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HISTORY

SHORE TEMPLE

In News:

- The historic Shore Temple in Mamallapuram, a UNESCO World Heritage Site, has achieved a significant milestone by becoming **India's first Green Energy Archaeological Site**.
- This achievement is the **result of the Green Heritage Project, a collaborative initiative between the Renault Nissan Technology & Business Centre India (Renault Nissan Tech) and Hand in Hand India (HiH)**.

Analysis of Background:

About the temple:

The Shore Temple is a magnificent and historically significant temple located in Mahabalipuram, a coastal town in the southern Indian state of Tamil Nadu. This temple is a UNESCO World Heritage Site and is considered one of the finest examples of ancient Dravidian architecture.

Historical Background:

- **Origins:** The Shore Temple was built during the reign of the Pallava dynasty in the 7th century AD. It is part of a complex of temples in Mahabalipuram, a major port city during the Pallava dynasty's rule.
- **Patronage:** The temple was commissioned by Narasimhavarman II, also known as Rajasimha, a prominent Pallava king. It was dedicated to Lord Shiva and served as a prominent pilgrimage site for devotees of the deity.
- **Architectural Style:** The temple is a prime example of the Dravidian architectural style, characterized by its pyramid-shaped towers (shikharas), intricate carvings, and use of granite stones.

Architectural Features:

- **Layout:** The Shore Temple consists of two shrines, one facing east and the other west, flanked by a smaller shrine. The main shrine is dedicated to Lord Shiva, while the other is believed to be for Lord Vishnu.
- **Monolithic Sculptures:** The temple complex features numerous monolithic sculptures, including Nandi (Shiva's sacred bull), lions, and other divine and mythical figures. These sculptures are intricately detailed and have withstood the test of time.
- **Five Rathas:** Near the Shore Temple, there are five monolithic rock-cut temples known as the Five Rathas (Pancha Rathas). Each of these rathas is carved from a single piece of stone and represents various styles of South Indian temple architecture.

- **Bas-Reliefs:** The temple also boasts exquisite bas-reliefs that depict scenes from Hindu mythology, such as the descent of the Ganges (Ganga) and the churning of the ocean (Samudra Manthan). These carvings provide insights into ancient Indian culture and beliefs.

Significance and Cultural Impact:

- **UNESCO World Heritage Site:** The Shore Temple, along with other monuments in Mahabalipuram, was designated as a UNESCO World Heritage Site in 1984, recognizing its cultural and historical significance.
- **Spiritual Importance:** The temple continues to be a place of worship for Hindus and attracts pilgrims and tourists alike. It is especially popular during the Mahashivaratri festival when devotees gather to seek Lord Shiva's blessings.

TOTO LANGUAGE

In News:

- A language spoken by barely 1,600 people living in parts of West Bengal bordering Bhutan is to get a dictionary, thanks to the efforts of a professor at the University of Calcutta.

Analysis of Background:

Toto Language:

- Toto is a **Sino-Tibetan language spoken by the Toto tribal people**, primarily in parts of West Bengal bordering Bhutan.
- It is a minority language spoken by approximately **1,600 individuals**.
- Toto is traditionally a spoken language, and although a **script was developed in 2015 by Dhaniram Toto**, many Toto people still write in the Bengali script or use the Bengali language for written communication.
- **They inhabit Totopara, West Bengal, near the border with Bhutan. The language is also spoken in other areas along the India-Bhutan border in Jalpaiguri district, West Bengal.**
- **Endangered Status:** Toto is considered a critically endangered language by UNESCO, with an estimated 1,000 speakers or fewer. Despite this endangered status, many families within the Toto community still use the language at home. It is often the primary language children learn at home, although they use Bengali when attending school.
- **Language Preservation Efforts:** Researchers and members of the Toto community are aware of the endangered status of the language. The influence of other languages, particularly Nepali and Bengali, is increasing, posing a threat to Toto. Efforts are being made to document and preserve the language, including the Himalayan Languages Project's work on creating the first grammatical sketch of Toto.

- **Anthropological Study:** The Anthropological Survey of India (AnSI) has conducted a study on the language of the Toto tribe. Despite the tribe's small population, the language is even more endangered. This underscores the urgency of preserving and revitalizing the Toto language.

Dictionary Project

- The University of Calcutta, in collaboration with Bhakta Toto, a bank employee and poet, has undertaken the initiative to create a trilingual dictionary called "Toto Shabda Sangraha."
- This dictionary aims to document the vocabulary of the Toto language and translate it into both Bengali and English.

Preservation Efforts

- This dictionary is a significant step in preserving the Toto language, which **has been primarily an oral language**.
- By putting its vocabulary into print and making it available in multiple languages, the aim is to ensure its survival and accessibility to a wider audience.

Bengali Script

- Since the Toto script is still in a nascent stage and the Toto community is more familiar with the Bengali script, the **dictionary will present Toto words in the Bengali script**, making it more accessible to the community.

Calcutta Comparatists 1919

- Mrinmoy Pramanick, an assistant professor at the University of Calcutta and the chairman of Calcutta Comparatists 1919, played a significant role in organizing this initiative.
- The trust aims to save marginal languages from extinction and promote them within academic circles.
- The trust plans to publish other works, such as "Uttal Torsa," a Bengali novel written by Dhaniram Toto, to further promote Toto culture and language.

AKSHARDHAM TEMPLE

In News:

Rishi Sunak, UK Prime Minister, visited the Akshardham Temple in Delhi with his wife Akshata Murty.

Analysis of Background:

- Akshardham Temple, also known as the **Swaminarayan Akshardham Temple**, is a magnificent Hindu temple complex located in Delhi.

History

- Akshardham Temple was inaugurated on November 6, 2005, by Pramukh Swami Maharaj, the spiritual leader of the BAPS Swaminarayan Sanstha (Bochasanwasi Shri Akshar Purushottam Swaminarayan Sanstha), a prominent sect within Hinduism.
- **The temple was built to honor Bhagwan Swaminarayan (1781-1830), the founder of the Swaminarayan tradition.**

Architecture

- The temple complex showcases stunning architecture inspired by ancient Vedic and Hindu architectural principles.
- The main monument is **made of intricately carved pink sandstone and white marble.**
- It stands 141 feet tall and features more than 20,000 statues and sculptures.
- The **central monument represents Mount Meru**, the mythical abode of the gods.

Main Attractions

- **Yagnapurush Kund:** This is the world's largest stepwell and serves as the central feature of the temple complex. It hosts the spectacular Sahaj Anand Water Show, a multimedia fountain show that depicts an episode from the life of Bhagwan Swaminarayan.
- **Abhishek Mandap:** This area allows visitors to participate in the Abhishek ritual, where they can pour holy water over the sacred image of Bhagwan Swaminarayan.
- **Exhibitions:** Akshardham features several exhibitions, including the Sahaj Anand Water Show, a cultural boat ride, and the Hall of Values (Sahaj Anand Multimedia Museum), which educates visitors on Swaminarayan's teachings and values.
- **Garden of India:** The temple complex also includes beautifully landscaped gardens with bronze sculptures depicting India's cultural and spiritual heritage.

Spiritual Significance

- Akshardham Temple is not only a place of architectural beauty but also a center for spiritual activities, prayers, and devotion.
- It emphasizes the principles of non-violence, truth, purity, celibacy, and faith.

Awards and Recognition

Akshardham Temple has received numerous awards and recognitions for its architectural and cultural contributions, including the **Guinness World Record for the World's Largest Comprehensive Hindu Temple.**

MEGALITHIC DOLMEN SITE

In News:

- The **discovery of unique terracotta figurines in the megalithic dolmen site near Moodbidri, Dakshina Kannada, is a significant archaeological find.**
- According to historian T. Murugeshi, who was involved in the explorations, these figurines **date back to 800-700 B.C.**

Analysis of Background:

Figurines and Their Types

- Eight figurines were found during the exploration.
- These include two cow bovines, one mother goddess, two peacocks, a horse, a hand of a mother goddess, and an unknown object.
- Each of these figurines provides valuable insights into the culture and beliefs of the people from that era.

