



# DHEERAN IAS ACADEMY®

(Institute for UPSC,SSC,TNPSC, Banking Exams)

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### **CURRENT AFFAIRS**

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**Address**

**Head Office:** Dheeran IAS Academy, Raj Rathna Building, Lawley Road Bus Stop, Coimbatore -03.

**Branch Office:** 32/9, Velmurugan complex, Nachiyappa Street, Erode-01.



9337997597, 8178318007



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DHEERAN IAS ACADEMY

## HISTORY

### KARNAIL SINGH ISRU

#### In News:

- On this year's Independence Day, Punjab Chief Minister Bhagwant Mann commemorated the memory of the late activist **Karnail Singh Isru**.
- He **passed away on the same day in 1955**, while actively participating in the Goa Liberation Movement, a campaign dedicated to securing the state's integration into India.
- Isru, along with satyagrahis, **participated in a march from Pune to Goa in 1955** at a time when the state was under Portuguese colonial rule.

#### Analysis of Background:

##### Roles he played in India's freedom struggle:

- Isru's **unwavering dedication** to the cause of freedom was deeply influenced by his experiences in Punjab's struggle against colonial rule.
- He **aligned himself with the Communist Party of India (CPI)** and became a fervent advocate for liberating Goa from Portuguese colonial dominance. Embracing this mission, Isru became an integral part of a group of Satyagrahis—devotees of **Gandhian principles**—marching towards Goa.
- He paid the highest price while actively **engaged in the Goa Liberation Movement**, dedicating himself to the cause of securing the state's integration into India.
- Tragically, his life was cut short during a confrontation with Portuguese forces.

##### Who was Karnail Singh Isru's?

- Born on September 9, 1930, in **Chak village** (which is now located in Pakistan).
- Isru encountered the loss of his father during his early years and was subsequently nurtured by his mother.
- His upbringing was characterized by a profound commitment to justice and an intense yearning for freedom.
- Isru's admiration for national heroes **like Bhagat Singh and Udham Singh**, along with their dedication to the freedom movement, ignited a fire within him.
- His engagement with student unions and subsequent alignment with the CPI mirrored his unwavering commitment to the cause.

## Lasting impact on India's history

- Isru, in the company of fellow Satyagarhis, embarked on a journey toward Goa, guided by the leadership of Sahodrabai Rai.
- Their collective goal was to confront colonial rule and establish India's sovereignty within the region.
- His sacrifice and commitment to this cause serve as a reminder of the struggles and aspirations that surrounded the fight for India's freedom.
- Isru's **affiliation with the Communist Party of India (CPI)** demonstrated his commitment to social justice and the fight for India's independence.

## MEGALITHIC SITE

### In News:

- A recent **archaeological salvage excavation conducted by the State Archaeology Department at Nagaparamba, Kuttippuram village, near Tirunavaya, Kerala, has led to the discovery of a large number of megalithic hat stones.**
- These findings **provide valuable insights into the burial practices and culture of people who lived in the region over 2,000 years ago.**
- The presence of these megalithic structures highlights the need for preservation and recognition of the historic significance of Tirunavaya.

### Analysis of Background:

#### Megalithic Hat Stones:

- **Definition:** Hat stones, known as "Thoppikkallu" in Malayalam, are hemispherical laterite stones that were used as lids for burial urns during the megalithic period.
- **Archaeological Significance:** These hat stones are a crucial archaeological find as they provide insights into the burial rituals, customs, and beliefs of the ancient people.

#### Salvage Excavation and Discoveries

- **Archaeological Salvage Excavation:** The recent excavation was prompted by the discovery of a unique rock-cut laterite burial chamber during pipeline work in Nagaparamba.
- **Uncovered Relics:** The salvage excavation revealed a significant number of megalithic burial sites, earthen urns, and iron implements with distinct features.

- **Distinctive Rock-Cut Cave:** The architectural features of the rock-cut cave stand out, and the recovered pottery from the site differs from the usual urns found in such megalithic sites.
- **Special Ashes:** Among the artifacts recovered were ashes found in both the burial chamber and under the hat stones. The ashes are deemed to be of particular significance.

### Cultural Insights

- **Burial Practices:** The discovery of megalithic burial sites and unique artifacts sheds light on the burial practices and rituals of the people who lived in the region during the megalithic period.
- **Distinctive Urns:** The distinctive features of the urns recovered suggest variations in burial customs and cultural practices.

### Local Response and Heritage Status

- Many locals advocate for Tirunavaya to be recognized as a heritage village due to its historic significance. They urge the government to acknowledge the cultural importance of the region.

### Understanding Megaliths: Ancient Stone Structures in India

- Megaliths, large stones used to construct prehistoric structures and monuments, provide valuable insights into ancient civilizations and burial practices.
- These stones were either erected individually or in combination with others to create significant structures.
- They can be categorized into two main types: those used for burial purposes and those erected as commemorative memorials.

### Types of Megalithic Structures

- **Stone Circles (Cromlechs):** Circular arrangements of stones, often used as ceremonial or burial sites. The term "cromlech" is sometimes used, with variations in different languages.
- **Monoliths:** Single standing stones erected in prehistoric times, sometimes used as memorials or markers.

### Burial Sites

- **Dolmenoid Cists:** These are box-shaped stone burial chambers where a large capstone is placed on support stones, forming an enclosed chamber beneath. Often used for burials.
- **Cairn Circles:** Stone circles with defined peripheries, sometimes enclosing a central burial chamber. They are common burial sites.
- **Capstones:** Unique mushroom-shaped burial chambers, mainly found in Kerala, often used as tombs.

### Burial Containers

- **Terracotta Urns:** The urns or sarcophagi containing mortal remains were usually made of terracotta and placed within the burial chambers.

### Memorial Sites

- **Menhirs:** These are large single standing stones erected in prehistoric times. They are often used as memorials or markers.

### Chronology of Megaliths in India

- **Iron Age and Preceding Periods:** Most megalithic sites in India are attributed to the Iron Age, dating from 1500 BC to 500 BC. Some sites even predate the Iron Age, extending back to around 2000 BC.

### Distribution of Megaliths

- **Geographical Spread:** Megalithic sites are spread across the Indian subcontinent, with a concentration in Peninsular India.
- **States:** Notable states with numerous megalithic sites include Maharashtra (particularly in Vidarbha), Karnataka, Tamil Nadu, Kerala, Andhra Pradesh, and Telangana.

## MYLARA CULT

### In News:

- The recent discovery of two ancient sculptures in Basrur, near Kundapura, Udupi district, has provided significant evidence for the existence of the ancient Mylara cult in the coastal region.
- These sculptures, believed to date back to the 15th and 17th centuries A.D., shed light on the historical significance of the Mylara cult and its presence in the area.

## **Analysis of Background:**

### **The Discoveries**

#### **Mutilated Royal Hero Sculpture**

- Found in a well at Basrur, this sculpture depicts a royal hero seated on a horse, holding a sword and a bowl in his right and left hands respectively.
- The uniqueness of this sculpture lies in the sitting posture of the horse and the absence of Mylaladevi on the horse's back.
- It is believed to belong to the 15th century A.D. and was brought to the attention of historian T. Murugeshi by Pradeep Basrur.

#### **Mylara and Mylaladevi Sculpture**

- Another sculpture, in the form of a tiny stone tablet, was discovered in a water body or tank.
- This sculpture portrays Mylara and Mylaladevi sitting on an ornate horse, each holding swords in their right hands.
- The sculpture, showcasing side profiles of the figures, is associated with the 17th century A.D. and was found during dredging activities in a tank owned by Devananda Shetty of Halnad.

## **Historical and Cultural Significance**

### **Proof of Mylara Cult Existence**

- The discovery of these sculptures adds weight to the historical existence of the Mylara cult in the coastal region.
- **The representation of Mylara and Mylaladevi in these sculptures indicates the popularity and reverence for this cult during the respective time periods.**

### **Basrur's Historical Importance**

- Basrur, identified as a **historical trading city of the Medieval period, played host to various trading guilds such as Uhayadesi and Nanadesi.**
- These guilds actively engaged in trade, making Basrur a center for diverse cults, including the Mylara cult.



## The Mylara Cult

- The Mylara cult, also known as the Milara cult, is a **significant religious and cultural movement in Karnataka, India, rooted in the worship of the deity Mylaralinga or Milaralinga.**
- This syncretic cult combines elements of Hinduism and local folk traditions, holding deep spiritual and cultural importance for its followers.

## Historical Evolution

- The origins of the Mylara cult **can be traced back to the 12th century CE, associated with the revered Lingayat saint and philosopher Siddharama, also known as Siddharameshwara or Siddhalinga.**
- His teachings emphasized devotion to Lord Shiva and social equality, which laid the foundation for the Mylara cult's principles.

## Core Beliefs and Practices

- **Central Deity:** Mylaralinga is the central deity of the Mylara cult, often depicted as a unique fusion of a linga (symbolizing Lord Shiva) with a human face. This representation signifies the union of the formless divine and human experience.
- **Worship Rituals:** Devotees gather in Mylara temples to offer milk and other offerings to the deity. Rituals involve pouring milk over the linga and reciting hymns and devotional songs. The cult emphasizes personal experience and devotion.

## Cultural and Social Significance

- **Unity and Equality:** The teachings of Siddharama advocate social equality and unity among followers, transcending caste-based distinctions. The cult fosters a sense of inclusivity and harmony.
- **Cultural Legacy:** The Mylara cult contributes to Karnataka's cultural heritage through its music, poetry, and folklore. It has inspired various art forms, enriching the region's cultural tapestry.

## Festivals and Gatherings

- **Mylaralinga Jayanti:** The birth anniversary of Siddharama and the embodiment of Mylaralinga is celebrated as Mylaralinga Jayanti. Festivities include processions, cultural performances, and religious discourses.

## Contemporary Relevance

- **Spiritual and Cultural Resonance:** The Mylara cult continues to attract followers who value its spiritual teachings and cultural legacy. Its emphasis on social equality and the fusion of Hindu and folk traditions maintains its relevance.
- **Religious Centers:** Mylara temples and shrines across Karnataka serve as spiritual and cultural hubs, providing devotees with a space for worship and cultural expression.

## BIDRI WORK PAIR OF 'SURAHI'

### In News:

- PM Modi Gifts Bidri Work Pair Of 'Surahi' To South African President during 15<sup>th</sup> BRICS Summit

### Analysis of Background:

- Prime Minister Narendra Modi's **gesture of presenting a Bidri work pair of 'Surahi' to South African President Cyril Ramaphosa serves as a testament to India's rich artistic heritage and diplomatic finesse.**
- The intricate Bidri craft, originating from Bidar in Karnataka, holds profound cultural significance and reflects the synthesis of diverse artistic traditions.

### Cultural Diplomacy and Significance

- **Symbol of Heritage:** The presentation of Bidri craft signifies India's deep-rooted artistic heritage, showcasing the country's creative prowess and cultural diversity.
- **Bridging Cultures:** Gifting Bidriware fosters cultural exchange by sharing India's craftsmanship with the world, thus strengthening diplomatic ties and fostering mutual understanding.
- **Preservation and Promotion:** International recognition garnered through such exchanges contributes to the preservation of traditional crafts by creating demand and appreciation on a global stage.

### Dimensions of Bidri Craft's Promotion

- **Empowering Artisans:** Initiatives supporting Bidri artisans ensure the continuity of this heritage craft, providing livelihood opportunities and safeguarding traditional skills.

- **Global Exposure:** Such diplomatic gestures amplify the reach of Bidriware, making it known to a broader international audience and garnering appreciation for its intricate artistry.
- **Cultural Identity:** Bidri craft encapsulates India's historical narratives and artistic genius, acting as a cultural ambassador that transcends borders.

### Origins and Techniques

- Bidri craft **originated around the 14th century during the Bahmani Sultanate's reign in Bidar.**
- It is the **result of the fusion of Persian and local Indian artistic traditions.**
- The distinctive dark hue of Bidriware **comes from a special alloy of zinc, copper, and traces of other metals.**
- The intricate patterns are etched onto the metal surface using chisels and then inlaid with pure silver or gold wires.
- The alloy is then oxidized to achieve the characteristic black color, creating a striking contrast with the silver or gold designs.

### Crafting Process

- **Design:** Master artisans sketch intricate designs that blend traditional motifs, geometric patterns, and intricate calligraphy.
- **Molding:** The design is carefully traced or embossed onto the alloy surface.
- **Engraving:** Expert craftsmen use chisels and hammers to engrave the intricate patterns.
- **Inlay:** Thin silver or gold wires are meticulously hammered into the engraved lines, creating a seamless fusion of metal and design.
- **Oxidization:** The object is buried in a mixture of soil and ammonium chloride, resulting in the blackened background and highlighting the inlaid designs.
- **Buffing and Polishing:** The excess oxide is rubbed off, revealing the silver or gold inlays in stark contrast.
- **Final Touches:** The object is polished to a smooth finish, enhancing its visual appeal and tactile experience.

## SEETHAKALI

### In News:

T N Shajimon wins Kerala Folklore Akademi award for reviving 'Seethakali', a female-oriented Dalit narrative of the Ramayana.

### Analysis of Background:

#### Origin and History

- Seethakali, a **vibrant and flamboyant folk art**, traces its roots back to Perinad in Kollam district, Kerala.
- This captivating art form **emerged around 150 years ago**, initially performed by the **Vedar and Pulayar communities**.

#### Narrative Basis

- Based on episodes from the epic Ramayana, Seethakali breathes life into mythical characters such as Rama, Seetha, Ravana, and Hanuman.
- The performances vividly depict Seetha's journey, from accompanying Rama to the woods to her ascent to the heavens.

#### Festival Tradition

- In its early days, Seethakali **was an integral part of the harvest festival, Onam**.
- From the Atham star until the 28th day following Onam, performers from subaltern communities would travel from house to house, sharing the enchantment of this art.

#### Instruments and Attire

- **Natural materials like bamboo and palm leaves find artistic expression in Seethakali**.
- The costumes and makeup are strikingly vibrant; characters like Rama and Laxmana are adorned in green, a color symbolic of gods and goddesses in Kathakali.

#### Captivating Elements

- Seethakali performances captivate with their dynamic music, traditional instruments, and spontaneous rhythmic movements.
- The incorporation of orally transmitted folk songs passed down through generations adds depth to the experience.

## Revival Efforts

- **Perinad Seethakali Sangham is the sole registered Seethakali performing group in Kerala.**
- In 2018, it gained affiliation with the Kerala Folklore Akademi, a crucial step in reviving this once nearly lost art form.

## GOND PAINTING

### In News:

- During the 15th BRICS summit in South Africa, Prime Minister Narendra Modi presented unique gifts to various leaders from participating nations.
- These thoughtful gifts showcase India's rich cultural heritage and artistic prowess.

### Analysis of Background:

#### Gift to South African President Cyril Ramaphosa

- **Prime Minister Modi gifted a Bidri work Pair of Surahi to President Ramaphosa.**
- The Bidri work, originating in the Bidar region and dating back 500 years, is an Indian innovation inspired by Persian art.
- The Pair of Surahi is adorned with intricate patterns casted on the surface and inlaid with pure Silver wire.
- **The process, known as "nakkashi," involves transferring patterns from paper onto silver sheets.**
- This craft, requiring precision and skill, is practiced in various parts of India, notably in Karnataka.

#### Gift to First Lady of South Africa Tshepo Motsepe

- PM Modi presented a Naga shawl for Tshepo Motsepe, the First Lady of South Africa.
- This shawl is a **splendid example of textile art, woven for centuries by the tribes in Nagaland.**
- **Crafted from locally sourced materials** such as cotton, silk, and wool, the shawl boasts geometric and symbolic designs.
- These designs are deeply rooted in the tribe's myths, legends, and beliefs, imbuing them with special meanings and significance.

## Gift to Brazilian President Luiz Inácio Lula da Silva

- To Brazilian President Lula da Silva, PM Modi gifted a Gond painting.
- The Gond painting is a revered tribal art form originating in Madhya Pradesh.
- The intricate paintings, created using dots and lines, adorn the walls and floors of Gond households.
- Natural colors and materials like charcoal, plant sap, and leaves are used to create these exquisite artworks.
- **The term "Gond" is derived from the Dravidian expression "Kond," which means "green mountain."**

## Gond Painting: Tradition, Technique, and Significance

- Gond painting is a traditional form of tribal art that originates from the Gond communities of central India.
- **The Gonds are one of the largest Adivasi (indigenous) communities in India and are known for their rich cultural heritage,** which includes their unique style of painting.
- Gond paintings are characterized by intricate and vibrant patterns, depicting the connection between humans, nature, and the spiritual world.

## History and Evolution

- Gond painting has a long history, deeply rooted in the Gond culture.
- Traditionally, these paintings were created as a form of expression for various rituals, festivals, and celebrations.
- Historically, Gond artists used natural colors derived from materials like plant sap, charcoal, and cow dung.
- Over time, these paintings have evolved to include contemporary themes while retaining their distinctive style.

## Themes and Motifs

Gond paintings are known for their distinctive patterns and motifs. Some common themes and motifs in Gond paintings include:

- **Nature:** Gond artists often depict elements of nature such as trees, animals (elephants, birds, and more), and rivers. These elements are often interconnected, reflecting the community's close relationship with the natural world.

- **Mythology and Folklore:** Gond paintings frequently feature characters from local myths, legends, and folktales. These stories are passed down through generations and are visualized in the artworks.
- **Rituals and Celebrations:** Many Gond paintings are created in connection with various rituals and celebrations, illustrating the significance of these events in the community's life.
- **Spiritual and Mystical Elements:** The spiritual beliefs of the Gond people are also depicted in their art. Symbolic representations of gods, goddesses, and other spiritual beings are common in Gond paintings.
- **Life and Community:** Gond paintings often depict scenes from daily life within the community, showcasing activities like farming, dancing, and social gatherings.

### Techniques and Process

Gond paintings are traditionally created on walls, floors, and other surfaces within the Gond households. However, with changing times, artists have adapted to using paper, canvas, and other modern mediums. The process of creating a Gond painting involves the following steps:

- **Outline:** The artist begins by creating the basic outline of the subject using a fine-tipped brush or pen.
- **Filling:** Intricate patterns and motifs are filled in using vivid and contrasting colors. Traditionally, natural colors were used, but contemporary artists also use acrylic paints.
- **Dot Work:** Gond paintings are famous for their dot work, where fine dots are used to create intricate designs and textures.
- **Detailing:** The painting is then detailed with finer lines and additional decorations, enhancing its visual appeal.
- **Symbolism:** Each element in the painting holds symbolic significance, conveying cultural and spiritual messages.

### Significance and Contemporary Adaptations

- Gond painting serves not only as a form of artistic expression but also as a cultural repository of the Gond community.
- It connects the past with the present and provides a visual representation of their beliefs, traditions, and way of life.

- With the emergence of the global art market, Gond paintings have gained recognition on a wider scale, leading to collaborations with contemporary artists, art institutions, and exhibitions.

## GEOGRAPHY

### SLOVENIA

#### In News:

The ongoing severe floods in Slovenia, which are described as the worst natural disaster the country has experienced since gaining independence in 1991.

#### Analysis of Background:

- The ongoing floods in Slovenia, occurring in August 2023, have been declared as the worst natural disaster the country has faced since gaining independence in 1991.
- Prime Minister Robert Golob emphasized the severity of the floods, surpassing even the destructive incidents of 1998 and 2004.

#### Magnitude of the Disaster

- Slovenia witnessed an extraordinary **rainfall of over 200 millimeters within a span of 12 hours** from August 3-4, 2023, a record-breaking event noted by meteorologist Brane Gregorcic.
- The torrential rains led to flooding that affected approximately two-thirds of the country, leaving several areas cut off and necessitating evacuations.
- The floodwaters caused **major roads and rail lines to be closed**, hampering transportation and isolating regions.

#### Response and Action Taken

- Key government officials, including the Minister of Defence, Minister of the Interior, Commander of Civil Protection, and hydrologist, convened to address the situation.
- **Slovenia sought assistance through the EU Civil Protection Mechanism**, collaborating with neighboring countries for support and aid.

#### Impact and Causes

- Experts attribute the extreme weather conditions and resulting floods, at least in part, to climate change and its effects.



- The estimated damage caused by these floods, the worst in the country's history, amounts to around €500 million.

### Legislative Response and Amendments

- In response to the calamity, the **Slovenian government swiftly amended the Natural Disaster Recovery Act** to facilitate relief and recovery.
- The amendment allows for the allocation of advanced funds to affected municipalities, up to 20% of the preliminary assessed damages, for emergency remedial action.

### About Slovenia



- Slovenia is a European country **located in Central Europe, bordered by Italy to the west, Austria to the north, Hungary to the northeast, and Croatia to the south and southeast.**
- It gained **independence from Yugoslavia in 1991** and has since developed into a prosperous and diverse nation.

### Geography and Climate

- Slovenia's diverse landscape includes the Julian Alps, forests, lakes, and a **small coastline along the Adriatic Sea.**
- The climate varies from Alpine in the north to Mediterranean on the coast, with continental influences in the interior.

### Economy and Development

- Slovenia has a well-developed economy with a strong focus on **industry, services, and tourism.**
- The country is **known for its high-quality wines,** agriculture, and traditional crafts.

- **Membership in the European Union and the Eurozone** has contributed to its economic growth and stability.

### **Culture and Heritage**

- Slovenia has a rich cultural heritage, influenced by its history and geographical location.
- **The capital city, Ljubljana**, boasts a charming old town, historic architecture, and vibrant cultural scene.
- Traditional festivals, folk music, and dance are an integral part of Slovenian culture.

### **Natural Disasters and Challenges**

- Slovenia is vulnerable to natural disasters such as floods, earthquakes, and landslides due to its varied topography.
- The recent severe floods in August 2023 have been described as the worst disaster since the country's independence.

### **Environmental Concerns and Climate Change**

- Climate change is contributing to more frequent and severe extreme weather events, including heavy rainfall and flooding.
- Slovenia, like many other countries, is grappling with the challenges posed by climate change and its impact on natural disasters.

### **International Cooperation and Support**

- Slovenia has engaged with the EU Civil Protection Mechanism and sought assistance from neighboring countries to cope with the devastating floods.
- The country's response reflects the importance of international collaboration in managing and mitigating the effects of disasters.

## **CROATIA**

### **In News:**

An agreement between Ukraine and Croatia regarding the export of Ukrainian grain through Croatian ports.

### **Analysis of Background:**

- The announcement of an **agreement between Ukraine and Croatia to allow Ukrainian grain exports via Croatian ports** seemed promising, but a closer examination reveals **significant logistical challenges and raises questions about the extent of its impact.**
- The agreement was seen as a response to Russia's war on Ukraine and the blockade of Ukraine's Black Sea ports.

## Announcement and Purpose

- Ukrainian Foreign Minister Dmytro Kuleba announced the agreement after a meeting with Croatian counterpart Gordan Grlic Radman in Kyiv.
- The agreement aimed **to address the threat to global food security caused by Russia's actions** and symbolically contribute to unblocking exports.

## Logistical Hurdles

- Ukrainian grain can be shipped through Ukrainian ports on the Danube (Izmail and Reni) or via the Black Sea to the Romanian port of Constanta.
- Shipping through the Black Sea to Constanta would involve **transporting the grain 1,000 kilometers upstream to the Croatian Danube river port of Vukovar.**
- **Vukovar's limited capacity and one small silo raise doubts** about its role in handling the volume of Ukrainian grain.

## Transportation Challenges

- Transporting the grain from Vukovar to Adriatic ports like Rijeka, Zadar, or Split presents challenges.
- Large trucks can carry only around 45 tons of freight, requiring over 22,000 trucks for one million tons of grain.
- Croatia's road and rail infrastructure may struggle to handle such traffic volumes, with the rail network being slow and poorly maintained.

## Financial Implications

- The financial benefits of exporting grain through Croatia for Ukraine are limited.
- Global market prices for wheat and maize (€350 and €260 per ton, respectively) yield a profit of approximately €300 million for one million tons of grain.
- Profits would be distributed among various parties involved in the transport chain.

## Symbolic Support and Military Aid

- The grain agreement is seen as a **symbolic gesture of support from Croatia to Ukraine.**
- Similar to other aid, such as the donation of helicopters, Croatia's support is characterized by its symbolic nature.
- Croatia's military aid to Ukraine is considered relatively insignificant in the context of the war.

## About Croatia



- **Croatia, a country located in Southeastern Europe**, boasts a rich history, diverse culture, and stunning natural landscapes.
- Its **strategic position along the Adriatic Sea** and its European integration have contributed to its development and prominence on the global stage.

## Geographical Landscape

- Croatia is situated in the Balkan Peninsula, bordered by Slovenia to the northwest, Hungary to the northeast, Serbia to the east, Bosnia and Herzegovina to the southeast, and Montenegro to the southeast.
- The country has a diverse geography, encompassing coastal areas along the Adriatic Sea, picturesque islands, lush valleys, and mountainous regions.

## Adriatic Coastline and Islands

- Croatia's Adriatic coastline stretches over 1,700 kilometers, offering picturesque beaches, charming fishing villages, and historical cities.
- The country boasts over a thousand islands, such as Hvar, Korčula, and Brač, each with its unique culture, traditions, and landscapes.

## Historical Significance

- Croatia's history dates back to ancient times, with influences from Illyrians, Romans, Byzantines, and more.

- The medieval Kingdom of Croatia was part of the Austro-Hungarian Empire and later the Kingdom of Yugoslavia.
- **Croatia declared independence in 1991**, leading to the **Croatian War of Independence**.

### **Cultural Heritage**

- Croatian culture is a blend of historical influences, including Slavic, Mediterranean, and Central European elements.
- The country is renowned for its arts, literature, music, and traditional crafts such as ceramics and lacework.
- Festivals like the **Dubrovnik Summer Festival** showcase the country's vibrant cultural scene.

### **Tourism and Natural Beauty**

- Croatia's natural beauty, including its coastline, islands, and national parks like Plitvice Lakes, attracts millions of tourists annually.
- **The historic city of Dubrovnik**, with its well-preserved walls and architecture, is a **UNESCO World Heritage Site**.

### **European Integration**

- **Croatia joined the European Union (EU) in 2013**, marking a significant milestone in its modern history.
- EU membership has brought economic benefits, improved infrastructure, and opportunities for cultural exchange and collaboration.

### **Economic Progress**

- Croatia's economy is characterized by tourism, manufacturing, and services.
- Agriculture, particularly olive oil and wine production, is also important.
- Challenges such as unemployment and regional disparities persist, but EU membership has aided economic growth.

### **Croatian Cuisine**

- Croatian cuisine reflects its diverse cultural influences, with Mediterranean and Eastern European flavors.
- Seafood dishes, traditional stews like "pašticada," and pastries like "štrukli" are popular.

- Wine production, especially in regions like Istria and Dalmatia, is gaining international recognition.

## BLACK SEA

### In News:

Recent developments in the ongoing conflict between Ukraine and Russia in the Black Sea region.

### Analysis of Background:

- Ukraine's sea drones struck a major **Russian port, Novorossiysk**.
- The attack damaged a **Russian warship, Olenegorsky Gornyak**, impacting its combat capabilities.
- This marks the first time a commercial Russian port has been targeted in the ongoing conflict.
- Novorossiysk is a significant Black Sea port with naval base, shipbuilding yards, and oil terminal.
- The attack disrupted maritime traffic temporarily, highlighting Kyiv's growing capabilities.

### Escalation of Conflict in the Black Sea

- The Black Sea region has become a crucial battleground in the ongoing conflict.
- Fighting intensifies after Moscow's withdrawal from a grain export deal through the waterway.
- Recent attacks include damaging Russian grain facilities and targeting patrol vessels.
- Change in dynamics suggests Ukraine's attempt to challenge Russia's naval control.

### Role of Drones

- Mykhailo Podolyak, advisor to the Ukrainian President, emphasizes the impact of drones in changing the conflict dynamics.
- Drones are altering the rules of engagement and diminishing the value of the Russian fleet.
- Drone technology provides Ukraine with a new strategy to challenge Russian naval dominance.

### Impact of Grain Deal Termination

- Termination of the grain export deal gives Ukraine more flexibility to take aggressive actions.

- Ships carrying food from Ukrainian ports were previously given safe passage, but this constraint is now lifted.
- Military analyst Roman Svytan predicts an increase in attacks on Russian ships due to this change.

### **Russia's Naval Control**

- Russia's Navy has controlled the seas in the conflict, launching cruise missiles and blockading the Ukrainian coast.
- Frequent missile attacks on ports and cities have been reported.
- Mining the Black Sea has made passage dangerous for other vessels.

### **Shifting Dynamics**

- Ukraine's actions, including the recent drone strike and attacks on Russian vessels, signal an attempt to shift the naval dynamics.
- It indicates a strategic move to challenge Russia's dominance in the Black Sea region.
- The conflict's nature and intensity are evolving as both sides adapt to changing strategies.

### **Geopolitical Implications**

- Developments in the Black Sea conflict have broader geopolitical implications.
- The conflict reflects tensions between Ukraine and Russia, impacting regional stability.

### **About Black Sea**

- The Black Sea is a significant geographical and geopolitical entity located in **southeastern Europe**, bordered by six countries: **Bulgaria, Romania, Ukraine, Russia, Georgia, and Turkey**.
- It is characterized by its historical, economic, and strategic importance in the region.

### **Geographical Features**

- The Black Sea is **situated between Europe and Asia**, with an area of approximately 436,000 square kilometers.
- **It is connected to the Mediterranean Sea through the Bosphorus Strait, the Sea of Marmara, and the Dardanelles Strait.**
- The Black Sea is known for its unique hydrographic properties.
- It is characterized by its **limited exchange of water with the Mediterranean**, which results in a lower oxygen content in deeper layers, creating anoxic conditions.
- The coastlines of the Black Sea are dotted with numerous ports and cities of historical significance, including **Odessa, Istanbul, Varna, and Constanta**.

### **Economic Importance**

- The Black Sea has historically been a crucial trade route connecting Europe with Asia.
- It facilitates the movement of goods through major ports, contributing to regional and international trade.
- The Black Sea is believed to possess significant energy resources, including oil and natural gas reserves beneath its seabed.
- Exploration and exploitation of these resources are of economic importance to the countries bordering the sea.

### **Geopolitical Significance**

- The Black Sea region has witnessed the convergence of various civilizations and cultures throughout history. It has been a strategic crossroads for trade, migration, and conflicts.
- The Black Sea has been a focal point for geopolitical tensions, particularly due to Russia's military presence and assertive actions in the region.
- Control over maritime access and security has been a subject of concern for neighboring countries and international actors.

### **Environmental and Ecological Considerations**

- The Black Sea supports a diverse range of marine species, including fish and marine mammals. However, overfishing and pollution have posed threats to its ecological balance.
- Pollution from agricultural runoff, industrial activities, and untreated sewage has led to environmental degradation, including eutrophication and oxygen depletion.

### **Current Geopolitical Dynamics**

- The Black Sea has been a site of geopolitical tensions, particularly between Russia and Ukraine.
- The annexation of Crimea by Russia in 2014 escalated the conflict and led to concerns over security and territorial integrity.
- The control of naval access and trade routes in the Black Sea has implications for regional stability and the balance of power among countries in the region.
- International agreements such as the Montreux Convention govern the passage of ships through the Bosphorus and Dardanelles Straits, regulating the naval presence of non-Black Sea states in the region.





## SOLAR FLARES

### In News:

A significant solar event that occurred on Monday, August 7, resulting in the disruption of radio and navigation signals across North America.

### Analysis of Background:

- A **powerful solar flare disrupted radio and navigation signals across North America** on August 7.
- Space weather forecasters issued warnings due to **energetic particles hitting Earth.**

### Solar Flare Classification and Cycle

- The flare was classified as an **5**, the **20th X flare in the current 11-year solar cycle.**
- Solar flares are **energetic radiation bursts from magnetically dense sunspot regions.**
- X flares are the most potent solar flare category.
- The solar cycle is set to reach its maximum next year.

### Solar Flare Mechanics

- Flares **originate from cool, magnetically dense sunspots.**
- Photons from flares reach Earth in eight minutes at the speed of light.
- Flare radiation interacts with particles in Earth's ionosphere (altitude: 50-400 miles).
- Interaction supercharges ionosphere particles, affecting radio and satellite signals.

### Impact of the X1.5 Flare

- The X1.5 Flare caused an **R3 (strong) radio blackout** event on the daylit side of Earth.

- Affected regions included most of the **US, Canada, and the Pacific Ocean.**
- Frequencies below 5 MHz were most affected, degrading navigation signals.

### **Sunspot Activity and Recent Flares**

- The flare erupted from the largest, most active sunspot group visible on the sun's disk.
- Occurred just two days after a somewhat weaker X flare on August 5.
- **Multiple moderate-class flares were also observed recently,** with three in the past 24 hours.

### **Solar Radiation Storm Warning**

- The Met Office warned of a mild solar radiation storm due to charged solar particles.
- Solar flares contributed to the presence of charged particles in Earth's atmosphere.
- Potential radiation hazard to astronauts, aircraft passengers, crew, and satellites.
- Current event classified as a mild category 1, likely harmless.

### **Future Solar Flare Predictions**

- The Met Office predicts potential strong flares as the sunspot cluster remains visible.
- The threatening region is expected to move behind the sun's edge in the next two days.

### **Coronal Mass Ejections (CMEs) and Geomagnetic Storms**

- Experts anticipate the arrival of two CMEs, magnetized gas clouds escaping from the sun.
- CMEs can cause geomagnetic storms by interacting with Earth's magnetic field.
- Geomagnetic storms lead to beautiful aurora displays and atmospheric swelling.
- Severe storms can disrupt power grids and telecommunication networks.

### **About Solar Flares**

- Solar flares are intense bursts of energy and radiation originating from the sun's surface.
- These explosions release a tremendous amount of electromagnetic radiation, including X-rays and ultraviolet light.

### **Sunspots and Magnetic Activity**

- Solar flares typically **originate from magnetically active regions on the sun's surface** known as sunspots.
- Sunspots are cooler and more magnetically dense areas compared to their surroundings.

## **Energetic Particle Acceleration**

- Flares result from the **sudden release of magnetic energy stored in the sunspot's magnetic fields.**
- **Magnetic reconnection**, a process where magnetic fields rearrange and realign, accelerates charged particles.

## **Classification of Solar Flares**

- Solar flares are **categorized based on their X-ray intensity**, measured in X-ray flux units (Watts per square meter).
- The classification scale includes **A, B, C, M, and X classes, with X being the most powerful.**

## **Impact and Effects**

- Solar flares can cause radio and communication disruptions on Earth due to ionospheric disturbances.
- High-energy particles from flares can interfere with satellite operations and damage sensitive electronics.

## **Solar Flare Prediction and Monitoring**

- Space weather forecasters use satellite observations to monitor sunspots and solar activity.
- Prediction models help estimate the potential impact of flares on Earth's technology and infrastructure.

## **Interaction with Earth's Atmosphere**

- Flare radiation reaches Earth in about eight minutes, traveling at the speed of light.
- Radiation interacts with particles in Earth's ionosphere, leading to ionization and disturbances.

## **Auroras and Geomagnetic Storms**

- Geomagnetic storms can result from interactions between solar flares and Earth's magnetic field.
- These storms lead to stunning aurora displays at high latitudes.

## **Space Weather Hazards**

- Severe solar flares and associated geomagnetic storms **can disrupt power grids and communication systems.**
- Astronauts in space or passengers on polar flights could be exposed to increased radiation levels.

## Preparedness and Mitigation

- Organizations like the **National Oceanic and Atmospheric Administration (NOAA)** provide space weather alerts.
- Measures such as adjusting satellite operations and power grid management help mitigate potential impacts.

## Solar Flares and Technological Society

- Solar flare research and monitoring play a crucial role in protecting modern technology-dependent societies.
- Continued study helps us understand solar dynamics and develop strategies to minimize potential disruptions.

## PERSEID METEOR

### Context

Perseid meteor shower, a celestial event that captures the attention of skywatchers and astronomers alike.

### Analysis of Background:

- The **NASA All Sky Fireball Network** is currently detecting the initial meteors of this year's **Perseid meteor shower**.
- The peak of the meteor shower is **expected on the night of August 12** as Earth passes through the densest debris of comet Swift-Tuttle's trails

### Features of the Perseid Meteor Shower

- Considered one of the most impressive meteor showers of the year due to its high meteor rates and favorable late-summer temperatures.
- Unlike the previous year's shower, which coincided with a full moon, this year's moon will be a waning crescent, allowing even fainter meteors to be visible.

### Expected Meteor Sightings

- Observers in the United States can anticipate seeing approximately 40 Perseids per hour just before dawn on peak nights.
- Ideal conditions include being in rural areas, far from the light pollution of cities and suburbs.

- Suburban environments experience significantly reduced meteor rates, with an expectation of 10 or fewer meteors per hour.

### **Best Viewing Locations and Technique**

- The Perseid meteor shower is **most visible in the Northern Hemisphere**.
- Clear skies, darkness, and some patience are the only requirements for witnessing the celestial display.
- Meteors can be observed across the entire sky, so there is no need to focus on a specific direction.

### **Radiant Point and Meteor Origin**

- The meteors of the Perseid shower **appear to radiate from a point in the constellation Perseus**.
- Each meteor within the shower follows a similar orbit around this radiant point.
- The name of a meteor shower is derived from the location of its radiant point.

### **Interesting Trivia**

- The Perseid meteor shower holds the unique distinction of delaying a Space Shuttle launch.
- In 1993, the NASA STS-51 launch was postponed due to concerns about the heavy activity forecast for the Perseid meteor shower.
- The increased risk of spacecraft damage from debris prompted the precautionary delay of the launch.