Megalithic Dolmen Site

- The site at Mudu Konaje was first discovered and reported by historian and researcher Pundikai Ganapayya Bhat in the 1980s.
- It's described as the **largest megalithic dolmen site in the area, featuring nine dolmens on the slope of a stone hill.**
- Unfortunately, only two dolmens remain intact, while the rest of the burials have been ruined over time.

Megalithic Culture

- The presence of megalithic dolmens at the site is a reflection of the megalithic culture known for its distinctive types of burials and the use of iron in India.
- **Dolmens are characterized by the erection of large stone slabs (orthostats) in a clockwise order, creating a square room.**
- These chambers were sealed with another massive stone slab as a capstone, typically featuring a round or U-shaped entrance on the Eastern slab.

Terracotta Figurines

- The terracotta figurines discovered at Mudu Konaje within the megalithic context are considered a rare find in India.

- These figurines were found inside the surface of dolmens, although some had been disturbed by treasure hunters.
- The presence of cow bovines among these figurines helps determine the chronology of the dolmens.

Cultural Significance

- The presence of cow bovines and mother goddess figurines in the dolmens is of particular interest.
- **Cow goddesses have parallels in other megalithic terracotta figurines found in places like Kerala and Egypt.**
- These discoveries offer insights into the cultural and religious practices of the people of coastal Karnataka during the 800-700 B.C. timeframe.

Peacock and Horse Figurines

- The figurines of peacocks and a horse suggest a connection to animals in their beliefs or possibly a representation of their natural surroundings.
- The details of these figurines, such as the use of red ochre and the design of the feathers, could provide further clues about their significance.

Research Opportunity

- According to T. Murugeshi, **these terracotta figurines provide a solid foundation for studying the Bhoota cult or Daiva Aradhane in coastal Karnataka during ancient times.**
- The presence of these figurines in a megalithic burial context adds to our understanding of the religious and cultural practices of the region.

SANTINIKETAN

In News:

- Santiniketan, a town established by Nobel laureate Rabindranath Tagore in West Bengal's Birbhum district, has been added to UNESCO's World Heritage List. This recognition highlights its cultural and historical significance on a global scale.

Analysis of Background:

- **Foundation of Visva-Bharati University:** Santiniketan is the place where Rabindranath Tagore laid the foundations of Visva-Bharati University, which is known for its unique approach to education, emphasizing art, culture, and the integration of human values.
- **India's 41st World Heritage Site:** Santiniketan's inclusion on the UNESCO list makes it India's 41st World Heritage Site, showcasing the rich cultural and historical diversity of the country.

- **Longstanding Efforts:** The efforts to have Santiniketan included in the World Heritage List date back to 2010. The recent proposal for its nomination began in the financial year 2020-21. The Archaeological Survey of India (ASI) has been actively involved in the restoration of several structures in Santiniketan in recent years.

About santiniketan:

- Santiniketan is a **renowned cultural and educational hub located in the Birbhum district of West Bengal, India.**
- It holds a special place in Indian history and culture due to its **association with Rabindranath Tagore, a Nobel laureate poet, philosopher, and polymath.**
- **Santiniketan translates to "Abode of Peace" and was founded by Tagore as an experiment in education and art, which continues to influence generations of artists, scholars, and thinkers.**

History:

- Santiniketan was established in 1901 when Rabindranath Tagore moved to this region, inspired by the serene and tranquil environment.
- Tagore was dissatisfied with the conventional educational system and wanted to create an institution where education would be more holistic, integrating arts, culture, and nature.
- Under his guidance, Santiniketan developed into a unique educational and cultural institution.

Visva-Bharati University:

- In 1921, Rabindranath Tagore established Visva-Bharati University within Santiniketan.
- It aimed to promote the ideals of a universal, non-sectarian, and holistic education system.
- Visva-Bharati remains a prestigious institution known for its emphasis on the arts, literature, and social sciences.
- The university comprises various schools, including Shantiniketan (the core campus), Sriniketan (its rural reconstruction center), and several institutes and departments dedicated to diverse disciplines.

Cultural Significance:

- Santiniketan has been a crucible for art and culture in India.
- **It was instrumental in the development of the Bengal School of Art, a significant movement in Indian art.** The school emphasized traditional Indian art forms, nature, and the spirit of the land.

- **The annual Poush Mela and Basanta Utsav (Holi festival) celebrations at Santiniketan attract people from all over India.** These events showcase the rich cultural heritage of India, with performances of music, dance, theater, and more.
- **Rabindranath Tagore's residence, known as the "Rabindra Bhavan," is a major attraction in Santiniketan.** His personal belongings, manuscripts, and artistic works are preserved here, allowing visitors to gain insight into his life and creative process.

Landmarks and Attractions:

- **Upasana Griha (Prayer Hall):** A red-brick structure designed by Tagore himself, it's a place for meditation and prayer.
- **Kala Bhavana:** The art college at Visva-Bharati, it continues the legacy of the Bengal School of Art.
- **Patha Bhavana:** The school where Tagore's educational philosophy is put into practice.
- **Sangeet Bhavana:** The music school, fostering the study and practice of Indian classical music.
- **Rabindra Bhavan:** The museum and archive dedicated to Rabindranath Tagore.
- **Khoai:** A nearby natural red soil ravine offering scenic beauty.

VINOBA BHAVE

In News:

The Prime Minister has paid homage to Acharya Vinoba Bhave on his birth anniversary.

Analysis of Background:

- Acharya Vinoba Bhave, **born Vinayak Narahari Bhave on September 11, 1895, in Gagoji (present-day Gagode Budruk), Maharashtra, India, was a revered figure in India's struggle for independence and a prominent advocate of nonviolence and human rights.**
- **Often referred to as Acharya,** which means "Teacher" in Sanskrit, Vinoba Bhave is best known for his pivotal role in the Bhoodan Movement and is considered the spiritual successor of Mahatma Gandhi.

Early Life and Influences

- Vinoba Bhave was deeply influenced by his mother, Rukmani Devi, who was a religious woman. He was raised in a family that valued modern rationalism, with his father, Narahari Shambhu Rao, being a trained weaver who worked in Baroda.
- His early spiritual awakening occurred when he read the Bhagavad Gita at a young age, which left a profound impact on him.

Association with Mahatma Gandhi

- Vinoba Bhave's life took a transformative turn in 1916 when he read about Mahatma Gandhi's speech at Banaras Hindu University. He was so moved that he abandoned his studies and wrote to Gandhi, eventually meeting him at the Kochrab Ashram in Ahmedabad.
- He actively participated in various activities at Gandhi's ashram, such as teaching, spinning, and community improvement.
- His involvement in constructive programs like Khadi, village industries, new education (Nai Talim), sanitation, and hygiene increased over time.

Freedom Struggle

- Vinoba Bhave played a crucial role in India's struggle for independence, **participating in civil disobedience movements and facing imprisonment.**
- He served a five-year jail sentence in the 1940s for his nonviolent resistance against British rule.
- In 1940, **Gandhi chose him as the first individual Satyagrahi (advocate of truth) against British rule, elevating his national prominence.**

Religious and Social Work

- Vinoba Bhave had a broad religious outlook, synthesizing the truths of many religions.
- **His Sarvodaya movement aimed to improve the lives of the average Indian in villages with a firm spiritual foundation.**
- **The Bhoodan Movement, initiated in 1951, involved soliciting land donations from landowners to distribute to the landless poor, addressing land reform and rural poverty.**
- He campaigned against the slaughter of cows, advocating nonviolence and compassion.

Literary Career

- Vinoba Bhave was a prolific writer and translator, making Sanskrit texts accessible to the common person.
- He translated the Bhagavad Gita into Marathi and authored numerous books and essays on philosophy and spirituality.
- **His "Talks on the Gita" have been translated into many languages and continue to inspire readers worldwide.**

Later Life and Passing

- In his later years, Vinoba Bhave resided at his Brahma Vidya Mandir ashram in Paunar, Wardha district, Maharashtra.
- He passed away on November 15, 1982, after embracing "Samadhi Maran" or "Santhara," a practice in Jainism where one voluntarily refrains from food and medicine.

Criticism

- Vinoba Bhave faced criticism from some quarters, including V.S. Naipaul, who questioned his rationality and excessive imitation of Gandhi.
- His support for Indira Gandhi's government during the Indian Emergency (1975-1977) drew controversy and earned him the nickname "Sarkari Sant" (Government Saint).

Awards and Recognition

- In 1958, Vinoba Bhave became the first recipient of the international Ramon Magsaysay Award for Community Leadership.
- He was posthumously awarded the Bharat Ratna, India's highest civilian honor, in 1983.

OPERATION POLO

In News:

- 13th September marks the **75th anniversary of Operation Polo, the military action launched by the Indian Army on September 13, 1948, to integrate the princely state of Hyderabad.**
- The Nizam of Hyderabad was dithering on joining India ever since Independence on August 15, 1947.
- The **military offensive in Hyderabad state was termed as 'Police Action' at the time by the then home minister Sardar Vallabhbhai Patel and the Nizam's forces surrendered to the Indian Army by September 18.**

Analysis of Background:

- Operation Polo was **launched in the context of the Nizam of Hyderabad's desire to keep his state independent after India gained independence in 1947.**
- He took advantage of India's focus on the Kashmir conflict with Pakistan, which diverted resources and attention away from Hyderabad.
- In November 1947, the **Nizam signed a standstill agreement with India, which meant that there would be no immediate integration of Hyderabad into India, and the existing conditions would continue for a year.**

- However, there were **several reasons that led to the launch of Operation Polo on September 13, 1948:**
- **Increasing Tensions:** The Nizam's administration in Hyderabad took advantage of the standstill agreement to increase the strength of its irregular force known as the Razakars. These Razakars, led by Maj Gen SA El Edroos, were causing problems for the predominantly Hindu population in the state.
- **Cross-Border Raids:** The Razakars were conducting cross-border raids and creating tensions along the state's borders.
- **Overtures to Pakistan:** The Nizam was making overtures to Pakistan, hinting at the intention to establish an independent country within India's borders.
- **Threat of Secession:** The Nizam's actions and the presence of the Razakars posed a threat to the unity of India, and there was a fear of Hyderabad attempting to secede from India.
- As a result of these developments, the Indian government decided to take action against Hyderabad to remove the threat of secession and to ensure the state's integration into India.
- In terms of military strength, the **Nizam's forces numbered less than 25,000, and only a fraction of them were well-trained.**
- The Razakars, though numerous, were not a formidable military opposition. The Nizam had boasted of a much larger force, but this turned out to be an empty claim, and Hyderabad's resistance crumbled within the first two days of the offensive.
- Operation Polo was conducted primarily by Maj Gen Jayanto Nath Chaudhuri's 1 Armoured Division, with subsidiary thrusts from the north, south, and east of the state.
- The operation was a success, and the Nizam announced a ceasefire on September 17, with the formal surrender taking place on September 18.
- Maj Gen Chaudhuri became the Military Governor of Hyderabad, and the state was integrated into India.

Other details:

- **Hyderabad State:** Hyderabad was one of the largest princely states in British India, ruled by the Nizam, Mir Osman Ali Khan. The population was predominantly Hindu, but the Nizam was a Muslim ruler.
- **Controversial Status:** The Nizam wanted to maintain Hyderabad's independent status, even as India gained independence in 1947. The Nizam's aspirations for independence were complicated by his predominantly Hindu population's desire to merge with the Indian Union.
- **Communal Tensions:** Communal tensions between the Hindu majority and the Muslim ruling elite, led by the Razakars (a private militia), further escalated the situation. The Razakars were accused of atrocities against Hindus, which intensified the demand for Hyderabad's integration into India.

- **Sardar Patel's Diplomacy:** The Indian government, led by Sardar Vallabhbhai Patel, sought to peacefully integrate Hyderabad into India through negotiations, but these efforts failed due to the Nizam's reluctance.

Operation Polo

- **Planning and Execution:** In September 1948, the Indian government decided to use military force to bring Hyderabad into the Indian Union. The operation was led by Lieutenant General J.N. Chaudhuri, and the Indian Army moved swiftly to encircle Hyderabad.
- **Military Campaign:** The military campaign was relatively short-lived. Indian forces faced limited resistance from the Nizam's army and the Razakars. The Indian Army advanced rapidly, capturing key cities and towns.
- **Nizam's Surrender:** Realizing the futility of resistance, the Nizam surrendered on September 17, 1948. He signed an Instrument of Accession, officially integrating Hyderabad into the Indian Union.

Aftermath

- **Integration:** The successful conclusion of Operation Polo marked the integration of Hyderabad into the Indian Union, ensuring the end of princely rule in India. The state was reorganized into Andhra Pradesh and parts of Maharashtra and Karnataka.
- **Resettlement:** Many Razakars and officials of the Nizam's government were arrested and tried for their roles in the violence and atrocities during the conflict.
- **Legacy:** Operation Polo remains a subject of historical debate. Critics argue that the Indian government's use of force was heavy-handed, while proponents contend that it was necessary to prevent further communal violence and to secure Hyderabad's integration into India.
- **Cultural Integration:** Hyderabad's integration into India brought together people from diverse linguistic, religious, and cultural backgrounds. It marked the beginning of a process of cultural assimilation and integration.

KONARK WHEEL

In News:

Prime Minister Narendra Modi chose a wall depicting the historic Konark Wheel of Odisha's Sun Temple as the backdrop for his welcome handshake with world leaders at the G20 Summit venue.

Analysis of Background:

- The Konark Temple, also known as the **Sun Temple of Konark**, and the Konark Wheel, are two interconnected aspects of a remarkable cultural and architectural legacy in India.

Konark Temple

Historical Background

- The Konark Temple is **located in Konark, a town in the Puri district of Odisha.**
- It was **constructed in the 13th century during the reign of King Narasimhadeva I of the Eastern Ganga Dynasty.**

Architectural Marvel

- The Konark Temple is renowned for its stunning and intricate architecture. It is designed in the shape of a colossal chariot with 12 pairs of stone-carved wheels, representing the chariot of the Sun God.
- The temple is **built using Khondalite rocks, which are locally available and intricately carved to depict various mythological and religious themes.**
- The temple's main sanctum, originally housing an idol of the Sun God, has partially collapsed over time, but many beautifully carved structures, pillars, and sculptures still stand.

Sun Temple and Astronomy

- The Konark Temple is **dedicated to the Sun God, Surya, and is designed to capture the first rays of the rising sun.**
- It is a significant representation of ancient Indian astronomy and timekeeping. The **wheels of the temple served as sundials and timekeepers.**
- The temple is designed in such a way that its main entrance is aligned with the east-west axis, allowing the first rays of the morning sun to fall on the Sun God's idol.

Sculptural Grandeur

- The temple is adorned with intricate sculptures that depict various aspects of Hindu mythology, daily life, and cultural elements.
- The erotic sculptures at Konark Temple are famous for their bold and artistic representations, showcasing human passion and sensuality.

UNESCO World Heritage Site

- The Konark Temple complex was declared a **UNESCO World Heritage Site in 1984**, recognizing its cultural and architectural significance.

Konark Wheel

- The Konark Wheel, also known as the Konark Chakra, is an iconic symbol associated with the Konark Temple.
- The wheel symbolizes the Sun God's chariot and serves as a representation of the cosmic cycle and the concept of time in Hindu mythology.