### **Meteor Rates and Visibility**

- The Perseid meteor shower is known for its high meteor rates, often producing around 60 to 100 meteors per hour during its peak.
- However, actual meteor rates can vary based on factors such as the time of night, the observer's location, and atmospheric conditions.
- To observe the shower, it's best to find a location away from city lights to reduce light pollution and enhance visibility.

### **Moon's Influence**

- The brightness of the moon can significantly impact the visibility of the meteor shower.
- A bright moon can wash out the fainter meteors, making them harder to see.

- In contrast, a dim moon or absence of the moon (as a waning crescent) enhances visibility by allowing even the fainter meteors to be observed.

### **Historical Anecdote**

- The Perseid meteor shower holds the unique distinction of delaying a Space Shuttle launch.
- In 1993, NASA's STS-51 launch was postponed due to concerns about the intense Perseid meteor shower activity.
- The decision was made to mitigate the risk of the shuttle encountering debris in Earth's orbit.

## **HAWAII**

### **In News:**

The devastating wildfires that have been affecting the US state of Hawaii, particularly the island of Maui, since Tuesday, August 9th.

### **Analysis of Background:**

- **Large-scale wildfires** have been **sweeping the US state of Hawaii** since Tuesday (August 9).
- The death toll has reached 55 as of Friday.
- Widespread destruction includes downed power lines and over 675 acres of burned land.
- The **town of Lahaina has suffered near-total damage**, with State Governor Josh Green comparing it to a bombed area.

### **Factors Contributing to the Extent of Fires**

- Dry weather and strong winds from a passing hurricane played a significant role in the blaze.
- Maui County's hazard mitigation plan, last updated in 2020, had identified Lahaina as at risk due to frequent ignitions and vulnerable populations.
- **The region also has a high rate of non-English speakers, potentially limiting effective response during hazards.**
- The emergency warning sirens were not triggered, and mobile alerts were used instead.

## Historical Significance of Maui and Lahaina

- Lahaina was the one-time capital of the former Hawaiian kingdom (1820-1845).
- It was the royal residence of King Kamehameha, who unified Hawaii.
- Important historical sites like the **Wainee Church and Lahainaluna High School** connect to Hawaiian heritage.
- The town's connection to Native Hawaiians and its role in drafting the Hawaiian Kingdom's Constitution.

## Causes of Devastating Fires

- **"Flash droughts" caused by rapid drying of atmospheric moisture** aided fire spread.
- Around **83% of the island was abnormally dry** or in moderate to severe drought conditions.
- Invasive, fire-prone grass species have taken over former pineapple and sugar cane lands.
- Unusually strong trade winds from Hurricane Dora's impact contributed to fire conditions.
- Climate change's role in increasing forest fires globally and in Hawaii due to rising temperatures.

## Implications and Ongoing Investigation

- Human factors in evacuation and response are under investigation.
- Climate-related factors, including flash droughts and strong winds, are being discussed.
- Climate change's impact on fire frequency and severity in Hawaii.
- Unanticipated effects of distant hurricanes, like Hurricane Dora's influence on fire occurrence.

## About Hawaii:

- Hawaii is a state **located in the Pacific Ocean**, comprising **an archipelago of islands**.
- It is **situated in the central Pacific region**, southwest of the continental United States.
- The state is known for its isolated and unique geographical position.

### Islands and Geography

- Hawaii consists of eight main islands: **Hawaii (also known as the Big Island), Maui, Oahu, Kauai, Molokai, Lanai, Niihau, and Kahoolawe.**

Each island has its distinct geography, landscapes, and natural features



### Cultural and Historical Significance

- The islands were originally settled by Polynesians, and their cultural heritage is deeply rooted in the native Hawaiian traditions.
- The arrival of Western explorers, missionaries, and eventual colonization significantly impacted Hawaiian society and culture.
- Hawaii's historical significance includes being the royal capital of the Kingdom of Hawaii before it became a U.S. territory.

### Statehood and Government

- Hawaii became the **50th state of the United States** on August 21, 1959.
- It operates under a state government structure, with an elected governor and state legislature.
- **The state capital is Honolulu, located on the island of Oahu.**

### Economy and Industries

- Hawaii has a diverse economy that includes tourism, agriculture, defense, and technology sectors.
- Tourism is a major industry, attracting millions of visitors annually to enjoy its beaches, landscapes, and cultural attractions.
- Agriculture, including the cultivation of crops like sugarcane, pineapples (historically), and coffee, has played a significant role.



### **Natural Beauty and Biodiversity**

- Hawaii is renowned for its stunning natural beauty, characterized by lush rainforests, volcanic landscapes, and picturesque beaches.
- The islands are home to unique and diverse ecosystems, with numerous endemic species of plants and animals.

### **Volcanic Activity and Landforms**

- **The Hawaiian islands are of volcanic origin**, with active and dormant volcanoes shaping the landscapes.
- **Kilauea and Mauna Loa on the Big Island are among the world's most active volcanoes**, contributing to the islands' dynamic geology.

### **Cultural Diversity and Heritage**

- Hawaii's population is ethnically and culturally diverse, influenced by Polynesian, Asian, European, and American cultures.
- Native Hawaiian culture and traditions remain an integral part of the state's identity.

### **Languages and Society**

- English is the primary language, but Hawaiian is also spoken and recognized.
- Hawaii's society reflects a blend of cultural practices, customs, and values from its multi-ethnic population.

### **Environmental Challenges**

- Hawaii faces environmental challenges, including habitat loss, invasive species, and climate change impacts such as rising sea levels and increased frequency of extreme weather events.

## **IMPACT OF ENSO ON INDIA**

### **In News:**

The complex interplay between the **El Nino Southern Oscillation (ENSO)**, global warming, and their impact on monsoon rainfall patterns in different regions of India.

### **Analysis of Background:**

- The **El Nino Southern Oscillation (ENSO)** is a climate phenomenon characterized by sea surface temperature changes in the equatorial Pacific Ocean.

- **ENSO affects monsoon rainfall patterns in India**, with varying impacts across different regions.
- **El Nino (warming phase) suppresses monsoon rainfall, while La Nina (cooling phase) enhances it.**

### **Recent Research Findings**

- A research paper published in **Nature Scientific Reports** in August 2023 **reveals the changing impact of ENSO on India's monsoon rainfall.**
- The impact varies across regions: greater in northern, lesser in central, and relatively constant in southern India.
- Global warming contributes to this phenomenon.

### **El Nino and Monsoon Suppression**

- El Nino causes subsidence of air, suppressing monsoon rainfall.
- ENSO-related events were announced by World Meteorological Organization (WMO) and India Meteorological Department (IMD).
- A recent La Nina phenomenon ended in March 2023.

### **Local Factors in Monsoon Rainfall**

- **Monsoon rainfall is influenced by ENSO** and local factors like monsoon trough strength and frequency of low-pressure areas.
- Monsoon depressions play a crucial role in causing rainfall during the monsoons.

### **Changing ENSO Impact**

- Analysis of data from 1901 to 2018 reveals evolving trends.
- Strength of monsoon trough and low-pressure areas declining across India.
- El Nino forming later in the year, impacting monsoon rainfall delay.

### **Compensation Effect and Weakening Relationship**

- Warming of the Arabian Sea due to global warming sends moisture to central India.
- The compensation is leading to a weakening of the relationship between monsoon rainfall over central India and El Nino.

### **Shift in Monsoon Depressions**

- Monsoon depressions moving southward in recent decades.
- This has reduced their influence over northern India and has increased the influence of El Nino on the region.
- Southward movement reasons were currently unknown.

### **Historical Trends and Uncertain Future**

- The relationship between ENSO and monsoon rainfall strengthens till 1940, remains stable till 1980, and weakens thereafter.
- Future changes are uncertain due to evolving ENSO patterns and global warming effects.

### **Incorporating Differential Impact for Improved Forecasting**

- There is a need to incorporate varying El Nino impact into climate models for better regional rainfall forecasts.
- There is a shifting of the ENSO onset region from the extreme eastern Pacific to the east-central Pacific Ocean.
- The differential impact of El Nino has to be incorporated into climate modelling for accurate regional forecasts during ENSO events.

### **About El Nino Southern Oscillation**

- El Nino Southern Oscillation (ENSO) is a **complex and recurring climate phenomenon** that involves **interactions between the ocean and the atmosphere**.
- It has significant **impacts on weather patterns, sea surface temperatures, and ecosystems across the globe**, particularly in the Pacific Ocean region and beyond.

### **Key Components of ENSO**

#### **El Nino Phase: Warm Anomaly**

- El Nino refers to the **warming of sea surface temperatures in the central and eastern equatorial Pacific Ocean**.
- This phase disrupts the normal atmospheric circulation patterns, leading to far-reaching effects on global climate.
- Warmer waters in the Pacific lead to **changes in wind patterns, rainfall distribution, and ocean currents**.

### **La Nina Phase: Cool Anomaly**

- La Nina is the opposite phase of ENSO, characterized by **cooler-than-average sea surface temperatures in the central and eastern equatorial Pacific**.
- It triggers distinct atmospheric patterns, including increased trade winds and upwelling of cold oceanic waters along the coasts of South America.

### **ENSO Cycle**

- The ENSO cycle **typically oscillates between El Nino and La Nina phases every 2 to 7 years**, although the intervals can vary.
- The transitions between these phases are often associated with shifts in atmospheric pressure systems, wind patterns, and oceanic circulation.

### **Impacts of ENSO**

#### **Global Weather Patterns**

- ENSO influences weather patterns worldwide, affecting regions far from the Pacific Ocean.
- El Nino can lead to droughts, heatwaves, and reduced rainfall in some areas, while causing heavy rains, flooding, and increased cyclone activity in others.
- La Nina, on the other hand, can result in increased rainfall, cooler temperatures, and heightened hurricane activity.

#### **Agriculture and Food Security**

- ENSO-induced droughts or excessive rainfall can impact crop yields, leading to agricultural losses and affecting food production.
- Crop failures and disrupted growing seasons can threaten food security in affected regions.

#### **Economic and Environmental Consequences**

- ENSO-related weather extremes can lead to economic losses due to damaged infrastructure, reduced agricultural output, and increased disaster management costs.
- Ecosystems, fisheries, and marine life can also be disrupted by changes in ocean temperatures and currents.

## Prediction and Monitoring

- Scientists and meteorological agencies closely monitor ENSO indicators, such as sea surface temperatures and atmospheric pressure patterns, to predict its phases.
- Advanced forecasting models help anticipate potential impacts on weather and climate, allowing for preparedness and mitigation efforts.

## SPONGE CITIES

### In News:

China's "sponge city" initiative and its efforts to address the challenges posed by urban flooding and water management.

### Analysis of Background:

- China facing devastating floods, raising questions about the **effectiveness of the 2015 "sponge city" initiative.**
- **Aimed at reducing urban flood risks and improving water management in major cities through nature-based solutions.**

### Background and Rationale

- China's history of extreme weather and vulnerability to flooding and drought.
- "Sponge city" initiative launched to address flooding and improve water distribution and storage.
- **Encroachment of impermeable concrete due to rapid urbanization, leading to waterlogging and flooding.**
- 2018 data showed widespread vulnerability to flooding and waterlogging in Chinese cities.

### Implementation and Progress

- **Positive effects seen in local pilot projects**, such as green roofs and rain gardens reducing run-offs.
- **Selection of 30 pilot sponge cities** in 2015-2016, **but patchy implementation.**
- Only 64 out of 654 cities had legislation to implement sponge city guidelines by last year.
- Lack of sufficient attention from the government, calls for national legislation.

## Limitations of Sponge Cities

- Inadequate to prevent recent devastating floods.
- Example of Zhengzhou, allocated substantial funds but was overwhelmed by historical rainfall in 2021.
- **Sponge city infrastructure's capacity is limited to handling up to 200 mm of rain per day.**
- Rainfall levels far exceeded this capacity in recent rainstorms, revealing the infrastructure's limitations.
- Climate change and unexpected heavy rain hitting less-advanced sponge city development areas.

## TAMPARA LAKE

### In News:

A legal and environmental issue involving Tampara Lake in the state of Odisha

### Analysis of Background:

- The National Green Tribunal, Eastern Zone, has issued a directive to the Odisha government concerning construction activities around Tampara Lake, a designated Ramsar site and a significant freshwater lake in the state.
- The order was issued in response to a petition filed by the Wildlife Society of Orissa (WSO), an environmental group, which alleged that the ongoing construction work at Tampara Lake was illegal.

### Illegal Construction and Lack of Permissions

- The WSO's petition highlighted large-scale permanent construction activities within the waterbody and its zone of influence without obtaining necessary permissions.
- Allegations included non-implementation of wetland rules and the dysfunctional state of the grievance committee and State wetland authority.

### Ecological Importance of Tampara Lake

- Tampara Lake is spread across 337.86 hectares, with dimensions of 5.8 km in length and 670 meters in width, situated in Ganjam district.

- The lake is home to diverse wildlife, including at least 60 species of birds, 46 species of fishes, over 48 species of phytoplankton, and more than seven species of terrestrial plants and macrophytes.
- The wetland is a habitat for vulnerable species such as *Cyprinus carpio*, common pochard (*Aythya ferina*), and river tern (*Sterna aurantia*).
- **Tampara Lake was included in the Wetland Atlas prepared by the Ministry of Environment, Forest and Climate Change in 2010.**

#### **Violation of Wetland Conservation Rules**

- The WSO's counsel emphasized that Ramsar sites are protected under Wetland Conservation Rules 2017, and the construction violates these rules.
- The state government's construction activities, including concrete structures, restaurants, hotels, resorts, and cottages, encroach upon the lake and its 50-meter fringe area.

#### **Proposed Ecotourism Activities and Additional Infrastructure**

- Plans for water sport activities like surfing, kayaking, and scuba diving are being developed to establish **Tampara Lake as an ecotourism hub.**
- The Berhampur Development Authority (BeDA) had finalized additional infrastructure projects for the tourist destination, estimated at ₹8 crore.

#### **NGT's Decision and Committee Formation**

- The National Green Tribunal appointed a committee consisting of senior scientists from the Ministry of Environment, Forest and Climate Change (MoEF&CC), the Central Pollution Control Board, District Collector of Ganjam or nominee, and the Secretary of State Wetland Authority, Odisha, or nominee.
- The committee is tasked with preparing a report within four weeks regarding the construction and its impact on the lake's ecosystem.

### **EXTREME HEAT IN THE MEDITERRANEAN SEA**

#### **In News:**

The adverse effects of rising temperatures and heat waves on marine ecosystems in the Mediterranean region.

## **Analysis of Background:**

- Rising temperatures are causing heat waves in the Mediterranean region, impacting both terrestrial and marine ecosystems.

## **Heatwaves and Marine Ecosystems**

- Heatwaves are affecting the Mediterranean, leading to wildfires and elevated sea temperatures.
- High sea temperatures have negative effects on marine creatures due to reduced oxygen availability and increased metabolism.
- Warmer waters promote algal blooms, further depleting oxygen and producing toxins harmful to marine life.

## **Vulnerable Species and Ecosystems**

- Bottom-dwelling species such as corals, mussels, sponges, and sea grasses are most affected.
- Mass deaths of benthic species observed along the Mediterranean coastline between 2015 and 2019.
- Benthic species play a crucial role in water filtration, habitat provision, and food sources.

## **Impacts on Specific Species**

- Neptune grass, a slow-growing seagrass, is vital for carbon storage and habitat creation. Heatwaves threaten its survival.
- Higher temperatures and nutrient run-off lead to jellyfish thriving due to fewer predators and overfishing.
- The Mediterranean hosts around 1,000 invasive species, reshaping ecosystems and reducing biodiversity.

## **Effects on People and Economy**

- Rising sea temperatures disrupt fish populations, leading to more invasive species and difficulties in selling unfamiliar catches.
- Loss of seagrass and fish populations impact tourism, as divers are less likely to visit degraded underwater landscapes.



## Mitigation and Solutions

- The primary solution is to curb emissions to prevent further warming of the Mediterranean Sea.
- While direct protection is challenging, making ecosystems more resilient is crucial.
- Controlling agricultural, wastewater, and industrial run-off can mitigate algal blooms.
- Increasing the number of well-managed protected areas can aid ecosystem recovery and reduce disturbances.

## Hope for Adaptation

- Invasive tropical seaweed copes well with rising temperatures and may aid seagrass survival.
- Studies show that if exposed to heat as young seedlings, native Neptune grass can adapt to rising temperatures.

## About Mediterranean Sea



- The Mediterranean Sea is a vast body of water **located between Europe, Asia, and Africa.**
- It holds historical, cultural, and ecological significance due to its central role in trade, civilization, and biodiversity.

## Geographical Location

- The Mediterranean Sea is **bordered by southern Europe to the north, northern Africa to the south, and southwestern Asia to the east.**

- It is surrounded by 21 countries, including Spain, France, Italy, Greece, Turkey, Egypt, and Tunisia.

### **Physical Characteristics**

- The Mediterranean covers an area of approximately 2.5 million square kilometers and has an average depth of around 1,500 meters.
- **The Strait of Gibraltar connects the Mediterranean Sea to the Atlantic Ocean, while the Suez Canal links it to the Red Sea.**

### **Climate and Weather**

- The region has a Mediterranean climate characterized by warm, dry summers and mild, wet winters.
- The sea's heat-absorbing properties influence regional weather patterns, leading to hot, dry summers and temperate winters.

### **Biodiversity and Marine Life**

- The Mediterranean Sea is home to a diverse range of marine species, including fish, marine mammals, sea birds, and various invertebrates.
- Many species found here are unique to the Mediterranean due to its isolation and distinct environmental conditions.
- Pollution, overfishing, habitat destruction, and climate change pose threats to the region's marine life.

### **Historical and Cultural Significance**

- The Mediterranean region is often referred to as the "Cradle of Civilization" due to its role in the development of ancient cultures like the Greeks, Romans, Egyptians, and Phoenicians.
- It has been a major crossroads for trade and cultural exchange, facilitating the movement of goods, ideas, and people between continents.

### **Environmental Challenges**

- The Mediterranean faces overfishing, resulting in depleted fish stocks and ecosystem imbalances.

- Urbanization and industrial activities contribute to pollution, impacting water quality and marine life.
- Rising sea temperatures, sea level rise, and increased frequency of extreme weather events threaten coastal areas and marine ecosystems.
- The introduction of non-native species disrupts native ecosystems and impacts biodiversity.

### Conservation Efforts

- Efforts are being made to establish marine protected areas to conserve biodiversity and ecosystems.
- Initiatives focus on promoting sustainable fishing practices and restoring fish stocks.
- Countries are working to reduce greenhouse gas emissions and adapt to the impacts of climate change.

### Economic Importance

- The Mediterranean attracts millions of tourists annually due to its scenic beauty, historical sites, and coastal activities.
- The sea supports a significant fishing industry and serves as a vital trade route.

## YELAGIRI HILL TRIBE

### In News:

The history, lifestyle, and evolution of the Malaiyali tribe, a community that inhabited the picturesque Yelagiri hill in northern Tamil Nadu, India, over two centuries ago.

### Analysis of Background:

- **Over 200 people of Malaiyali tribe settled on Yelagiri hill in northern Tamil Nadu,** building traditional clay huts that served as a comprehensive system for shelter, storage, farming, and cattle.

### Evolution of the Malaiyali Tribe's Lifestyle

- The Malaiyali tribe, derived from "malai" (hill) and "yali" (people), **inhabited Tamil Nadu's hilly regions as foragers.**
- **They settled in Yelagiri's upper Nillavur region, transitioning from makeshift huts to permanent structures made of red loam clay.**

- Simple one-room huts, measuring 16 by 22 feet, were constructed using red clay and teak wood frames.

### **The Significance of Red Clay and Hut Construction**

- **Red clay** played a crucial role in the tribe's life cycle, **used for hut construction and burial rituals.**
- Govinthasamy, a tribesman and former panchayat member, owns and maintains the last remaining traditional hut.
- **The hut is constructed with a teak wood frame covered with red clay,** featuring a distinctive four-foot-tall entrance.

### **The Quaint Design and Functionality of the Hut**

- The hut's 12-foot thatched roof, **made of dry bamboo leaves and cow dung, prevents leaks during monsoons.**
- Despite its deceptively small exterior, the hut **accommodates eight people** and includes an attic (paran) for storage.
- Originally built for living, it later served as a seed storage space after harvest.

### **Innovative Construction Techniques**

- **The hut stands on teak wood stilts,** elevating it two feet above the ground to prevent flooding and rodent intrusion.
- Traditional cooking practices took place in nearby huts, while this hut was used for living and storage.

### **Cultural and Agricultural Significance**

- The single-room structure exemplified the tribe's close connection to agriculture; grains were stored in dedicated spaces.
- Mohan Gandhi, a Tamil professor, highlights the scientific design of the houses and their resilience against weather.
- **Stilts provided additional storage and shelter space for grains and poultry.**

### **Nostalgia and Transformation**

- The hut's interior now holds **remnants of a straw attic and a clay pot.**

- Despite the scorching heat, the hut remains cool, sheltering occasional street dogs and hens.
- Govinthasamy retains the hut for cultural preservation and educates tourists about the tribe's history.

### **Modern Times and Cultural Evolution**

- Access to education, employment, and financial resources led the tribe to adopt a modern lifestyle.
- The traditional hut represents a bygone era, showcasing the tribe's ability to adapt to changing times.

## **LIBYA**

### **In News:**

The political controversy arising from the meeting between Libya's Foreign Minister Najla Mangoush and Israeli Foreign Minister Eli Cohen.

### **Analysis of Background:**

- Libyan Prime Minister sacks Foreign Minister Najla Mangoush over a meeting with Israeli Foreign Minister Eli Cohen.
- The meeting triggers protests in various Libyan cities and fuels internal political tensions.

### **The Meeting and its Controversy**

- Mangoush meets Cohen in Rome, claiming it was unplanned and informal.
- Israeli official contradicts, stating the meeting was approved at the highest levels in Libya and lasted two hours.
- **Libya does not formally recognize Israel; the meeting contradicts Libyan sentiment supporting Palestinian cause for an independent state.**

### **Impact on Political Crisis**

- The meeting adds to Libya's internal political crisis.
- Critics of Prime Minister Abdulhamid al-Dbeibah seized on the controversy to question his leadership amid ongoing internal challenges.
- Dbeibah's interim government, in office since 2021, faces resistance and calls for a unified administration for national elections.

### **Protests and Response**

- Demonstrations outside Libya's Foreign Ministry cause damage, protests in other parts of Tripoli and cities.

- Burning tires block roads in Tripoli, Palestinian flags raised in Benghazi.
- Mangoush's office attempts to clarify, stating the meeting was unplanned during her encounter with Italian Foreign Minister Antonio Tajani.

### **Geo-Political Implications**

- Libya's push for stronger international ties includes Israel and the UAE.
- Israel has normalized relations with Arab states through the "Abraham Accords" brokered by the United States.
- Dbeibah's government seeks international support, fearing weakening backing without such ties.

### **Parliamentary Response and Armed Faction Dynamics**

- Libya's eastern-based parliament questions the meeting; Tripoli-based Presidency Council seeks clarification.
- Armed factions' actions against Dbeibah monitored post-Tripoli fighting.
- Diplomacy targets national elections to resolve internal conflicts.

### **International Players and Italy's Involvement**

- A UN-backed process installed Dbeibah's Government of National Unity (GNU).
- Italy, with interests in Libya, hosts the meeting, aiming to raise its diplomatic profile.
- Italy's involvement causes controversy and raises questions about international backing for Dbeibah.

## **About Libya**

- Libya is a country **located in North Africa**, bordered by the **Mediterranean Sea to the north**.
- It is known for its rich history, diverse culture, and strategic geographical location.

### **Geography and Borders**

- Libya shares its borders with several countries: **Egypt to the east, Sudan to the southeast, Chad and Niger to the south, Algeria to the west, and Tunisia to the northwest**.
- Its coastline along the Mediterranean Sea is significant, and many major cities are situated along it.

### **Capital and Major Cities**

- The capital city of Libya is **Tripoli**, which is located on the country's northwestern coast.
- Other major cities include **Benghazi, Misrata, and Sabha**.

## Historical Significance

- Libya has a history dating back to ancient times, with notable civilizations like the Phoenicians, Greeks, Romans, and Byzantines having had an influence on the region.
- The city of **Leptis Magna, a Roman archaeological site, is a UNESCO World Heritage Site** and a testament



## PACIFIC DECADAL OSCILLATION

### In News:

The changing patterns of equatorial-origin cyclones and the factors influencing their frequency and intensity.

### Analysis of Background:

- **Cyclones originating near the Equator** have historically been devastating but **subdued in recent decades**.
- Last major equatorial cyclone in India: Cyclone Okchi in 2017, impacting Kerala, Tamil Nadu, and Sri Lanka.

### Factors Influencing Equatorial Cyclones

- Combination of **global warming and the Pacific Decadal Oscillation (PDO)** could increase the frequency of equatorial cyclones.
- Study published in Nature Communications suggests changing patterns.

- Equatorial-origin cyclones decreased by 43% (1981-2010) compared to (1951-1980) due to the positive PDO phase.

### **Understanding PDO and ENSO:**

- **Pacific Decadal Oscillation (PDO) cycle:** Repeats every 20-30 years, affecting cyclone frequency.
- **Positive PDO phase:** Warmer Western Pacific, cooler Eastern Pacific, leading to more equatorial cyclones.
- **El Nino Southern Oscillation (ENSO):** El Nino (warm) and La Nina (cool) phases influence India's rainfall patterns.
- El Nino corresponds to reduced India rainfall, La Nina to excessive rainfall.

### **PDO's Influence on Cyclone Formation**

- PDO's warmer phase enhances equatorial cyclone formation, driven by warm Central Equatorial Pacific waters.
- Cyclones can intensify due to increased moisture and warm waters.
- PDO's positive phase is detected after years of ocean temperature and atmosphere interaction observation.

### **Recent Developments and Predictions**

- In 2019, PDO shifted to a cooler, negative phase.
- **Potential impact:** Increased equatorial-origin cyclones during post-monsoon months.
- S. Ajayamohan, meteorologist, suggests warm waters near the Equator intensify cyclone potential.

### **El Nino's Impact on Rainfall**

- Developing El Nino in the Pacific affects central and southern India.
- Recorded rainfall deficits in central and southern India: 7% and 17%, respectively.
- El Nino's influence on India's rainfall patterns due to changing ocean temperatures.

### **What is Pacific Decadal Oscillation ?**

- The Pacific Decadal Oscillation (PDO) is a climate pattern affecting the Pacific Ocean region.
- Characterized by long-term variations in sea surface temperatures.
- Reflects multi-decadal climate variability.



## Phases of PDO

### Positive Phase:

- The Central and eastern Pacific Ocean experience warmer sea surface temperatures.
- Western Pacific Ocean tends to be cooler.

### Negative Phase:

- Central and eastern Pacific Ocean become cooler.
- Western Pacific Ocean becomes warmer.

## SULINA CHANNEL

### In News:

The recent drone strikes conducted by Russia on ports and grain storage facilities along the Danube river in Ukraine.

### Analysis of Background:

- Russia conducted drone strikes on Ukrainian ports and grain storage facilities along the Danube river.
- The Danube delta provided an alternative route for Ukrainian grain after Russia exited the Black Sea grain deal.

### Significance of the Danube Delta

- The Danube delta offers a trade route for Ukrainian grain shipments after the Black Sea grain deal.
- The deal facilitated secure passage for cargo ships from Ukrainian Black Sea ports (Odessa, Chornomorsk, Pivdennyi) via the Danube delta.

### Importance of the Sulina Channel

- **The Sulina Channel, a 63 km distributary of the Danube, is crucial for the 'new' trade route.**
- It connects major Ukrainian river ports to the Black Sea, entirely within Romania's borders (a NATO member).

### Ukraine's Grain Export and Economic Dependency

- Ukraine is a significant global grain exporter, known as the "breadbasket of Europe."

- Its economy heavily relies on agricultural exports, making the grain trade vital.

### **Trade Route Path and Operation**

- The Danube river's role in freight movement is historical and important.
- The Sulina Channel is the only deep and wide channel suitable for freight transport.
- Ships carrying grain depart from Ukrainian ports (Izmail, Reni), head to Sulina, then to Constanta, Romania's major seaport.
- From Constanta, grain is transferred to larger ships for Black Sea to Mediterranean transit under NATO protection.

### **Challenges and Constraints**

- Russian targeting of Ukrainian ports and grain facilities threatens the route's stability.
- Ukrainian ports' capacity to handle sudden grain volume is limited due to reliance on rail and Black Sea ports.
- Congestion at the mouth of the Sulina Channel leads to significant shipping delays.

### **Proposed Solutions and Considerations**

- Romania's transport minister suggests transporting grain from Ukraine to Romanian ports via rail.
- This solution may incur financial losses for Ukraine due to loading fees and expenses.
- Congestion issues at the Sulina Channel's mouth contribute to shipping delays.

### **Vulnerability and Potential Solutions**

- Russian attacks on Ukrainian grain facilities raise concerns about the trade route's viability.
- The Danube delta's significance for Ukraine's grain export underscores the need for security measures and capacity enhancements.
- Exploring alternative transportation methods and addressing congestion can contribute to maintaining grain exports and economic stability for Ukraine.

### EXPUNGING

#### In News:

Some Portions of the speech delivered in Lok Sabha have been expunged or removed from the Parliament records by the orders of the Speaker.

#### Analysis of Background:

- Expunging is the **process of removing or deleting any words or expressions used in a debate** that is considered defamatory, indecent, unparliamentary, or undignified from the official record of Parliament.
- The power to expunge lies with the Presiding Officer of the House, i.e., the Speaker of Lok Sabha or the Chairperson of Rajya Sabha. The decision to expunge is based on the context and the intention of the speaker and is intended to maintain the decorum and dignity of the House.

#### Expunging

##### About

- Expunging is the **removal of remarks that are considered defamatory, indecent, unparliamentary, or undignified from the official records of the Parliament**. It is a routine procedure that happens in most parliamentary democracies, including India. The purpose of expunging is to prevent the misuse of freedom of speech guaranteed within the Parliament.
- Freedom of speech is a vital privilege for members of Parliament (MPs), as it allows them to express their views and opinions without fear of legal consequences. However, this privilege comes with certain responsibilities and limitations, as MPs are expected to adhere to parliamentary rules and etiquette.

#### Article 105(2) of the Indian Constitution

- The constitutional basis for expunging lies in **Article 105(2) of the Indian Constitution, which grants MPs immunity from legal proceedings in courts for statements made within Parliament**. This means that MPs cannot be sued or prosecuted for what they say in the House, even if their words are defamatory or offensive to someone outside the Parliament. However, this does not mean that MPs can say whatever they want

without any consequences. They are still subject to parliamentary rules, decorum, and the control of the Speaker.

### **Rules 380 and 381 of the Rules of Procedure and Conduct of Business in Lok Sabha**

- The rules governing expunging are laid down in Rules 380 and 381 of the Rules of Procedure and Conduct of Business in Lok Sabha (the lower house of Parliament). According to these rules, **if the Speaker deems certain words or usage to be inappropriate for parliamentary discourse, those words can be expunged from the records.**
- The **Speaker can also direct MPs to withdraw their remarks or apologize for them.** The decision to expunge is made by the Speaker based on recommendations from the reporting section, which is a team of officials who prepare the verbatim transcripts of parliamentary proceedings.
- The Speaker holds the discretion to expunge and can also restore expunged remarks. **The Speaker's authority is supreme in these matters and cannot be challenged or questioned by anyone.** The Speaker can also expunge remarks made by ministers, opposition leaders, or even the Prime Minister. Once a word or usage is expunged, it is removed from the records and marked with an explanatory footnote. The expunged portions are not published in any official document or website and are not accessible to anyone.

### **Conclusion**

- Expunging is a complex and controversial practice that has both advantages and disadvantages. It aims to balance the freedom of speech and expression of MPs with the dignity and decorum of the Parliament. However, it also raises questions about transparency, accountability, and public access to parliamentary information. In the digital age, where information can be easily shared and accessed online, expunging faces new challenges and dilemmas that require careful consideration and deliberation.

## CAUVERY WATER SHARING ISSUE

### In News:

Tamil Nadu has approached the Supreme Court with a plea to direct Karnataka to release 24,000 cusecs of water from its reservoirs and ensure its availability at Biligundlu, the inter-State border point, for the remaining days of August.

### Analysis of Background:

- The petition also seeks the Court's direction to Karnataka to comply with the Cauvery Water Disputes Tribunal (CWDT)'s final award of February 2007, as modified by the SC in 2018, and release 36.76 TMC of water for September 2023.
- **The petition is based on the contention that Karnataka has failed to honour its obligations under the award and has caused severe distress to Tamil Nadu's farmers who depend on the Cauvery water for irrigation.**

### How is the water being shared?

- **The Cauvery River basin is divided among four states: Karnataka, Tamil Nadu, Kerala and Puducherry.** The sharing of water from this basin has been a source of dispute for decades. To resolve this issue, the Supreme Court of India gave a verdict in February 2018, based on the recommendations of the Cauvery Water Disputes Tribunal (CWDT) in 2007.
- According to the verdict, Karnataka has to release 177.25 TMC of water to Tamil Nadu in a normal year, from June to May. Out of this, 123.14 TMC has to be released from June to September, which is the southwest monsoon season. However, this arrangement often leads to conflicts when the rainfall is less than expected.
- To ensure compliance with the verdict, the **Cauvery Water Management Authority (CWMA) and Cauvery Water Regulation Committee (CWRC) were set up in 2018.** These bodies monitor the water situation and hold meetings regularly.

### Cauvery water sharing issue

#### About

- The Cauvery water-sharing issue is a longstanding and complex dispute between the Indian states of Karnataka and Tamil Nadu over the sharing of water from the Cauvery River. The river originates in Karnataka and flows through both Karnataka and Tamil Nadu before emptying into the Bay of Bengal.

- The **dispute revolves around the allocation of water for irrigation, drinking water, and other uses** between the two states.

### Background

- The origins of the Cauvery water dispute can be traced back to the 19th century when agreements were signed between the princely state of Mysore (now Karnataka) and the British Madras Presidency (now Tamil Nadu). These agreements were revised over time, with the Cauvery Water Disputes Tribunal (CWDT) being established in 1990 to resolve the conflicting demands of Karnataka, Tamil Nadu, Kerala, and Puducherry (union territory) regarding water sharing.

### Impact

**Agricultural Distress:** Farmers in the Cauvery Basin heavily depend on the river's water for irrigating their crops, particularly during the crucial sowing and growing stages. Fluctuations in water availability due to the dispute have resulted in the following

#### consequences:

- **Crop Failures:** Inconsistent water supply has led to crop failures, reducing farmers' incomes and pushing them into debt.
- **Unpredictable Planning:** Farmers find it challenging to plan their agricultural activities effectively due to uncertainty about water availability, affecting crop choices and cultivation practices.
- **Economic Losses:** Crop losses translate to economic losses for farmers, affecting their livelihoods and contributing to the cycle of poverty.

**Water Scarcity:** Water scarcity is a significant outcome of the dispute, impacting various aspects of daily life and the environment:

- **Drinking Water Shortages:** Reduced water allocation affects the availability of clean and safe drinking water for both urban and rural populations.
- **Hygiene and Health Issues:** Water scarcity can lead to inadequate sanitation and hygiene practices, increasing the risk of waterborne diseases.
- **Ecological Impact:** Insufficient water flow in the river affects aquatic ecosystems, biodiversity, and the overall health of the river.
- **Urbanization Challenges:** Rapid urbanization in both states has increased water demand for domestic and industrial purposes, exacerbating water scarcity issues.

**Political Tensions:** The Cauvery water dispute has had significant political implications and has often been a source of tension between Karnataka and Tamil Nadu:

- **Interstate Relations:** The dispute strains relations between the two states, affecting collaboration in other areas and hindering overall development.
- **Public Outcry:** The public often demands strong action from political leaders, putting pressure on them to adopt aggressive stances on the issue.
- **Protests and Violence:** The dispute has led to protests, rallies, and even violent incidents, which disrupt normal life and can lead to law and order problems.
- **Legal Battles:** The protracted legal battles over water sharing consume time, resources, and energy that could be otherwise invested in more productive pursuits.

### Steps taken to address the Cauvery water dispute

- The Cauvery water dispute has seen several steps taken to address and manage the complex issue. In addition to the Cauvery Water Disputes Tribunal (CWDT) and interim orders by the Supreme Court, there have been other efforts as well.

**Cauvery Water Disputes Tribunal (CWDT):** The establishment of the CWDT marked a significant effort to resolve the water-sharing dispute through a legal and judicial process.

The key aspects of the CWDT's role include:

- **Formation:** The CWDT was constituted in 1990 under the Inter-State River Water Disputes Act 1956. It was formed to adjudicate the distribution of Cauvery River waters among the riparian states of Karnataka, Tamil Nadu, Kerala, and Puducherry.
- **Verdict:** After examining the arguments and evidence from all parties involved, the CWDT delivered its final verdict in 2007, which allocated specific amounts of water to each state during various seasons of the year.
- **Modification:** The verdict was subsequently modified by the Supreme Court of India in 2018, adjusting the water allocations for Karnataka and Tamil Nadu.

**Interim Orders by the Supreme Court:** To manage the dispute and ensure water availability during periods of disagreement, the Supreme Court has issued interim orders. These orders have played a crucial role in preventing immediate water crises and maintaining some level of stability in water sharing:

- **Equitable Distribution:** The interim orders have aimed to ensure a fair and equitable distribution of water between the states until a final resolution could be reached.

- **Preventing Water Scarcity:** These orders have been crucial in preventing severe water scarcity, which could have had significant humanitarian and economic consequences.
- **Addressing Emergency Situations:** The Supreme Court has sometimes issued specific orders to address emergencies, such as drought conditions, where water availability becomes even more critical.

While the CWDT and interim orders have provided temporary solutions and prevented immediate crises, they are not comprehensive long-term resolutions. The dispute continues to resurface due to changing circumstances, and there is a need for a more sustainable and permanent solution.

### **Challenges associated with the Cauvery water-sharing issue**

- **Equitable Sharing:** Balancing the water needs of multiple states, particularly Karnataka and Tamil Nadu, is a complex task. This challenge involves considering the following factors:
  - **Historical and Legal Context:** Historical agreements and legal provisions form the basis of water allocations. Reconciling these with the current needs of states can be contentious.
  - **Agricultural and Economic Impacts:** Both Karnataka and Tamil Nadu heavily rely on Cauvery water for agriculture. Balancing their agricultural economies while addressing water needs for other sectors is intricate.
  - **Population Growth:** Population growth in both states has increased water demand for drinking and domestic use, adding another layer of complexity.
  - **Changing Climate:** Climate change has introduced new uncertainties in water availability and distribution:
  - **Erratic Rainfall:** Irregular and unpredictable rainfall patterns impact water inflow into the river. This affects the planning and allocation of water resources.
  - **Droughts and Floods:** Increasing frequency and intensity of droughts and floods affect water availability and storage, requiring adaptive strategies.
- Enforcement:** Ensuring compliance with water-sharing agreements and court orders is challenging due to various reasons:
- **Political Resistance:** Changes in governments or political dynamics can lead to shifts in the commitment to uphold water-sharing agreements.



- **Technical Difficulties:** Monitoring and measuring water flow accurately is complex, leading to disputes over data accuracy and subsequent enforcement.
- **Community Expectations:** Fulfilling the expectations of local communities for water resources can conflict with formal agreements.
- **Legal Delays:** Legal processes can be time-consuming, delaying the enforcement of agreements and exacerbating tensions.

## **Steps to address the Cauvery water sharing issue effectively**

### **Negotiation and Dialogue**

- Establish regular and structured dialogues between Karnataka and Tamil Nadu, possibly mediated by a neutral third party or facilitated by relevant international or national institutions.
- **Engage technical experts**, hydrologists, environmentalists, and other specialists to provide unbiased insights during negotiations.
- Encourage open communication and active participation from community representatives to ensure local perspectives are considered.

### **Technology and Data Sharing**

- Implement modern technologies like satellite-based remote sensing and Geographic Information Systems (GIS) to monitor water flow, usage, and availability.
- **Develop a centralized database for water-related information**, accessible to all parties, ensuring transparency and accuracy in data sharing.
- Use real-time data to make informed decisions about water allocation and respond promptly to changing conditions.

### **Integrated Water Resource Management**

- Develop comprehensive water management plans that consider the diverse needs of agriculture, industry, urban areas, and the environment.
- Promote efficient irrigation practices, rainwater harvesting, and water recycling to optimize water usage.
- **Encourage reforestation and conservation measures** to protect watersheds and maintain healthy river ecosystems.

### **Institutional Mechanisms**

- Strengthen existing institutions or establish new ones dedicated to managing interstate water disputes and cooperative water management. Ensure these institutions have clear mandates, adequate resources, and authority to enforce agreements.
- **Establish grievance redressal mechanisms** to address disputes promptly before they escalate.

### Public Awareness

- Launch public awareness campaigns to educate citizens about the importance of water conservation and responsible water usage.
- **Involve schools, universities, NGOs, and community organizations** to spread awareness about the long-term benefits of cooperation.
- Harness social media and other communication platforms to reach a wider audience.

### Legal Framework

- Formulate a legal framework that not only addresses the current dispute but also accommodates changing circumstances and future challenges.
- **Include provisions for periodic reviews and adaptations** to keep the framework relevant over time.

The combined efforts of negotiation, technology, integrated management, strong institutions, public awareness, and a well-crafted legal framework can create a comprehensive approach that addresses the complex and multidimensional nature of the Cauvery water-sharing issue. The emphasis should be on long-term sustainability, equitable distribution, and fostering cooperation for the benefit of all stakeholders involved.

## ODOP Wall

### In News:

The 'ODOP Wall' was inaugurated as a result of the collaboration between One District One Product (ODOP) and Deendayal Antyodaya Yojna - National Rural Livelihoods Mission (DAY-NRLM) to identify and promote products that have a cultural and historical significance for their place of origin.

## Analysis of Background:

- The One District One Product (ODOP) program is an initiative **under the Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry**. Its goal is to promote self-reliance and balanced regional development across all districts of India. The program selects, brands, and promotes one unique product from each district, spanning various sectors such as handlooms, handicrafts, and agriculture.
- The 'ODOP Wall' aims to **identify and promote products from all districts that have unique qualities and cultural significance**. This includes products related to handicrafts, handlooms, and agriculture, which are associated with the identity of their place of origin.
- The collaboration represents a step towards showcasing India's rich and diverse craftsmanship and promoting rural livelihoods through the promotion of unique products from each district

## One District One Product (ODOP)

### About

- The concept of One District One Product (ODOP) **originated in Japan as a regional development strategy**. It was later adopted by various countries, including India, to promote local economic growth and create employment opportunities by capitalizing on the unique products and skills of each district. The ODOP initiative in India aligns with the vision of decentralization, self-reliance, and holistic development.

### Features

#### Product Specialization

- The identification of a specific product or industry that a district can excel in. Factors contributing to this advantage could include local resources (natural or human), traditional skills, historical significance, or existing infrastructure. By focusing on a particular product, districts can maximize their potential and competitiveness in that area.

#### Economic Diversification

- ODOP aims to **reduce the vulnerability associated with over-reliance on a limited number of industries by promoting a diverse range of products across districts**. This

strategy helps distribute economic activities more evenly and reduces the risk of economic shocks stemming from fluctuations in specific sectors.

### **Cultural Heritage**

- The initiative **recognizes and promotes traditional crafts, arts, and industries that are an integral part of a district's cultural identity**. By preserving and revitalizing these crafts, ODOP not only generates economic benefits but also safeguards cultural heritage and ensures that traditional skills are passed down through generations.

### **Sustainable Growth**

- ODOP emphasizes sustainability by utilizing local resources and expertise. This approach aligns with the principles of environmental conservation and responsible resource utilization. By leveraging what the district already has to offer, the initiative minimizes the ecological footprint associated with economic development.

### **Value Chain Enhancement**

- The entire value chain, from sourcing raw materials to marketing the final product, is crucial for a product's success. ODOP **focuses on improving various stages of this chain**. This could involve upgrading production techniques, enhancing product quality, creating branding and marketing strategies, and establishing efficient distribution networks.

### **Significances**

#### **Rural Employment**

- ODOP plays a vital **role in generating employment opportunities, particularly in rural areas**. By focusing on local industries and products, the initiative creates jobs in communities where employment options might be limited. This contributes to poverty alleviation, enhances the livelihoods of rural populations, and reduces the need for migration to urban areas in search of work.

#### **Inclusive Growth**

- ODOP **fosters inclusive growth by supporting marginalized communities, women, and artisans**. The initiative provides avenues for skill development, training, and entrepreneurship for these groups, enabling them to participate more actively in economic activities. This empowerment contributes to reducing economic disparities and promoting social equity.

#### **Cultural Heritage Preservation**

- Many traditional crafts and products are part of a district's cultural heritage. ODOP's focus on promoting these crafts ensures the preservation of unique cultural identities.

By **providing a market and recognition for these products**, the initiative helps communities sustain their cultural heritage while also benefiting economically.

### **Export Promotion**

- ODOP's emphasis on enhancing the quality, branding, and marketing of district-specific products can lead to increased exports. When these products gain recognition for their uniqueness and quality, they can attract international demand, contributing to a positive trade balance and boosting the country's exports.

### **Steps Taken by India**

- The initiation of the ODOP program **demonstrates the government's commitment to promoting district-level economic development**. By focusing on specific districts, the initiative aims to create localized economic growth that contributes to the overall national development agenda.
- The core of the ODOP initiative lies in **identifying a specific product for each district**. This step is crucial as it leverages the unique strengths and resources of each area, allowing districts to channel their efforts toward a product they can excel in. This specialization enhances the district's market competitiveness.
- The **government's facilitation of market linkages is a significant support mechanism**. This step exposes district-specific products to both domestic and international markets, expanding their reach and potential customer base. Access to markets is critical for ensuring sustainable demand and growth.
- **Skill enhancement and training programs are essential for improving the quality of production and fostering innovation**. By upgrading the capabilities of artisans and entrepreneurs, ODOP enhances the overall value proposition of the district's products and ensures their alignment with market trends.
- Financial assistance, subsidies, and incentives play a pivotal role in kickstarting and sustaining the development of ODOP products and industries. This support makes it feasible for artisans and entrepreneurs to invest in their businesses, adopt modern practices, and enhance product quality.

### **Challenges**

#### **Infrastructure Constraints**

- **Inadequate transportation, storage facilities, and other infrastructure limitations** can hinder the smooth movement of products from production centres to markets. This can

lead to delays, increased costs, and reduced product quality, impacting the overall competitiveness of the district's offerings.

### **Quality Control**

- Maintaining consistent product quality is paramount for building consumer trust and ensuring competitiveness. Without proper quality control measures and adherence to standards, the reputation of district-specific products may suffer, affecting their market acceptance and potential for growth.

### **Market Access**

- Gaining access to broader markets, especially for products with limited exposure, can be a significant challenge. Establishing a distribution network, both domestic and international, requires strategic planning, marketing efforts, and collaborations to ensure products reach their intended consumers.

### **Technology Gap**

- The lack of access to modern technology and innovation can hinder production efficiency and inhibit product improvement. Embracing technological advancements is crucial to enhancing product quality, production processes, and the overall competitiveness of district-specific products.

### **Coordination Issues**

- Effective coordination among various stakeholders, including government agencies, local bodies, and other relevant entities, is essential for the successful implementation of ODOP. Lack of coordination can lead to delays, miscommunication, and inefficient resource allocation, potentially hampering the initiative's outcomes.

Addressing these challenges requires a multi-faceted approach that involves policy interventions, capacity building, investments in infrastructure, technology adoption, and robust coordination mechanisms.

## SAMUDRA App

### In News:

The 'SAMUDRA' mobile app, launched by the Indian National Centre for Ocean Information Services (INCOIS) under the Ministry of Earth Sciences (MoES), is designed to provide a range of ocean-related information and services.

### Analysis of Background:

- The mobile app **provides users with real-time updates and critical alerts concerning oceanic disasters** like tsunamis, storm surges, high waves, and swell surge alerts. This information empowers individuals and communities to remain informed and take necessary precautions to protect lives and property.
- The App is particularly **beneficial for the fishing community**, it offers advisories regarding Potential Fishing Zones (PFZs), helping fishermen locate probable fish aggregation spots.
- It **includes interactive maps, charts, and animations** to enhance understanding of intricate oceanic phenomena. It aims to serve as a cutting-edge tool, bolstering marine safety and profitable fishing operations.
- It aligns with the INCOIS mission to **provide ocean data, information, and advisory services**, promoting sustainable ocean activities and contributing to the Blue Economy.
- The app is currently available in English; plans are in place to include eight coastal languages in the near future.

### Indian National Centre for Ocean Information Services (INCOIS)

- It is an **autonomous organization under the Ministry of Earth Sciences**. Established in 1999, the headquartered in Hyderabad, India.
- Its primary mandate is **to provide various ocean information and advisory services** to support various ocean-based activities and decision-making in India.
- It plays a crucial role in **monitoring and forecasting various oceanographic parameters and phenomena**, including sea surface temperature, ocean currents, wave forecasts, and potential fishing zones.
- It **collects data from various sources** such as satellites, buoys, and other ocean observing systems, and processes this data to generate forecasts and advisories that are useful for maritime operations, coastal management, disaster management, and scientific research.

## ARTICLE 35A

### In News:

The Chief Justice of India highlighted that Article 35A of the Indian Constitution, which gave the Jammu and Kashmir Legislature the power to decide who were the "permanent residents" of the State and grant them special rights, was a violation of the fundamental rights of other citizens. He said that Article 35A created a "class within a class" and discriminated against people on the basis of their place of origin, gender, religion and caste.

### Analysis of Background:

#### Article 35A of the Indian Constitution

##### About

- Article 35A was a provision in the Indian Constitution that was **inserted through a Presidential Order in 1954**. It granted the Jammu and Kashmir Legislature the power to define who qualified as a "permanent resident" of the state and conferred certain special rights and privileges upon those recognized as such.

##### Special Privileges

- Article 35A allowed the Jammu and Kashmir Legislature **to determine the criteria for being considered a "permanent resident" of the state**. This definition was important because only those who were classified as permanent residents could avail themselves of the special privileges outlined in the article.
- **Permanent residents of Jammu and Kashmir were entitled to various special privileges**, which included:
  - **Equal Opportunity in State Employment:** Permanent residents had the right to be treated equally and have equal opportunities in matters related to state government jobs and employment.
  - **Right to Acquire Property:** Permanent residents were granted the right to acquire property within the state. This meant they could own land and other real estate properties in Jammu and Kashmir.
  - **Right to Settle:** Permanent residents had the right to live and settle in Jammu and Kashmir without any restrictions. This right was not extended to non-residents.
  - **Distinction between Residents and Non-Residents:** Article 35A created a legal distinction between permanent residents and non-residents of Jammu and Kashmir.



Non-residents, who did not meet the criteria to be classified as permanent residents, were not entitled to the same special privileges.

### **Origin and Impact of Article 35A**

- Article 35A was introduced through the "Constitution (Application to Jammu and Kashmir) Order, 1954." It was incorporated into the Indian Constitution under Article 370. **Article 370 granted special autonomy to the state of Jammu and Kashmir**, allowing it to have its own constitution and decision-making authority in certain matters.
- The article defined "permanent residents" as individuals who could trace their hereditary state-subject status back to 1927. This essentially meant that those who had legal and ancestral ties to the region before it acceded to India in 1947 were considered permanent residents. This definition formed the basis for determining who would be entitled to the special privileges and protections provided by Article 35A.
- **Article 35A established a clear distinction between individuals who were considered permanent residents and those who were not.** Only permanent residents were eligible for the special privileges and rights that the article granted, such as the right to own property and access certain government jobs. Non-residents, who did not meet the criteria, were excluded from these benefits.
- The introduction of Article 35A had a profound impact on the social, economic, and political dynamics of Jammu and Kashmir. While proponents argued that it helped preserve the distinct identity of the region and protect the interests of its residents, critics contended that it created divisions and reinforced exclusivity. The article's provisions were seen as contributing to a sense of separate identity and autonomy within the state.

### **Immunity from Judicial Review**

- Article 35A indeed **provided immunity from judicial review for the special privileges it conferred upon permanent residents of Jammu and Kashmir.** This meant that the decisions made under Article 35A could not be challenged in court on the grounds of violating fundamental rights or principles of the Indian Constitution.

### **Abrogation of Article 35A and Article 370**

- **In August 2019, the Indian government took the significant step of abrogating both Article 35A and Article 370.** Article 370 granted special autonomous status to the state

of Jammu and Kashmir, allowing it to have its own constitution and decision-making authority in various matters except for those related to defence, foreign affairs, finance, and communications.

- The abrogation effectively revoked the special status that Jammu and Kashmir had enjoyed for several decades. As a result, the state was reorganized into two separate Union Territories: Jammu and Kashmir, and Ladakh. The decision led to changes in the political, administrative, and legal landscape of the region, sparking debates and discussions both within and outside the region.

These actions were significant and had far-reaching implications for the region, its relationship with the central government, and the political dynamics within India. The move was met with various reactions, ranging from support for greater integration of the region into the Indian Union to concerns about the potential impact on the unique identity and autonomy of Jammu and Kashmir.

### Discussion on Constitutional Implications

- **Adherence to Constitutional Principles:** The abrogation of Article 35A and Article 370 raised questions about whether the actions were in line with constitutional principles, particularly federalism. Federalism is a foundational principle of the Indian Constitution that delineates powers and responsibilities between the central government and the state governments. Critics argued that the abrogation might undermine the federal structure by centralizing power and decision-making.
- **Dissolution of Jammu and Kashmir State Legislature:** The dissolution of the Jammu and Kashmir State Legislature and the subsequent imposition of President's Rule under Article 356 were seen as steps leading to the abrogation. Article 356 allows the central government to assume control of a state's administration if there is a failure of constitutional machinery. Critics questioned whether the use of Article 356 in this context was constitutionally justified or whether it was an excessive measure.
- **Parliament's Role v/s Federal Structure:** There was debate about whether Parliament assuming the legislative role for Jammu and Kashmir, in the absence of the State Legislature, was consistent with the federal structure of India. Critics argued that this move might erode the autonomy of the state and set a precedent for similar actions in other states.

## Government's Justification

- **Correction of Past Mistakes:** The government's argument, as presented by Solicitor-General Tushar Mehta, was that the abrogation aimed to rectify what it saw as historical mistakes. It suggested that Article 35A and Article 370 had hindered development and growth in the region by maintaining a separate legal and constitutional framework. The government's stance was that removing these provisions would lead to economic progress and investments in Jammu and Kashmir.
- **Development and Investments:** The government believed that by revoking Article 35A and Article 370, the region would open up to greater opportunities for growth and investment. It emphasized that the changes were intended to benefit the people of Jammu and Kashmir by providing them with the same rights and opportunities as citizens in the rest of India.
- **Retained Status as a State:** The representative argued that despite the abrogation, Jammu and Kashmir continued to retain their status as a state within the Indian Union, albeit with some changes. While certain special privileges were removed, the state still had a legislature, and only a subset of police powers was transferred to the President. The justifications offered by the government underline its perspective on the potential benefits of the abrogation in terms of economic development, equal citizenship, and administrative efficiency. However, these justifications were met with a range of reactions, including concerns about the impact on local autonomy, cultural identity, and the constitutional integrity of the region.

## WESTERN ZONAL COUNCIL MEETING

### In News:

The Union Home Minister chaired the 26th meeting of the Western Zonal Council in Gandhinagar, Gujarat. The Western Zonal Council includes the states of Gujarat, Goa, and Maharashtra, as well as the Union Territories of Dadra and Nagar Haveli and Daman and Diu.

### Analysis of Background:

- The meeting was **organized by the Inter-State Council Secretariat**, which operates under the Ministry of Home Affairs.
- The Union Home Minister urged the Zonal Council member states to **focus on three key national issues**: POSHAN Abhiyaan (nutrition campaign), reducing school dropout rates,

and ensuring the benefits of the Ayushman Bharat healthcare scheme reach every economically disadvantaged individual

### Zonal Councils

- Zonal Councils in India are an important mechanism for **fostering cooperation and coordination among states and union territories**. They are **established under the States Reorganization Act of 1956 as well as Article 263 of the Indian Constitution**.
- The primary purpose of these councils is **to promote inter-state cooperation, address common regional concerns, and work towards the overall development and welfare of specific zones**.
- The Zonal Councils are advisory bodies and their **recommendations are not binding on the Central Government or the State Governments**. However, the Zonal Councils can play an important role in promoting cooperation and coordination among the States in the concerned zone.

### 5 Zonal Councils

- **Northern Zone:** Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, National Capital Territory of Delhi, and Union Territory of Chandigarh.
- **Central Zone:** Chhattisgarh, Uttarakhand, Uttar Pradesh, and Madhya Pradesh.
- **Eastern Zone:** Bihar, Jharkhand, Odisha, Sikkim, and West Bengal.
- **Western Zone:** Goa, Gujarat, Maharashtra, Union Territories of Daman & Diu, and Dadra & Nagar Haveli.
- **Southern Zone:** Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Union Territory of Puducherry.

### North Eastern Council (NEC)

- It is a **statutory advisory body, established under the North Eastern Council Act of 1971**.
- The council includes the **eight states of the Northeast:** Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim. Initially, Sikkim was not part of the council, but it was added in 2002, bringing its total membership to eight states.
- The NEC primarily aims to facilitate the economic and social development of the northeastern region of India.

- The members of the council are represented by their respective Chief Ministers and Governors.
- The **headquarters of the North Eastern Council is located in Shillong**, and it operates under the Ministry of Development of North Eastern Region (DONER) within the Government of India.
- The NEC's primary role is to act as a forum for coordinating and planning development activities in the northeastern states, with a focus on areas like infrastructure, connectivity, economic growth, and social welfare. It plays a crucial role in addressing the specific developmental needs and challenges of the region.

### Composition of the Zonal Councils

- **Chairman:** The Union Home Minister serves as the Chairman of each Zonal Council.
- **Vice-Chairmen:** The Chief Ministers of the states within the respective zone act as the Vice-Chairmen of the Zonal Councils.
- **Secretaries:** The Chief Secretaries of the states in the concerned zone hold the position of Secretaries for the Zonal Councils.
- **Other Members:** The Zonal Councils also include the following members:
  - Ministers from the Central Government who are responsible for matters related to the particular zone.
  - Members of Parliament (MPs) representing the states within the zone.
  - Members of the Legislative Assemblies (MLAs) from the states within the zone.

### Key Functions

- **Cooperation:** Zonal Councils indeed play a crucial role in fostering cooperation among states and union territories within a particular geographic zone. These councils provide a structured environment for representatives from different states to come together and share their experiences, best practices, and challenges. By promoting collaboration, Zonal Councils enable the pooling of resources, expertise, and knowledge, which can lead to more effective solutions to shared problems.
- **Discussion and Resolutions:** The formal platform offered by Zonal Councils allows member states and union territories to engage in substantive discussions on various issues affecting the region. Through these discussions, participants can present their viewpoints, exchange ideas, and propose resolutions. This dialogue-driven approach encourages consensus-building and the development of joint strategies, ultimately leading to more coherent and well-informed decisions.

- **Dispute Resolution:** One of the significant functions of Zonal Councils is dispute resolution. Inter-state disputes can arise due to various reasons, such as resource sharing, boundaries, and jurisdictional matters. Zonal Councils provide a space for affected parties to engage in open dialogue and negotiation. This collaborative process can prevent conflicts from escalating and help in finding peaceful solutions that are acceptable to all parties involved.
- **Policy Formulation:** Zonal Councils offer a valuable channel for contributing to policy formulation. The insights and recommendations provided by member states and union territories can inform the central government's decision-making process. This input is particularly important because it reflects regional nuances, needs, and aspirations, ensuring that policies are more relevant and effective across the entire zone.
- **Developmental Planning:** Zonal Councils have a role in shaping the developmental landscape of the region. By actively participating in the formulation and execution of development plans, member states and union territories can ensure that resources are allocated in a manner that benefits the entire zone. This collaborative approach prevents duplication of efforts and promotes a more equitable distribution of development opportunities.
- **Border Disputes and Inter-State Transport:** Zonal Councils deliberate and suggest recommendations on matters concerning border disputes between states, issues related to linguistic minorities, and inter-state transportation. These discussions help in finding common ground and solutions.
- **Other Matters of Common Interest:** Zonal Councils are platforms for discussing and providing recommendations on various other matters that are of mutual concern to the states within a zone. This can encompass a wide range of issues including cultural exchanges, environmental concerns, and other regional needs.

### Significance

- **Promoting Cooperative Federalism:** Cooperative federalism refers to the collaboration and cooperation between different levels of government (central and state governments in this case) to collectively address various issues and challenges. Zonal Councils provide a platform where states and union territories can come together, share their experiences, and work together on common issues. This promotes a sense

of unity among the diverse regions of India while allowing them to retain their identities and priorities.

- **Regional Integration:** India is a vast and diverse country with different regions having distinct cultural, economic, and geographical characteristics. Zonal Councils help ensure that developmental plans and policies take into account the specific needs and requirements of each zone. This approach avoids a uniform approach that might not be suitable for every region, leading to more balanced and inclusive development across the country.
- **Dispute Resolution:** Interstate disputes can arise due to various reasons, including differences in resource allocation, boundaries, or other issues. Zonal Councils offer a platform where such disputes can be discussed and resolved peacefully through dialogue and negotiation. This prevents conflicts from escalating and maintains peaceful relationships between states, contributing to overall stability.
- **Coordination of Policies:** Zonal Councils are not just forums for discussion but also have the authority to make recommendations on various policy matters. These recommendations are influential at both the state and central levels of government. This coordination ensures that policies are well-informed, consider regional nuances, and are more likely to effectively address the challenges faced by different regions.

### Challenges

- **Limited Binding Power:** The lack of legal enforceability for the recommendations made by Zonal Councils is indeed a significant limitation. While these councils provide a platform for discussions and consensus-building, their impact can be reduced if the recommendations they put forth are not binding on the member states or central government. This can lead to situations where well-intentioned suggestions may not translate into concrete actions.
- **Political Differences:** The presence of diverse political ideologies and priorities among member states can make it challenging to reach a consensus on various issues within Zonal Councils. Political differences might lead to gridlock or superficial agreements that do not effectively address regional challenges. Overcoming these differences and fostering productive discussions requires strong leadership and a commitment to the greater good.
- **Resource Disparities:** Economic and developmental disparities among states within a zone can complicate resource allocation and planning. Balancing the needs of less-

developed states with those that are more prosperous can be a delicate task. Ensuring equitable growth across the entire zone is essential for the success of cooperative federalism, but it might require careful negotiation and resource management.

- **Administrative Bottlenecks:** The administrative structures and practices of different states and union territories can vary significantly. This diversity can lead to administrative complexities, procedural bottlenecks, and delays in implementing the decisions or recommendations made by the Zonal Councils. Effective coordination and streamlined administrative processes are crucial for translating council decisions into concrete actions.

## INTERNATIONAL RELATIONSHIP

### RAISINA DIALOGUE

#### In News:

Foreign Secretary Vinay Kwatra has told a Parliament committee that the Raisina Dialogue is now among the most significant global-level think tank events in the world.

#### Analysis of Background:

##### Raisina Dialogue

- The Raisina Dialogue is **India's flagship conference on geopolitics and geoeconomics** committed to addressing the most challenging issues facing the global community.

##### Concept of Raisina Dialogue

- The concept of Raisina dialogue is inspired by the Shangri-La dialogue **which is held every year in Singapore.**
- In the Shangri-La dialogue, the focus is **mainly to discuss the defence issue.** This is also known as Asia's premier defence summit. Whereas **Raisina dialogue is a broad-based term.**



## The name

- The name "**Raisina Dialogue**" comes from Raisina Hill, an elevation in New Delhi, seat of the Government of India, as well as the Presidential Palace of India, Rashtrapati Bhavan.

## Commencement

- It is **held annually since 2016**.

### Organization

- It is **organized by the Ministry of External Affairs** in collaboration with the **Observer Research Foundation (ORF)** an independent think tank.
- This effort is supported by a number of institutions, organizations and individuals, who are committed to the mission of the conference.

## Aim

- The Raisina Dialogue is **held to provide a platform for discussing important global issues** and fostering greater cooperation among nations.
- The conference aims to facilitate a constructive dialogue on a wide range of topics, **including security, economics, climate change, and technology**.
- The Raisina Dialogue also **serves as a platform for India to showcase its growing strategic and economic significance on the global stage**.

## Participants

- The Raisina Dialogue is attended by a wide range of participants, including government officials, policymakers, business leaders, and strategic experts from various countries.
- The conference attracts delegates from around the world, with a special emphasis on Asia and the Indo-Pacific region. In the past, the conference has been attended by high-level dignitaries such as heads of state, foreign ministers, and top business leaders.

## Significance

- Since its foundation, the Raisina Dialogue has **emerged as a leading global conference on international affairs** featuring the participation of heads of state, ministers, journalists, academics, and researchers from across the globe.

- The first Raisina Dialogue was held in 2016, in which over 100 representatives from over 35 countries spoke on the theme, ***“Asia: Regional and Global Connectivity”***.

### **8th Edition of Raisina Dialogue 2023**

- The theme for the 2023 edition of the Raisina Dialogue was ***“Provocation, Uncertainty, Turbulence: Lighthouse In The Tempest?”***
- This year, over the course of three days, over 250 decision-makers and thought leaders of the world engaged in 100 conversations of various formats.

#### **The discussions deliberated over five thematic pillars:**

- **Neo Insurgence:** Geographies, Domains, Ambitions.
- **Amoral Mosaic:** Contest, Cooperate or Cancel.
- **Chaotic Codes:** Sovereignty, Security, Society.
- **Pernicious Passports:** Climate, Commons, Citizens.
- **Grey Rhinos:** Democracies, Dependencies, and Debt Traps.
- Over 2500 participants are expected to join the dialogue in person and the proceedings would reach millions across various digital platforms.

### **Why does the Dialogue matter?**

- The Raisina Dialogue has **quickly become India’s premier event on foreign policy and strategic affairs**, with the aim to increase engagement of global actors with Asia and of Asia with the world.
- An event of such scale sets the tone for the rest of the year. The **Dialogue provides a platform for the government to state its position on various questions and issues of international relations.**
- The event gives many experts, and other countries, a glimpse into the **Indian government’s near-term priorities in international relations.** Such insight is exceedingly, and this is no doubt why the Raisina Dialogue has proved to be a success.
- The Dialogue also **provides a golden chance for young scholars and researchers to interact with a galaxy of stars from the international relations universe.** Also, it gives a platform for researchers to network and perhaps even collaborate.
- The Dialogue has arguably played an essential role in the blossoming policy **the event creates an ecosystem for the growth and development of think tanks and other policy groups** sector in Delhi.

- The Dialogue’s success as an emerging global platform reflects how governments **can shed their rigid “we know it all approach” and collaborate with think tanks** and other parties with a stake in global affairs for informed and credible engagement.

## MAITRI SETU

### In News:

The Maitri Setu connecting Sabroom is set to become operational from September 2023.

### Analysis of Background:

#### Maitri Setu

- Maitri Setu (lit. **friendship bridge**) is a 150-metre (490 ft) bridge on the **Feni River** that **links Tripura in India with Chittagong port in Bangladesh**.
- Thus, it provides a **shorter and more economical alternate land route between India's eastern and western states** compared to the longer route through Assam.



### Significance

- The opening of the Maitri Setu connecting Sabroom in Tripura and Chittagong port **will give India’s northeastern region and landlocked countries like Bhutan and Nepal access to the Bay of Bengal**.
- This **will significantly boost connectivity, development and security in the region**.
- The bridge place a **very important economic role as a major trade route to Northeast India**, with access to Chittagong Port, which is just 80 kilometers from the border.

- The land route between Agartala and Kolkata Port through this bridge is just 450 km via Bangladesh compared to the 1600 km land route via Siliguri Corridor.
- **Logistics cost from Agartala to Kolkata Port will be 80% lower, as compared to the Siliguri Corridor**, if the goods are sent through this bridge via Chattogram Port 200 km away
- Chittagong port is just around 80 km away from **Tripura's last border town Sabroom** and can be covered by road in two-and-a-half hours. The opening of Maitri Setu **will further boost connectivity with India's strategic northeastern region.**
- With the opening of this bridge, apart from India's northeastern region, **other landlocked countries in the region like Bhutan and Nepal will now get access to the Bay of Bengal.**
- Connectivity is vital for the development of every country in the Indo-Pacific region.

#### **Other Strategic steps being taken**

- The Maitri Setu is but another project to boost connectivity in the Northeast and neighboring countries, including Myanmar and Bangladesh **in the face of Chinese influence in the region.**
- China has already gained a backdoor entry to the Indian Ocean by investing in the Kyaukpyu port in Myanmar's Rakhine state. Other Chinese infrastructure projects in the region under the BRI include the construction of the Hambantota port in Sri Lanka and the building of an airport in the tourist city of Pokhara in Nepal.
- To counter these, the **Sittwe port, also in the Rakhine state of Myanmar, was constructed by India.** The port connects with Mizoram in northeastern India via the Kaladan Multimodal Transit Transport Corridor, the construction of which is close to completion.
- The **Kaladan Multimodal Transport Corridor** is not confined to connecting Mizoram to Myanmar but it also encompasses India's expanded outreach to the prosperous Southeast Asian economies.
- Additionally, India, being a member of the BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation), the new connectivity routes would help India deepen its presence and ties with the prosperous Southeast Asian countries.
- Access to the Bay of Bengal will also substantially bring down freight transportation costs to the Northeast. As of now, the only option for freight transportation between

the Northeast and the rest of India is through the Siliguri Corridor, popularly **known as the Chicken's Neck**.

- With the chain of ports along India's eastern coast, **Indian naval ships can now freely ply in the Bay of Bengal**, which is at the centre of the Indo-Pacific region. This **will help deter the presence of Chinese naval ships in these waters**.
- In terms of land connectivity, **India is also constructing the India-Myanmar-Thailand Trilateral Highway**. The Highway connects Moreh in Manipur with Mae Sot in Thailand via Mandalay, Naypyitaw and Bago in Myanmar.
- In terms of sub-regional connectivity, **India is a party to the Bangladesh-Bhutan-India-Nepal (BBIN) Motor Vehicle Agreement**. The Agreement was **conceived after the South Asian Association for Regional Cooperation (SAARC)** failed to agree on a regional motor vehicles agreement at a summit in Nepal in 2014, mainly because of opposition from Pakistan.\
- India, Bangladesh and Bhutan have signed the agreement. Bhutan, though, has temporarily opted out pending parliamentary approval. Operationalizing the MVA by concluding the Passenger and the Cargo Protocol will help realise the full potential of trade and people-to-people connectivity between the BBIN countries by fostering greater sub-regional cooperation.

#### **FENI RIVER**

- Feni River is a river in southeastern Bangladesh and Tripura state of India. It is a trans-boundary river with an ongoing dispute about water rights. The Feni River **originates in South Tripura district** and flows through Sabroom town and then enters Bangladesh. Muhuri River, also called Little Feni, from Noakhali District joins it near its mouth. According to the Indian government press release, there has been no water-sharing agreement between the countries on the Feni previously.
- The dispute over the sharing of the river water has been long-standing. It was taken up between India and Pakistan (before the independence of Bangladesh) in 1958.

## B20 Summit India 2023

### In News:

The Prime Minister Shri Narendra Modi addressed the B20 Summit India 2023 in New Delhi.

### Analysis of Background:

#### B20 Summit

#### About

- The Business 20 (B20) is the **official G20 dialogue forum with the global business community.**

#### Established

- **Established in 2010**, B20 is among the most prominent Engagement Groups in G20, with companies and business organizations as participants.
- The B20 works to deliver concrete actionable policy recommendations to spur economic growth and development.

#### Theme

- The three-day summit is being held from 25th to 27th August. Its theme is **A.I.S.E – Responsible, Accelerated, Innovative, Sustainable and Equitable Businesses. It is being attended by over 1,500 delegates from about 55 countries.**

#### Role

- B20 Summit India brings policymakers, business leaders and experts from across the world to deliberate and discuss the B20 India Communique. The B20 India Communique includes 54 recommendations and 172 policy actions for submission to G20.

## KAMPALA DECLARATION ON CLIMATE CHANGE, HUMAN MOBILITY

### In News:

The Kampala Ministerial Declaration on Migration, Environment, and Climate Change (KDMECC) has garnered support from 48 African countries, highlighting the continent's collective commitment to tackling the interplay of human mobility and climate change.

## **Analysis of Background:**

### **Expansion of KDMECC**

- The **KDMECC, originally endorsed by 15 African states in Kampala, Uganda in July 2022, seeks to address climate-induced migration practically and effectively.**
- A Conference of States, co-hosted by Kenya and Uganda with support from the International Organization for Migration (IOM) and the United Nations Framework Convention on Climate Change (UNFCCC), discussed the continental expansion of KDMECC.
- **This expansion allows African states to formulate a unified stance ahead of the Africa Climate Summit and Conference of Parties (COP 28).**

### **Vulnerability to Climate Change**

- Africa is identified as one of the most vulnerable continents to climate change impacts.
- Increasing frequency and intensity of extreme weather events directly influence migration patterns.

### **Benefits of KDMECC**

- KDMECC stands as the first comprehensive, action-oriented framework led by Member States to address climate-induced human mobility.
- It aims to provide practical solutions to the challenges posed by climate change in relation to migration.

### **Projected Migration Numbers**

- A report by the Internal Displacement Monitoring Centre revealed over 7.5 million new internal disaster displacements in the recent year.
- Without intervention, up to 105 million people could potentially become internal migrants within Africa, underlining the urgent need for proactive measures.

### **Policy and Implementation**

- The KDMECC-AFRICA is set to be signed by Member States during the Africa Climate Summit in Nairobi on September 4, 2023. This expansion ensures inclusivity, with a focus on youth, women, and vulnerable populations.
- The KDMECC-AFRICA emphasizes that the voices of diverse segments, including youth, women, and those in vulnerable situations, are given precedence.

## **Background**

- The Inter-Ministerial Conference on Migration, Environment, and Climate Change held in Kampala, Uganda from 27 to 29 July brought together governments across Africa to address the critical issue of climate change-induced human mobility.
- Organized by RCC Kampala, the International Organization for Migration (IOM), and the Ministry of Water and Environment of Uganda, the conference aimed to enhance collaboration on this pressing challenge.

## **Key Highlights**

### **Diverse Representation**

- The conference was hosted by President of Uganda and saw the participation of Ministers of Environment, Interior, and Foreign Affairs from countries in the Inter-Governmental Authority on Development (IGAD), the East African Community (EAC), and the East and Horn of Africa.
- High-level representatives from the African Union, UN agencies, development partners, and youth delegates were also present.