Architecture

- The Konark Temple is designed in the **shape of a massive chariot drawn by seven spirited horses**.
- The temple is **adorned with 12 pairs of gorgeously decorated wheels at its base, making a total of 24 wheels**.
- Each wheel has a diameter of 9 feet 9 inches and features 8 wider spokes and 8 thinner spokes.
- These wheels are **positioned in various parts of the temple, with 6 on either side of the main temple, 4 on each side of the Mukhasala (front assembly hall), and 2 on each side of the steps at the eastern front**.
- The Konark Wheel is adorned with intricately carved spokes and other ornamental details.
- It is a marvel of ancient stone carving and craftsmanship, reflecting the technical and artistic expertise of the artisans of that era.

Significance

- Various theories exist regarding the significance of the Konark Wheel.
- According to one interpretation, the seven horses represent the days of the week, the 12 pairs of wheels symbolize the 12 months of the year, and the 24 wheels represent the 24 hours of a day, with the 8 major spokes denoting three-hour periods (prahars) of a day.
- Another interpretation suggests that the wheels symbolize the cycle of creation, preservation, and realization, akin to the "Wheel of Life."
- Some believe the 12 pairs of wheels may represent the 12 zodiac signs.
- Others draw parallels between the Konark Wheel and the Dharmachakra, the Wheel of Karma, in Buddhist symbolism.

Carvings and Decorations

- The 24 wheels of the Konark Temple, though similar in size and architecture, feature unique carvings all over.
- The thicker spokes are adorned with circular medallions at their centers.
- The axles of the wheels project about one foot from the surface, also decorated at their ends.

- The rims of the wheels are intricately carved with foliage designs, along with depictions of various birds and animals.
- The medallions in the spokes of the wheels showcase figures of women in various poses, often of a sensual nature.

PULI KALI

In News:

- **Thrissur in Kerala** recently reverberated with the energetic beats of drums and the roars of a different kind – those of 'human tigers and leopards.'
- More than 250 enthusiastic participants, adorned with vibrant stripes and spots, transformed the city into a spectacle of color and tradition during the exhilarating Pulikkali festival.
- This rollicking show **served as the grand finale to the Onam celebrations**, creating a carnivalesque atmosphere in Thrissur.

Analysis of Background:

The Puli Kali Experience

- In this unique celebration, **participants, or 'human tigers and leopards,' paint their bodies to resemble these majestic animals, creating a visually stunning and vibrant display.**
- The 'tigers' from five different contingents representing Ayyanthole, Viyyur, Sitaram Mill Lane, Sakthan, and Kanattukara flooded the streets of Thrissur, each group donning a distinct array of colors.
- From traditional tiger stripes to unexpected fluorescent green and pink hues, the participants brought a kaleidoscope of shades to the festival.
- **Pulikkali does not adhere to rigid rules for dance movements. Each artist creates their unique style, resulting in a dynamic and individualistic performance.**

About puli kali:

- Puli Kali, also known as "Puli Kali" or "Puli Kettu," is a vibrant and colorful traditional folk art form and cultural event that is celebrated primarily in the Indian state of Kerala.
- **Puli Kali translates to "Tiger Play" or "Tiger Dance," and it involves performers painting their bodies to resemble tigers and leopards and dancing in the streets to the beat of traditional percussion instruments.**

History of Puli Kali

- The history of Puli Kali can be traced back to over two centuries.

- It is believed to have originated in the 18th century in the Thrissur district of Kerala.
- **The credit for its creation is often given to Raja Rama Varma, also known as Sakthan Thampuran, the Maharaja of Kochi.** He is said to have introduced this art form as a way to boost the festive spirit and add entertainment to the Onam celebrations.
- Pulikkali, **believed to have originated as a street dance form two centuries ago, eventually became an integral part of Onam celebrations.**
- Initially, it faced criticism for being rather obscene, but over time, certain rules regarding style and dance steps were introduced, enhancing its popularity and cultural significance.
- In recent years, women have broken barriers in Pulikkali. In 2016, they stormed into what was traditionally a male-dominated arena.

Significance of Puli Kali

- **Cultural Significance:** Puli Kali is a celebration of Kerala's rich cultural heritage. It brings together people from various communities and backgrounds to participate in and witness the vibrant performances.
- **Festival Highlight:** Puli Kali is one of the highlights of the Onam festival, which is celebrated to commemorate the return of the mythical King Mahabali. It adds excitement and enthusiasm to the festivities.
- **Dance and Music:** Puli Kali is a dance-based performance. The "tigers" dance to the rhythm of traditional percussion instruments like chenda and thakil. The synchronized movements and energetic dance routines are an integral part of the performance.

ADOPT A HERITAGE 2.0

In News:

- The **Archaeological Survey of India (ASI) has 3696 monuments under protection**, which are spread, throughout the country.
- These monuments not only exhibit the rich cultural heritage of India but also play a significant role in fostering the economic growth.
- In order to sustain the rich cultural legacy, the heritage sites require time to time enhancement of the amenities. To this end and to further enhance the experience of visitors, ASI launched "Adopt a Heritage 2.0" programme.

Analysis of Background:

The "Adopt a Heritage 2.0" programme is an initiative launched by the Archaeological Survey of India (ASI) with the aim of preserving and enhancing India's rich cultural heritage. Here are the key points about this program:

Objective:

- The program aims to encourage corporate stakeholders to collaborate with the ASI in preserving and maintaining historical monuments and heritage sites across India.
- It seeks to enhance the amenities at these sites using funds allocated through Corporate Social Responsibility (CSR) initiatives.

Revamped Version:

- **"Adopt a Heritage 2.0" is an updated version of a scheme that was initially launched in 2017.**
- This revised program clearly outlines the specific amenities required for different monuments, in accordance with the **Ancient Monuments and Archaeological Sites and Remains Act (AMASR Act) of 1958.**

Application Process:

- **Corporate stakeholders** interested in participating in the program can apply for adopting a monument or specific amenities at a monument through a **dedicated web portal**, which has the URL indianheritage.gov.in.
- The portal provides comprehensive details about the monuments available for adoption, including gap analysis and estimated financial requirements.

Responsibilities of Selected Stakeholders:

- The selected stakeholders are responsible for developing, providing, and maintaining amenities in various categories, including hygiene, accessibility, safety, and knowledge.
- By participating, they have the opportunity to be recognized as responsible and heritage-friendly entities.

Term of Appointment:

- The initial term of appointment for selected stakeholders is five years, and it may be extended for an additional five years.

Indian Heritage App:

- Alongside the program, a **user-friendly mobile app called "Indian Heritage" was launched.**
- This app showcases heritage monuments across India, providing state-wise details of monuments, photographs, information about public amenities, geo-tagged locations, and a feedback mechanism for citizens.
- The launch of the app is in phases, starting with ticketed monuments in Phase I.
- Additionally, an e-permission portal was launched with the URL asipermissionportal.gov.in. This portal simplifies the process for obtaining permissions for photography, filming, and developmental projects at heritage monuments, addressing operational and logistical bottlenecks.

Collaboration

The "Adopt a Heritage 2.0" program is a collaborative effort between the Ministry of Tourism, Ministry of Culture, and the Archaeological Survey of India (ASI).

Background of Adopt Heritage Scheme:

- The original "Adopt a Heritage Scheme" was launched in September 2017 (World Tourism Day), with the aim of inviting entities, including public and private sector companies, as well as individuals, to develop and upgrade tourist amenities at selected monuments and heritage sites in India.
- **It encourages these entities, referred to as "Monument Mitras," to use CSR funds for site upkeep and development.**
- **Benefits for Monument Mitras:** Monument Mitras receive visibility on-site premises and on the Incredible India website as recognition for their contribution to heritage preservation and development.