### **Conference Theme: Enhancing Cooperation**

- The central theme of the conference revolved around "Enhancing cooperation in relation to climate change induced human mobility, including migration, displacement, and planned relocation."

### **Kampala Ministerial Declaration**

- The conference culminated in the creation of a landmark document known as the "Kampala Ministerial Declaration on Migration, Environment, and Climate Change."
- This declaration underscores concerns regarding the impact of climate change on human mobility and emphasizes the need for enhanced collaboration and action.

### **Areas of Concern**

The Declaration identifies five key areas of concern that require urgent attention:

- Progressive desertification and land degradation leading to forced migration of people and livestock.



- Unsustainable ecosystem use and the effects of extreme weather events on communities and livestock.
- Unplanned migration from rural to urban areas due to climate change and disasters.
- Scarcity of data on climate change's impact on human and livestock mobility in the region.
- Limitations in partnerships and funding to address climate-induced mobility challenges.

### **About Kampala**

- Kampala is the **capital and largest city of Uganda**, a country located in East Africa.
- It is situated in the southern part of Uganda, near the northern shores of Lake Victoria.
- Kampala is not only the political and administrative center of Uganda but also a major economic and cultural hub in the region.

**Geography and Location:** Kampala is located at an altitude of about 1,190 meters (3,900 feet) above sea level. It is situated on several hills and valleys, which gives the city a unique topography. The city lies on the shores of Lake Victoria, which is the largest freshwater lake in Africa.

**Economy:** Kampala plays a significant role in Uganda's economy. The city is home to various industries, including manufacturing, finance, trade, and services. The informal sector also contributes significantly to the city's economy.

**Culture and Entertainment:** Kampala has a vibrant cultural scene with a mix of traditional and modern influences. The city hosts numerous events, festivals, and art exhibitions. The Uganda National Cultural Centre and the Ndere Centre are important venues for showcasing Ugandan music, dance, and cultural performances.

**Landmarks and Attractions:** The city is known for its historical and modern landmarks. Some notable places include the Uganda Museum, Kasubi Tombs (a UNESCO World Heritage Site), Gaddafi National Mosque, Namugongo Martyrs Shrine, and the Kabaka's Palace.

**Languages:** English and Swahili are widely spoken in Kampala, along with various local languages.

### **About IOM**

- The International Organization for Migration (IOM) is a leading intergovernmental organization that works to ensure orderly and humane migration management.

- Established in 1951, it was initially founded to assist in the resettlement of people displaced by World War II.
- Since then, IOM's scope has expanded, and it now addresses a wide range of migration-related challenges globally.

### **Mission and Objectives**

IOM's primary mission is to promote safe, orderly, and humane migration for the benefit of all. Its core objectives include:

**Migration Management:** IOM supports governments and societies in managing migration effectively by providing technical assistance, policy advice, and capacity building. This includes helping countries develop migration policies that balance the interests of migrants and host communities.

**Migration and Development:** IOM recognizes the positive linkages between migration and development. It works to maximize the developmental potential of migration by facilitating the contributions of migrants to their home and host countries.

**Humanitarian Assistance:** IOM responds to humanitarian crises, including natural disasters and conflicts, by providing emergency assistance to displaced populations. This assistance includes shelter, health care, and other essential services.

**Counter-Trafficking and Smuggling:** IOM is committed to combating human trafficking and migrant smuggling. It assists victims of trafficking, raises awareness about the dangers of irregular migration, and helps strengthen national and international efforts to prevent these crimes.

**Migration Health:** IOM supports migrants' health by providing medical assessments, vaccinations, and health care services. It addresses health-related challenges faced by migrants and promotes the health of both migrants and host communities.

**Migration Research and Data:** IOM conducts research to generate reliable migration data and analysis. This information is essential for evidence-based policy-making and understanding migration trends.

## **BRICS EXPANSION**

### **In News:**

The leaders of the BRICS nation **decided to admit six countries to their grouping.**

## Analysis of Background:

- The predecessor of BRICS (Brazil, Russia, India, China, and South Africa) was BRIC (Brazil, Russia, India, and China) **established by Goldman Sachs in 2006**.
- BRIC was the acronym for the four countries, which were deemed to be at a **similar stage of newly advanced economic development**. Behind BRIC was the idea that China and India will, by 2050, be the world's dominant suppliers of manufactured goods, while Brazil and Russia will become dominant as suppliers of raw materials.
- With the induction of South Africa in December 2010, BRIC became BRICS whose original aim was the establishment of an equitable, democratic, and multi-polar world order.
- The BRICS mechanism aims to promote peace, security, development and cooperation. It also aims at contributing significantly to the development of humanity and establishing a more equitable and fairer world.
- Despite the five members' divergent economic trajectories in the years since—with China and India having grown impressively while the other three saw weak growth—the BRICS group has made significant progress.
- Together, BRICS countries have 3.24 billion inhabitants—or **41 percent of the world population**—and a combined gross domestic product (GDP) of \$26 trillion, or 60 percent of the G7 countries' combined GDP. However, on a purchasing power parity basis, BRICS countries' GDP accounts for **5 percent of the global economy**, overtaking the G7 share of 30.4 percent. Despite this, BRICS countries **get only 15 percent of the voting power at the International Monetary Fund**—a source of developing countries' discontent over the governance of international financial institutions.
- The group's achievements include the **establishment of the New Development Bank (NDB) in 2015** with a total capital of \$100 billion and paid-up capital of \$50 billion equally subscribed by the five members. The bank funds sustainable development and infrastructure projects in member countries; NDB-funded projects in India include the Mumbai Metro rail, the Delhi-Meerut Regional Rapid Transit System and a number of renewable energy projects.

## 15<sup>th</sup> BRICS Summit

- The 2023 BRICS summit is the fifteenth ongoing annual BRICS summit, an international relations conference attended by the heads of state or heads of government of the five member states: Brazil, Russia, India, China, and South Africa.

- South African President Cyril Ramaphosa also invited the leaders of 67 countries to the summit, including 53 other African Countries, Bangladesh, Bolivia, Indonesia and Iran.
- Discussions focus on spheres of political and socioeconomic coordination, in which member countries have identified business opportunities, economic complementarities, and areas of cooperation.
- As the Chair of BRICS, South Africa is focusing on the theme, ***'BRICS and Africa: Partnership for Mutually Accelerated Growth, Sustainable Development, and Inclusive Multilateralism'***.
- **This theme informs South Africa's five priorities for 2023:**
  - Developing a partnership towards an equitable just transition,
  - Including managing the risks associated with climate change;
  - Transforming education and skills development for the future;
  - Unlocking opportunities through the African continental free trade area;
  - Strengthening post-pandemic socioeconomic recovery and the attainment of the 2030 agenda on sustainable development; and strengthening multilateralism, including reform of global governance institutions and strengthening the meaningful participation of women in peace processes.

## **BRICS EXPANSION**

- The BRICS brings together five of the largest developing countries in the world—**Brazil, Russia, India, China, and South Africa** and represents **41 percent of the global population, 24 percent of the global GDP and 16 percent of the global trade.**
- Several countries, **including Argentina, Egypt, Indonesia, the UAE, Saudi Arabia, and others, are willing to join the bloc.**

### **The proposition**

- BRICS is considering expanding its membership, and a growing number of countries, mostly from the global South, have expressed interest in joining.
- Several countries including the United Arab Emirates, Saudi Arabia, Argentina, Iran, Egypt, Bahrain, Indonesia, and Kazakhstan had shown their willingness to join the BRICS.
- **Around 40 countries had shown interest in joining BRICS out of which 23 formally applied for the membership.**
- Earlier, representatives from Iran, Saudi Arabia, the United Arab Emirates, Cuba, the Democratic Republic of Congo, Comoros, Gabon, and Kazakhstan attended a meeting in

Cape Town for so-called **“Friends of BRICS”** talks. Egypt, Argentina, Bangladesh, Guinea-Bissau, and Indonesia participated virtually.

### **The expansion in the recent 15<sup>th</sup> Summit**

- The leaders of the BRICS nation **decided to admit six countries, Argentina, Egypt, Ethiopia, Iran, Saudi Arabia and the United Arab Emirates(UAE) as full members of BRICS.**
- The Chinese move to include Pakistan as a member country was turned down due to the strong opposition from India.

### **The decision to Expand**

- The decision on the new members was agreed upon after firming up the guiding principles, criteria and procedures for the expansion process.
- BRICS foreign ministers have been tasked **to further develop the BRICS partnership model and list of prospective countries** (which want to join the grouping).

### **The Need for Expansion**

- An expansion of the BRICS bloc is undergoing since countries – see one thing in common: a desire to level **the global playing field.** This is lacking because of the **wealthy West's domination of international bodies, such as the United Nations, the International Monetary Fund or the World Bank.** The list of grievances is long. **Abusive trade practices. Punishing sanctions regimes. Perceived neglect of the development needs of poorer nations.**
- Amid widespread dissatisfaction with the prevailing world order, the pledge of BRICS nations - currently Brazil, Russia, India, China and South Africa - to make the grouping a **leading champion of the "Global South"** has, found resonance.

### **Significance of the recent Expansion**

- The **"expansion and modernization"** of BRICS is a message that **all institutions in the world need to mold themselves according to changing times.**
- **India has always fully supported the expansion of the BRICS membership.** India has been of the view that the **addition of new members will further strengthen BRICS as an organization,** and give a new impetus to all our common endeavors.

- The decision to expand the bloc **will further strengthen the faith of many countries in the multipolar world order.**
  - This can become an **example for the reform of other global institutions established in the 20th century.**
  - It **will bring new vigor to the BRICS cooperation mechanism**, further strengthening a force for world peace and development.
  - Through this Summit, BRICS has **embarked on a new chapter in its effort to build a world that is fair, a world that is just, a world that is also inclusive and prosperous.**
- Benefits of the BRICS Expansion and launching of BRICS currency**

Here are some of the benefits of the BRICS Expansion plan and launching of BRICS currency:

**Increased Economic Cooperation:**

- The BRICS countries are working together to increase their economic cooperation.
- This could lead to increased trade, investment, and development.

**Reduced reliance on the US dollar:**

- The BRICS countries are trying to reduce their reliance on the US dollar.
- This could give them more control over their own economies and reduce their vulnerability to US economic policies.

**Increased influence in the Global Economy:**

- The BRICS countries are working to increase their influence in the global economy. This could lead to increased trade, investment, and development for these countries.
- When we look at the broader aspect the BRICS Expansion plan and launching of a common currency are ambitious projects. However, they could have a significant impact on the global economy.
- If successful, these projects could lead to increased economic cooperation, reduced reliance on the US dollar, and increased influence for the BRICS countries in the global economy.

**Benefits specific to India**

**Here are some ways in which India could benefit from the expansion of BRICS and the launch of a new BRICS currency:**

### **Reduced dependence on the US dollar:**

- India is currently heavily dependent on the US dollar for its foreign trade and currency reserves.
- This makes India vulnerable to fluctuations in the value of the dollar, which can have a negative impact on India's economy.
- A BRICS currency would provide India with an alternative to the dollar, which would reduce its dependence on the US and make its economy more stable.

### **Increased trade and investment:**

- A BRICS currency would make it easier for India to trade with other BRICS countries.
- This could lead to increased trade and investment between India and other BRICS countries, which would boost India's economy.

### **Reduced political pressure from the US**

- The US has a history of using its financial power to exert political pressure on other countries.
- For example, the US has imposed sanctions on countries that do not cooperate with its sanctions on Iran.
- A BRICS currency would reduce India's vulnerability to this type of political pressure from the US.
- Overall, the expansion of BRICS and the launch of a new BRICS currency could have a number of positive benefits for India. These benefits include reduced dependence on the US dollar, increased trade and investment, and reduced political pressure from the US.

### **Challenges**

- BRICS aspirants Argentina and Egypt, to name just two, are also members of the infamous **"Coffee Club" (United for Consensus)** —opposed to India's membership in the UNSC. They also get a lot of support from China.

## COFFEE CLUB

Uniting for Consensus (UfC), nicknamed the Coffee Club, is a movement that developed in the 1990s **in opposition to the possible expansion of permanent seats in the United Nations Security Council**. Under the leadership of Italy, it aims to counter the bids for permanent seats proposed by G4 nations (Brazil, Germany, India, and Japan) and is calling for a consensus before any decision is reached on the form and size of the United Nation Security Council.

The Coffee Club includes Italy, Pakistan, South Korea, Colombia, Costa Rica, Mexico, Turkey, Canada, Spain, Argentina, Malta and San Marino which obstruct every move of the G4 members.

This club was **established in 1995** and involves some 12 countries and primarily objects to one move in the UNSC reforms, the expansion.

The Coffee Club does not want any other permanent memberships; however, they want non-permanent seats in the UNSC to increase.

- China is looking at the potential expansion primarily through the lens of **expanding its sphere of influence**.
- China has been trying since 2017 to expand the group by including other countries to constitute a BRICS Plus framework. Its **main motivation seems to be the transformation of BRICS into a China-centric bloc, entrap the new members with loans under its Belt and Road Initiative, exporting manufactured goods** for which its markets in the West are contracting and demonstrating to the West that it is a leader of the Global South. China perceives that the economic performance of Brazil, Russia, and South Africa has deteriorated; Russia is besieged by the Ukraine war; India is getting closer to the US-led groupings; and unless the BRICS expands with the inclusion of big developing countries, its global influence will wane.
- With the SCO and BRICS, China dominates the two most prominent “alternate” groupings — neither of which includes the US.
- The BRICS is a relatively young group; there are **wide disparities in size, outlook, and perceptions of its members** about a multipolar world and restructuring of the global organs of power. The group has so far taken a non-confrontational stance and **stayed away from the rivalry between the West and the China-Russia-Iran axis**. Making the group too big would make **decision-making more complicated and time-consuming**.



## NORTHERN SEA ROUTE

### In News:

Murmansk port the beginning point of the **Northern Sea Route (NSR)**, is witnessing the rising trend of Indian involvement in cargo traffic.

### Analysis of Background:

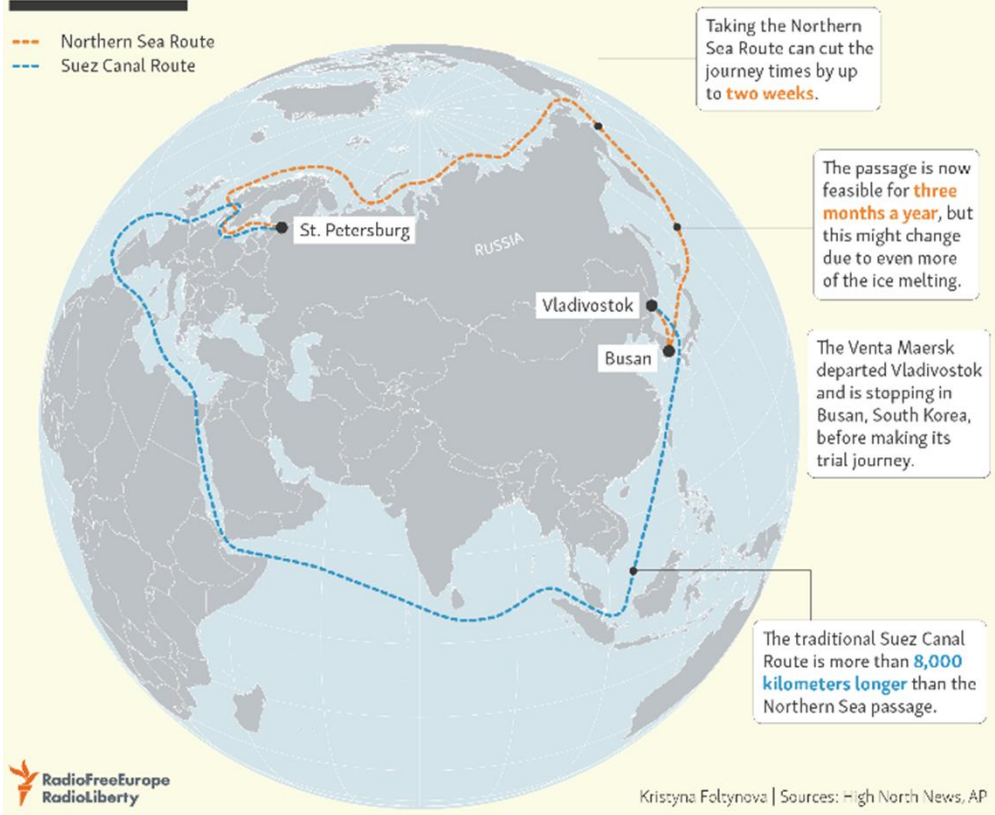
- In the first seven months of 2023, India got the lion's share with **35% of eight million tonnes of cargo handled by the Murmansk port, which is about 2,000 km northwest of Moscow.**

### Northern Sea Route (NSR)

- The **Northeast Passage [also known as the Northern Sea Route (NSR)]**, the shortest shipping route for freight transportation between Europe and countries of the Asia-Pacific region, **straddles four seas of the Arctic Ocean.**
- Running to 5,600 km, the Route begins at the boundary **between the Barents and the Kara seas (Kara Strait) and ends in the Bering Strait (Provideniya Bay).**
- The Northern Sea Route (NSR) defined by Russian legislation as running from the entrances to the Novaya Zemlya straits in the west, along the Russian Arctic coast above Siberia **through the Kara Sea, Laptev Sea, East Siberian Sea, and Chukchi Sea**, to Cape Zhelaniya on the Bering Strait.

# Northern Sea Route: A New Shipping Highway?

Maersk, the world's biggest shipping company, is preparing to send a cargo vessel through the Russian Arctic for the first time. This is how the passage compares to the traditional Suez Canal route.



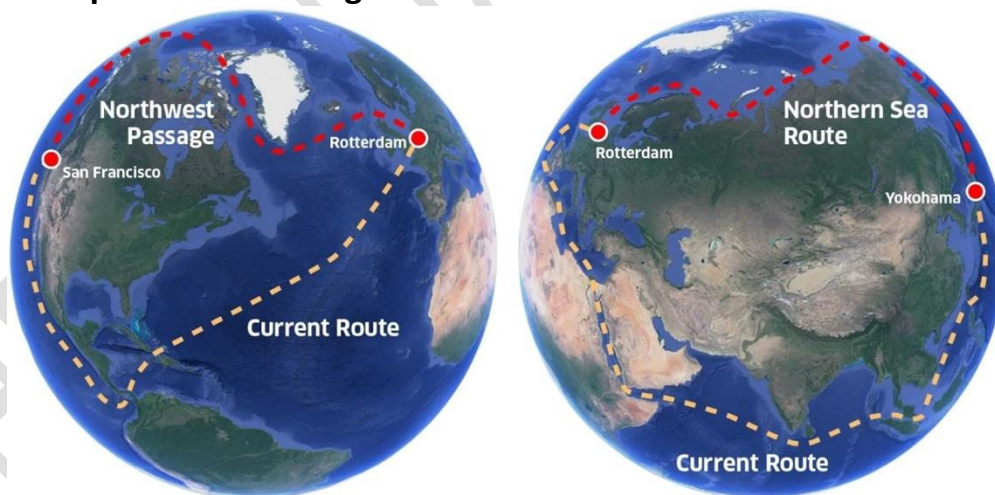
## Northern Sea Route Ports



- The **entire route lies in Arctic waters and within Russia's exclusive economic zone (EEZ)**, and is included in what has been called the Northeast Passage, analogous to Canada's Northwest Passage.
- The Northern Sea Route **itself does not include the Barents Sea, and it therefore does not reach the Atlantic.**
- The Northern Sea Route currently serves the Arctic ports and major rivers of Siberia by importing fuel, equipment, food and exporting timber and minerals.
- Some parts of the route are only free of ice for two months per year, but **melting Arctic ice caps are likely to increase traffic and the commercial viability of the Northern Sea Route.**
- ***Distance savings along the NSR can be as high as 50% compared to the currently used shipping lanes via Suez or Panama.***
- The 2021 blockage of the Suez Canal, which forms part of the widely-used maritime route involving Europe and Asia, has **led to greater attention on the NSR.**

#### **Northern Sea Route Vs North west passage**

- The Northwest Passage is a series of possible shipping routes connecting the Atlantic and Pacific Oceans through the Canadian Arctic.
- The Northeast Passage (also known as the Northern Sea Route) is **any shipping route between Europe and Asia along the northern shores of Russia.**





The Economist

### Who owns the Northwest and Northeast Passages?

- International law states that no one owns the North Pole, or the oceans immediately surrounding it. The five 'Arctic nations' (US, Russia, Canada, Norway, and Greenland) adjacent to the Arctic Ocean can each claim as an exclusive economic zone (EEZ) the 200 nautical miles of ocean off their coastline. However, there is much dispute over whether other parts of the seas in this region form a country's national waters or internal waters.
- In 1985, Canada designated the whole area through which the Northwest Passage passes as a Canadian archipelago (group of islands), claiming the route as part of their internal waters.
- If this was deemed to be the case, Canada would be able to regulate fishing and set laws on smuggling, shipping, and the environment, however, it would not be able to close the route to navigation by foreign vessels.
- Canada has until 2013 to submit its case officially to the UN. Until then, the uncertainty over sovereignty of the Northwest Passage continues. For example, the US disputes the Canadian's claim and considers that the Passage is an international strait.

### Why are they so important?

- The main reason that the **Northwest and Northeast Passages** are so important is for **shipping**.
- The Northwest Passage route is **7,000 km shorter than the current route through the Panama Canal**, and the Northeast Passage route is **one-third of the distance of the traditional route through the Suez Canal**.
- Shorter **distances mean less travel time, lower fuel consumption and costs**.
- The Managing Director of one shipping company, Nordic Bulk Carriers, has estimated that using the Northeast Passage instead of the Suez Canal would save up to \$180,000 in fuel costs. There is also the **much-reduced level of piracy** through these **northern routes**, compared to the risk of piracy for ships in the Indian Ocean that are using the Suez Canal.

### Why aren't they used all the time, then?

- The Arctic shipping routes aren't used all the time because this region is frozen over for most of the year. However, although in the far north, the sea ice is permanent; at lower latitudes it is seasonal.
- Climate change is gradually increasing the area that is ice-free during the summer, and lengthening the period that it remains so. A representative of the organization Environment Canada notes that the temperature in the Canadian Arctic has risen by 1.2°C in the last century, which is twice the global average. Ice cover in this region has been reduced by 32% since the 1960s. As a result of global warming, the Northwest and Northeast Passages are becoming increasingly viable as shipping routes.

### How is Russia making the NSR navigable?

- As the seas of the Arctic Ocean remain icebound during most of the year, icebreaking assistance is organized to ensure safe navigation along the NSR.
- Russia is the **only country in the world with a nuclear-powered icebreaker fleet**.
- In December 1959, the **world's first nuclear icebreaker, "Lenin," was put into operation**, unveiling a new chapter in the NSR development. It was decommissioned 30 years later.
- Today, FSUE Atomflot, a subsidiary of Rosatom, acts as the fleet operator of nuclear-powered icebreakers. The fleet comprises seven nuclear-powered icebreakers, apart

from one nuclear container ship. Three more are expected to be commissioned between 2024 and 2027.

### **Why is the Arctic region significant to India?**

- India has been showing greater interest in the NSR for a variety of reasons.
- The vulnerability of the Arctic region, which is above the Arctic Circle and includes the Arctic Ocean with the North Pole at its center, to unprecedented changes in the climate may have an impact on India in terms of economic security, water security, and sustainability.
- The region also **constitutes the largest unexplored prospective area for hydrocarbons remaining on the earth.**
- It is estimated that **the region may hold over 40 percent of the current global reserves of oil and gas.**
- There may also be **significant reserves of coal, zinc and silver.**” However, the **government’s Arctic Policy of 2022** mentions that the country’s approach to economic development of the region is guided by UN Sustainable Development Goals.

### **How old is India’s engagement with the Arctic?**

- India’s engagement with the Arctic can be traced to the **signing of the Svalbard Treaty in February 1920 in Paris.**
- India is undertaking several scientific studies and research in the Arctic region. This encompasses atmospheric, biological, marine, hydrological and glaciological studies.
- Apart from setting up a research station, **Himadri, at Ny-Ålesund, Svalbard, in 2008**, the country launched its inaugural multi-sensor moored observatory and northernmost atmospheric laboratory in 2014 and 2016 respectively.
- Till last year, thirteen expeditions to the Arctic were successfully conducted.
- In May 2013, India became **an observer-state of the Arctic Council along with five others including China.**

### **What are the driving factors for India to participate in the NSR development?**

- Primarily, the growth in cargo traffic along the NSR is on the constant rise and during 2018-2022, the growth rate was around 73%. Last year, the volume of cargo traffic was 34.117 million tonnes.

- With India increasingly importing crude oil and coal from Russia in recent years, “the record supplies of energy resources for the Indian economy are **possible due to such a reliable and safe transport artery as the NSR.**”
- Secondly, the **NSR, as a transit route, assumes importance, given India’s geographical position and the major share of its trade associated with sea transportation.**
- Thirdly, the **Chennai-Vladivostok Maritime Corridor (CVMC) project**, an outcome of signing of the memorandum of intent between the two countries in September 2019, is being examined as one linking with another organise international container transit through the NSR.
- The **10,500 km-long CVMC**, passing through the Sea of Japan, the South China Sea and Malacca Strait, **will bring down transport time to 12 days**, almost a third of what is taken under the existing St. Petersburg-Mumbai route of 16,000 km.
- Coking coal [used by steel companies], crude oil, Liquefied Natural Gas (LNG) and fertilisers are some of the cargo that can be imported from Russia to India through CVMC.
- Fourthly, experts are discussing the possibility of China and Russia gaining collective influence over the NSR.

#### **What lies forward?**

- The NSR development plan until 2035, as approved by the Russian government last year, **sets the cargo traffic target as 80 million tonnes and 150 million tonnes for 2024 and 2030.** The plan approval took place amid economic sanctions imposed by the West against Russia.
- In March 2023, a Russian delegation held meetings with the Indian business community on the NSR development. The delegation had promised to provide the availability of key components for the year-round operation of the route.
- Russia seeks the participation of Indian companies in projects related to the NSR.
- As for the CVMC project, a workshop, featuring stakeholders from the two countries, is expected to be held in the second half of October.

#### **What is the impact of all this on the environment of the Arctic?**

- Many environmental groups oppose any future exploitation of the Arctic region. In addition, an increase in the numbers of cargo ships cargo ships using the Arctic Sea

routes may have a very specific impact on climate change. These ships use **advanced diesel engines which emit black carbon (soot) into the atmosphere.**

- Black carbon acts as a greenhouse gas in a similar way to carbon dioxide, and in addition, when it is deposited on snow and ice it alters the albedo (the reflective quality) of these surfaces.
- White surfaces such as snow and ice reflect sunlight, keeping the ground relatively cool. In contrast, black surfaces (such as when the snow is covered by soot) can absorb more energy from the sunlight leading to relatively higher ground temperatures and the potential for the snow and ice to melt.
- An Increased number of ships travelling through the Arctic **may also bring new species into this distinct ecosystem.** For example, species 'alien' to the Arctic may be carried in water used by ships for ballast or on their hulls.
- These ships **may also threaten the biodiversity of the Arctic's ballast.** Introducing aggressive new species to the region in this way could have a serious impact on Arctic ecosystems.
- Opening up the Arctic Ocean would also **create the potential for more fishing, which may need international action to establish quotas on the levels and species of fish caught.**

## ECONOMY

### INCREMENTAL CRR

#### In News:

The Reserve Bank of India (RBI) Governor has announced a temporary measure involving the Cash Reserve Ratio (CRR), which is the portion of deposits that banks are required to maintain with the central bank.

#### Analysis of Background:

- The RBI Governor announced that Indian banks must maintain an incremental CRR of 10% on the rise in deposits between May 19 and July 28. This requirement will be in effect for the fortnight starting August 12.



## Highlights of the Announcement

- **Purpose of the Measure:** The purpose of this temporary measure is to absorb liquidity from the return of high-denomination notes that was announced by the central bank in mid-May. This liquidity overhang needed management to ensure the stability of the financial system.
- **Temporary Nature:** Governor Das emphasized that this measure is temporary in nature. He assured that even after the temporary impounding, there will still be adequate liquidity in the system to meet the credit needs of the economy.
- **Review Date:** The measure will be reviewed on September 8 or earlier. The impounded funds will be returned to the banking system ahead of the festival season, which suggests that this measure is not intended to be a long-term policy change.
- **Liquidity Surplus:** The banking system has experienced a liquidity surplus, with the average being around Rs 2.5 lakh crore (\$30.18 billion) in August, which is higher than the previous month of July.
- **Discontinuation of Reverse Repos:** The RBI has stopped conducting lower-durability variable-rate reverse repos after auctions were not fully subscribed about a month ago. Reverse repos are a tool used by central banks to manage liquidity by absorbing excess funds from banks.

A trader from a private bank mentioned that banks will need to maintain excess CRR for the next two fortnights, leading to a reduction in the current liquidity surplus. The amount that could be withdrawn due to this measure is estimated to be less than one trillion rupees.

## Incremental Cash Reserve Ratio (CRR)

### About

- The Incremental Cash Reserve Ratio (CRR) is a **monetary policy tool used by central banks, including the Reserve Bank of India (RBI), to manage liquidity in the banking system.**
- CRR is the portion of a bank's deposits that it is required to hold with the central bank. The Incremental CRR is an additional requirement imposed on banks for a specific period to absorb excess liquidity from the banking system.

## Features

- **Temporary Nature:** The Incremental CRR is not a permanent measure; it's implemented for a short duration to address a particular liquidity issue or economic circumstance. It's not a long-term policy but rather a tool used when needed.
- **Specific Time Frame:** This refers to the fact that the Incremental CRR is not a continuous or ongoing requirement. It's applied over a defined period that is linked to a specific event, policy change, or economic situation. Once the situation is resolved or the designated period ends, the requirement may be lifted.
- **Targeted Absorption:** The purpose of the Incremental CRR is to absorb excess liquidity in the banking system that might arise due to particular events, policies, or economic conditions. By mandating banks to hold a higher reserve, the central bank aims to control the flow of money and manage the liquidity situation more effectively.
- **Graduated Approach:** The central bank typically specifies a certain percentage of additional CRR that banks need to maintain on the incremental deposits they receive during the specified period. This additional percentage might be higher than the regular CRR. The graduated approach ensures that the impact on banks' liquidity and lending activities is proportional and manageable.

Overall, the Incremental CRR is a tool used by central banks to fine-tune the liquidity levels in the banking system for a limited duration, addressing specific circumstances that require temporary measures. It allows the central bank to exert a targeted influence on the economy without committing to a permanent policy change.

## Significance

### Liquidity Management

- Excessive liquidity in the banking system can lead to an array of problems, including inflation and speculative activities. **By implementing Incremental CRR, central banks can regulate the level of liquidity in the financial system.** This ensures that there's an appropriate amount of money available to support economic activities without allowing excess funds to drive inflation or create financial imbalances.

### Monetary Policy Control

- Central banks use monetary policy to influence economic growth, inflation, and other macroeconomic factors. The CRR, including the incremental component, is a tool that central banks can utilize to control the money supply. **When the central bank wants to**

**tighten monetary policy, it can increase the CRR, which restricts the amount of money that banks can lend.** Conversely, when the central bank wants to stimulate the economy, it can lower the CRR. This allows central banks to exercise direct control over credit availability and lending conditions.

### **Price Stability**

- An oversupply of money in the economy can lead to rising prices, commonly known as inflation. Incremental **CRR plays a significant role in maintaining price stability by absorbing excess liquidity that could otherwise contribute to inflationary pressures.** By ensuring that there is an appropriate balance between money supply and economic activity, central banks can help prevent rapid price increases and their potential negative effects on consumers and businesses.

In essence, Incremental CRR is a tool that central banks use to fine-tune the economy's financial conditions, enhance the effectiveness of monetary policy, and promote a stable economic environment by managing liquidity and mitigating inflationary risks.

**Challenges that need to be carefully managed by central banks and financial institutions.**

### **Liquidity Shortage**

- **Setting the incremental CRR requirement too high can lead to a shortage of liquidity in the banking system.** This shortage might restrict banks' ability to lend, affecting economic activities and the smooth functioning of financial markets. If the liquidity shortage becomes severe, it could potentially lead to increased interest rates and market instability.

### **Banks' Profitability**

- Requiring banks to allocate a higher proportion of their funds to reserves can reduce the amount of money available for lending and other revenue-generating activities. This can **impact banks' profitability, especially if their lending income is a significant part of their earnings.** Striking a balance between maintaining adequate reserves for stability and allowing banks to remain profitable is a challenge.

## Communication Challenges

- Communicating the rationale behind implementing incremental CRR and managing market expectations can be complex. If the central bank's intentions are not communicated, it might lead to uncertainty and market volatility. Central banks need to effectively communicate the reasons for the measure, its temporary nature, and its expected impact on the financial system.

Addressing these challenges requires careful consideration, planning, and clear communication strategies. Central banks need to assess the potential impact of Incremental CRR and its duration to ensure that the benefits of using the tool outweigh the potential negative consequences. Monitoring market reactions and adjusting communication strategies accordingly can also help in managing the challenges associated with Incremental CRR implementation.

## FLOATING RATE LOANS

### In News:

The Reserve Bank of India (RBI) has announced a major reform for home loan borrowers. The central bank will introduce a transparent framework to reset interest rates on floating-rate loans such as home loans. This was announced by RBI Governor at the bi-monthly monetary policy meeting recently.

### Analysis of Background:

- This move is aimed at addressing the issues faced by borrowers who opt for floating-rate loans, which are linked to a benchmark rate that changes over time. The RBI said that all regulated entities will implement a proper conduct framework to ensure fair and transparent pricing of floating-rate loans and detailed guidelines in this regard will be issued shortly.
- In India, banks have the freedom to offer all categories of loans at fixed or floating rates. The methodology of computing the floating rate is supposed to be objective, transparent and mutually acceptable to both the lender and the borrower. However, in practice, there have been complaints from borrowers about the lack of transparency and unfair practices by some banks in resetting the interest rates on floating-rate loans.

## Why is RBI introducing a new framework?

- Floating-rate loans, also known as variable-rate loans, are **loans where the interest rate fluctuates over time based on market conditions**. These loans are often linked to a benchmark interest rate, such as the repo rate, LIBOR (London Interbank Offered Rate), or other external market benchmarks. The idea behind such loans is to provide borrowers with the flexibility to benefit from lower interest rates when the market rates decrease.
- **Issues with Transparency and Fairness:** Over time, concerns emerged regarding the transparency and fairness of resetting interest rates on these loans. Borrowers faced difficulties due to unclear communication from lenders about rate adjustments, confusing how their interest rates were being calculated. Additionally, some borrowers experienced elongated loan tenures due to unfavourable rate adjustments, leading to potential financial strain.
- **Lack of Knowledge about Charges and Options:** Borrowers often lacked clear information about potential charges associated with rate adjustments and the options available to them when rates changed. This lack of knowledge made it challenging for borrowers to make informed decisions about their loans.
- Recognizing the concerns, the Reserve Bank of India (RBI) took steps to address the transparency and fairness issues associated with resetting interest rates on floating-rate loans, particularly home loans. The RBI announced a transparent framework that aimed to make the process more understandable and fair for borrowers.

## Key features of the proposed framework by the RBI

### Clear Communication

- Lenders will be required to communicate any upcoming changes to borrowers' loan terms well in advance. This is intended to provide borrowers with ample time to prepare for rate adjustments.
- Lenders must also define reasonable periods for resetting loan tenors. Consideration of borrower factors like age and repayment capacity is crucial, as this ensures that rate adjustments are aligned with the borrower's financial circumstances.

### Switching Options

- **Borrowers will have the flexibility to switch from floating-rate loans to fixed-rate loans** or even choose to foreclose their loans based on their discretion. To enable informed decisions, lenders will be obligated to disclose all associated charges upfront.

This empowers borrowers with the necessary information to evaluate their options and make the best choices for their financial situation.

### **Transparent Mechanism**

- Lenders will be required to ensure that the interest rate reset process is objective, transparent, and mutually agreed upon. The reference benchmarks for floating-rate products will be based on base rates or external benchmark rates. This approach promotes fairness by using well-defined benchmarks for rate adjustments, reducing the potential for arbitrary changes.

### **Conduct Framework**

- The proposed framework will apply to all regulated entities, including banks and non-banking financial companies (NBFCs). These entities will need to implement a proper conduct framework specifically designed for interest rate resets.
- The RBI will issue detailed guidelines to ensure consistency and adherence to these rules, promoting a standardized and equitable approach across the industry.

### **Significance of the proposed framework**

#### **Enhanced Consumer Protection**

- The transparency and clear communication requirements of the proposed framework will significantly benefit borrowers. **With advance notice about changes in their loan terms, borrowers will have the opportunity to assess how those changes might impact their financial situation.** This empowers them to make well-informed decisions that align with their financial goals, whether it's switching loan types, foreclosing the loan, or simply preparing for rate adjustments.

#### **Transparency and Fairness**

- The framework's emphasis on transparency and fairness will have a positive impact on both borrowers and lenders. Clear communication and objective, mutually agreed-upon mechanisms for interest rate adjustments will reduce information asymmetry between borrowers and lenders. This means borrowers will have a clearer understanding of how their rates are being determined, fostering a sense of fairness in the lending relationship.

## Monetary Transmission Efficiency

- Aligning benchmark rate changes with borrowers' interest rates is crucial for efficient monetary policy transmission. When central banks like the RBI make changes to policy rates (like the repo rate), the effectiveness of those changes depends on how well they are transmitted to the broader economy.
- **By ensuring that borrowers' rates are more closely linked to these policy changes, the framework can enhance the efficiency of monetary policy transmission.** This helps the central bank's efforts to manage inflation and stimulate economic growth.