GEOGRAPHY

RELATION BETWEEN THUNDERSTORM AND CIRRUS CLOUD

In News:

- A new study has found a significant statistical correlation between thunderstorms occurring around the world and the formation of wispy cirrus clouds - which might increase global warming.

Analysis of Background:

Cirrus clouds

- They are delicate, feathery clouds composed primarily of ice crystals.
- They have a thin and wispy appearance, resembling fragile high-altitude filaments or strands.
- Wind currents twist and distribute the ice crystals into strands, giving them their wispy appearance.
- They are often white or light grey. They are whiter than any other cloud in the sky during the day.
- They are usually referred to as "mare's tails" because they resemble the tail of a horse.
- Cirrus clouds, which are often found at elevations greater than 20,000 feet (6,000 meters), are comprised of ice crystals formed by the freezing of supercooled water droplets.
- They are more common in clear skies and point in the direction of air movement at their elevation.

Other cloud types

- **Cumulus clouds** are most common at elevations ranging from 4,000 to 7,000 meters and resemble cotton wool most of the time. They can be found in smaller patches and distributed over the area. They are flat on the bottom.
- **Stratus clouds** are large, horizontal, stratified, or layered clouds that cover large areas of the sky. The occurrence of these clouds is caused by the mixing of air masses with varying temperatures or in the case of less heat. The presence of stratus clouds in the atmosphere indicates a cold atmosphere.
- **Nimbus Clouds** are most commonly created in locations with lower heights. These clouds are black or dark grey in appearance. These clouds obstruct the sun's rays, resulting in severe rains and thunderstorms.

Classification of clouds according to the altitude

- Clouds are classified based on their development at various heights. The altitude at which different types of clouds arise varies depending on the polar region, tropical region, and so on.

Information about cloud

Types of clouds

High clouds

- Cirrus
- Cirrostratus
- Cirrocumulus

Low clouds

- Stratocumulus
- Nimbostratus

Middle clouds

- Altostratus
- Altocumulus

Clouds with extensive vertical development

- Cumulus
- Cumulonimbus

Thunderstorm:

- A thunderstorm is an extreme atmospheric circulation characterized by huge, dense cumulonimbus clouds and powerful upward air movement. Thunderstorms create massive downpours, which is why they're called 'cloud bursts,' although the rain lasts only a few minutes.
- A thunderstorm is a type of weather event characterized by the presence of lightning, thunder, heavy rain, and, on rare occasions, powerful winds or hail.
- It is a storm that forms when warm, wet air rises quickly in an unstable environment. It is caused by convection.

Relation between Thunderstorm and Cirrus cloud

- A new study has found a significant statistical correlation between thunderstorms occurring around the world and the formation of wispy cirrus clouds—which might increase global warming.
- The cirrus clouds can contribute to global warming. However, it is very difficult to track these clouds and obtain accurate data about them.
- Findings indicate that a rise in the number of thunderstorms occurring globally might significantly increase the number of cirrus clouds, thereby exacerbating the climate crisis.
- Cirrus clouds, those feathery clouds we see in the sky, significantly impact the Earth's climate.
- An increase in these clouds will act as a blanket that increases warming, while a decrease will allow the heat of the Earth to rise and escape from the atmosphere.
- This is why climate researchers are highly interested in cirrus clouds, trying to predict potential changes due to the rise in greenhouse gases and global warming.

Issues

- It is very hard to obtain accurate, comprehensive data about cirrus clouds.
- Being so wispy, they can be invisible to the human eye and even to satellites, they form in the upper atmosphere, far from the monitoring stations operating on the ground.
- To address this challenge the researchers explored the possibility of predicting the quantity of cirrus clouds based on readily available data about thunderstorms and lightning activity.
- They explain that the brilliant flash of lightning is formed when a huge electric field is discharged instantaneously, generating a very high temperature of up to 30,000 degrees Centigrade in the lightning channel.
- The light waves and radio waves emitted by the lightning discharge can be detected even thousands of kilometers away, enabling long-term monitoring and mapping of thunderstorms.

Studies

- The present study is based on thunderstorm data collected worldwide over 6 years by the NASA satellite ISS-LIS which detects the light emitted by lightning.
- The researchers compared these data with data on cirrus clouds (the partial information available combined with supplementary models), looking for a correlation between lightning activity on a specific day, month, or year, and the amount of cirrus clouds formed in the upper atmosphere.

Findings

- Findings indicate a statistically significant correlation, with the number of cirrus clouds increasing with the number of thunderstorms.
- According to the researchers, this means that thunderstorms, which are easy to detect and measure, can be used as a reliable indicator for the amount of cirrus clouds in the atmosphere, today and in the future.
- It has been discovered that thunderstorms are a major mechanism in the formation of cirrus clouds and that lightning activity can account for over 70% of the changes in the number of cirrus clouds in the world.
- Thunderstorms act as an enormous "vacuum cleaner," lifting moisture from the surface of the planet, especially above oceans and forests, to higher levels of the atmosphere.
- There, at an altitude of about 10km, this moisture turns into ice crystals that form cirrus clouds.
- In this study, it is found a significant statistical correlation between the number of thunderstorms occurring across the globe at any given time and the number of cirrus clouds formed in the atmosphere.

- Many models predict that climate change will probably lead to an increase in thunderstorm activity in the coming years.

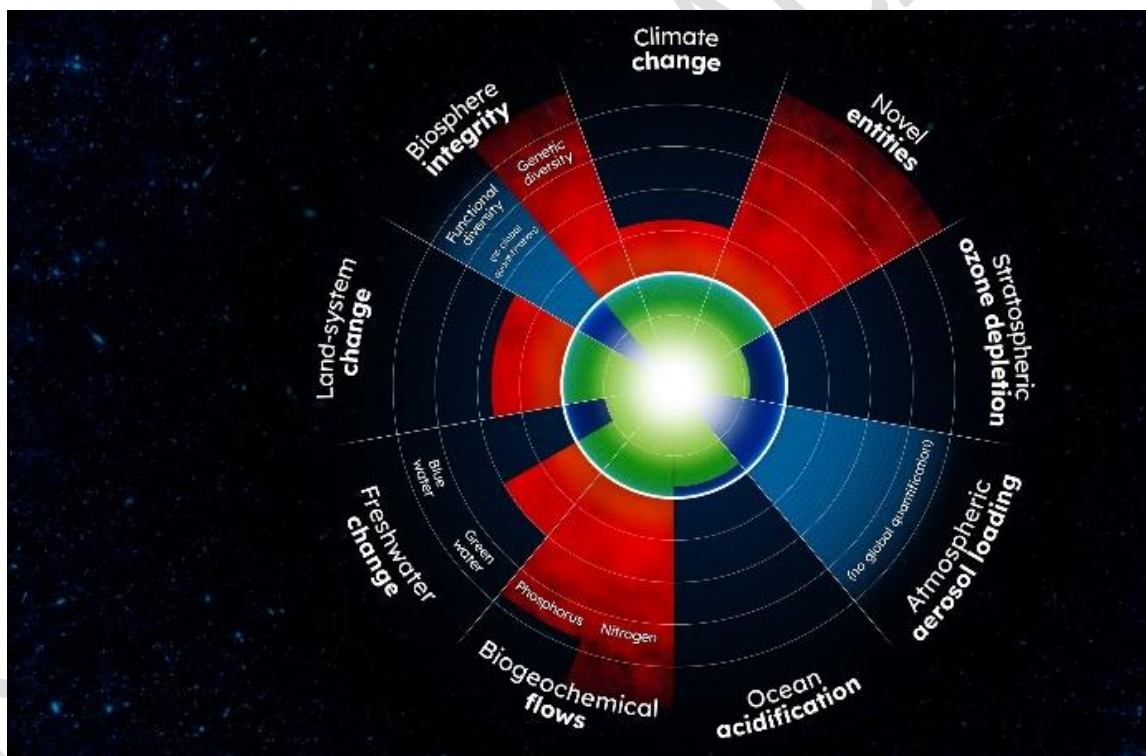
PLANETARY BOUNDARIES

In News:

The world has breached six of the nine planetary boundaries necessary to maintain Earth's stability and resilience- a study published in Science Advances warned.

Analysis of Background:

The six boundaries include climate change, biosphere integrity (genetic diversity and energy available to ecosystems), land system change, freshwater change (changes across the entire water cycle over land), biogeochemical flows (nutrient cycles), and novel entities (microplastics, endocrine disruptors, and organic pollutants).



Planetary Boundaries

- These are the thresholds or limits beyond which significant, potentially irreversible changes to Earth's ecosystems and the global environment could occur, endangering the planet's habitability.

Earth System Processes

The planetary boundaries are associated with nine essential Earth system processes that help maintain the stability and resilience of the Earth system. They are:

Climate Change:

Climate change refers to the long-term alterations in Earth's temperature, precipitation patterns, and other meteorological phenomena, primarily driven by anthropogenic greenhouse gas emissions. The concentration of atmospheric carbon dioxide has surpassed 410 ppm, the highest level in the past 800,000 years at least. This boundary is of planetary and societal significance because it directly affects global ecosystems, weather patterns, and the frequency of extreme events, posing risks to agriculture, infrastructure, human health, and the stability of ecological systems.

Biosphere Integrity:

The rapid decline in global biodiversity, driven by habitat destruction, overexploitation, pollution, and climate change, has led to what is now recognized as the Earth's sixth mass extinction. Species are currently going extinct at a rate 1,000 times higher than the background rate. Biodiversity loss is of planetary and societal significance because it weakens the resilience of ecosystems, reduces the availability of natural resources, and compromises the essential services

Biogeochemical Flows:

The biogeochemical flows of nitrogen and phosphorus have been dramatically altered by human activities, such as fertilizer application and fossil fuel combustion. Approximately 80% of nitrogen and 75% of phosphorus applied to croplands end up in the environment. Disruptions to these elemental cycles are of planetary and societal significance because they can lead to eutrophication, biodiversity loss, and the creation of oxygen-depleted "dead zones" in aquatic ecosystems, undermining water quality and fisheries.

Introduction of Novel Entities:

Novel entities encompass new substances, organisms, and technologies introduced into the environment by human activities, such as synthetic chemicals, genetically modified organisms, and nanomaterials. Over 350,000 different chemicals and mixtures are commercially available, with many having unknown long-term impacts. This boundary is of planetary and societal significance because novel entities can disrupt ecosystems, bioaccumulate in food chains, and pose risks to human health and the environment, often with unpredictable and far-reaching consequences. Addressing this boundary is essential for preserving the integrity of Earth's systems and safeguarding the well-being of present and future generations.

Land-System Change:

Land-system change encompasses the conversion of natural landscapes, such as forests and wetlands, into agricultural and urban areas. Since the 1960s, the world has lost approximately 20% of its forest cover. This boundary is crucial because land-system change can result in habitat loss, biodiversity decline, soil degradation, and disruptions to the global carbon cycle, undermining ecosystem services and exacerbating climate change.

Freshwater Use:

The unsustainable extraction and consumption of freshwater resources have led to the depletion of rivers, lakes, and aquifers. Agriculture accounts for about 70% of global freshwater withdrawals. This boundary is critical because water scarcity threatens food security, human health, and economic development, exacerbating social tensions and heightening the risk of geopolitical conflicts over access to water resources.

Stratospheric Ozone Depletion:

The depletion of stratospheric ozone, primarily caused by the release of chlorofluorocarbons (CFCs) and other ozone-depleting substances, reduces the protective barrier against harmful ultraviolet (UV) radiation. The 1987 Montreal Protocol led to a nearly 99% reduction in controlled ozone-depleting substances. This boundary is of planetary and societal importance because increased UV radiation can cause skin cancer, cataracts, and immune system suppression in humans, as well as damage to ecosystems and agricultural productivity.

Ocean Acidification:

As oceans absorb anthropogenic carbon dioxide emissions, their pH levels decrease, resulting in a more acidic environment. Since the beginning of the Industrial Revolution, the global oceanic pH has dropped by 0.1 units. This planetary boundary is crucial because ocean acidification negatively impacts marine life, particularly calcifying organisms such as coral reefs and shellfish, threatening biodiversity, food security, and the livelihoods of millions of people dependent on ocean resources.

Atmospheric Aerosol Loading:

Aerosols, tiny solid or liquid particles suspended in the atmosphere, influence air quality, human health, and climate. Fine particulate matter (PM_{2.5}) is responsible for an estimated 4.2 million premature deaths globally each year. Addressing this boundary is vital because aerosols can cause respiratory and cardiovascular diseases, disrupt regional weather patterns, and impact global climate through their interaction with sunlight and cloud formation.

Safe Operating Space (SOS)

- The concept of a "safe operating space" refers to the range within which human activities and development can occur without significantly disrupting Earth's essential processes and tipping the planet into an undesirable state.

Tipping Points

- These are thresholds in the Earth system beyond which small changes can lead to significant, sometimes irreversible shifts in the system's behaviour, potentially destabilising the environment and reducing its capacity to support human life.

Resilience

- Resilience refers to the ability of a system to withstand disturbances and recover from disruptions, maintaining its essential functions and processes.

Feedback Loops

- Feedback loops are interactions between different components of the Earth system, which can amplify or dampen changes. Positive feedback loops can accelerate environmental degradation, while negative feedback loops can help stabilize the system.

Holistic Approach / Resilience Thinking

- Planetary boundaries emphasize the need for a holistic approach to managing human activities and their impacts on the environment, recognizing the interconnectedness and complexity of the Earth system.

Global Governance & Cooperation

- The concept of planetary boundaries highlights the importance of global governance and cooperation in managing shared resources and addressing transboundary environmental challenges.

The recent study on Planetary Boundaries

- The researchers first identified the processes in the Earth's ecosystem that have been important for maintaining favourable conditions for humans in the last 12,000 years. This period is **known for its stable and warm planetary conditions.**

- Next, they assessed how much humans are changing them and identified the level at which human activities raise the risk of potentially dramatic and irreversible changes in the overall conditions on Earth.
- They used performed computer simulations in their research.
- Their results showed humans caused a breach in our planet's safe climate and land system in 1988 and are now facing a risk of approaching systemic disruption.
- The researchers set the planetary boundary for atmospheric carbon dioxide concentration and radiative forcing (represents the size of the energy imbalance in the atmosphere) at 350 parts per million (ppm) and 1 Watts per square meter (Wm^{-2}), respectively. Currently, **this has reached 417 ppm and is 2.91 $W m^{-2}$.**
- As for land system change, the team looked at the global area of forested land as the percentage of the original forest cover boundary. This was estimated at 75 per cent.
- The current value is beyond the safe limits. The global value was found to have dropped to 60 per cent.
- For biosphere integrity, the researchers kept a limit of less than 10 extinctions per million species-years. But their calculations, which were done conservatively, estimate the extinction rate was greater than 100 extinctions per million species-years. This boundary has also been violated.
- Currently, it is estimated around one million of the 8 million plant and animal species are threatened with extinction, and over 10 per cent of the genetic diversity of plants and animals may have been wiped out over the last 150 years.
- The second aspect of biosphere integrity is the energy available to the ecosystem or the net primary production (NPP). It is equal to the difference between the amount of carbon produced through photosynthesis and the amount of energy that is used for respiration.
- Humans are appropriating roughly 30 per cent of the energy that was available to support biodiversity before the Industrial Revolution, the study showed. This, it added, could drive biodiversity loss.
- Richardson determined the planetary boundary for freshwater, which includes blue water (surface and groundwater) and green water (available water for plants).
- Human impacts on blue and green water were calculated to be 18.2 per cent and 15.8 per cent, respectively, which is higher than the boundary of 10.2 per cent and 11.1 per cent, respectively.
- The analysis showed that violations of blue and green water boundaries occurred in 1905 and 1929, respectively.
- The paper also looked at the flows of nutrients such as nitrogen and phosphorus. "Changing nutrient availability has huge consequences for biodiversity and water quality. In addition, reactive nitrogen [includes oxides of nitrogen (NO_x), ammonia (NH_3), and nitrous oxide (N_2O)] can lead to the production of potent greenhouse gases that worsen climate change.