The proposed framework's implications extend beyond individual borrowers and lenders. It aims to create a more transparent, fair, and efficient lending environment that benefits consumers, promotes financial stability, and supports the broader goals of monetary policy. By addressing issues related to transparency, fairness, and policy transmission, the framework contributes to a healthier and more resilient financial system.



## Challenges associated with implementing the proposed framework

### Operational Complexities

- The new framework could introduce additional operational complexities for lenders. Compliance with multiple regulations and guidelines related to interest rate resets may require changes to existing processes and systems.
- **Ensuring accurate and timely communication with borrowers about rate changes,** as well as managing the administrative aspects of different loan options (such as switching to fixed rates), could increase operational workload and associated costs. Prudent liquidity and risk management strategies will be crucial for lenders to navigate these complexities effectively.

### Borrower Uncertainty

- While the framework aims to provide transparency, borrowers may still experience uncertainty due to the inherent volatility of benchmark rates and their impact on

monthly payments. Borrowers may need to actively monitor changes in benchmark rates to anticipate potential fluctuations in their loan terms.

- **Decisions about switching loan types or foreclosing the loan will require careful evaluation**, and borrowers might need to seek financial advice to make well-informed choices.

### Regulatory Supervision

- Regulators, such as the RBI, will need to closely supervise the implementation of the framework to ensure that lenders adhere to the conduct framework and guidelines. This involves monitoring lenders' communication practices, the accuracy of rate adjustments, and the disclosure of charges. Additionally, regulators will need to address any grievances or disputes that arise between borrowers and lenders regarding interest rate resets. This oversight role demands a robust regulatory framework to maintain transparency, fairness, and accountability.

## HIGH INFLATION and INTEREST RATES

### In News:

The projected GDP growth rate for 2023-24 stands at 6.5%. Simultaneously, the benchmark stock market index, Sensex, is currently at a level of 65,000. However, the potential impact of high inflation on returns from stock market movements is a concern.

### Analysis of Background:

- Retail inflation spiked to 7.44% in July, creating uncertainty for investors. The Reserve Bank of India projects inflation to stay above 5% until the first quarter of 2024-25, with the potential for it to reach 6.2% in the current quarter. This exceeds the RBI's comfort level of 4%.
- Food price pressures, including surges in vegetable prices, cereals, pulses, spices, and milk, are expected to continue for a few months. Government interventions and fresh crop arrivals are expected to provide relief afterwards.
- High inflation can **impact stock prices and gold, as well as increase interest rates and bond yields**. This affects the cost of equity and debt, leading to changes in equity valuations. Despite rising inflation and high-interest rates, India's stock market has performed well due to a strong earnings outlook and macro conditions.



- India's market performance remains positive despite inflation and high rates. Earnings resilience is essential for sustained positive momentum. Long-term investors are advised to stay invested in strong holdings while exercising caution in applying for IPOs and considering equity mutual funds for long-term investments.

### **High Inflation and Interest Rates**

- High inflation refers to a sustained and significant increase in the general price level of goods and services within an economy. It erodes the purchasing power of money over time, as consumers need more money to buy the same quantity of goods.
- Interest rates represent the cost of borrowing money or the return on investment. Central banks, like the Reserve Bank of India (RBI), use interest rates as a tool to influence economic conditions.

### **Relation and Impact**

- **Direct Relationship:** High inflation and interest rates indeed often have a direct and positive correlation. Central banks frequently raise interest rates to counteract high inflation by reducing consumer spending and investment, which, in turn, can help control inflationary pressures.
- **Impact on Borrowing:** High inflation can increase the cost of living and doing business. To offset the eroding purchasing power of money caused by inflation, lenders typically demand higher nominal interest rates. This ensures that they maintain a real return on loans after accounting for the declining value of money. As a result, borrowing becomes more expensive for both consumers and businesses when inflation is high.
- **Impact on Investment:** Higher interest rates can discourage borrowing for investment purposes. When businesses face high borrowing costs, they may be less inclined to take out loans for expansion, research, and development, or other investments. Likewise, consumers might reduce borrowing for big-ticket purchases, such as homes and vehicles. This reduction in borrowing can potentially slow down economic growth since investment is a key driver of economic activity.

## Effect of increase in interest rates

Personal	Economy
<ul style="list-style-type: none"><li>• <b>Increased cost of borrowing</b></li><li>• <b>Improved return for savers</b></li><li>• <b>Higher mortgage interest payments</b></li><li>• <b>Increased cost of bank loans.</b></li><li>• <b>Banks may be more willing to lend.</b></li><li>• <b>Could reduce confidence of borrowers</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Currency will appreciate</b><ul style="list-style-type: none"><li>• making exports less competitive, imports cheaper</li></ul></li><li>• <b>Inflation – will tend to be lower</b></li><li>• <b>Economic growth – will tend to be slower</b></li><li>• <b>Unemployment – could rise</b></li><li>• <b>Government will see rising borrowing costs</b></li></ul>

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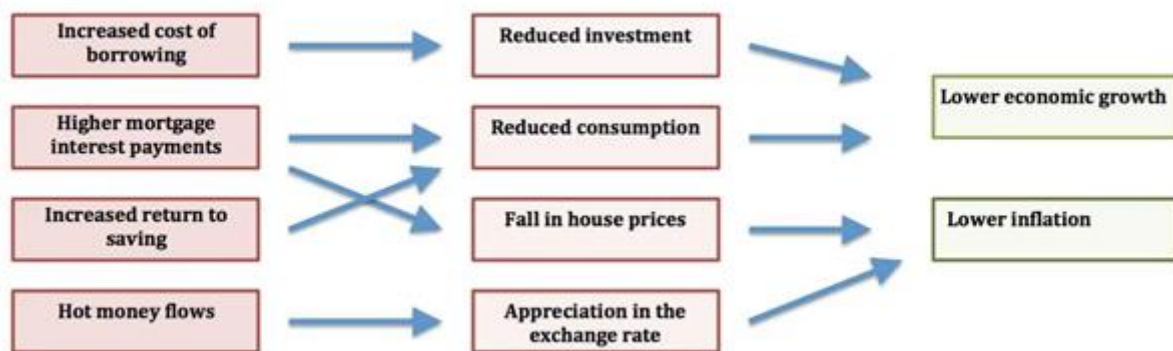
### Key consequences and challenges associated with high inflation

- **Rising Prices:** High inflation leads to a widespread increase in the prices of goods and services. This affects not only individual consumers but also businesses that rely on various inputs for their operations. When costs of production rise, businesses might pass these increased costs onto consumers, leading to a spiral of increasing prices.
- **Reduced Purchasing Power:** As prices rise, the purchasing power of money diminishes. Consumers find that their money can buy fewer goods and services than before. This can lead to a lower standard of living, especially for those on fixed incomes or with limited resources, as they struggle to afford the same quantity of goods they used to.
- **Uncertainty:** High inflation introduces uncertainty into the economy. Businesses and investors find it challenging to make financial plans and decisions when price levels become unpredictable. This uncertainty can hinder long-term investment and planning, as well as erode consumer confidence.
- **Distorted Allocations:** Inflation can lead to misallocation of resources in the economy. When prices rise rapidly and unexpectedly, the price signals that guide businesses and individuals in their decision-making can become distorted. This can lead to inefficient allocation of resources, as businesses might invest in sectors that seem profitable due to the distorted prices but might not be sustainable in the long run.

## Impact of High Inflation and Interest Rates

- **Interest Rates:** When facing high inflation, central banks often respond by raising interest rates. This is a measure to manage an overheating economy and to control the rapid rise in prices. Higher interest rates increase the cost of borrowing, which in turn discourages spending and investments. This mechanism helps to rein in inflation by reducing overall demand.
- **Investment Decisions:** High-interest rates can significantly affect investment decisions. The process of discounting future cash flows at higher rates leads to lower present valuations for assets like stocks and bonds. The uncertainty caused by high-interest rates can also lead to more cautious business investment and expansion plans.
- **Consumption:** The impact of high inflation on consumer spending can be significant. As prices rise, consumers' purchasing power diminishes, leading them to prioritize essential purchases and cut back on discretionary spending. This shift in consumer behaviour can have a cascading effect on overall economic activity, potentially leading to slower economic growth.
- **Savings:** Fixed-income savers, particularly those relying on conservative investment options like savings accounts or bonds, can face challenges during times of high inflation. The returns on these investments might not keep up with the rising cost of living, causing a reduction in real purchasing power for these savers.

Effect of higher interest rates



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## Steps Taken by India

- **Monetary Policy:** The Reserve Bank of India (RBI) employs various monetary policy tools to manage inflation. One of the key tools is the repo rate, which is the rate at which banks borrow funds from the RBI. When inflation is high, the RBI might decide to raise the repo rate. This has the effect of making borrowing more expensive for banks, which can then lead to higher interest rates for consumers and businesses. The aim is

to reduce excess liquidity in the economy, restrain borrowing, and consequently temper demand, thus helping to control inflation.

- **Supply-Side Measures:** To address inflation, especially when it's driven by supply constraints, the government can implement supply-side measures. These steps might include initiatives to increase the production and availability of essential goods, such as agricultural products. The government might also take measures to prevent hoarding and ensure efficient distribution of goods to prevent artificial scarcity and price spikes.

### **Challenges**

- **Policy Dilemma:** Striking the right balance between controlling inflation and promoting economic growth is indeed a complex challenge. Aggressive interest rate hikes can slow down economic activity and potentially hinder job creation and investment. Conversely, keeping interest rates too low for too long could lead to continued inflationary pressures. This highlights the delicate task policymakers face in navigating these conflicting objectives.
- **Structural Factors:** Inflation can often be influenced by structural issues within an economy. Factors like supply-side constraints, inefficient distribution networks, and imbalances between supply and demand can contribute to inflationary pressures. Addressing these structural challenges requires comprehensive policy interventions and reforms.
- **Impact on Vulnerable Groups:** High inflation can have a disproportionate impact on low-income and vulnerable populations. Rising prices for essential goods and services can erode the purchasing power of individuals with limited resources. This can exacerbate income inequality and lead to a decline in the standard of living for those who are already economically marginalized.

## **MINIMUM EXPORT PRICE**

### **In News:**

The Indian government is considering extending duty restrictions to non-basmati parboiled rice exports, which could involve imposing a 20% export duty on this variety. For basmati rice, there is a proposal to introduce a minimum export price (MEP) of around \$1,250 per tonne. The decisions regarding duty and MEP will depend on various factors, including domestic rice prices.

## Analysis of Background:

- **India is the world's largest exporter of rice, with a share of about 25% in the global market.** However, in recent years, the country has faced a **surge in domestic rice prices** due to various factors, such as lower production, higher demand, rising input costs, and supply chain disruptions caused by the COVID-19 pandemic. This has led to concerns about food security and inflation in the country, as well as pressure from farmers and consumers to intervene in the market.
- In response to this situation, the **government has taken some measures to regulate the rice trade and ensure adequate availability and affordability of the staple for domestic consumers.** In 2021, the government banned the export of white rice (also known as milled or polished rice), which accounts for about 80% of India's rice exports. The ban applies to all varieties of white rice, including basmati (a premium long-grain aromatic rice) and non-basmati (a generic term for all other types of rice). The ban is expected to remain in place until further notice, depending on the domestic price situation.
  - However, the ban does not cover parboiled rice (also known as converted or easy-cook rice), which is a type of rice that undergoes a partial boiling process before milling. Parboiled rice accounts for about 20% of India's rice exports and is mainly exported to African countries. The government has allowed the export of parboiled rice but with some restrictions.
- According to media reports, the **government is considering imposing a 20% duty on non-basmati parboiled rice exports**, while a minimum export price (MEP) of around \$1,250 per tonne could be levied on basmati parboiled rice. However, these measures have not been officially announced yet and will depend on several factors, including domestic rice prices, they added.

## Market response

- The government's decision to ban white rice exports and restrict parboiled rice exports has been met with mixed reactions from various stakeholders.
- On one hand, **some experts and industry bodies have welcomed the move as a necessary step to curb inflation and protect the interests of domestic consumers and farmers.** They have argued that the ban will increase the domestic supply of rice and bring down its prices, which have risen by about 20% in the past year. They have also claimed that the ban will not affect India's overall export earnings much, as white rice exports account for only about 2% of India's total merchandise exports.

- On the other hand, **some exporters and traders have opposed the move as a short-sighted and counter-productive policy that will hurt India's reputation and competitiveness in the global market.** They have contended that the ban will reduce India's export volumes and revenues, which amounted to about \$6.8 billion in 2020-21. They have also warned that the ban will create a supply gap in the international market, which could be filled by rival countries such as Thailand, Vietnam, Pakistan, and Myanmar. They have urged the government to lift the ban as soon as possible and adopt a more stable and predictable policy framework for rice exports.

## Rice

- Rice is a staple food for a vast portion of the population. It is a dietary foundation for millions, especially in states across South India and the northeastern regions.
- Rice is predominantly a **kharif crop**, cultivated during the rainy season. It requires specific climatic conditions for optimal growth:
  - Rice cultivation thrives in areas with **high temperatures, typically above 25°C.**
  - **High humidity levels** are favourable for rice growth.
- Regions with annual rainfall exceeding 100 cm are ideal for rice cultivation.
- Approximately one-fourth of the total cropped area in India is dedicated to rice cultivation.
- Southern states like Tamil Nadu, Andhra Pradesh, Karnataka, and Kerala, along with West Bengal, enjoy a climate suitable for multiple rice crops within a single agricultural year. This allows farmers to cultivate two or even three crops of rice successively.
- West Bengal is known for cultivating three distinct crops of rice: Aus Rice, Aman Rice, and Boro Rice.
- Punjab, Tamil Nadu, Haryana, Andhra Pradesh, Telangana, West Bengal, and Kerala are recognized for achieving high rice yields, often due to improved cultivation techniques and agricultural technology.

## Minimum Export Price (MEP)

- A Minimum Export Price (MEP) is a **policy tool used by governments to set a floor price for the export of certain commodities.** It ensures that exports are not sold below a specified price, protecting the domestic market from price fluctuations and supply shortages. MEPs are usually implemented in response to concerns about domestic availability, food security, and price stability.

## Objectives

- **Price Stability:** MEPs play a crucial role in maintaining stability within domestic markets by preventing excessive exports. When commodities are exported at very low prices due to global market fluctuations or aggressive trade practices, it can lead to scarcity in the domestic market. This scarcity can then result in price spikes, making essential commodities unaffordable for consumers. **By setting an MEP, governments ensure that exports do not disrupt the local supply-demand balance**, thus preventing sudden price fluctuations.
- **Domestic Food Security:** MEPs contribute significantly to domestic food security. By controlling the outflow of essential commodities at very low prices, governments can ensure a consistent supply of these commodities to their citizens. This is particularly important during times of increased demand, such as festivals, and in the face of production disruptions caused by natural disasters or other factors. An adequate supply of essential goods reduces the risk of food shortages and promotes overall social stability.
- **Protecting Farmers:** Farmers often face the risk of receiving inadequate compensation for their produce due to volatile international markets. MEPs offer a safety net by preventing international prices from falling below a certain level. This protection ensures that farmers receive fair prices for their goods, thus incentivizing them to continue agricultural activities and ensuring the sustainability of the agricultural sector.
- **Inflation Control:** Price instability in essential commodities can contribute to broader inflationary pressures within the economy. Sudden increases in the cost of necessities can lead to higher living costs for consumers and increased production costs for businesses. By maintaining stable prices through MEPs, governments contribute to overall inflation control and help maintain a balanced macroeconomic environment.

## Key features

- **Price Floor:** MEP establishes a baseline price below which exporters are not allowed to sell their commodities in international markets. This prevents these commodities from being dumped in foreign markets at extremely low prices, which could have a detrimental impact on domestic markets and the local economy. By setting a price floor, governments ensure that their commodities are sold at reasonable levels, which can also benefit local producers and industries.

- **Export Control:** MEP functions as a regulatory tool for governments to manage the quantity of commodities leaving the country. It allows authorities to monitor and control the volume of exports, preventing excessive outflows that could lead to domestic shortages or price spikes. This control mechanism ensures that the country retains an adequate supply of essential commodities to meet domestic needs.
- **Commodity Specific:** MEP is not uniformly applied to all commodities but can be tailored to specific products or categories. Governments may choose to apply MEP to commodities that are crucial for domestic consumption, strategic reasons, or industries of national importance. This targeted approach ensures that vital commodities remain available and affordable for the local population.
- **Periodic Review:** MEP is not a fixed policy but can be subject to periodic reviews and adjustments. Governments monitor international market trends, domestic production levels, and demand-supply dynamics to determine whether the MEP needs to be modified. This adaptability allows authorities to respond to changing economic conditions and ensure that the MEP remains effective in achieving its intended goals.

### Significances

- **Macro-Economic Stability:** MEPs play a pivotal role in maintaining macroeconomic stability by preventing abrupt and extreme price fluctuations. Excessive exports at very low prices can lead to market instability, inflationary pressures, and economic uncertainty. **By controlling exports through MEPs, governments contribute to a more predictable and balanced economic environment,** benefiting both consumers and businesses.
- **Domestic Welfare:** At times of supply uncertainty, such as during production disruptions or sudden changes in international market conditions, MEPs provide a safety net for consumers. By preventing the outflow of essential commodities at excessively low prices, MEPs ensure that consumers continue to have access to these goods at reasonable prices. This stability contributes to the overall well-being and welfare of the population.
- **Agricultural Sector Support:** MEPs offer critical support to the agricultural sector by protecting the interests of farmers. Agriculture is often vulnerable to external market forces, and farmers can face challenges when dealing with price volatility. MEPs ensure that farmers receive fair compensation for their hard work and investment, which can boost their confidence and incentivize them to continue contributing to the economy.



## Challenges

- **Trade Relations:** Implementing MEPs can indeed have implications for trade relations. **Importing countries may view MEPs as protectionist measures aimed at limiting their access to certain goods.** This perception could lead to strained trade relationships, trade disputes, or even retaliatory actions. Navigating this challenge requires careful diplomacy and clear communication to ensure that MEPs are understood as measures taken for domestic stability rather than trade barriers.
- **Misalignment with International Prices:** There's a potential risk of setting MEPs too high, which could lead to a disconnect between domestic prices and international market trends. If the MEP exceeds prevailing international prices, exporters might struggle to compete in the global market. This could result in reduced demand for the country's exports, negatively impacting trade revenue and market share.
- **Enforcement and Monitoring:** Implementing MEPs effectively requires robust enforcement and monitoring mechanisms. Ensuring that exporters comply with the minimum price requirement is essential to prevent circumvention or violations. Effective enforcement mechanisms are necessary to **prevent black-market activities, where goods are exported below the MEP through illicit means.** This requires a dedicated regulatory framework, technology-enabled monitoring, and collaboration between government agencies.
- **Balancing Domestic and Export Interests:** Governments must carefully balance the interests of domestic consumers and producers with those of exporters. While MEPs protect domestic markets, they can potentially impact the profitability and competitiveness of exporters. Striking the right balance between these interests is crucial to avoid unintended consequences that could affect both domestic and export sectors negatively.
- **Responsive Adjustments:** Regular adjustments to MEPs based on changing market dynamics and economic conditions are necessary for their effectiveness. However, implementing timely adjustments can be challenging, especially in rapidly changing markets. Delays in adjusting MEPs could render them ineffective in achieving their intended goals.
- **Compliance Costs:** For businesses, adhering to MEPs might involve additional administrative and operational costs. Ensuring that goods meet the minimum price criteria could require extra documentation, quality control measures, and compliance

checks. These added costs can impact profit margins, especially for small and medium-sized enterprises.

## NATIONAL FINANCIAL REPORTING AUTHORITY (NFRA)

### In News:

The National Financial Reporting Authority (NFRA) is to release a circular that will outline common deviations observed in the preparation of financial statements and statutory audits.

### Analysis of Background:

- The purpose of this circular is to **guide both company management and auditors about practices that should be strictly avoided**. These deviations were identified through investigations and audit quality reviews conducted by NFRA over the past few years.
- The aim is to address these issues and enhance corporate governance by encouraging adherence to proper financial reporting and auditing standards.
- The circular will draw attention to various requirements that preparers of financial statements and auditors are obligated to follow under different statutes, including the Companies Act, accounting and auditing standards, rules, and ethical guidelines. It will also offer insights into how similar violations are approached by other regulatory bodies, such as the Public Company Accounting Oversight Board (PCAOB) in the United States.
- Experts view this initiative positively, as it allows the industry and auditor community to learn from past cases and enhance their practices. The proposed approach will consolidate the outcomes of NFRA's disciplinary proceedings, helping audit firms and auditors understand and apply lessons from audit performance decisions, ultimately leading to improvements.

## National Financial Reporting Authority (NFRA)

### About

- The concept of NFRA emerged after the Satyam scandal in 2009, which exposed significant financial irregularities and a lack of oversight in the auditing profession.
- The Standing Committee on Finance proposed the establishment of NFRA in its 21st report, recognizing the need for an independent regulator to oversee financial reporting and auditing.

- The **Companies Act of 2013 provided the legal framework for the formation and functioning of NFRA**. It was established in 2018 by the Government of India under the Companies Act, 2013.

### Features

- **Independent Regulatory Authority:** NFRA operates as an independent regulatory authority separate from the government's control. This independence is crucial to ensure unbiased oversight of the auditing profession and to maintain the credibility of its regulatory actions.
- **Recommendations and Standards:** NFRA has the authority to recommend accounting and auditing policies, as well as standards, for adoption in India. These recommendations play a vital role in aligning financial reporting practices with internationally accepted standards and best practices.
- **Investigations:** One of NFRA's significant roles is to investigate cases of financial reporting irregularities and misconduct by auditors and audit firms. This investigative power helps uncover any wrongdoing in the financial reporting process and holds auditors and firms accountable for their actions.
- **Sanctions:** NFRA possesses the authority to impose penalties and debarment measures on auditors and audit firms that are found to have violated accounting and auditing standards. These sanctions act as deterrents against unethical or negligent behaviour in the auditing profession.
- **Transparency:** By focusing on transparency, accuracy, and reliability in financial reporting, NFRA contributes to bolstering investor confidence. When financial information is accurately and transparently presented, it helps investors make informed decisions and fosters trust in the financial markets.

### Significance

- **Enhanced Credibility:** NFRA's oversight of financial reporting and auditing practices contributes to the enhanced credibility of financial statements. When investors and stakeholders trust that financial information is accurate and reliable, they are more likely to make informed decisions, which is crucial for a healthy investment environment.
- **Improved Governance:** The establishment of NFRA as an independent regulatory authority reduces the risk of conflicts of interest in the auditing process. Auditors can

perform their duties without undue influence, ensuring that financial statements are assessed impartially. This improved governance fosters transparency and accountability.

- **Global Alignment:** Adherence to international best practices and standards by NFRA brings India's financial reporting regulations in line with global norms. This alignment has the potential to attract more cross-border investments and facilitate comparisons between companies from different countries, making India's financial markets more attractive to international investors.
- **Detection and Deterrence:** NFRA's ability to investigate cases of financial reporting irregularities and misconduct and impose sanctions serves as a deterrent against fraudulent practices. The presence of a regulatory body actively looking into such matters encourages ethical behaviour within the auditing profession, ultimately reducing the likelihood of financial scandals.

### Challenges

- **Resistance:** There could be resistance from various stakeholders, especially audit firms, who might perceive increased oversight and the imposition of penalties as an additional regulatory burden. Balancing the need for enhanced regulatory measures with the concerns of these stakeholders requires effective communication and collaboration.
- **Resource Constraints:** Ensuring that NFRA has the necessary resources, including skilled professionals and technical expertise, to effectively oversee a large number of companies and audits can be challenging. A lack of adequate resources could potentially hinder NFRA's ability to conduct thorough investigations and enforce standards.
- **Coordinated Approach:** Coordinating with other regulatory bodies, such as the Securities and Exchange Board of India (SEBI) and the Reserve Bank of India (RBI), is crucial to avoid overlaps or gaps in jurisdiction. Establishing clear lines of communication and collaboration among regulatory authorities is necessary to ensure a comprehensive and cohesive regulatory framework.
- **Complexity:** Financial reporting and auditing involve intricate technicalities and nuances. Conducting investigations and enforcement actions in this complex landscape can be time-consuming and resource-intensive. NFRA needs to have the expertise and patience to navigate through these complexities effectively.

## OFFSHORE WIND ENERGY IN INDIA

### In News:

India's efforts to harness offshore wind energy as a part of its renewable energy expansion strategy.

### Analysis of Background:

#### Key Highlights

- **Introduction of Offshore Wind Energy Policy:** India introduced the National Offshore Wind Energy Policy in 2015 to promote the development of offshore wind energy within the nation's Exclusive Economic Zone (EEZ) up to 200 nautical miles from the coastline. The policy aimed to provide a regulatory structure for offshore wind energy growth.
- **Multi-Model Approach:** The Union Ministry of New and Renewable Energy (MNRE) is the nodal ministry, while the National Institute of Wind Energy (NIWE) serves as the nodal agency to oversee offshore wind energy initiatives. Despite the policy, progress in the offshore wind sector has been slow over the past few decades.
- **Identification of Offshore Wind Zones:** A multi-criteria approach was used to identify areas with high potential for offshore wind energy, involving factors like wind resources and water depth measurements. The southern tip and west coast regions were found to be promising for offshore wind farm development. Eight zones off the coasts of Gujarat and Tamil Nadu were identified as potential offshore wind energy zones.
- **Government Agencies and Plans:** The Ministry of New and Renewable Energy (MNRE) and the National Institute of Wind Energy (NIWE) are responsible for conducting studies, creating policies, and implementing financial incentives to encourage private sector investment in offshore wind power projects. India plans to auction 37 gigawatts of offshore site leases over the next seven years, with different phases and capacities each year.

### Offshore Wind Energy in India

#### About

- Offshore wind energy refers to the harnessing of wind power from turbines installed in bodies of water, typically in seas or oceans. It involves the construction of wind farms with multiple turbines located offshore to capture the kinetic energy of wind and convert it into electricity.

- Offshore wind energy has **gained prominence as a clean and renewable energy source**, offering several advantages over onshore wind, such as higher wind speeds and a reduced visual impact on landscapes.

**Mechanism: Offshore wind energy works through the following steps:**

### **Turbine Installation**

- Offshore wind turbines are strategically **placed in water bodies to capture the kinetic energy of the wind and convert it into electricity.**
- **Site Selection:** The first step is selecting suitable locations for installing offshore wind turbines. Factors considered include wind resource quality, water depth, proximity to the grid, and environmental impact assessments.
- **Foundation Types:** Depending on the water depth and seabed conditions, different types of foundations are used:
  - **Fixed Foundations:** These are similar to foundations used in onshore wind turbines. They are embedded into the seabed to provide stability for the turbine.
  - **Floating Platforms:** In deeper waters where fixed foundations are not feasible, floating platforms are used. These platforms are anchored to the seabed and allow turbines to operate in varying water depths.
  - **Submerged Structures:** These innovative structures are partially submerged and are designed to capture wind energy at different heights above the water surface.
- **Turbine Installation:** Once the foundation is in place, the turbine components are assembled and lifted onto the foundation using specialized vessels and equipment. This includes the tower, nacelle (housing the generator and other machinery), and rotor assembly (blades).

### **Electricity Generation**

- Once the turbines are installed and operational, the process of electricity generation begins.
- **Wind Energy Capture:** As the wind blows, it causes the turbine blades to rotate. The design of the blades is optimized to capture the maximum amount of wind energy at different wind speeds.
- **Rotor and Generator:** The rotation of the blades is transferred to the rotor in the nacelle. The rotor is connected to a generator, which converts the mechanical energy into electrical energy through electromagnetic induction.

- **Electromagnetic Induction:** Inside the generator, the rotor's rotation creates a magnetic field that interacts with coils of wire, inducing an electrical current. This current is an alternating current (AC) with a frequency determined by the rotor's rotation speed.

### Transmission

- After electricity is generated, it needs to be transported to the onshore grid for distribution.
- **Substation:** The electricity generated by multiple turbines is collected at an offshore substation. This substation transforms the generated electricity to a higher voltage level, making it suitable for long-distance transmission.
- **Undersea Cables:** High-voltage undersea cables are used to transmit the electricity from the offshore substation to the onshore substation. These cables are designed to withstand the marine environment and are usually buried or protected on the seabed.
- **Onshore Substation:** The undersea cables are connected to an onshore substation, where the voltage is further transformed to match the grid's voltage. At this stage, the electricity is ready for distribution to consumers and industries.
- **Grid Integration:** The electricity is integrated into the national or regional grid, where it becomes part of the overall electricity supply. It can be used to power homes, businesses, and various other applications.

## Significances of Offshore Wind Energy in India

### Renewable Energy Growth

- **Climate Mitigation:** Offshore wind power is a clean and renewable energy source that produces minimal greenhouse gas emissions. By replacing fossil fuel-based energy sources, it helps reduce India's carbon footprint and contributes to global efforts to mitigate climate change.
- **Meeting Renewable Targets:** India has set ambitious renewable energy targets as part of its commitment to the Paris Agreement. Offshore wind power offers a valuable avenue to meet these targets, diversifying the renewable energy portfolio beyond solar and onshore wind.

### Energy Security

- **Reduced Fuel Imports:** India currently relies on coal, oil, and natural gas imports to meet a significant portion of its energy needs. Offshore wind power reduces this

dependence, thus improving energy security and reducing vulnerability to international energy price fluctuations.

- **Domestic Energy Production:** Generating electricity from offshore wind within India's maritime boundaries reduces the need to rely on foreign energy sources, contributing to energy self-sufficiency.

### **Job Creation**

- **Skilled and Unskilled Jobs:** Offshore wind projects require a range of expertise, from engineering and construction to operations and maintenance. This leads to the creation of both skilled and unskilled jobs.
- **Local Employment:** Offshore wind projects can stimulate economic growth in coastal regions by creating local job opportunities, supporting local communities, and boosting ancillary industries such as logistics and marine services.

### **Technological Innovation**

- **Foundation Design:** Offshore wind farms require innovative foundation designs to withstand the harsh marine environment, different water depths, and seabed conditions.
- **Floating Platforms:** In deeper waters where traditional fixed foundations are not feasible, floating platforms present an innovative solution to support offshore turbines.
- **Undersea Transmission Systems:** The design and deployment of undersea cables for transmitting electricity from offshore turbines to onshore substations require technical innovation to ensure reliability and efficiency.
- **Remote Monitoring and Maintenance:** Developing technologies for remote monitoring and maintenance of offshore turbines and platforms can lead to cost savings and operational efficiencies.

### **Steps Taken by India**

#### **National Offshore Wind Energy Policy (2015)**

- In 2015, India introduced the National Offshore Wind Energy Policy to establish a framework for the development of offshore wind energy **within the country's Exclusive Economic Zone (EEZ) up to 200 nautical miles from the coastline**. This policy aimed to provide a clear roadmap and regulatory structure for the growth of offshore wind energy.



- **Regulatory Framework:** The policy laid out guidelines for obtaining permits, clearances, and licenses required for offshore wind projects. It established a comprehensive regulatory framework to streamline the approval process and ensure compliance with environmental and safety standards.
- **Incentives:** To attract private investments and project developers, the policy offered various incentives, including financial incentives, tax benefits, and favourable tariff structures.
- **Zonal Allocation:** The policy identified specific zones within the EEZ that were deemed suitable for offshore wind development. These zones were selected based on factors such as wind potential, water depth, and environmental considerations.

### **NIWE (National Institute of Wind Energy)**

- The National Institute of Wind Energy (NIWE) was designated as the nodal agency responsible for coordinating and facilitating offshore wind energy initiatives in India.
- **Feasibility Studies:** NIWE conducted detailed feasibility studies to assess the wind resource potential, environmental impact, and technical feasibility of offshore wind projects. These studies helped identify viable project locations and understand the challenges associated with offshore wind development.
- **Research and Development:** NIWE is involved in research and development activities related to offshore wind technology, including foundation designs, grid integration, and environmental impact assessment methodologies.
- **Capacity Building:** NIWE has been instrumental in building technical capacity and expertise in the offshore wind sector through training programs, workshops, and knowledge sharing with industry stakeholders and experts.

### **Feasibility Studies**

- **Wind Resource Assessment:** Comprehensive wind resource assessment studies were conducted to identify areas with high wind energy potential, taking into account seasonal and spatial variations.
- **Environmental Impact Assessment:** These studies assessed the potential impacts of offshore wind projects on marine ecosystems, wildlife, and local communities, ensuring that projects adhere to environmental regulations.

- **Technological Viability:** Feasibility studies evaluated the technical feasibility of offshore wind projects, considering factors like water depth, foundation types, and transmission infrastructure.

### **Collaborations**

- India collaborated with international players and organizations to leverage their expertise and experience in offshore wind technology.
- **Knowledge Sharing:** Collaborations with countries like Denmark, the United Kingdom, and Germany allowed India to learn from their experiences in developing and operating offshore wind farms.
- **Technology Transfer:** International collaborations facilitated the transfer of advanced offshore wind technology, including innovative foundation designs, floating platform concepts, and grid integration solutions.
- **Global Best Practices:** By collaborating with established offshore wind markets, India gained insights into best practices, regulatory approaches, and strategies for overcoming challenges.

### **Challenges:**

#### **High Initial Costs:**

- **Capital-Intensive:** Offshore wind projects involve substantial costs for various components such as turbines, foundations, subsea cables, and infrastructure development. These high initial costs can pose financial challenges.
- **Uncertainty:** The capital-intensive nature of offshore wind projects can make investors cautious due to uncertainties related to return on investment, project delays, and technological risks.
- **Financing Challenges:** Securing financing for large-scale projects can be challenging, particularly when compared to more established forms of energy generation.

#### **Infrastructure Development**

- **Port Infrastructure:** Developing ports capable of handling the transportation, assembly, and maintenance of offshore wind components is essential but can involve significant time and investment.
- **Specialized Vessels:** Offshore wind projects require specialized vessels for turbine installation, maintenance, and cable laying. Building or retrofitting these vessels can be costly.

- **Grid Connections:** Connecting offshore wind farms to onshore substations and the national grid requires the installation of undersea cables and grid infrastructure, which can be technically challenging and expensive.

### Regulatory Complexities

- **Multiple Approvals:** Offshore wind projects require approvals from multiple regulatory bodies, including environmental agencies, maritime authorities, and local governments. The lengthy approval process can lead to delays.
- **Environmental Regulations:** Due to the sensitive marine ecosystem, offshore wind projects must adhere to stringent environmental regulations, which can add to the complexity of the approval process.
- **Land Use and Zoning:** Balancing offshore wind development with other maritime activities such as shipping, fishing, and conservation efforts requires careful zoning and coordination among stakeholders.

### Environmental Concerns

- **Marine Ecosystem Impact:** The installation and operation of offshore wind farms can disrupt marine ecosystems through habitat displacement, underwater noise, and changes in water quality.
- **Wildlife Interaction:** Turbine installations and cable laying activities can potentially impact marine life, including fish, mammals, and birds. Collisions and disturbance to migratory routes are concerns.
- **Visual and Aesthetic Impact:** While offshore wind farms have reduced visual impact compared to onshore ones, they can still raise concerns among local communities and recreational users of coastal areas.
- **Community Engagement:** Addressing local communities' concerns and engaging stakeholders in the planning and decision-making process is crucial to ensuring project acceptance and minimizing conflicts.

## GREAT SCHEME

### In News:

The Indian government recently announced a grant-in-aid of up to Rs 50 lakh to foster innovation in the technical textiles sector, specifically targeted at startups and individuals. This initiative falls under the framework of the Startup Guidelines for Technical Textiles,

named Grant for Research and Entrepreneurship across Aspiring Innovators in Technical Textiles (GREAT).

### **Analysis of Background:**

- The GREAT scheme (Grant for Research and Entrepreneurship across Aspiring Innovators in Technical Textiles) was launched by the Indian government recently. The scheme falls **under the Ministry of Textiles** and aims to promote innovation and entrepreneurship within the technical textiles sector.
- The scheme aims to propel the growth of technical textiles by supporting the transformation of research and prototypes into viable technologies and commercial products.

### **Key Features**

#### **Grant-in-Aid Funding**

- Under the GREAT scheme, the **Ministry of Textiles has approved grant-in-aid funding of up to Rs 50 lakh**. This funding is available for a maximum duration of 18 months. The goal is to provide financial support that encourages innovation in specialized areas of technical textiles.

#### **Nurturing Innovation**

- The primary focus of the scheme is **to nurture and promote innovation within the technical textiles sector**. The guidelines are designed to guide startups, individuals, and companies through the process of taking their prototypes and concepts and translating them into market-ready technologies and products. This process ultimately facilitates their commercialization.

#### **Collaboration with Leading Institutions**

- The initiative aims **to collaborate with renowned institutions** such as IITs (Indian Institutes of Technology), NITs (National Institutes of Technology), Textiles Research Associations, and Centers of Excellence. These partnerships are intended to provide startups with essential support, guidance, and expertise.

#### **Emphasis on Incubators**

- The scheme places a **significant emphasis on collaborating with incubators**. Startups are eligible to receive grants without any expectation of royalties or equity from their products. The only required contribution from the recipient startups is a minimum of 10% towards the project.

### **Online Application Portal**

- To streamline the application process and expedite the selection of potential beneficiaries, an online portal will be launched. This portal will accept applications for the grant, making it more accessible and efficient for startups to apply for funding.

### **Alignment with NTTM**

- The GREAT scheme **aligns with the National Technical Textiles Mission (NTTM), showcasing its integration into the broader framework** of promoting technical textiles in India. This alignment emphasizes the scheme's strategic importance within the overall mission.

### **Expected Number of Beneficiaries**

- The scheme is projected to support approximately 100-150 startups operating within the technical textiles domain. This indicates the substantial impact the scheme aims to have on fostering innovation and growth in the sector.

### **Incubator Support**

- To further boost the startup ecosystem, the Textile Ministry has committed to providing 10% of the total grant-in-aid to the incubators. Incubators play a pivotal role in nurturing and guiding innovative ventures, making this support essential.

### **Commitment from Incubatees**

- As a testament to the authenticity and commitment of the startup teams, a minimum investment of 10% of the grant funding is mandated. This requirement underscores the dedication of the startups to their projects and goals.

## Significance of the Initiative

### Innovation Catalyst

- The GREAT scheme serves as a **powerful catalyst for innovation within the technical textiles sector**. By extending financial assistance to startups and individuals, the initiative fuels the development and commercialization of their groundbreaking ideas. This infusion of funding stimulates fresh perspectives, novel concepts, and inventive solutions, thereby elevating the entire landscape of technical textiles.

### Niche Development

- The initiative's emphasis on specialized segments of technical textiles, such as sustainable textiles, high-performance fibres, and smart textiles, addresses specific and often untapped market demands. This focus **ensures that startups align their efforts with emerging trends and unique market needs**, leading to the creation of products that cater to niche sectors.

### Startup Empowerment

- The GREAT scheme **empowers startups by offering more than just financial support**. Through collaborations with renowned institutions like IITs, NITs, and Textiles Research Associations, startups gain access to a wealth of resources, expertise, and mentorship. This empowerment creates a nurturing environment where startups can thrive, innovate, and overcome challenges more effectively.

### Economic Growth

- The successful **commercialization of innovative technical textile products carries the potential to contribute significantly to economic growth**. As startups progress from prototyping to market-ready products, they generate new job opportunities across various sectors of the economy. Additionally, the increased revenue generated by successful products positively impacts industry growth and GDP contribution.

### Research Translation

- The initiative **bridges the gap between theoretical research and practical application** by facilitating the translation of academic findings into tangible products. This alignment of research with industry needs is crucial for fostering collaboration between academia

and the business world. It ensures that innovative ideas emerge from research labs and find their way into the market, ultimately driving progress.

## Challenges

### Funding

- The technical textiles sector demands substantial investment in research and development activities. Funding constraints hinder the ability to conduct extensive research, develop advanced technologies, and prototype innovative products. This financial barrier can stifle progress and limit the sector's growth potential.

### Skilled Manpower

- **A skilled and knowledgeable workforce is essential for driving research and innovation.** However, the technical textiles sector faces a shortage of experts, scientists, engineers, and researchers who possess the expertise required for cutting-edge advancements. Bridging this skill gap is crucial to accelerate progress.

### Infrastructure

- Research and development necessitate robust infrastructure, including well-equipped laboratories, advanced testing facilities, and pilot plants for prototyping. The deficiency in adequate infrastructure hampers the ability to carry out sophisticated experiments, prototype development, and testing, slowing down the pace of innovation.

### Intellectual Property Protection

- Intellectual property (IP) protection is **crucial for incentivizing companies to invest in research and development efforts.** Without proper IP protection, companies might hesitate to share their innovative ideas and technologies, fearing that they might be copied without proper compensation or recognition.

## SANCHAR SAATHI

### In News:

Reforms introduced by the Union Minister for Telecommunications to address cybercrimes and financial fraud. The reforms are aimed at strengthening the citizen-centric portal called Sanchar Saathi and implementing changes to the bulk procurement of SIM cards.

## **Analysis of Background:**

### **Sanchar Saathi:**

- Sanchar Saathi is a citizen-centric portal introduced in India **to combat cybercrimes and financial fraud related to mobile connections**. The portal provides various services to citizens.
- **Connection Verification:** Citizens can use the Sanchar Saathi portal to verify the mobile connections that are registered under their names. This service enables users to ensure that the mobile connections associated with their identity are accurate and legitimate.
- **Stolen/Lost Phone Blocking:** Users can block mobile phones that have been reported as stolen or lost. This functionality helps prevent unauthorized use of stolen or lost devices, enhancing security and reducing the potential for misuse.
- **Reporting Fraudulent Connections:** The portal provides a feature that allows citizens to report any suspicious or unwanted mobile connections. This empowers users to play an active role in identifying and reporting fraudulent activities related to mobile connections.
- **Device Verification:** Sanchar Saathi enables users to verify the authenticity of a mobile device before making a purchase. This is done by utilizing the device's IMEI (International Mobile Equipment Identity), which serves as a unique identifier for mobile devices. Verifying the device's authenticity can help users avoid purchasing counterfeit or unauthorized devices.

### **Since its launch, Sanchar Saathi has achieved several results, including:**

- Analyzing 114 crore (1.14 billion) active mobile connections.
- Identifying 66 lakh (6.6 million) suspicious connections.
- Disconnecting 52 lakh (5.2 million) connections that failed re-verification.
- Blocking 66,000 WhatsApp accounts.
- Freezing eight lakh (800,000) bank/wallet accounts.
- Filing more than 300 FIRs against over 1,700 dealers.

### **Reform on Point of Sale (PoS)**

- The reform concerning the Point of Sale (PoS) involves changes to how SIM cards are distributed and sold.
- Franchisees, agents, and distributors of SIM cards (PoS) must be registered with the licensees or telecom network operators.



- The operator is responsible for "indisputable" verification of the PoS, including mandatory police verification.
- Existing SIM card providers have 12 months to comply with registration requirements.
- If a PoS is involved in illegal activities, the agreement can be terminated, and the entity may be blacklisted for three years. A penalty of ₹10 lakh can also be imposed.

### **Reform on Bulk SIM Cards**

- The reform related to bulk SIM cards aims to prevent their misuse.
- **Replacing the system of bulk procurement of SIM cards with a system involving "business" connections**, which requires KYC (Know Your Customer) completion for all end-users.
- Businesses can procure any number of connections, subject to completing KYC for the end-users.
- Demographic details from the printed Aadhaar card are required by scanning the QR code to prevent misuse.
- Subscribers must undergo the entire KYC procedure to replace their SIM cards, and there's a 24-hour period during which outgoing and incoming SMS facilities are barred.

### **Challenges and Observations**

- Researchers at the Centre for Internet and Society (CIS), raise concerns about the enforcement of these provisions, especially at the local store level. Adequate infrastructure and safeguards are necessary to handle sensitive data during the SIM card distribution process.

Overall, these reforms are introduced to strengthen cybersecurity, prevent fraud, and enhance accountability in the telecommunications sector in India.

## ENVIRONMENT

### HOLLONGAPAR GIBBON SANCTUARY

#### In News:

A railway track has divided the Hollongapar Gibbon Sanctuary. This division created by the railway track disrupts the habitat and movement of the gibbons within the sanctuary.

#### Analysis of Background:

##### Details

##### Canopy Bridge Proposal

- The Wildlife Institute of India (WII) **proposed designing an artificial canopy bridge to facilitate the movement of hoolock gibbons across the railway track within the sanctuary.**
- This canopy bridge aims to reconnect the divided habitat and enable the gibbons to move freely between the two parts of the sanctuary.

##### Habitat and Gibbon Population

- The Hollongapar Gibbon Sanctuary, **located in the Jorhat district of Assam, covers an area of 21 sq. km.**
- The **sanctuary is home to about 125 hoolock gibbons, which are India's only ape species.**

##### Habitat Fragmentation and Endangerment

- The report highlights that **like the other 19 gibbon species globally, the hoolock gibbons in this sanctuary are also endangered due to habitat loss and fragmentation.**
- The **sanctuary has lost connectivity with surrounding forest patches, creating a "forest island."**
- Gibbons, **being arboreal animals living in the upper canopy of the forest, are sensitive to canopy gaps, making habitat fragmentation especially concerning.**

##### Genetic Isolation and Survival Concerns

- The division caused by the railway track has isolated gibbon families on both sides, compromising their genetic variability.
- This genetic isolation further endangers the survival of the hoolock gibbons within the sanctuary, which were already facing threats to their existence.

## **Hollongapar Gibbon Sanctuary: A Comprehensive Overview**

### **Location and Geography**

- Hollongapar Gibbon Sanctuary was **established in 1997 primarily for the conservation of the Hoolock Gibbon and its habitat.**
- Hollongapar Gibbon Sanctuary is situated in the Jorhat district of Assam, near the town of Mariani.
- It covers an area of approximately 20.98 square kilometers (8.11 square miles).
- The sanctuary is **characterized by semi-evergreen and mixed deciduous forests, offering a diverse range of habitats for various flora and fauna.**

### **Biodiversity**

- The sanctuary is renowned for its role in the conservation of the Western Hoolock Gibbon (*Hoolock hoolock*), which is **listed as Endangered on the IUCN Red List.**
- Apart from gibbons, the sanctuary is **home to various other primate species, including the Stump-tailed Macaque and Capped Langur.**
- The avian diversity is also significant, with a variety of bird species such as the Great Hornbill, Green Imperial Pigeon, and White-cheeked Partridge.

### **Vegetation**

- The sanctuary's vegetation includes semi-evergreen and mixed deciduous forests, with a range of tree species like Holong (*Dipterocarpus macrocarpus*) from which the sanctuary gets its name.
- The diverse forest types provide important habitats for the resident and migratory species.

### **About Western Hoolock Gibbon**

- Hoolock hoolock is a **primate species belonging to the family Hylobatidae, commonly known as gibbons.**
- They are found in parts of South Asia, primarily in India, Bangladesh, and Myanmar.

- The estimated current population of hoolock gibbons is around 12,000 individuals.

### **Taxonomy and Classification**

- The Western Hoolock Gibbon is one of the two species of hoolock gibbons, the other being the Eastern Hoolock Gibbon (*Hoolock leuconedys*).
- **Hoolock gibbons are small apes and are often referred to as "lesser apes," in contrast to the larger "great apes" like chimpanzees, gorillas, orangutans, and humans.**

### **Physical Characteristics**

- Western Hoolock Gibbons have a distinct appearance with a black or dark brown fur coat, with a white face ring and pronounced eyebrows.
- Males and females have similar appearances, but males are slightly larger than females.
- They have long arms, which are well adapted for brachiation (swinging from branch to branch) through the trees.

### **Habitat**

- Western Hoolock Gibbons are found in a variety of forest types including tropical rainforests, subtropical forests, and mixed deciduous forests.
- They inhabit the upper canopy layers of trees and are highly arboreal, rarely descending to the ground.

### **Geographical Distribution**

- The Western Hoolock Gibbon's **range extends across parts of northeastern India, northern and western Myanmar (Burma), and southwestern China.**
- In India, their distribution spans states like Assam, Arunachal Pradesh, and Nagaland.

### **Behavior and Ecology**

- Gibbons are **known for their impressive vocalizations**, which play a crucial role in marking territory and maintaining group cohesion. They are known to produce songs that can be heard over long distances.
- These gibbons are **primarily frugivorous**, feeding on a variety of fruits, leaves, and occasionally insects.

- They **live in small family groups consisting of a monogamous pair** (male and female) and their offspring. These groups usually consist of two to four individuals.
- Their social structure revolves around strong pair bonds between males and females, who often perform duets as part of their territorial behavior.

### Conservation Status

- The Western Hoolock Gibbon is listed as Endangered on the International Union for Conservation of Nature's (IUCN) Red List.
- The Eastern Hoolock Gibbon is listed as Vulnerable on the IUCN Red List.
- Both species are listed on Schedule 1 of the Indian (Wildlife) Protection Act 1972, which offers them the highest level of legal protection in India.

## UN GENERAL COMMENT NO. 26

### In News:

- Insufficient progress in achieving global commitments to limit global warming exposes children to hazards like rising temperatures.
- The impact of climate change on children's rights is a growing concern that the United Nations (UN) has recently addressed through a new guidance document

### Details

- This guidance, formally known as General Comment No. 26, **outlines the obligations that member states have to protect children's rights in the face of environmental degradation and climate change.**

### Analysis of Background:

#### Climate Change and Children's Rights

- Climate change is not just an environmental crisis but also a human rights crisis, with children being the most vulnerable.
- Recent extreme weather events, such as heatwaves, floods, and wildfires, have directly impacted children's lives and well-being.

## UN Convention on the Rights of the Child

- The UN Convention on the Rights of the Child is an **international agreement that addresses a wide range of human rights related to children's health, education, development, and living standards.**
- **General Comment No. 26 provides authoritative guidance to the governments of the 196 countries that have ratified the convention.**

## Key Points from the General Comment

**Best Interests of the Child:** The best interests of the child should be a primary consideration in the adoption and implementation of environmental decisions affecting children. This includes considering the unique vulnerabilities children face in environmental contexts.

**Protecting Indigenous Children:** Indigenous children and their communities are particularly vulnerable to climate change. States are obligated to ensure the right to life, survival, and development of Indigenous children. Engagement with Indigenous communities and their knowledge is essential for climate change response.

**Business Sector Accountability:** Governments should require businesses to conduct "due diligence" to assess how their actions might affect climate and children's rights. Governments are expected to ensure businesses operate at environmental standards aimed at protecting children's rights from climate-related harm.

**Responsibility for Rapid Emissions Reductions:** Nations are urged to rapidly and effectively reduce carbon emissions to support children's rights and avoid irreversible damage to nature. Carbon emission reductions can prevent child deaths due to heat and other climate-related impacts.

**Adaptation and Displacement:** Adaptation frameworks should address climate change-induced migration and displacement, considering children's rights in the process.

## Children's Role and Input

- The guidance document was developed following consultations with more than 7,000 children from 103 countries, along with governments and experts.
- **Children are recognized as agents in their own lives and have the right to participate in the creation of environmental policies that affect them.**

## Global Action and Future Considerations

- The guidance pushes the interpretation of the convention to emphasize children's rights to a clean, healthy, and sustainable environment.
- The UN committee's emphasis on governments' responsibilities is seen as an important step toward addressing the impact of climate change on children.

## KUMBALGARH WILDLIFE SANCTUARY

### In News:

The proposal to designate the Kumbhalgarh Wildlife Sanctuary (KWS) in Rajasthan as a tiger reserve has ignited a debate, raising concerns about indigenous communities, tiger presence, ecological impact, and the balance between conservation and local livelihoods.

### Analysis of Background:

#### Indigenous Communities and Displacement Concerns

- **Situated on the fringes of the Aravalli range, the KWS is inhabited by indigenous tribes such as Bhil, Garasia, and Raika pastoralists.**
- These communities express apprehension about potential displacement due to the reserve's declaration, impacting their ancestral lands and traditional way of life.
- Threat to displacement of 20 tribal villages located inside KWS.

#### Tiger Presence and Connectivity

- One of the focal points of the controversy is the **absence of documented tiger presence in the Kumbhalgarh forest.**
- Experts and critics question the rationale behind establishing a tiger reserve where historical evidence of tiger populations is lacking.
- Not much prey to support tiger population.
- Furthermore, the lack of connectivity corridors to other tiger reserves raises concerns about genetic diversity and healthy tiger populations.

#### Ecotourism and Livelihood Impact

- Proponents of the tiger reserve argue that it could spur employment opportunities through ecotourism.
- However, opponents stress that potential benefits must be weighed against potential negative impacts on the livelihoods of indigenous communities.

- The declaration might lead to the displacement of traditional livelihoods and disrupt the equilibrium between conservation and human well-being.

### **Conservation and Human-Wildlife Conflict**

- The KWS is known for its diverse fauna, including Indian wolves, four-horned antelope, and leopards.
- However, the **area has never been part of any established tiger corridor.**
- The presence of roads traversing the sanctuary raises concerns about human-wildlife conflicts, particularly if tiger populations were introduced without proper connectivity measures.

### **Complexity and Considerations**

- The proposed tiger reserve highlights the intricate balance required between conservation and local communities' rights.
- Striking a balance between protecting biodiversity and respecting the livelihoods and traditions of indigenous tribes presents a complex challenge.

### **List of Tiger reserves in Rajasthan**

- Mukandra Hills Tiger Reserve
- Ramgarh Vishdhari Tiger Reserve
- Ranthambore Tiger Reserve
- Sariska Tiger Reserve

### **Newly approved**

- Dhoulpur-Karauli tiger reserve
- Kumbhalgarh tiger reserve (in-principal approval)

### **Kumbhalgarh Wildlife Sanctuary: A Precious Natural Haven**

#### **Location and Overview**

- **Situated in the Rajsamand District of Rajasthan**, Kumbhalgarh Wildlife Sanctuary encompasses an area of 610.528 square kilometers, surrounding the awe-inspiring Kumbhalgarh fortress.
- The sanctuary is an exemplar of the rich natural diversity of western India.



- **The landscape extends across the Aravalli Range, spanning parts of Rajsamand, Udaipur, and Pali districts, with elevations ranging from 500 to 1,300 meters.**
- This sanctuary is a **part of the Khathiar-Gir dry deciduous forests ecoregion**, which adds to its ecological significance.

### **Geographical Features**

- The sanctuary's nomenclature is derived from the remarkable Kumbhalgarh fort.
- Its territory comprises a core area spanning 224.890 square kilometers and a buffer area spanning 385.638 square kilometers.
- Notably, the sanctuary envelopes four hill and mountain ranges within the Aravalli: Kumbhalgarh range, Sadri range, Desuri range, and Bokhada range.
- Additionally, the sanctuary houses twenty-two villages.
- The terrain varies from hills to piedmont and plains. While plains have been adapted for agricultural activities, the sanctuary's charm resides in its diverse topography.

### **Flora and Fauna**

- Kumbhalgarh Wildlife Sanctuary is home to a vibrant array of flora and fauna.
- Within its confines reside the Indian wolf, Indian leopard, sloth bear, striped hyena, golden jackal, jungle cat, sambhar, nilgai, chausingha, chinkara, and Indian hare.
- The elusive Indian leopard assumes the role of the sanctuary's apex predator, embodying the intricate balance of its ecosystem.

### **Avian Diversity**

- The avian inhabitants of Kumbhalgarh Sanctuary are equally captivating.
- Among them, the grey junglefowl captures attention with its vibrant presence.
- The sanctuary's varied habitats provide a haven for numerous bird species, contributing to the area's ecological richness.

### **Ecological Significance**

- This sanctuary is not merely a geographical entity; it symbolizes the commitment to conserving nature's wonders.
- Its encompassing of multiple ecosystems within the Aravalli Range speaks to its ecological relevance.

- The sanctuary's rich biodiversity and varied landscapes underscore its role in maintaining regional ecological balance.

## Exploring the Richness of Kumbhalgarh

### Historical Significance

- The **Kumbhalgarh fortress, dating back to the 15th century, stands as a testament to Rajput valor and architectural brilliance.**
- Built by Rana Kumbha, this fortress served as a refuge for the Mewar rulers during times of conflict.
- Its robust walls, spanning over 36 kilometers, make it one of the longest fortifications in the world.

### Architectural Marvel

- The intricate design of the Kumbhalgarh fortress showcases the fusion of artistic prowess and defensive strategy.
- The fort's massive gates, intricate carvings, and bastions reflect the skill of artisans and engineers of its time.
- The **Badal Mahal (Palace of Clouds) within the fortress adds a touch of elegance to its rugged grandeur.**

### Ranakpur Jain Temple

- Nearby, the Ranakpur Jain Temple stands as a pinnacle of architectural brilliance.
- Its intricate marble carvings and unique architecture make it a significant spiritual and cultural destination.

## KALIVELI BIRD SANCTUARY

### In News:

The Southern Bench of the National Green Tribunal (NGT) has withheld the environmental clearance granted for fishing harbours at Alamparaikuppam and Azhagankuppam, located in the intertidal area of Kailveli estuary, noting with “surprise” that the Environmental Impact Assessment (EIA) does not include detailed studies on turtle nesting grounds, mangroves and other eco-sensitive aspects.

## Analysis of Background:

### Kaliveli Bird Sanctuary: South India's Brackish Water Gem

- Nestled in the southern Indian state of Tamil Nadu, the Kaliveli Bird Sanctuary stands as a vital refuge for avian biodiversity. Covering an expansive area, this sanctuary boasts the distinction of being the **second-largest brackish water lake in South India, trailing only behind the renowned Pulicat Lake.**
- The **sanctuary's establishment under the Wildlife Protection Act, 1972**, underscores its importance as a sanctuary for both resident and migratory bird species.
- Spanning over 61 square kilometers, it's nestled between the Bay of Bengal to the east and the Buckingham Canal to the west. The sanctuary encompasses an extensive area of tidal mudflats, brackish water lakes, salt pans, and mangrove forests.

### Geographical Significance

- **Encompassing the sprawling Kaliveli Lake**, the sanctuary's expanse is a mosaic of tidal mudflats, salt pans, and brackish water lakes.
- The sanctuary's geographical layout features a connection to the Bay of Bengal through the Uppukalli Creek, fostering an ecosystem that is a magnet for a plethora of bird species.

### Historical Declaration

- The sanctuary's inception was marked by a significant declaration from the Villupuram District Administration.
- **This declaration was issued under Section 18 of the Wildlife Protection Act, 1972**, underscoring the legal commitment to protecting the diverse avian population and the critical ecosystem that the sanctuary encompasses.

### Ecological Connectivity

- One of the sanctuary's unique features is its **connection to the Bay of Bengal through the Uppukalli Creek and the nearby Edayanthittu sanctuary.**
- This connectivity is a boon for both resident and migratory birds, as it offers nesting and breeding opportunities for species traveling along the Central Asian flyway.

## Protected Southern Region

- Recognizing the sanctuary's ecological value, the southern part of the wetland was designated as reserved land in 2001.
- This move ensures that this crucial portion remains untouched by human interference, safeguarding a haven for birdlife and preserving the natural balance of the ecosystem.

## Migratory Marvels

- The Kaliveli Bird Sanctuary's significance extends beyond its resident species to include a vital role as a feeding and nesting ground for migratory birds.
- These feathered travelers embark on arduous journeys from the cold subarctic regions of Central Asia and Siberia, making the sanctuary a crucial pit stop.
- **Species like the Black-tailed Godwits, Eurasian Curlew, White Stork, Ruff, and Dublin find solace and sustenance within the sanctuary's shores.**

## Avian Biodiversity

- The sanctuary is a haven for avian enthusiasts, ornithologists, and nature lovers alike. It's home to an impressive range of resident and migratory bird species. Some of the notable species found here include:
- **Greater Flamingo (*Phoenicopterus roseus*):** These elegant pink birds are a major attraction, especially during the winter months when they migrate to the sanctuary in large numbers.
- **Painted Stork (*Mycteria leucocephala*):** Known for their striking appearance, painted storks are a resident species often seen in the wetland areas of the sanctuary.
- **Spot-billed Pelican (*Pelecanus philippensis*):** These large waterbirds are a common sight, gliding gracefully over the sanctuary's water bodies.
- **Eurasian Spoonbill (*Platalea leucorodia*):** With their distinctive spoon-shaped bills, these birds can be spotted wading in the shallow waters.
- **Common Teal (*Anas crecca*):** A migratory species, common teals visit the sanctuary during the winter months, adding to its diversity.
- **Osprey (*Pandion haliaetus*):** This bird of prey can be seen hunting for fish in the sanctuary's waters.
- **Kentish Plover (*Charadrius alexandrinus*):** These small waders are known for their quick movements along the shoreline.

## CLETHODIM

### In News:

A new study raises concerns about the use of the common herbicide clethodim.

### Analysis of Background:

#### About the study and findings

- It was a collaborative study of researchers from **Kasturba Medical College (KMC), Manipal Academy of Higher Education (MAHE), Manipal, and Yenepoya Research Center, Mangaluru.**
- The findings were published in the journal Chemosphere.
- The research has unveiled alarming insights into the potential impact of the widely used **herbicide clethodim on male reproductive health.**
- The study reveals a spectrum of effects including a reduction in **testicular weight, a decrease in germ cell population, lower levels of serum testosterone, abnormalities in sperm, and compromised preimplantation embryo development.**

#### Importance of the findings

- These findings necessitate further **investigation and reconsideration of the use of such herbicides** to ensure the well-being of both humans and our environment.
- There is a necessity for **molecular-level screenings** to comprehend the potential effects of herbicides on human and environmental health.
- The researchers underlie the **urgency of comprehensive testing** for this post-emergent herbicide.
- There is a need for **revisiting the application of the herbicide**
- Advocacy for **upgraded standards** in the formulation of new agents for similar uses can be done.

#### About Clethodim

- It is an organic compound.
- It is a member of the **cyclohexanedione family** of herbicides.
- It is used to **control grasses**, especially *Lolium rigidum*.
- Clethodim has been an approved herbicide in India and globally for some time.

#### Regulations of herbicides and pesticides in India

## Central Insecticides Board and Registration Committee

The *import, manufacture, sale, transport, distribution, and use of insecticides and herbicides* is regulated by the central insecticide board and registration committee in India.

The pesticide in India is regulated by the following two government bodies

1. Central Insecticides Board and Registration Committee (CIBRC) and
2. Food Safety and Standards Authority of India (FSSAI)

## Central Insecticide Board (CIB)

- The Central Insecticides Board **advises the central government and state governments on technical matters** arising out of the administration of this act and to carry out the other functions assigned to the board by or under this act.
- The CIB committee **regulates the entry of new active substances or formulations** of pesticides in India.
- It is the apex body involving the various experts that evaluate the registrability of a particular molecule in India.
- After the approval from CIB the new molecule is included in the Insecticide Schedule.
- Once CIB approves the new molecule inclusion, the applicant can start the registration process.

## Registration Committee (RC)

- Once the new molecule is included in the insecticide schedule, the applicant is required to obtain the registration of the new molecule under **various 9(3) categories to legally sell, trade, manufacture or import the new molecule or its formulation in India.**
- The RC facilitates the registration process through an online portal. The various experts in the RC **scrutinize the formulae and verify claims made by the importer or the manufacturer** as regards their efficacy and safety to human beings and animals.
- After the requirements are met satisfactorily, RC presents the Certificate of Registration (CR) to the applicant.

## Food Safety and Standards Authority of India (FSSAI)

- As per the Food Safety and Standards Act, 2006, the FSSAI has constituted a Scientific Panel with relevant experts which **recommends Maximum Residue Level (MRL).**

- In India, the State Agricultural Universities (SAUs)/Indian Council of Agricultural Research (ICAR) generate the **multi-location supervised field trial data for pesticide and herbicide residues** following GAP on registered crops approved by CIB&RC.
- The Food Safety and Standard Authority of India (FSSAI) **under the Ministry of Health and Family Welfare** evaluates the supervised **trial residue data based on the approved GAP for fixation of MRL**, keeping in view the dietary exposure and risk assessment of the pesticide.

## RED SAND BOA

### In News:

The report by the Wildlife Conservation Society (WCS)-India sheds light on the alarming trend of illegal trade involving the Red Sand Boa (*Eryx johnii*) in India.

### Analysis of Background:

#### Key findings and insights from the report

#### Incidents of Illegal Trade

- Between the years 2016 and 2021, WCS-India documented 172 incidents of seizures related to the illegal trade of Red Sand Boas.

#### Distribution of Incidents

- The illegal trade of Red Sand Boas was reported in 18 Indian states and one Union Territory, covering a broad geographic range.

#### Conservation Status

- The **Red Sand Boa** is classified as **'Near Threatened'** by the International Union for Conservation of Nature (IUCN) due to a decreasing population trend across its habitat range.

#### Reasons for Illegal Trade

- The report highlights **two main drivers of the illegal trade in Red Sand Boas: the demand in the pet trade and their use in black magic practices.**
- The species' unique appearance and perceived mystical properties contribute to its desirability.

## Role of Social Media

- Social media platforms, particularly YouTube, play a significant role in facilitating the illegal trade of Red Sand Boas.

## Conservation Recommendations

- The report suggests that local and international conservation organizations should conduct formative research to gain a deeper understanding of the illegal reptile trade and the demand driving it.

- This research could inform more effective conservation strategies and interventions.

### **Red Sand Boa (*Eryx johnii*) - A Comprehensive Overview**

- The Red Sand Boa (*Eryx johnii*) is a **non-venomous snake species belonging to the Boidae family**.
- It is **widely distributed across the Indian subcontinent, including regions like India, Pakistan, Sri Lanka, and parts of Bangladesh**.
- Known for its distinctive appearance and relatively docile nature, the Red Sand Boa is a popular species in the exotic pet trade.

## Physical Characteristics

- **Size:** Red Sand Boas are relatively small snakes, with adult lengths typically ranging between 40 to 60 centimeters (16 to 24 inches), although some individuals can grow slightly larger.
- **Coloration:** As the name suggests, these boas exhibit a reddish-brown to pale pink coloration on their upper side, which helps them blend into their sandy habitats. They have a lighter belly and a distinct contrast between the dorsal and ventral colors.
- **Body Shape:** Red Sand Boas have a robust, cylindrical body with a short, stubby tail. They have smooth scales and a slightly flattened head.
- **Eyes and Nostrils:** These boas possess small, prominent eyes with vertical pupils. They also have nostrils that are positioned on the top of their snout, allowing them to breathe while partially buried in sand.
- **Habitat and Distribution:** Red Sand Boas are primarily found in arid and semi-arid regions. They prefer habitats with loose, sandy soil that allows them to burrow effectively. These snakes are commonly found in areas with scrublands, deserts, and rocky terrains.



## Behavior and Diet

- **Burrowing:** Red Sand Boas are well-adapted to their subterranean lifestyle. They are excellent burrowers, using their specialized head shape and strong body to create tunnels in loose sand. These burrows provide them protection from extreme temperatures and predators.
- **Nocturnal:** These snakes are predominantly nocturnal, meaning they are most active during the night. They emerge from their burrows in search of prey and to regulate their body temperature.
- **Diet:** Red Sand Boas are carnivorous and primarily feed on small mammals like rodents, as well as birds and their eggs. They are known to ambush their prey from their burrows and use constriction to subdue it.
- **Reproduction:** Red Sand Boas are ovoviviparous, meaning that they give birth to live young instead of laying eggs. After a gestation period of several months, the female gives birth to a small number of offspring, usually between 2 to 10, depending on factors like the female's size and health.

## GREEN HYDROGEN STANDARDS

### In News:

India announces definition of Green Hydrogen.

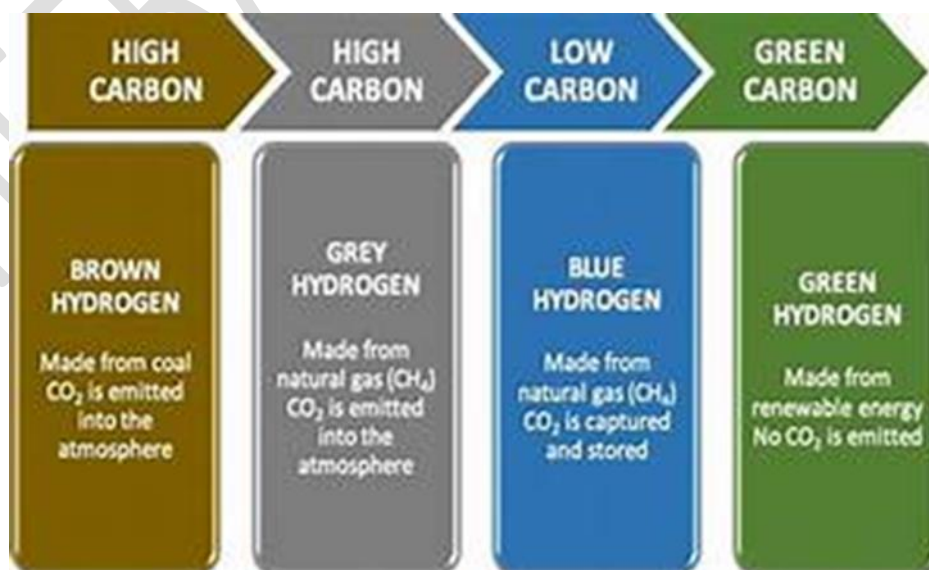
### Analysis of Background:

- The Green Hydrogen Standard for India sets a criterion of 2 kg CO<sub>2</sub> equivalent per kg H<sub>2</sub> as a 12-month average emission threshold.
- It is a significant move for the progress of the National Green Hydrogen Mission.
- The guidelines established by the **Ministry of New and Renewable Energy (MNRE)**, Government of India, delineate the emission benchmarks that must be fulfilled for hydrogen production to qualify as 'Green', signifying its origin from renewable sources.
- The Ministry of New & Renewable Energy has characterized **Green Hydrogen as having a well-to-gate emission** (encompassing processes like water treatment, electrolysis, gas purification, hydrogen drying, and compression) that does not exceed 2 kg CO<sub>2</sub> equivalent per kg H<sub>2</sub>.
- The scope of the definition encompasses both electrolysis-based and biomass-based hydrogen production methods.

- The notification explicitly states that the Ministry of New & Renewable Energy will define a comprehensive methodology for measuring, reporting, monitoring, on-site verification, and certifying green hydrogen and its derivatives.
- Bureau of Energy Efficiency (BEE), **Ministry of Power shall be the Nodal Authority for accreditation of agencies** for the monitoring, verification and certification for Green Hydrogen production projects.

## Green Hydrogen

- It is a colourless, **odourless**, tasteless, non-toxic and **highly combustible gaseous substance**.
- Green hydrogen stands as an energy resource that emerges via **water electrolysis** using renewable sources like wind, solar, and hydroelectric power.
- This form of hydrogen plays a key factor in transitioning towards a carbon-neutral economy while aiding in climate change mitigation.
- The produced hydrogen can be stored and employed as fuel across transportation, industry, and agricultural sectors.
- **Other types of Hydrogen:** Hydrogen can also be categorized as 'grey' and 'blue'.
- Grey hydrogen is manufactured from fossil fuels like coal and gas, constituting around 95% of total production in South Asia.
- Blue hydrogen is generated utilizing electricity produced by combusting fossil fuels; however, it incorporates technologies to capture and prevent the carbon emissions from being released into the atmosphere.



## Reasons to Develop Green Hydrogen

- **Energy Transition:** As societies shift away from fossil fuels, green hydrogen offers a versatile and clean energy carrier to replace traditional energy sources in various sectors, such as transportation and industry.
- **Energy Storage:** Hydrogen can store excess renewable energy that might otherwise go to waste, serving as a reservoir for intermittent renewable sources like solar and wind power.
- **Decarbonizing Industries:** Hard-to-abate sectors like heavy industry and chemicals rely heavily on fossil fuels. Green hydrogen can be utilized as a clean feedstock and energy source, aiding in decarbonization efforts.
- **Energy Security:** Diversification of energy sources through green hydrogen production reduces dependence on finite fossil fuels, enhancing energy security and resilience.
- **Global Market Potential:** The growing global interest in sustainable energy solutions presents a substantial market for green hydrogen technologies and expertise.
- **Technological Innovation:** Research and development in green hydrogen technologies spur innovation, leading to more efficient production methods and lowering costs over time.
- **International Commitments:** Many countries are committed to achieving net-zero emissions. Green hydrogen can aid in meeting these targets by offering a clean energy alternative.

## Applications of Green Hydrogen

- **Energy Storage:** Hydrogen can store excess energy generated from renewable sources when demand is low and release it when demand is high. This addresses the intermittency of renewable energy generation and contributes to grid stability.
- **Power Generation:** Green hydrogen can be used in gas turbines or fuel cells to generate electricity. This can provide backup power during peak demand or when renewable energy sources are unavailable.
- **Residential and Commercial Heating:** Hydrogen can be used for space heating and water heating in homes and businesses, reducing the reliance on fossil fuels and lowering carbon emissions.
- **Decentralized Power Generation:** Remote areas with limited access to electricity grids can use green hydrogen to generate power locally using fuel cells or hydrogen combustion.

- **Aviation and Shipping:** Green hydrogen can be used to produce synthetic aviation and marine fuels, helping to decarbonize these hard-to-abate sectors.
- **Hydrogen Injection:** Green hydrogen can be blended with natural gas in existing pipelines, reducing the carbon intensity of the gas supply.
- **Hydrogen Fuelling Stations:** Infrastructure for refuelling hydrogen-powered vehicles is being developed, enabling the expansion of FCVs in regions with a focus on clean transportation.
- **Carbon Capture and Storage (CCS):** Green hydrogen can be used in conjunction with CCS technologies to create "blue" hydrogen, where the carbon emissions from hydrogen production are captured and stored underground.
- **Agriculture:** Green hydrogen can be utilized for sustainable agricultural practices, including producing fertilizers and running agricultural machinery.

## SCIENCE AND TECHNOLOGY

### VOYAGER 2

#### In News:

NASA's Voyager 2 spacecraft, which is currently exploring the outer reaches of the solar system, has encountered a communication problem due to an antenna misalignment. The problem occurred after a set of planned commands were executed by the spacecraft on July 21, resulting in the antenna deviating 2 degrees from its optimal orientation towards Earth. As a consequence, Voyager 2 is unable to receive any instructions or send back any data to Earth.

#### Analysis of Background:

- Voyager 2 is a space probe **launched by NASA in 1977, to explore the outer planets of our solar system.**
- It is part of the Voyager program, which also includes its twin spacecraft, Voyager 1.
- The primary mission of Voyager 2 was to **study Jupiter, Saturn, Uranus, and Neptune**, and it provided invaluable data and images during its flybys of these planets.