- The boundary was fixed at 11 teragrams (Tg) for Phosphorus and 62 Tg for Nitrogen. This is now 22.6 Tg and 190 Tg, respectively.
- The planetary boundary of novel entities was calculated to be zero. This means humans have transgressed this limit as well.
- Stratospheric ozone depletion, aerosol loading, and ocean acidification were found to be within the planetary boundary. Aerosols are minute particles from combustion processes, biomass burning, and plant/microbial materials suspended in the air. They are known to impact climate.
- However, the risk that aerosol loading and ocean acidification exiting their boundaries is increasing, the researchers warned.
- “It is interesting to note that the ozone layer planetary boundary was transgressed in the 1990s. today, it is back in the safe operating space thanks to global negotiations, including the Montreal Protocol.
- The world needs to negotiate and respect the limits to the amount of waste that is dumped into the environment.
- In short, we need a circular economy and we need to be moving in that direction.

CAUVERY WATER SHARING DISPUTE

In News:

- The Supreme Court on Thursday refused to intervene either in favour of Karnataka or Tamil Nadu in the Cauvery water dispute.
- Instated it banked on the combined expertise of the Cauvery Water Regulation Committee (CWRC) and the Cauvery Water Management Authority (CWMA) to manage the water sharing between the two neighbouring states.

Analysis of Background:

Cauvery River

- Cauvery (or Kaveri) is the state's largest river, flowing from Talakaveri in the Brahmagiri hills of Karnataka's Western Ghats.
- It is known as the Dakshina Ganga (the Ganges of the South) and is regarded as one of India's holiest rivers.
- The source of the Kaveri River is a popular pilgrimage and tourism destination in Coorg, located in the Bramahagiri Hills near Madikeri.

The tributaries of the Kaveri include:

- Harangi, Hemavathi (origin in western Ghats joins the river Kaveri near Krishnarajasagar), Lakshmanatirtha,

- Kabini (originates in Kerala and flows eastward and joins the Kaveri at Tirumakudal, Narasipur),
- Shimsha, Arkavati, Suvarnavathi or Honnuholé, Bhavani, Lokapavani, Noyyal, Amaravati

Cauvery Water Dispute

About Cauvery River:

- The issue stems from a long-standing disagreement about the distribution of water from the Cauvery River.
- There are three states and one union territory involved: Tamil Nadu, Kerala, Karnataka, and Puducherry.
- The disagreement is on how river water should be apportioned among these states for diverse purposes like as agriculture, drinking water, and industrial use.

History of Dispute

- This disagreement initially arose in 1892, during the reign of Britishers, between the Presidency of Madras and the Princely State of Mysore.
- Mysore and Madras established an agreement in 1924 that would last for 50 years. As a result, it was no longer enforced in 1974.
- Without the permission of Tamil Nadu, Karnataka has been diverting water into four newly constructed reservoirs since 1974.
- This caused conflict in post-independence India.

The establishment of the Cauvery Water Disputes Tribunal and its final decision

- The Cauvery Water Disputes Tribunal (CWDT) was established in June 1990 in compliance with Section 4 of the Inter-State Water Disputes Act, 1956.
- The CWDT gave its final award in February 2007, after 17 years, outlining the amount of water that each state should receive at different times of the year.
- Given that the total available water in the Cauvery basin throughout the four states is 740 TMC in a normal year, the Tribunal has apportioned the water as follows:
 - Tamil Nadu: 419 TMC (as opposed to 512 TMC),
 - Karnataka: 270 TMC (as opposed to 465 TMC),
 - Kerala has 30 TMCs, and 7 TMCs in Pondicherry
- The final award set aside 10 TMC for environmental purposes and 4 TMC for inevitable seawater exits.
- The tribunal ordered the formation of a monitoring authority to manage water releases.

- However, the final decision did not provide a specific methodology in circumstances where there is a water deficit owing to insufficient precipitation.
- It simply stated that in such cases, the assigned shares should be lowered accordingly.

The following development

- On the direction of the Supreme Court, the administration took another 6 years and notified the order in 2013.
- Later, the Tamil Nadu government petitioned the Supreme Court for a special leave under Article 136.
- The Tamil Nadu government had sought the court because the Karnataka government had refused to obey the tribunal's decision.
- Article 136 makes the Supreme Court the highest appellate court.
- It states that, notwithstanding anything in this Chapter, the Supreme Court may grant special leave to appeal from any judgment, decree, resolution, sentence, or order rendered by any court or tribunal in India's territory.
- The Supreme Court issued its decision in 2018. The Supreme Court designated Cauvery a national asset in its decision.
- It upheld the CWDT's finalized water-sharing arrangements.
- According to the ruling, Karnataka would receive 284.75 TMC, Tamil Nadu 404.25 TMC, Kerala 30 TMC, and Puducherry 7 TMC.
- The Centre was also asked to notify the Cauvery Management Scheme.
- The 'Cauvery Water Management Scheme' was announced by the central government in June 2018.
- To carry out the decision, it established the 'Cauvery Water Management Authority' (CWMA) and the 'Cauvery Water Regulation Committee' (CWRC).

Water sharing procedure

- Karnataka, the upper riparian state of the Cauvery basin, has agreed to transfer water to Tamil Nadu every month.
- According to the timetable, Karnataka will make a total of 177.25 TMC accessible to Tamil Nadu at Biligundlu in a "normal" water year (June to May).
- From this total, 123.14 TMC will be distributed between June and September, which coincides with the southwest monsoon season.
- When the monsoon produces less rainfall than expected, the Cauvery issue inevitably flares up during this time.

The reason behind Tamil Nadu's approach towards the Supreme Court

- At its meeting on August 11, the CWMA requested that Karnataka manage its releases in such a way that 10,000 cusecs of water were realized at Biligundlu over the next 15 days, beginning August 12.
- In other words, Karnataka would have to deliver 0.86 TMC per day for a total of 12.9 TMC over 15 days.
- However, what reportedly irritated Tamil Nadu was Karnataka's failure to adhere to the quantity agreed upon at the previous day's CWRC meeting.
- Karnataka has claimed that low rainfall in the Cauvery basin, which includes Kerala, has resulted in minimal inflow to its reservoirs.

Cauvery Water Regulation Committee (CWRC)

- Later, the Cauvery Water Regulation Committee (CWRC) was formed to implement and monitor the CWDT's award and to govern water distribution by its terms.
- The committee is responsible for monitoring water releases from Karnataka's reservoirs and ensuring that the allocated amounts of water are given to Tamil Nadu, Kerala, and Puducherry by the set formula.

MT SEMERU VOLCANO, INDONESIA

About Semeru Volcano:

- Semeru, often known as "The Great Mountain," is Java's highest and most active volcano.
- It last erupted in June 2023.
- Indonesia, which has the most active volcanoes in the world, is vulnerable to seismic activity due to its location on the Pacific's Ring of Fire.
- The Semeru volcano is also part of the Island arcs generated by the subduction of the Indo-Australian plate beneath the Sunda Plate (which is part of the Eurasian Plate). The trench developed here is known as the Sunda Trench, and its main section is known as the Java Trench.