#### Key features and achievements of Voyager 2 include:

- **Multi-Planet Exploration:** It is the only spacecraft to have visited all four of the solar system's giant outer planets: Jupiter, Saturn, Uranus, and Neptune. Its trajectory

allowed it to fly by each of these planets and gather scientific data about their atmospheres, compositions, and magnetic fields.

- **Jupiter Encounter:** During its flyby, it discovered a previously unknown moon of Jupiter and provided detailed images of the planet and its moons, including the famous "Great Red Spot."
- **Saturn Encounter:** It captured stunning images of Saturn's rings and its many moons, including close-up views of Titan, Saturn's largest moon, which has a thick atmosphere.
- **Uranus Encounter:** It is the first and only spacecraft to visit this distant ice giant. It discovered 10 previously unknown moons and two new rings around Uranus.
- **Neptune Encounter:** It provided the first close-up images and data of this icy blue planet. It discovered five new moons, four faint rings, and a massive storm called the "Great Dark Spot."
- **Voyager Interstellar Mission:** After completing its primary mission to explore the outer planets, Voyager 2 continued its journey beyond the solar system. In 2018, it crossed the heliopause—the boundary that separates our solar system from interstellar space.
- **Long-Distance Communication:** Despite its immense distance from Earth, Voyager 2 continues to communicate with scientists on Earth through NASA's Deep Space Network. However, as mentioned earlier, it faced a recent communication problem due to antenna misalignment, but NASA is hopeful that the issue will be resolved during the next orientation reset.

## GSAT-24

### In News:

- In a significant stride towards enhancing its Direct-to-Home (DTH) services, Tata Play has commenced the transmission of television channels through its dedicated GSAT-24 satellite, which has been leased from the Indian Space Research Organisation (ISRO).
- This development comes as the culmination of collaborative efforts and advanced satellite technology, unlocking a new era of broadcasting capabilities for Tata Play.

### Analysis of Background:

#### Dedicated Satellite for Enhanced Services

- GSAT-24, a **4-tonne 24-Ku band communication satellite**, was launched in June the previous year, with a specific focus on enhancing Tata Play's DTH offerings.

- Designed and built by ISRO, the satellite was **strategically positioned in a geosynchronous orbit of 36,000 kilometers after its launch by the French company Ariane space using the Ariane 5 space launch vehicle from French Guiana in South America.**
- **Also known as CMS-02 satellite,** it is funded, owned and operated by New Space India Limited.
- Cost of spacecraft was around ₹400 crore.
- **The entire capacity onboard CMS-02 satellite will be leased to Tata Play.**

#### **Augmented Channel Capacity and Nationwide Coverage**

- The deployment of GSAT-24 positions Tata Play to expand its channel carrying capacity from 600 to a formidable 900 channels.
- **This expanded bandwidth not only facilitates improved signal reception and channel quality but also bolsters Tata Play's status as the largest satellite bandwidth provider among all DTH platforms in the country.**
- Importantly, the extended coverage ensures that the length and breadth of the nation, including remote areas like the Andaman and Nicobar Islands and Lakshadweep, receive uninterrupted broadcasting services.

#### **India's Technological Triumph**

- GSAT-24's operational commencement underscores India's aerospace and technological prowess.
- The satellite's presence serves as a tribute to the nation's commitment to indigenous technological advancements.
- This significant achievement amplifies India's capabilities in the telecommunications sector, solidifying its successful entry into the demand-driven mission segment.

#### **NSIL's Pioneering Role**

- New Space India Limited (NSIL), ISRO's commercial arm, played a pivotal role in the realization of GSAT-24's mission.
- The satellite, a result of collaboration between NSIL and Tata Play, aligns seamlessly with the 'Make in India' initiative.

- GSAT-24 stands as NSIL's first demand-driven communication satellite mission post-space sector reforms, attesting to India's progress in effectively utilizing satellite capacity to meet specific requirements.

## CELL-FREE DNA

### In News:

Cell-free DNA (cfDNA) is a type of DNA that circulates in the bloodstream, released by dying cells. It was first discovered in 1948, but it took more than half a century for scientists to realize its potential applications in medicine.

### Analysis of Background:

- cfDNA is seen as a promising **biomarker for detecting and monitoring various diseases, such as cancer, infections, and organ transplant rejection**. By analyzing the quantity and quality of cfDNA in a blood sample, doctors can gain insights into the health status of their patients and tailor treatments accordingly.

### Background

- The **genome of a human being consists of DNA molecules that are organized and stored inside the cells with the help of specialized proteins**. These proteins ensure that the DNA is protected from damage and degradation. However, **there are some situations in which small pieces of DNA can escape from their cellular compartments and circulate in the body fluids**. These tiny pieces of nucleic acids are called cell-free DNA (cfDNA).
- cfDNA was first discovered in patients with systemic lupus erythematosus, an autoimmune disease that causes the immune system to attack the body's cells. Since then, many other applications of cfDNA have been explored, such as detecting fetal DNA in maternal blood, identifying genetic mutations in cancer cells, or monitoring organ transplant rejection.
- The existence of cfDNA in body fluids has been known since 1948, but it was not until the recent advances in genome sequencing technologies that scientists were able to exploit this knowledge for various applications.

## A Useful tool

- cfDNA, or cell-free DNA, is a type of DNA that is released from cells into the bloodstream or other body fluids. It can **provide valuable information about the health and status of different cells and tissues in the body**. For example, cfDNA can reveal the presence of cancer, infections, autoimmune diseases, or pregnancy complications.
- cfDNA is **produced when cells die and their DNA is broken down into smaller fragments**. The amount and size of cfDNA can vary depending on the type and number of cells that are dying, as well as the mechanisms that cause cell death. Some processes that can affect cfDNA levels are normal cell turnover, inflammation, tissue injury, or tumour growth.
- cfDNA is a **useful tool because it is easy to obtain from a blood sample or other body fluid, and it reflects the current state of the cells and tissues in the body**. By analyzing cfDNA, researchers and clinicians can gain insights into the molecular mechanisms of diseases and develop better ways to diagnose, treat, and monitor them.

## Key applications of cfDNA

- **Non-Invasive Prenatal Testing (NIPT):** cfDNA analysis from maternal blood can be used to screen for chromosomal abnormalities in the developing fetus, such as Down syndrome (trisomy 21), Edwards syndrome (trisomy 18), and Patau syndrome (trisomy 13). This method has significantly reduced the need for invasive procedures like amniocentesis or chorionic villus sampling, which carry certain risks to the mother and fetus.
- **Cancer Detection and Monitoring:** Tumor-derived cfDNA, known as circulating tumour DNA (ctDNA), can be detected and analyzed in a cancer patient's blood to provide information about specific genetic mutations present in the tumour. cfDNA analysis can help with early cancer detection, monitoring treatment response, detecting minimal residual disease, and identifying the emergence of drug resistance.
- **Transplant Rejection Monitoring:** After organ transplantation, cfDNA analysis can be used to monitor the recipient's blood for donor-derived cfDNA (dd-cfDNA) to detect early signs of organ rejection. This non-invasive approach allows for timely intervention and adjustment of immunosuppressive therapy.
- **Liquid Biopsy:** cfDNA analysis serves as a "liquid biopsy" that allows the characterization of genetic alterations in tumours without the need for invasive tissue biopsies. This is particularly useful in cases where obtaining tissue samples is challenging or risky.



- **Infectious Disease Diagnostics:** cfDNA analysis can be used to identify the presence of pathogen-derived DNA in body fluids, aiding in the diagnosis and monitoring of infectious diseases.
- **Monitoring Disease Progression and Treatment Response:** cfDNA analysis can be applied to various diseases, including cardiovascular diseases, neurological disorders, metabolic disorders, and autoimmune conditions, to track disease progression and assess the effectiveness of treatments.
- **Early Detection of Diseases:** cfDNA analysis has the potential to detect diseases at early stages, allowing for timely intervention and improved patient outcomes.
- **Forensic Applications:** cfDNA can be used in forensic investigations, such as identifying individuals from trace amounts of DNA in crime scene samples.
- **Personalized Medicine:** cfDNA analysis can provide valuable genetic information about an individual's health, helping to guide personalized treatment decisions based on their unique genetic profile.
- **Research and Drug Development:** cfDNA analysis is used in biomedical research to gain insights into disease mechanisms, identify potential drug targets, and assess drug efficacy in clinical trials.

## ADITYA L-1 MISSION

### In News:

ISRO is set to launch its first solar mission Aditya-L1 to study Sun.

### Analysis of Background:

#### Introduction

- The Aditya-L1 mission, developed by the Indian Space Research Organisation (ISRO), **represents India's first space-based observatory dedicated to studying the Sun.**
- **Positioned at the Lagrange point 1 (L1)**, located about 1.5 million km from Earth, this pioneering mission aims to unravel the mysteries of the Sun's behavior, magnetic fields, and space weather impacts.

#### Mission Overview

- **Halo Orbit Placement:** Aditya-L1 is designed to be positioned in a halo orbit around the L1 Lagrange point, ensuring a stable vantage point for continuous solar observations.

- **Launch and Deployment:** The mission will be launched using the ISRO PSLV rocket from the Sathish Dhawan Space Centre SHAR (SDSC SHAR) in Sriharikota. The spacecraft will initially be placed in a low Earth orbit, which will then be transformed into an elliptical orbit before reaching L1 using on-board propulsion.
- **Cruise Phase and Halo Orbit:** As the spacecraft journeys towards L1, it will exit Earth's gravitational sphere of influence, marking the commencement of the cruise phase. Once at L1, it will enter a vast halo orbit around the Lagrange point.

### Mission Objectives

- **Solar Upper Atmospheric Dynamics:** Aditya-L1's primary objective is to study the dynamic behavior of the Sun's upper atmosphere, including the chromosphere and corona. The mission seeks to understand processes like chromospheric and coronal heating, and the initiation of solar eruptive events.
- **Space Weather Impact:** By observing solar activities and their impact on space weather in real-time, the mission aims to contribute to the understanding of solar events like coronal mass ejections (CMEs) and their influence on Earth's space environment.
- **Particle and Plasma Environment:** Aditya-L1 will provide valuable data on particle dynamics from the Sun, contributing to the study of solar wind, particle propagation, and the partially ionized plasma in the solar atmosphere.

### Payloads and Scientific Instruments

- **VELC (Visible Emission Line Coronagraph):** This payload will focus on studying the corona through imaging and spectroscopy, along with observing coronal mass ejections.
- **SUIT (Solar Ultraviolet Imaging Telescope):** SUIT will capture images of the photosphere and chromosphere, measuring solar irradiance variations and facilitating narrow and broadband imaging.
- **SoLEXS (Solar Low Energy X-ray Spectrometer) and HEL1OS (High Energy L1 Orbiting X-ray Spectrometer):** These payloads will study X-ray flares over a wide energy range, providing insights into the Sun's X-ray emissions.
- **ASPEX (Aditya Solar wind Particle Experiment) and PAPA (Plasma Analyser Package For Aditya):** These instruments will analyze electrons, protons, and energetic ions in the solar wind, helping understand the solar particle environment.

- **Advanced Tri-axial High Resolution Digital Magnetometers:** This payload will examine the interplanetary magnetic field at L1, revealing crucial information about solar magnetic dynamics.

### Research Goals and Expected Outcomes

- **Coronal Heating and Eruption Mechanisms:** Aditya-L1 aims to uncover the mechanisms behind coronal heating, coronal mass ejections, and solar flares, providing insights into the complex interactions within the Sun's atmosphere.
- **Space Weather Prediction:** By studying space weather impacts and solar events, the mission intends to enhance space weather prediction models, offering the potential to mitigate their effects on Earth's technological infrastructure.
- **Solar Wind and Magnetic Field Studies:** The mission will contribute to understanding the solar wind's composition, dynamics, and magnetic field topology, shedding light on their roles in driving space weather.

### Significance and Future Prospects

- **Advancement in Solar Physics:** Aditya-L1's observations and data will contribute to advancements in solar physics, plasma dynamics, and magnetism, enriching our understanding of stellar astrophysics.
- **Space Exploration Endeavors:** The mission sets a precedent for India's space exploration initiatives, enabling future solar and space-based research missions.

### Lagrange Points

- Lagrange points, named after the French mathematician Joseph-Louis Lagrange, are **five distinct positions in space where the gravitational forces of two large bodies, such as the Earth and the Moon, produce enhanced gravitational effects.**
- These points represent positions of dynamic equilibrium where the gravitational forces and the centripetal acceleration due to the motion of objects around them are perfectly balanced.

### Basics of Lagrange Points

- **Definition:** Lagrange points are locations in a two-body system where the gravitational forces and centripetal forces on a third, much smaller object become balanced, allowing it to remain in a stable or nearly stable position relative to the larger bodies.

- **Numbering:** The five Lagrange points are denoted as L1, L2, L3, L4, and L5.

### Position and Characteristics

- **L1:** Located on the line connecting the two massive bodies, closer to the larger body. Objects placed at L1 move in sync with the Earth's orbital motion, making it suitable for space observatories like the James Webb Space Telescope.
- **L2:** On the line connecting the two bodies, beyond the larger body. Objects at L2 enjoy a constant view of the night sky and are used for solar and Earth observations.
- **L3:** Opposite to the larger body, forming a straight line with the two massive bodies. It's unstable, making objects there prone to perturbations and drift.
- **L4 and L5:** Form equilateral triangles with the two massive bodies. Objects at these points tend to accumulate over time due to gravitational forces, forming regions known as Trojan asteroids or Lagrange point clouds.

### Applications of Lagrange Points

- **Space Observatories:** L1 and L2 are commonly used for space observatories. Their stable positions allow telescopes to maintain consistent views of distant objects, free from atmospheric interference.
- **Solar and Planetary Observation:** Observatories positioned at L1 and L2 provide continuous views of the Sun, monitoring solar activities and space weather phenomena.
- **Communication Relays:** L4 and L5 could potentially serve as communication relay points for future deep-space missions, providing continuous coverage for signals.
- **Asteroid Exploration:** Lagrange points have been considered as staging areas for missions to study asteroids, given their relatively stable positions.

### Challenges and Limitations

- **Orbital Perturbations:** While Lagrange points offer stability, they are not completely free from disturbances. Orbital perturbations from other celestial bodies and non-gravitational forces can affect objects stationed at these points.
- **Energy Requirements:** Positioning and maintaining objects at Lagrange points require careful fuel management due to the need to counteract gravitational influences and maintain desired orbits.

## Future Exploration and Utilization

- **Artemis Program:** NASA's Artemis program aims to establish a sustainable human presence on the Moon. Gateway, a lunar orbiting space station, could be positioned at the Earth-Moon L2 point to facilitate lunar exploration.
- **Deep-Space Missions:** As humanity ventures further into space, Lagrange points could play a significant role in supporting missions beyond our Moon, enabling efficient communication and observation.

## The Sun

- The Sun, a colossal ball of hot, glowing plasma, serves as the center of our solar system and is the primary source of light, heat, and energy that sustains life on Earth.
- Its immense size and intense energy production have fascinated astronomers and scientists for centuries.

## Structure and Composition

- **Core:** The Sun's core is the central region where nuclear fusion reactions occur. Hydrogen atoms fuse to form helium, releasing an enormous amount of energy in the process.
- **Radiative Zone:** Surrounding the core, the radiative zone is characterized by the transfer of energy through photons created in the core's fusion reactions.
- **Convection Zone:** Above the radiative zone, the convection zone experiences heat transfer through the movement of hot plasma. Large cells of rising and sinking material create the granulated appearance seen on the Sun's surface.
- **Photosphere:** The visible surface of the Sun is the photosphere, where most of its visible light is emitted. This layer is marked by sunspots and granules, indicating complex magnetic activity.
- **Chromosphere:** Above the photosphere lies the chromosphere, emitting a reddish glow during solar eclipses due to the presence of hydrogen emissions.
- **Corona:** The outermost layer, the corona, extends millions of kilometers into space and is visible during solar eclipses as a halo of plasma. The corona's temperature is much higher than the Sun's surface, a phenomenon still under study (coronal heating problem).

## Solar Energy and Fusion

- **Nuclear Fusion:** The Sun's immense energy results from nuclear fusion, where hydrogen nuclei combine to form helium, releasing energy in the form of light and heat.
- **Energy Transport:** Energy produced in the core travels through the radiative and convective zones before reaching the photosphere and being radiated into space.

### Solar Activities and Phenomena

- **Sunspots:** Dark areas on the photosphere caused by intense magnetic activity. These regions are cooler than their surroundings due to magnetic fields inhibiting convection.
- **Solar Flares:** Sudden bursts of energy and radiation caused by the release of magnetic energy in the Sun's atmosphere. They can impact Earth's space environment and communication systems.
- **Coronal Mass Ejections (CMEs):** Large expulsions of solar plasma and magnetic fields into space. CMEs can trigger geomagnetic storms on Earth, affecting power grids and satellites.
- **Solar Wind:** A constant stream of charged particles emitted by the Sun, which affects the Earth's magnetosphere and contributes to space weather.

### Solar Influence on Earth

- **Energy Source:** The Sun provides the energy required for various natural processes on Earth, including photosynthesis, weather patterns, and ocean currents.
- **Space Weather:** Solar activities like CMEs and solar flares influence space weather, potentially disrupting satellites, communication systems, and power grids.

## AGNIKUL'S SorTeD

### In News:

- **Chennai-based space-tech startup Agnikul Cosmos has made strides in India's private space sector with the development of its rocket, Agnibaan.**
- This innovative suborbital space vehicle demonstrates the potential of 3D printing technology in aerospace manufacturing, making Agnikul the second Indian space-tech company to achieve such a feat.

### Analysis of Background:

#### Agnikul's Suborbital Tech Demonstrator (SorTeD)

- **Vehicle Overview:** Agnikul's SorTeD, named Agnibaan, is a **single-stage launch vehicle equipped with the company's proprietary Agnilet engine.**

- **Vertical Lift-Off:** Agnibaan launches vertically and follows a predetermined trajectory during its suborbital space flight.
- **Payload Capacity:** Agnibaan can carry payloads of up to 100 kg to low Earth orbit (LEO) at altitudes of up to 700 km.
- **Physical Dimensions:** The vehicle stands 18 m tall, has a diameter of 1.3 m, and a liftoff mass of 14,000 kg.
- **Payload Envelope:** The payload bay measures 2m x 1.5m and can accommodate one or more satellites.

### The Agnilet Engine

- **Key Features:** Agnilet is an **entirely 3D-printed, single-piece, 6 kN semi-cryogenic engine developed by Agnikul.**
- **Propellants:** The engine utilizes a combination of liquid kerosene and supercold liquid oxygen as propellants.
- **Testing and Validation:** Agnilet engine underwent successful testing at the Vikram Sarabhai Space Centre in Thiruvananthapuram.

### 3D Printing's Role in Aerospace

- **Speeding Up R&D:** Srinath Ravichandran, Agnikul's co-founder and CEO, emphasized 3D printing's ability to rapidly produce complex and customized designs, facilitating faster research and development.
- **Iterative Development:** Iterative design iterations are possible due to 3D printing's flexibility, allowing designers to refine their prototypes efficiently.
- **Challenges and Scalability:** While 3D printing accelerates design and prototyping, it may not be as scalable as traditional manufacturing techniques.

### Private Sector's Role in Indian Space Industry

- **Opening to Private Participation:** The establishment of the Indian National Space Promotion and Authorisation Centre (IN-SPACe) in 2020 paved the way for greater private sector engagement in India's space activities.
- **Resource Allocation:** Private involvement in routine activities frees up resources for ISRO to focus on research, development, interplanetary exploration, and strategic missions.

- **Commercial Ventures:** Indian space industry has ventured into satellite launch services, weather satellites, and communication satellites, allowing ISRO to concentrate on exploration and scientific missions.

## CHANDRAYAAN 3 MAKES SOFT LANDING

### In News:

- Launched on 14 July 2023, Chandrayaan-3 etched its place in history when the lander and rover touched down near the lunar south pole region on 23 August 2023 at 18:02 IST.
- **This successful landing not only established India as the first country to achieve such a feat but also marked the fourth nation to soft-land on the Moon.**
- The achievement is a testament to ISRO's determination and innovation.

### Analysis of Background:

#### A Triumph in Lunar Endeavors

- Chandrayaan-3, part of the Indian Space Research Organisation's (ISRO) Chandrayaan program, signifies a remarkable feat in lunar exploration.
- **Comprising a lander named Vikram and a rover named Pragyan, akin to the Chandrayaan-2 mission, this mission focuses on achieving a controlled landing and rover mobility on the lunar surface.**
- With the propulsion module transporting the lander-rover configuration to lunar orbit, a powered descent by the lander was the critical phase of the operation.
- The mission encompasses a Lander and Rover configuration, propelled by LVM3 from SDSC SHAR, Sriharikota. The propulsion module carries the Lander and Rover until the lunar orbit's 100 km mark.



# CHANDRAYAAN-3 INDIA'S SHOT TO THE MOON



The powered descent will begin on August 23, 5:45 pm, in four broad phases: Rough braking phase; Attitude Hold Phase; Fine Braking Phase; Terminal Descent Phase.

Earth-bound manoeuvres

Lunar Transfer Trajectory

Moon-bound manoeuvres



## CHANDRAYAAN-3

Lander Module:  
**1,752 kg**  
(including Rover of 26 kg)

Propulsion Module:  
**2,148 kg**



**Aug 17**  
Separation of the Lander Module from the Propulsion Module

## PROPULSION MODULE

was filled with 1,696.4 kg of fuel during the launch on July 14. With more than 150kg of fuel left, it could remain operational for several years to come



Lander has four payloads or scientific instrument (ChaSTE, Rambha, ILSA, LRA)

CHANDRAYAAN-3 Spacecraft (inside the payload fairing)

## LVM3-M4 VEHICLE

Height | Lift-off Mass  
**43.5 m** | **642 t**

S200 Solid Rocket Boosters  
L110 Liquid Stage

**Aug 23 (17.20 hrs)**  
Soft-landing begins (Chandrayaan-3 slowly land on the lunar surface and to explore it with the help of a rover)

## ROVER (6-wheeled robotic vehicle)

Life	Weight	Power
<b>One lunar day (14 Earth days)</b>	<b>26 kg</b>	<b>26 kg</b>



Source: ISRO Graphic: Ritesh Kumar

## **Origins and Progression: Chandrayaan-2's Influence**

- Chandrayaan-2's launch in July 2019, which featured an orbiter, lander, and rover, set the stage for Chandrayaan-3.
- While the initial lander's trajectory went awry during a landing attempt in September 2019, ISRO's spirit remained unbroken, leading to the conception of Chandrayaan-3 and other future lunar missions.

## **Global Collaboration: ESA's Involvement**

- The **European Space Tracking network** (ESTRACK), operated by the European Space Agency (ESA), provided support for the mission.
- A mutual support agreement emerged, where ESA's tracking assistance for ISRO missions, including Gaganyaan (India's human spaceflight program) and the Aditya-L1 solar research mission, was reciprocated by ISRO's support for future ESA missions.
- This collaboration underlines the global nature of space exploration.

## **Mission Aims**

### **ISRO laid out three primary objectives for Chandrayaan-3:**

1.
  1. Achieve a safe and soft lunar landing.
  2. Demonstrate the rover's mobility capabilities.
  3. Conduct experiments on lunar surface materials to enhance understanding of lunar composition.

## **Spacecraft Configuration**

### **Propulsion Module**

- Carries the lander-rover to a 100 km lunar orbit.
- Features a solar panel and mounting structure for the lander.

### **Lander (Vikram)**

- Executes the soft landing on the Moon.
- It had four landing legs and four landing thrusters capable of producing 800 newtons of thrust each
- Accommodates the rover and scientific instruments.

### **Rover (Pragyan)**

- A six-wheeled, 26 kg vehicle.

- Conducts diverse measurements, contributing to lunar research.
- Investigates lunar surface composition, presence of water ice, lunar impact history, and atmosphere evolution.

## **Payloads**

### **Lander Payloads**

#### **Chandra's Surface Thermophysical Experiment (ChaSTE)**

- **Objective:** Measure thermal conductivity and temperature of the lunar surface.
- Information gleaned aids in comprehending lunar surface properties near polar regions.

#### **Instrument for Lunar Seismic Activity (ILSA)**

- **Objective:** Measure seismic activity around the landing site, revealing the lunar crust and mantle's structure.

### **Langmuir Probe (LP)**

- **Objective:** Estimate plasma density variations in the vicinity of the landing site.
- Langmuir probe plays a crucial role in studying ionosphere and atmospheric phenomena.

#### **Laser Retroreflector Array (LRA)**

- Objective: Passive experiment for lunar laser ranging studies.
- LRA aids in comprehending the dynamics of the Moon system.

#### **Additional Payload: Collaboration with NASA**

- Passive Laser Retroreflector Array from NASA contributes to lunar laser ranging studies.

### **Rover Payloads**

#### **Alpha Particle X-ray Spectrometer (APXS)**

- **Objective:** Determine elemental composition (e.g., Mg, Al, Si, K, Ca, Ti, Fe) of lunar soil and rocks around the landing site.
- APXS provides insights into the chemical makeup of lunar materials.

#### **Laser Induced Breakdown Spectroscopy (LIBS)**

- **Objective:** Conduct qualitative and quantitative elemental analysis.
- LIBS aids in deciphering chemical and mineralogical composition for a deeper understanding of the lunar surface.

## Propulsion Module Payload

### Spectro-polarimetry of Habitable Planet Earth (SHAPE)

- **Objective:** To make future discoveries of smaller planets through reflected light, potentially identifying habitable exoplanets.
- SHAPE payload enhances India's contribution to the study of exoplanets.

### Mission Progress

The mission progressed through several stages, including launch, Earth and lunar orbit maneuvers, and descent. Notable milestones include:

- Launch on 14 July 2023.
- Lunar orbit insertion on 5 August 2023.
- Lander separation from the propulsion module on 17 August 2023.
- Successful soft landing on 23 August 2023, making India the fourth nation to land on the Moon.

### Chandrayaan-3's Landing Choice: Explained

- Chandrayaan-3, India's lunar mission, has drawn attention for its controlled descent strategy and its proximity to the lunar South Pole.
- **While it landed on the moon's near side, the Chinese Chang'e 4 mission remains the sole lunar landing on the far side.**

### Understanding Moon's 'Near' and 'Far' Sides

- The moon's near side comprises 60% visible from Earth due to synchronous rotation.
- The 'far side' is the non-visible half, illuminated during the 'new moon' phase.
- The term 'dark side' is misleading; it was revealed by Luna 3 in 1959.

### Contrasts Between Near and Far Sides

- The near side is smoother with more 'maria' (volcanic plains).
- Far side has colossal craters due to asteroid impacts.
- Thinner crust on the near side allowed lava flow, creating plains conducive to missions.

### Chandrayaan-3's Noteworthy Landing Choice

- Chandrayaan-3 achieved the closest-ever landing to the lunar South Pole.
- Coordinates (69.36 S, 32.34 E) placed Vikram about 600 km from the South Pole.

- The aim was to approach a 'permanently shadowed region' for potential water-ice discovery.
- The decision aimed to access 'interesting deposits' and harvestable resources.

### **The Role of Vikram Lander's Position**

- Vikram wasn't in complete shadow; sunlight was needed to charge solar batteries.
- The controlled 'soft landing' objective was prioritized.
- Near-South Pole offered the best balance between achieving a successful landing and retaining line-of-sight communication with Earth.

### **Near-Side vs. Far-Side Landing Considerations**

- Landing on the far side would have hindered direct, real-time communication with Earth.
- Chandrayaan-2 orbiter could have been repurposed for relay communication, but it required reorientation and introduced delays.
- Mission objectives, including direct communication and successful landing, guided the decision.

### **Decoding Soft Landing and South Pole Target**

#### **Significance of Soft Landing**

- **A soft landing refers to a controlled, gentle touchdown of a spacecraft on a celestial body to avoid damage.**
- Chandrayaan-3 aims to demonstrate technical prowess by ensuring a safe and damage-free landing on the Moon.
- The Lander's successful soft landing highlights its ability to come to a standstill from high speeds without human intervention.

#### **South Pole as the Landing Site**

- The mission's objectives include showcasing a safe landing, rover mobility, and in-situ scientific experiments.
- Chandrayaan-3 is targeting the Moon's south pole for its landing site.
- **Unlike previous lunar missions that landed near the equator, the south pole presents challenges due to unique terrain, temperatures, and illumination patterns.**

#### **Challenges and Rewards of South Pole Landing**

- The Moon's polar regions remain largely unexplored due to extreme conditions.

- Temperature extremes and limited sunlight pose obstacles for sustained operations and instrument functionality.
- Chandrayaan-3's endeavor to land at the south pole opens avenues for discovering clues about the early Solar System.

### **Moon's Transformative Impact on Evolution: Unveiling Earth's Evolutionary Journey**

- Beyond its celestial beauty, the Moon has played a profound role in shaping life on Earth.
- **As the small satellite orbits at a distance of 384,400 kilometers, its gravitational influence has exerted far-reaching effects on our planet's geological, biological, and ecological processes.**

## **LUNA-25**

### **In News:**

- Russia is poised to launch its first lunar landing spacecraft, Luna-25, on August 11, marking a significant step in its renewed lunar exploration efforts.
- This mission follows closely after India's Chandrayaan-3 lunar lander launch, reflecting a global interest in exploring the moon's south pole, potentially rich in resources like ice for future human habitation.

### **Analysis of Background:**

#### **Mission Overview**

- Luna-25, launching from the Vostochny cosmodrome, **aims to explore the moon's south pole region, believed to hold substantial ice deposits.**
- Despite the proximity in timing, Roscosmos assures no interference between Luna-25 and Chandrayaan-3 missions due to different landing areas.
- **The spacecraft, weighing 1.8 tons and carrying 31 kg of scientific equipment, will orbit the moon for five to seven days before descending to one of three potential landing sites near the pole.**

#### **Objectives and Challenges**

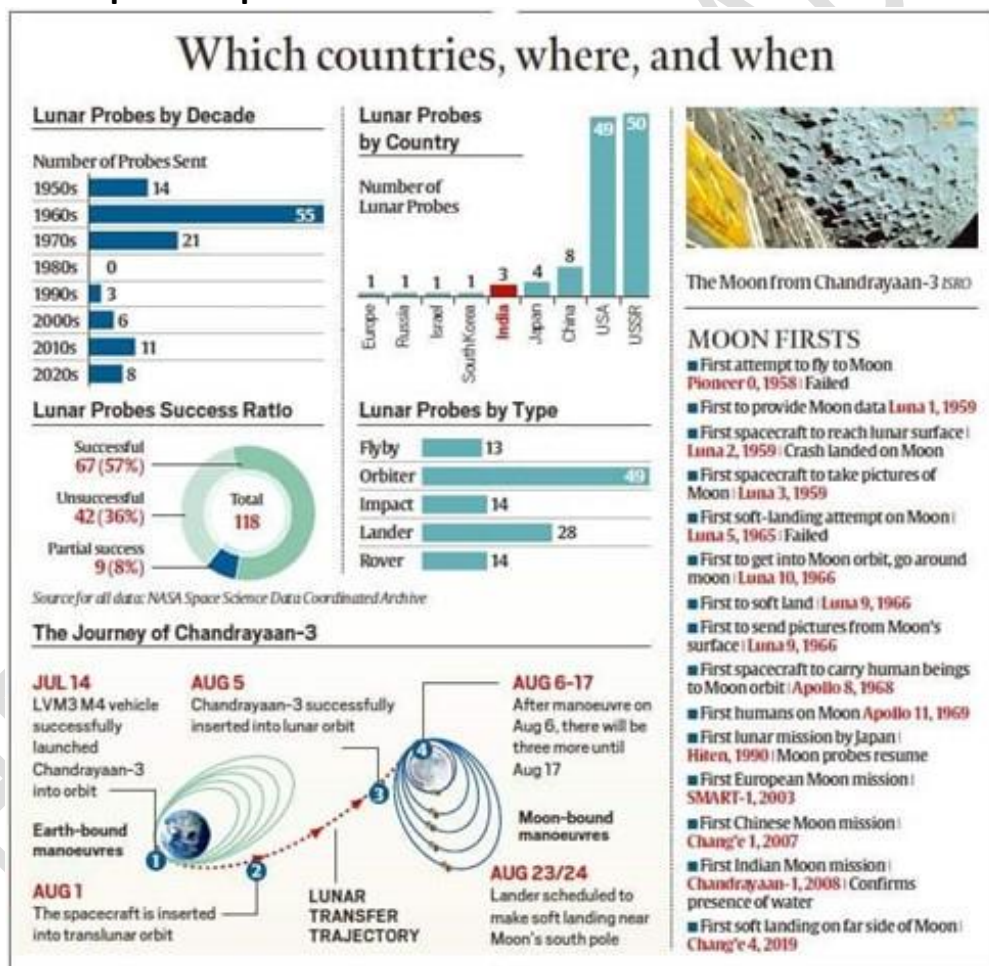
- Luna-25's primary task is to collect rock samples from depths of up to 15 cm, testing for the presence of frozen water, a critical resource for potential lunar bases.
- The launch was initially slated for October 2021 but faced delays, eventually rescheduled for August 11, 2023.

- The European Space Agency's Pilot-D navigation camera, planned for testing on Luna-25, was disengaged from the project after Russia's Ukraine invasion in February 2022.

## Significance for Russia

- **Luna-25 revives Russia's lunar exploration program after nearly 50 years**, marking a pivotal milestone in the country's space history.
- Despite challenges and setbacks, Russia's commitment to lunar exploration remains strong, as evidenced by the continued preparation for Luna-25's launch.
- The mission also underscores Russia's determination to contribute to scientific advancements and potential future lunar endeavors.

## List of significant moon missions that have been conducted by various countries and space agencies up to the present date



## Luna Program (Soviet Union/Russia)

- **Luna 2 (1959)**: First human-made object to reach the moon.
- **Luna 9 (1966)**: First successful soft landing on the moon, sent back images.
- **Luna 16 (1970)**: Successfully returned lunar soil samples to Earth.

- **Luna 24 (1972):** Collected and returned lunar soil samples.

### **Apollo Program (USA)**

- **Apollo 11 (1969):** First manned mission to land on the moon. Neil Armstrong and Buzz Aldrin walked on the lunar surface.
- **Apollo 12, 14, 15, 16, 17:** Follow-up missions with successful lunar landings, scientific experiments, and moonwalks.

### **Chang'e Program (China)**

- **Chang'e 3 (2013):** Successfully landed a rover, Yutu, on the moon's surface.
- **Chang'e 4 (2019):** Landed on the far side of the moon and deployed the Yutu-2 rover.
- **Chang'e 5 (2020):** Collected lunar samples and returned them to Earth.

#### **Lunar Reconnaissance Orbiter (USA)**

- Launched in 2009 to study the moon's surface and gather data for future lunar missions.

### **Chandrayaan Program (India)**

- **Chandrayaan-1 (2008):** Detected water molecules on the lunar surface and mapped the moon's composition.
- **Chandrayaan-2 (2019):** Orbiter, lander, and rover mission. Orbiter is operational and studying the moon.
- **Chandrayaan-3 (2023):** In-course towards moon.

### **Lunar Impact Missions:**

- **SMART-1 (European Space Agency) and Moon Impact Probe (India)** were missions that deliberately impacted the moon to study its surface.
- **Artemis Program (USA):** Planned program aiming to return humans to the moon, with Artemis I being an upcoming uncrewed mission.
- **Yutu-2 Rover (China):** Part of the Chang'e 4 mission, this rover continues to explore the far side of the moon.

### **The Revival of Lunar Exploration: A New Era of Moon Missions**

- The moon is set to witness a flurry of activity in the upcoming days as multiple spacecraft from different countries prepare to land on its surface.



- Chandrayaan-3 from India, Russia's Luna 25, and Japan's SLIM (Smart Lander for Investigating Moon) are all scheduled to touch down around the same time, potentially marking the first instance of three spacecraft operating simultaneously on the lunar surface.

## HYDROPONICS FARMING

### In News:

The Union Minister of Agriculture and Farmers' Welfare has highlighted the significance of the Hydroponics method of growing plants in the Lok Sabha.

### Analysis of Background:

- Hydroponics is a method of growing plants without soil, using water and nutrients. It is a promising alternative to conventional agriculture, as it can increase productivity and water efficiency. Hydroponics is an emerging technology in India, attracting the interest of entrepreneurs and innovative farmers who want to adopt sustainable and effective ways of crop production. Currently, this technology is mainly used for urban farming, rooftop gardening and commercial farming.
- Indian Institute of Horticulture Research, Bengaluru (IIHR) has developed a variation of hydroponics, called "Cocoponics", which uses cocopeat as a growing medium. **Cocopeat is a by-product of coconut processing, which has high water-holding capacity and good aeration.** The Institute has developed the complete production technology; including a liquid nutrient solution (Arka Sasya Poshak Ras) for growing various vegetables such as cabbage, chilli, brinjal, palak, cucumber, etc on arka fermented cocopeat under open or protected conditions.
  - The Institute has trained more than 3000 urban dwellers, cocopeat producers, hydroponics start-ups etc in the last 3 years through various capacity-building programmes.

### Hydroponics

- Hydroponics is a modern agricultural technique that involves growing plants without using traditional soil as a medium. Instead, plants are cultivated in nutrient-rich water solutions, allowing them to receive essential minerals and nutrients directly. This method enables precise control over plant growth conditions, making it possible to

optimize growth, yield, and resource utilization. Hydroponics is utilized in various settings, including commercial farming, urban agriculture, research, and even home gardening.

- The history of hydroponics dates back to the Hanging Gardens of Babylon, where plants were grown using a form of hydroponics. However, the modern concept of hydroponics emerged in the 19th and 20th centuries with scientific advancements in understanding plant nutrition and growth.

### Features of hydroponic systems

- **Soilless Growth:** By eliminating the need for soil, hydroponics reduces the risk of soil-borne diseases and pests. This allows for cleaner and more controlled plant growth.
- **Water Efficiency:** Hydroponic systems recycle and recirculate water, minimizing water wastage. Nutrient solutions are delivered directly to the roots, and excess water can be collected, treated, and reused, making hydroponics a highly water-efficient method.
- **Precise Nutrient Control:** Nutrient solutions can be customized based on the specific requirements of different plant species and growth stages. This precision ensures that plants receive the right balance of nutrients, promoting optimal growth, higher yields, and better nutrient utilization.
- **Space Efficiency:** Hydroponic systems can be vertically stacked or designed in configurations that maximize space utilization. This is particularly valuable in urban environments where available land for farming is limited.
- **Faster Growth:** With ready access to nutrients and controlled environmental conditions, plants in hydroponic systems can allocate more energy towards growth rather than seeking nutrients in the soil. This often results in faster growth rates and shorter crop cycles.
- **Reduced Environmental Impact:** The reduced water consumption in hydroponics contributes to water conservation. Additionally, the controlled environment can lead to decreased reliance on pesticides and fertilizers, as pests and diseases are less prevalent in soilless systems. This helps lower the environmental footprint associated with conventional agriculture.
- **Year-Round Cultivation:** Hydroponics enables year-round cultivation regardless of seasonal changes, making it suitable for regions with harsh climates or limited growing seasons.

- **Optimal Resource Allocation:** Nutrients are delivered directly to the roots, minimizing nutrient runoff and leaching, which can pollute groundwater in traditional farming.
- **Minimal Weeding:** Without soil, there's no need to worry about weed growth, reducing the time and effort required for weed control.
- **Consistent Crop Quality:** With controlled conditions, hydroponic systems can produce more consistent crop quality and appearance, meeting market demands for standardized produce.
- **Less Land Requirement:** The ability to stack hydroponic systems vertically or in tight configurations means less land is needed to produce the same amount of food compared to traditional farming.
- **Education and Research:** Hydroponics offers educational and research opportunities in plant biology, chemistry, and engineering, making it a valuable tool in advancing agricultural science.




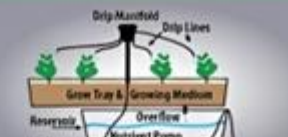
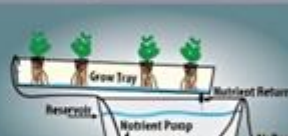

These features collectively contribute to the attractiveness of hydroponics as a sustainable and efficient method of food production in various contexts, from commercial agriculture to community gardens and personal indoor setups.

### Types of Hydroponic Systems

- **Flood and Drain (Ebb and Flow) System:** This system involves periodically flooding the grow tray with nutrient solution and then allowing it to drain back into a reservoir. This cycle provides the roots with nutrients and oxygen while preventing waterlogging.
- **Continuous Flow System:** Similar to flood and drain, this system maintains a constant flow of nutrient solution over the roots. The solution continuously circulates through the system, ensuring a steady supply of nutrients and oxygen.
- **Dutch Bucket System:** Dutch buckets are individual containers filled with a growing medium like perlite or coconut coir. Each bucket has its reservoir and a drip line for nutrient solution delivery. This system is often used for larger plants like tomatoes.
- **Vertical Hydroponic System:** Vertical systems stack plants vertically to maximize space utilization. They can employ various methods such as drip, or aeroponics. These systems are great for urban farming or when space is limited.
- **Wickless Hydroponic System:** This system is similar to the wick system but without the wick. The nutrient solution is delivered directly to the growing medium, relying on the medium's natural capillary action to provide moisture to the roots.

- **Kratky Method (Non-circulating Hydroponic System):** This method involves placing plant roots in a container filled with a nutrient solution. As the plants use up the solution, the nutrient levels decrease, and air space forms above the solution. This method is simple but is often used for smaller plants with shorter growth cycles.
- **Vertical A-Frame System:** This system arranges plants in a triangular or A-frame structure, allowing for efficient use of space. The nutrient solution is usually delivered via drip lines or channels.
- **Aquaponics:** While not solely a hydroponic system, aquaponics combines hydroponics with aquaculture (fish farming). The fish waste provides nutrients for the plants, and the plants filter and purify the water for the fish. It's a symbiotic system that can be highly sustainable.
- **Hydroponic Wick System:** Similar to the wick system, this uses a wick to draw nutrient solution from a reservoir to the plant roots. However, in this case, the wick is in direct contact with the roots, providing a constant supply of nutrients.

These are just a few examples of the many hydroponic systems that exist. The choice of system depends on factors such as the type of plants being grown, available space, budget, and the grower's experience level. Each system has its advantages and challenges, allowing growers to select the one that best suits their goals and resources.

	<b>Hydroponic Systems</b>	<b>Pros</b>	<b>Cons</b>
Simple			
<b>Wick Systems:</b>		<ul style="list-style-type: none"> <li>Affordable</li> <li>Low maintenance</li> <li>No nutrient pump</li> </ul>	<ul style="list-style-type: none"> <li>Limited oxygen access</li> <li>Slower growth rate</li> <li>No nutrient recirculation</li> <li>Prone to algae growth</li> </ul>
<b>Deep Water Culture:</b>		<ul style="list-style-type: none"> <li>Cheapest of the active systems</li> <li>Simple set up</li> <li>No nutrient pump</li> <li>Reliable</li> </ul>	<ul style="list-style-type: none"> <li>Risk of root rot if not cleaned regularly</li> <li>Slower growth rate</li> <li>Must top water until roots are long enough to fall into the nutrition solution</li> <li>Must frequently refill reservoir</li> </ul>
<b>Ebb &amp; Flow:</b>		<ul style="list-style-type: none"> <li>Affordable</li> <li>Low maintenance</li> <li>Excess nutrient solution recirculates</li> </ul>	<ul style="list-style-type: none"> <li>Prone to algae growth</li> <li>Technical malfunctions could result in crop loss</li> </ul>
<b>Drip Method:</b>		<ul style="list-style-type: none"> <li>Excess nutrient solution recirculates</li> <li>Sufficient oxygen flow</li> </ul>	<ul style="list-style-type: none"> <li>Prone to clogging</li> <li>Prone to algae growth</li> <li>Requires regular cleaning</li> </ul>
<b>Nutrient-Film Technique:</b>		<ul style="list-style-type: none"> <li>Excess nutrient solution recirculates</li> <li>Plentiful oxygen flow</li> <li>Space efficient</li> </ul>	<ul style="list-style-type: none"> <li>Prone to clogging</li> <li>Technical malfunctions could result in crop loss</li> </ul>
<b>Aeroponics:</b>		<ul style="list-style-type: none"> <li>Maximum nutrient absorption</li> <li>Excess nutrient solution recirculates</li> <li>Plentiful oxygen flow</li> <li>Space efficient</li> </ul>	<ul style="list-style-type: none"> <li>Prone to clogging</li> <li>Technical malfunctions could result in crop loss</li> <li>High-tech</li> <li>Time intensive</li> <li>Poorly suited to thick organic-based nutrients &amp; additives</li> </ul>
Advanced			

## Significant advantages and impact of hydroponics on agriculture and food production

- **Resource Efficiency:** Hydroponics maximizes the efficient use of resources, particularly water and nutrients. This is crucial in regions facing water scarcity, droughts, or soil degradation, where traditional agriculture might struggle to provide consistent yields.
- **Year-Round Cultivation:** The ability to control environmental conditions in hydroponic systems allows for consistent crop production throughout the year. This is especially valuable in regions with extreme climates or limited growing seasons, as well as in places where weather-related uncertainties could affect traditional outdoor farming.
- **Higher Yields:** The optimized conditions in hydroponic systems, including precise nutrient delivery and controlled environments, can lead to accelerated growth and higher yields compared to conventional methods. This is significant for meeting the growing global demand for food.

- **Urban Agriculture:** Urbanization has led to a reduction in available agricultural land near urban centres. Hydroponics presents an opportunity to grow fresh produce locally, reducing the need for long-distance transportation and minimizing the associated carbon emissions. This contributes to sustainable urban development and a more resilient food supply chain.
- **Food Security:** Hydroponics offers a means of addressing food security concerns by providing a consistent source of fresh produce even in challenging environments such as deserts, arid regions, or areas prone to natural disasters. It can also be an essential tool in supporting communities during emergencies or disruptions to traditional food supply chains.
- **Crop Diversity:** Hydroponics allows for the cultivation of a wide variety of crops, including those that might not thrive in certain soil conditions or climates. This promotes agricultural diversity and can help preserve heirloom or rare plant species.
- **Reduced Chemical Usage:** The controlled environment in hydroponics can lead to reduced reliance on pesticides and herbicides, promoting healthier produce and minimizing the environmental impact of agriculture.
- **Technology and Innovation:** Hydroponics encourages the integration of technology, automation, and data analysis into agriculture. This can lead to advancements in precision agriculture, sustainable farming practices, and the development of new techniques.
- **Education and Research:** Hydroponics provides educational opportunities for students, researchers, and the general public to learn about plant biology, chemistry, and sustainable agriculture practices.
- **Local Economy Support:** Hydroponic systems can be established in communities, contributing to local economies by generating jobs and supporting small-scale agriculture initiatives.
- **Reduced Land Footprint:** By maximizing space utilization, hydroponics can produce significant amounts of food using less land compared to traditional agriculture, which is crucial for minimizing habitat destruction and deforestation.
- **Adaptation to Climate Change:** As climate change brings unpredictable weather patterns and challenges to agriculture, hydroponics can offer a way to adapt and continue food production in a more controlled and resilient manner.

The significance of hydroponics extends beyond individual benefits to have broader implications for sustainability, food systems, and environmental conservation on a global scale.

## **Challenges associated with hydroponics**

### **High Initial Costs**

The infrastructure, equipment, and technology required for hydroponics can be costly, especially when setting up larger or more sophisticated systems. These costs include items like grow lights, pumps, nutrient solutions, climate control systems, and grow media. While these costs can be offset by higher yields and resource efficiency over time, the initial investment can still be a barrier for some growers.

### **Technical Expertise**

Hydroponics demands a good understanding of plant biology, water chemistry, nutrient management, and system maintenance. The learning curve can be steep, and growers need to invest time and effort in acquiring the necessary skills to ensure successful and productive cultivation. Lack of knowledge can lead to poor crop outcomes.

### **Energy Consumption**

Indoor hydroponic systems, particularly those grown in controlled environments, require artificial lighting, temperature regulation, and air circulation systems. These energy-intensive components can contribute to higher energy consumption compared to traditional outdoor farming methods. However, advancements in energy-efficient technologies are helping to mitigate this challenge.

### **Market Acceptance**

Convincing traditional farmers to switch to hydroponics can be challenging, as established agricultural practices are deeply ingrained. There may also be scepticism about the cost-effectiveness and sustainability of hydroponics, especially in regions where conventional farming methods are deeply rooted.

### **Resource Management**

While hydroponics is more resource-efficient in terms of water usage, the careful management of nutrient solutions and water quality is crucial. If not properly managed, nutrient imbalances or contamination can lead to poor plant health and reduced yields.

### **Disease Spread**

In hydroponic systems, disease outbreaks can spread quickly due to the proximity of plants and the recirculation of water. Strict hygiene practices and preventative measures are necessary to prevent the spread of pathogens.

### **Complexity of Scaling**

Scaling up hydroponic operations from small setups to larger commercial systems can introduce new challenges. Managing nutrient distribution, maintaining consistent environmental conditions, and ensuring uniform crop growth become more complex as the operation expands.

### **Regulatory Hurdles**

Depending on the region and country, there might be regulatory hurdles or a lack of clear guidelines for hydroponic farming. This can pose challenges in terms of obtaining permits, and certifications and adhering to food safety regulations.

### **Perception of Naturalness**

Some consumers might associate soil-based agriculture with naturalness and perceive hydroponics as less authentic. Overcoming this perception and educating consumers about the benefits of hydroponics can be a challenge.

### **Water Quality Concerns**

The quality of water used in hydroponic systems is crucial. Contaminants or high mineral content in water can affect nutrient balance and plant health. Proper filtration and water treatment might be necessary.



## **Strategic roadmap for addressing the challenges and promoting the adoption of hydroponics**

### **Research and Development**

- Ongoing research can lead to the development of more cost-effective and efficient hydroponic systems, nutrient solutions, and technologies. Innovations can address challenges such as energy consumption, scalability, disease control, and automation, making hydroponics more practical and accessible.

### **Skill Development**

- Expanding training programs and workshops on hydroponics can empower a wider range of individuals, including traditional farmers, to acquire the necessary skills and knowledge. This can include hands-on training, online courses, and educational resources to bridge the gap in technical expertise.

### **Policy Support**

- Government policies that provide financial incentives, grants, or subsidies for hydroponic infrastructure and equipment can encourage adoption. Clear regulations and guidelines for hydroponic farming can also provide a supportive framework for those interested in transitioning to this method.

### **Awareness Campaigns**

- Initiating public awareness campaigns to highlight the benefits of hydroponics can generate interest among potential growers. Educating consumers about the quality and sustainability of hydroponically grown produce can also drive demand and market acceptance.

### **Collaboration**

- Collaboration between research institutions, private sector entities, and government agencies can accelerate the dissemination of technology, knowledge, and best practices. Partnerships can lead to the development of localized solutions and encourage investment in the sector.

## GENE EDITED MUSTARD

### In News:

- The **development of low-pungent, pest and disease-resistant mustard using CRISPR/Cas9 gene editing holds immense significance for India's agricultural sector and food security.**
- This breakthrough innovation addresses various challenges associated with traditional mustard varieties, particularly the presence of glucosinolates.

### Analysis of Background:

#### Challenges in Traditional Mustard Varieties

- **Pungency:** Traditional mustard varieties contain high levels of glucosinolates, sulfur and nitrogen-containing compounds that contribute to the characteristic pungency of mustard oil and meal.
- **Palatability:** High glucosinolate content limits the acceptability of mustard oil among consumers who prefer milder flavors and odors in cooking mediums.
- **Feed Quality:** Rapeseed meal, the byproduct of oil extraction, is used in livestock and poultry feed. High glucosinolates make the meal unpalatable for certain animals and can lead to reduced feed intake, goiter, and organ abnormalities.

#### Advantages of Low-Pungent, Pest and Disease-Resistant Mustard

- **Improved Palatability:** Lowering glucosinolate levels in the seeds results in mustard oil with milder flavor and odor, making it more acceptable to consumers.
- **Enhanced Feed Quality:** Reduced glucosinolates in rapeseed meal make it more palatable and nutritious for livestock, poultry, and aqua feed, leading to increased feed intake and improved growth.
- **Pest and Disease Resistance:** The developed mustard variety exhibits enhanced resistance against pests and diseases, contributing to higher crop yields and reduced need for chemical pesticides.

#### Genome Editing Approach

- **CRISPR/Cas9 Technology:** The CRISPR/Cas9 gene-editing tool is utilized to modify the glucosinolate transporter (GTR) genes in mustard plants.
- **Targeted Mutations:** Ten out of the twelve GTR genes are edited in the high-yielding Indian mustard variety 'Varuna'.

- **Nucleotide Sequence Alteration:** Using the Cas9 enzyme, specific nucleotide sequences are altered in the DNA, rendering the encoded proteins non-functional.
- **Role of Glucosinolates:** Glucosinolates are synthesized in leaves and pod walls, and their accumulation in seeds depends on GTR genes' functionality.
- **Enhanced Resistance:** The edited lines exhibit defense responses against fungal pathogens and insect pests similar to or better than the wild-type mustard.

### Differentiating GM and GE Crops

- **Genetically Modified (GM) Crops:** GM crops involve the insertion of foreign genes into an organism's genome, leading to transgenic plants. These genes may come from unrelated species.
- **Genome-Edited (GE) Crops:** GE crops involve modifying existing genes within an organism's genome, typically without introducing foreign genes. These modifications mimic natural mutations.

### Regulatory Environment for GE Crops in India

- **Stringent Regulations:** GM crops face strict regulations in India, requiring approval from the Genetic Engineering Appraisal Committee (GEAC) for open field trials and commercial release.
- **Exemption for GE Crops:** GE plants "free of exogenous introduced DNA" are exempt from GEAC approval for field trials leading to commercial release.
- **Approval Process:** Institutional Bio-safety Committees (IBSCs) comprising scientists review GE crops' safety for field trials.

### Contributing to India's Agricultural Goals

- **Reduced Import Dependence:** India is a major importer of edible oils. Developing high-quality, low-pungent mustard contributes to reducing reliance on imported vegetable oils.
- **Enhanced Crop Yield:** GE mustard's pest and disease resistance lead to increased crop yields, ensuring food security and domestic self-sufficiency.
- **Improved Livestock Nutrition:** Lower glucosinolate content in rapeseed meal enhances its quality as livestock feed, resulting in improved animal health and productivity.

## SULPHUR

### In News:

Chandrayaan-3 mission's rover, Pragyan, has made significant discoveries on the moon's surface near its south pole, according to the Indian Space Research Organisation (ISRO).

### Analysis of Background:

#### Rover's Findings

- Pragyan, the rover of the Chandrayaan-3 mission, has **confirmed the presence of sulfur (S) on the moon's surface near its south pole.**
- The rover is also in the process of searching for hydrogen (H) in the same region.

#### Laser-Induced Breakdown Spectroscopy (LIBS)

- The in-situ measurements were made using the Laser-Induced Breakdown Spectroscopy (LIBS) instrument aboard the rover.
- LIBS is a **scientific technique that involves using intense laser pulses to analyze the composition of materials by generating localized plasma.**
- The light emitted by the plasma is analyzed to determine the elemental composition of the material.

#### Elements Detected

- Preliminary analyses of the data have revealed the presence of various elements on the lunar surface, including aluminum (Al), sulfur (S), calcium (Ca), iron (Fe), chromium (Cr), titanium (Ti), manganese (Mn), silicon (Si), and oxygen (O).
- These measurements were not feasible using the instruments aboard the orbiters.

#### Significance

- The in-situ measurements provide valuable insights into the elemental composition of the moon's surface, particularly in a region where it was previously unconfirmed.
- The confirmation of sulfur and ongoing search for hydrogen contribute to our understanding of lunar geology and resources.

## **National Space Day**

- **August 23** has been designated as **National Space Day** to celebrate the mission's success and India's contributions to space exploration.

## **About Sulfur**

- Sulfur is a **chemical element with the symbol "S" and atomic number 16**.
- It is a **non-metal** that plays a crucial role in various biological, industrial, and environmental processes.

## **Physical and Chemical Properties**

- Sulfur is **found in various forms, including solid crystals and compounds**.
- It is a bright yellow, odorless, and brittle substance.
- Sulfur is a poor conductor of heat and electricity.
- It is abundant in nature and often occurs in combination with other elements, forming a wide range of compounds.

## **Occurrence and Sources**

- Sulfur **occurs naturally in the Earth's crust and is found in minerals like pyrite (iron sulfide) and gypsum (calcium sulfate)**.
- **It is also found in various ores and in underground deposits**.
- Volcanic activity releases sulfur compounds into the atmosphere, contributing to the "smell of sulfur" often associated with volcanic regions.

## **Biological Importance**

- Sulfur is an essential element for all living organisms. It is a key component of amino acids like cysteine and methionine, which are building blocks of proteins.
- Many enzymes and coenzymes in biological processes contain sulfur, contributing to their functionality.

## **Industrial Applications**

- Sulfur has a wide range of industrial uses. One of the most common uses is in the production of sulfuric acid ( $H_2SO_4$ ), a highly important industrial chemical.
- Sulfuric acid is used in the manufacture of fertilizers, chemicals, detergents, and various other products.

- Sulfur compounds are used in the vulcanization of rubber to improve its durability and elasticity.
- Sulfur is a component in the production of paper, batteries, and various types of polymers.

### **Environmental Impact**

- **Sulfur dioxide (SO<sub>2</sub>) is a major air pollutant emitted from various industrial processes, including the burning of fossil fuels like coal and oil.**
- SO<sub>2</sub> contributes to the formation of acid rain, which can have harmful effects on ecosystems, water bodies, and infrastructure.
- Sulfur compounds in the atmosphere can also contribute to the formation of **fine particulate matter (PM<sub>2.5</sub>)**, which has implications for air quality and human health.

### **Mineral Resources**

- Sulfur is often extracted from underground deposits through mining processes.
- The sulfur industry is essential for providing the raw material required for the production of sulfuric acid and other sulfur-containing compounds.

### **Historical and Cultural Significance**

- Sulfur has been known and used by humans for centuries. Ancient civilizations used sulfur for medicinal and cosmetic purposes.
- In various cultures, sulfur has been associated with purification and healing properties.

### **Forms of sulfur**

#### **Elemental Sulfur**

- Elemental sulfur is the most common form of sulfur and is often found in nature in the form of yellow crystals.
- It is the purest form of sulfur and is often extracted from underground deposits through mining processes.
- Elemental sulfur is used in various industrial applications, including the production of sulfuric acid and fertilizers.

#### **Sulfides**

- Sulfides are compounds in which sulfur is bonded with a metal or another element.

- Examples include iron sulfide ( $\text{FeS}_2$ , known as pyrite or "fool's gold"), lead sulfide ( $\text{PbS}$ , known as galena), and zinc sulfide ( $\text{ZnS}$ , used in luminescent materials).

### **Sulfates**

- Sulfates are compounds containing sulfur and oxygen, often bonded to a metal.
- Gypsum (calcium sulfate dihydrate,  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) and anhydrite (calcium sulfate,  $\text{CaSO}_4$ ) are common sulfate minerals.
- Sulfates are also found in minerals like barite (barium sulfate,  $\text{BaSO}_4$ ) and Epsom salt (magnesium sulfate heptahydrate,  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ ).

### **Sulfur Dioxide ( $\text{SO}_2$ )**

- Sulfur dioxide is a gas formed when sulfur is burned in the presence of oxygen.
- It is a major air pollutant released from industrial processes and combustion of fossil fuels.
- Sulfur dioxide contributes to the formation of acid rain and can have harmful effects on the environment and human health.

### **Hydrogen Sulfide ( $\text{H}_2\text{S}$ )**

- Hydrogen sulfide is a colorless gas with a strong odor of rotten eggs.
- It is produced naturally by certain bacteria during decay processes and can be found in volcanic gases.
- Hydrogen sulfide is highly toxic and poses health risks to humans at high concentrations.

### **Sulfur Hexafluoride ( $\text{SF}_6$ )**

- Sulfur hexafluoride is a compound consisting of sulfur and six fluorine atoms.
- It is a colorless, odorless gas with excellent electrical insulating properties.
- $\text{SF}_6$  is used in various electrical applications, including as an insulating gas in high-voltage equipment.

### **Organic Sulfur Compounds**

- Sulfur is a crucial element in organic molecules found in living organisms.
- Amino acids like cysteine and methionine contain sulfur, contributing to the structure of proteins.

- Compounds like dimethyl sulfide (DMS) are produced by marine organisms and play a role in atmospheric chemistry.

### **Elemental Sulfur Allotropes**

- Sulfur has several allotropes, which are different structural forms of the same element.
- These allotropes include rhombic sulfur and monoclinic sulfur, each with distinct crystal structures.

## **NABHMITRA**

### **In News:**

- The **Indian Space Research Organization (ISRO)**, in collaboration with the **Space Applications Centre (Ahmedabad)**, has developed a revolutionary device named **'Nabhmitra'** to enhance the safety of fishermen at sea.
- Successfully tested at Neendakara, this satellite-based communication system promises two-way messaging services between fishing boats and the shore, catering to various aspects of fishermen's safety.

### **Analysis of Background:**

#### **Key Achievements and Features**

##### **Satellite-Based Communication**

- 'Nabhmitra' stands as an innovative satellite-based communication system.
- It facilitates seamless two-way messaging services, connecting fishing vessels with onshore authorities and control centers.

##### **Localized Weather and Cyclone Warnings**

- The device plays a crucial role in conveying weather and cyclone warnings to fishermen.
- Importantly, these alerts are communicated in the local language, ensuring effective and understandable communication.

##### **Distress Messaging and Emergency Response**

- 'Nabhmitra' becomes a lifeline in times of distress or emergencies.
- Fishermen aboard a vessel can send distress messages to the relevant authorities through the device.



- In emergency situations like capsizing or fire, a simple button press on the device establishes contact with the control center.

### **Location and Response Mechanism**

- Upon receiving a distress alert, the control center receives vital information including the boat's precise location.
- Simultaneously, the crew on the fishing boat receives a response message from the control center.

### **Enhanced Maritime Information**

- The device's capabilities extend beyond safety.
- It provides valuable insights into shipping channels, maritime boundaries, and fishing fields, empowering fishermen with comprehensive maritime information.

### **Impact and Significance**

- 'Nabhmitra' addresses a critical need by significantly enhancing the safety of fishermen during their sea journeys.
- It bridges communication gaps and provides a reliable means of seeking help during emergencies.
- Beyond safety, the device empowers fishermen with valuable information that can optimize their fishing activities and routes.

## **SECURITY**

### **AKIRA RANSOMWARE**

#### **In News:**

The **Computer Emergency Response Team of India** issued an alert for ransomware dubbed "**Akira.**"

#### **Analysis of Background:**

##### **Akira Ransomware**

##### **About**

- Akira is a type of ransomware, found to **target both Windows and Linux devices.**
- It **steals and encrypts data, forcing victims to pay double ransom for decryption and recovery.**

## Ransomware

Ransomware encrypts files or devices and forces victims to pay a ransom in exchange for re-entry. While ransomware and malware are often used synonymously, ransomware is a specific form of malware.

There are four main types of ransomware:

1. **Locker ransomware** completely locks users out of their devices.
2. **Crypto ransomware** encrypts all or some files on a device.
3. **Double extortion ransomware** encrypts and exports users' files. This way, attackers can receive payment from the ransom and/or the selling of the stolen data.
4. **Ransomware as a service** enables affiliates, or customers, to rent ransomware. A percentage of each ransom is paid to the ransomware developer.

## Victims

- The group behind the ransomware has already targeted multiple victims, mainly those located in the U.S., and has an active Akira ransomware leak site with information, including their most recent data leaks.

### The name- Akira

- The ransomware **gets its name due to its ability to modify filenames of all encrypted files by appending them with the “.akira” extension.**

## Working

- The ransomware is **designed to close processes or shut down Windows services** that may keep it from encrypting files on the affected system.
- It **uses VPN services**, especially when users have not enabled two-factor authentication, to trick users into downloading malicious files.
- As mentioned above, the ransomware deletes the Windows Shadow Volume copies on the affected device. These files are instrumental in ensuring that organizations can back up data used in their applications for day-to-day functioning.
- VSS services facilitate communication between different components without the need to take them offline, thereby ensuring data is backed up while it is also available for other functions.
- Once the ransomware deletes the VSS files it proceeds to encrypt files with the pre-defined **“.akira” extension.**

- The ransomware also **terminates active Windows services** using the Windows Restart Manager API, preventing any interference with the encryption process.
- It is **designed to not encrypt Program Data, Recycle Bin, Boot, System Volume information**, and other folders instrumental in system stability. It also **avoids modifying Windows system files with extensions like .syn. .msl and .exe**.
- Once the ransomware infects a device and steals/encrypts sensitive data, the group behind the attack extorts the victims into paying a ransom, **threatening to release the data on their dark web blog if their demands are not met**.
- **But how?** Once sensitive data is stolen and encrypted, the ransomware leaves behind a note named akira\_readme.txt which includes information about the attack and the link to Akira's leak and negotiation site.
- Each victim is given a unique negotiation password to be entered into the threat actor's Tor site.
- Unlike other ransomware operations, this negotiation site just includes a chat system that the victim can use to communicate with the ransomware gang.

#### **Indian Computer Emergency Response Team (CERT-IN)**

- CERT-IN is a part of the Indian government's Ministry of Electronics and Information Technology.
- It is the central organisation for handling risks to cyber security including hacking and phishing. It strengthens the Indian Internet domain's security-related defence.
- CERT-IN has **overlapping responsibilities with other agencies** such as;
  - National Critical Information Infrastructure Protection Centre (NCIIPC) which is under the National Technical Research Organisation (NTRO) that comes under the Prime Minister's Office
  - The National Disaster Management Authority (NDMA) is under the Ministry of Home Affairs.
- The **Ministry of Communications and Information Technology established CERT-IN** in 2004 under Information Technology Act, 2000 Section (70B).

## Exercise BRIGHT STAR-23

### In News:

An Indian Air Force (IAF) contingent departed today, for participating in Exercise BRIGHT STAR-23.

### Analysis of Background:

- Exercise Bright Star is a **series of biannual combined and joint military exercises led by the United States and Egypt.**
- The **exercises began in 1980, rooted in the 1977 Camp David Accords.** After its signing, the United States Armed Forces and the Egyptian Armed Forces agreed to conduct training together in Egypt.
- Bright Star is designed to strengthen ties between the Egyptian Armed Forces and the United States Central Command and demonstrate and enhance the ability of the Americans to reinforce their allies in the Middle East in the event of war.

### Exercise BRIGHT STAR-23

- Exercise BRIGHT STAR-23 is **scheduled to be held at Cairo (West) Air Base, Egypt from 27 August to 16 September 2023.**
- This is for the first time that IAF is participating in Ex BRIGHT STAR-23 which will also see participation of contingents from the United States of America, Saudi Arabia, Greece and Qatar.
- The Indian Air Force contingent will consist of five MiG-29, two IL-78, two C-130 and two C-17 aircraft.
- Personnel from the IAF's Garud Special Forces, as well as those from the Numbers 28, 77, 78 and 81 Squadrons will be participating in the exercise. The IAF transport aircraft will also provide airlift to approximately 150 personnel from the Indian Army.
- The objective of the exercise is to **practice planning and execution of joint operations.** Besides leading to the formation of bonding across borders, such interactions also provide a means to further strategic relations between participating nations. IAF contingents to flying exercises abroad are thus no less than Diplomats in Flight Suits.

## Significance

- The IAF's involvement in international exercises is not merely a display of military capabilities in fact, such exercises are **instrumental in strengthening diplomatic relations**.
- India and Egypt have strong defence cooperation. Recent visits by India's Defence Minister and Prime Minister to Egypt have further intensified this defence cooperation. The two countries have also enhanced their joint training with regular exercises between their armed forces.
- As India continues to rise on the global stage, the **IAF's participation in multinational exercises like BRIGHT STAR-23 cements its status as a force for peace and stability**.

## MISCELLANEOUS

### AFRICAN SWINE FEVER

#### In News:

African swine fever, a highly contagious virus, has **hit 49 countries since 2021**.

#### Analysis of Background:

##### About African Swine Fever (ASF)

- African Swine Fever (ASF), is a highly **contagious hemorrhagic viral infection**.
- It afflicts **domestic and wild pigs and boars**.
- It has a nearly 100 per cent mortality rate.
- The virus spreads through soft ticks and quickly engulfs the entire pig population.
- The livestock disease was **first reported in Kenya in 1921**.

#### Treatment and cure

- There is **no cure or vaccine** to contain the African swine fever virus.
- The only way to contain it is to cull the infected and in-contact pigs and bury them in lime-treated deep trenches.

#### Findings of a report on ASF by the World Organisation for Animal Health (WOAH)

- The fever has spread to 49 countries since January 2021.

- ASF has resulted in around 1.5 million animal losses since 2021, affecting more than 0.95 million pigs and more than 28,000 wild boars.
- The **highest losses of domestic pigs were reported from Europe (one million)**, followed by Asia (0.37 million) and Africa (24,143).
- The **losses could be much more than these figures** as according to the report, the figures refer to losses in the establishments affected by the outbreaks and do not include the animals culled in areas around the outbreak to control the disease.

#### **About World Organisation for Animal Health (WOAH)**

- It is an intergovernmental organization established in 1924.
- It aims to disseminate information on animal diseases and improve animal health globally.

#### **ASF and India**

- India managed to avert the virus for a century.
- The **first case was only reported in 2020 in Assam**, after its advent in China in 2018 which decimated porcine populations across Asia.
- Disease even hit the **bio-secure environment** of the Assam government's pig-breeding farm and the ICAR-National Research Centre on Pig, both in Guwahati. This resulted in the death of three pigs and the culling of approximately 292 in the last two weeks.
- After the first ASF outbreaks, cases were also reported from other north-eastern states of **Manipur, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh and Sikkim**.
- Following this, the disease spread to Bihar, Kerala, Punjab, Haryana, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Rajasthan, Tripura, Uttarakhand, Uttar Pradesh and Delhi.
- The disease is **still prevalent in India**, with the most recent cases reported in May and June 2023 from Meghalaya and Mizoram, respectively.

## BUBONIC PLAGUE

### In News:

China's northern region of Inner Mongolia reported two cases of bubonic plague.

### Analysis of Background:

#### What is the bubonic plague?

- Plague is an infectious disease caused by a specific type of bacteria called *Yersinia pestis*.
- *pestis* can affect humans and animals and is spread mainly by fleas.
- Bubonic plague is one type of plague.
- It gets its name from the swollen lymph nodes (buboes) caused by the disease.
- The nodes in the armpit, groin and neck can become as large as eggs and can ooze pus.

#### The other types of plague are:

- Septicemic plague, which happens when the infection goes all through the body.
- Pneumonic plague, which happens when the lungs are infected.

#### The symptoms of bubonic plague:

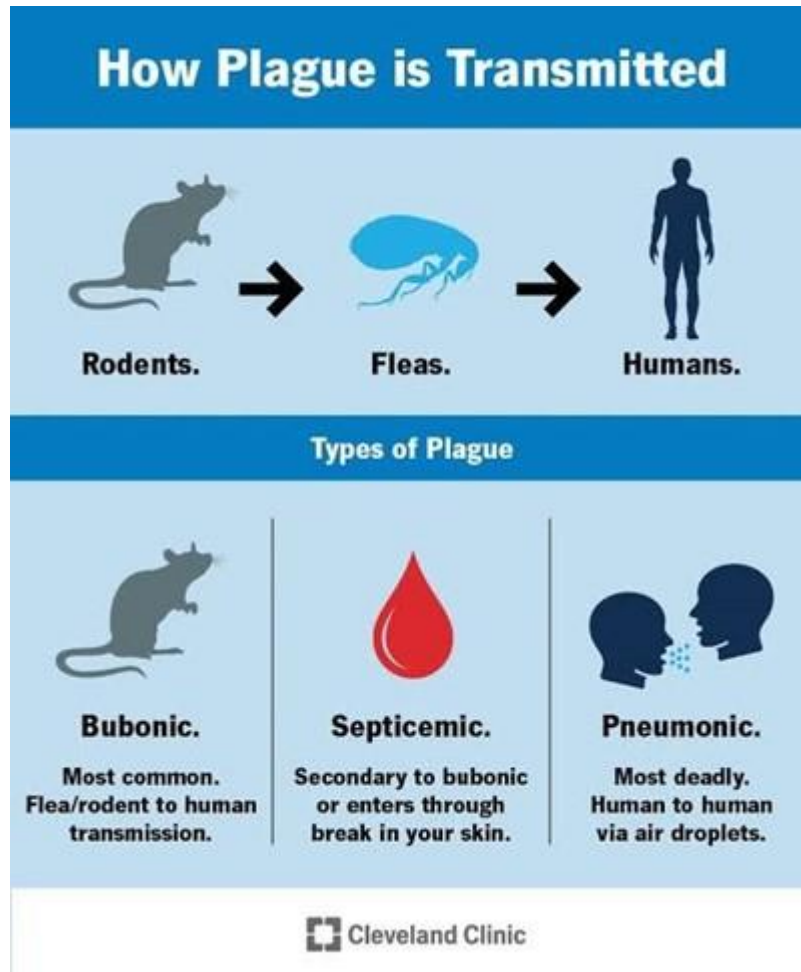
##### Bubonic plague symptoms include:

- Sudden high fever and chills.
- Pains in the areas of the abdomen, arms and legs.
- Large and swollen lumps in the lymph nodes (buboes) that develop and leak pus.

#### Cause and transmission of the disease

- Bubonic plague is caused by the *Yersinia pestis* (*Y. pestis*) bacterium which is spread mostly by fleas on rodents and other animals.
- Humans who are bitten by fleas then can come down with the plague.
- It's an example of a disease that can spread between animals and people (a zoonotic disease).
- **Cats in particular are vulnerable to plague** and can be infected by eating sick rodents. These cats can pass droplets infected with plague to their owners or to the veterinarians that treat them.

- Person-to-person spread is unlikely, except in rare cases of someone who has pneumonic plague (infected lungs) spreading plague through droplets sprayed into the air.



## Treatment

The bubonic plague can be treated and **cured with antibiotics**. In some cases, you may be put into an isolation unit.

Antibiotics that treat bubonic plague include:

- Ciprofloxacin, levofloxacin and moxifloxacin.
- Gentamicin
- Doxycycline

## What happens if the bubonic plague isn't treated?

- Bubonic plague can be fatal if it's not treated.
- It can create infection throughout the body (septicemic plague) and/or infect your lungs (pneumonic plague.)
- Without treatment, septicemic plague and pneumonic plague are both fatal.



### The bubonic plague of medieval times

- Bubonic plague deaths ***exceeded 25 million people during the fourteenth century.*** This was about two-thirds of the population in Europe at the time.
- Rats travelled on ships and brought fleas and plague with them.
- Because most people who got the plague died, and many often had blackened tissue due to gangrene, the bubonic plague was called the Black Death. A cure for bubonic plague wasn't available.

DHEERAN IAS ACADEMY