The Pacific Ring of Fire:

- The Ring of Fire, also known as the Circum-Pacific Belt, is a path that runs around the Pacific Ocean and is marked by active volcanoes and frequent earthquakes.
- It follows the tectonic plate borders of the Pacific, Cocos, Indian-Australian, Nazca, North American, and Philippine Plates.

About Island Arcs:

- They are long, curved chains of oceanic islands characterized by significant volcanic and seismic activity as well as orogenic (mountain-building) activities.

- On its concave side, an island arc usually has a land mass or partially enclosed, unusually shallow water.
- A long, narrow deep-sea trench nearly always exists along the convex side.
- The deepest ocean depths are found in these seafloor depressions, such as the Mariana (the world's deepest trench) and Tonga trenches.
- The Aleutian-Alaska Arc and the Kuril-Kamchatka Arc are two prime examples of this type of geologic phenomenon.



Volcanoes in India:

- Barren Island, Andaman Islands (India's only active volcano)
- Narcondam, Andaman Islands
- Baratang, Andaman Islands
- Deccan Traps, Maharashtra
- Dhinodhar Hills, Gujarat
- Dhosi Hill, Haryana

CORONAL MASS EJECTIONS (CMEs)

Facts about CMEs

- CMEs are massive plasma and magnetic field expulsions from the Sun's corona that propagate into interplanetary space.
- The Sun emits a massive amount of material, including electrons, protons, and heavier ions, as well as magnetic fields, during a CME. This material is expelled at great speeds into space.

Causes:

- CMEs are typically caused by the Sun's magnetic fields becoming unstable.
- The precise causes are unknown, although they frequently include the reconfiguration or rupture of magnetic loops on the Sun's surface.
- CMEs are separate from solar flares, though they frequently occur in tandem. Solar flares are brief bursts of energy and radiation, whereas CMEs are caused by the evacuation of solar material.

Impact on Earth:

- **Geomagnetic Storms:** Geomagnetic storms can occur as a result of the interaction of the CME's magnetic fields with the Earth's magnetosphere. These have the potential to interfere with satellite communications, navigation systems, and even power grids.
- **Auroras:** By energizing particles in Earth's atmosphere, CMEs can generate beautiful displays of the Northern and Southern Lights, popularly known as auroras.
- **Radiation Risks:** During a CME event, astronauts in space or passengers on high-altitude flights may be exposed to significant doses of radiation.

Important Solar Flare Facts:

- A solar flare is a powerful burst of radiation caused by the release of magnetic energy from sunspots.
- Flares are the most powerful explosive phenomena in our solar system.
- They appear as bright spots in the sun and can last anywhere from minutes to hours.
- They heat the material to many millions of degrees in a matter of minutes and emit a burst of radiation across the electromagnetic spectrum, including radio waves, x-rays, and gamma rays.
- Although solar flares can be seen in white light, their strong X-ray and ultraviolet emissions are generally more noticeable.
- The Impact of a Solar Flare on Earth: The powerful radiation emitted by a solar flare can interfere with satellite communications, distort radio transmissions, and even endanger humans in orbit.

- Furthermore, increasing solar radiation can generate geomagnetic storms, which can disrupt power systems and cause auroras (northern and southern lights) at lower latitudes.

What exactly is a geomagnetic storm?

- A geomagnetic storm is a significant disturbance in the magnetosphere of the Earth.
- These storms are caused by fluctuations in the solar wind, which cause large changes in the currents, plasmas, and fields in the Earth's magnetosphere.
- Sustained (for several hours) periods of high-speed solar wind and a southward-directed solar wind magnetic field (against the direction of Earth's field) near the dayside of the magnetosphere are effective for generating geomagnetic storms.
- The largest such storms are associated with solar coronal mass ejections (CMEs), where a billion tons or so of plasma from the sun, with its embedded magnetic field, arrives at Earth.

MOROCCO

In News:

- The earthquake struck 72km (45 miles) southwest of Marrakesh.
- Its epicenter was located in the Ighil area, a mountainous rural commune home to small farming villages in Al-Haouz province near the ski resort of Oukaimeden in the Atlas Mountains.
- The quake was felt all over the country, including in the provinces of Ouarzazate, Marrakesh, Azilal, Chichaoua, and Taroudant.
- In the coastal cities of Rabat, Casablanca, Agadir, and Essaouira, many panicked residents rushed out into the streets in the middle of the night, fearing that their homes would collapse.
- Tremors were felt as far away as Huelva and Jaen in southern Spain.

Analysis of Background:

About Earthquake

- An earthquake is the shaking of the Earth when two blocks of the earth suddenly slip past one another.
- The surface where they slip is called the fault or fault plane.
- The location below the earth's surface where the earthquake starts are **called the hypocenter**, and the location directly above it on the surface of the earth is **called the epicenter**.

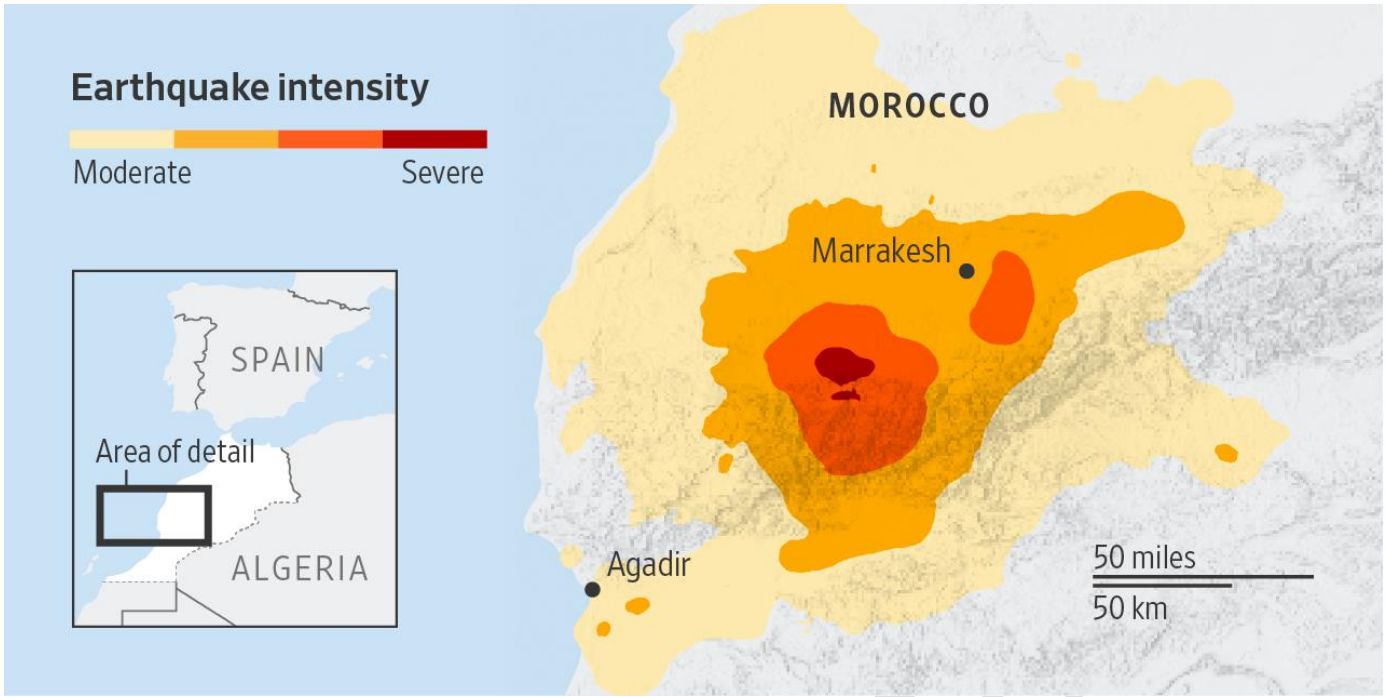
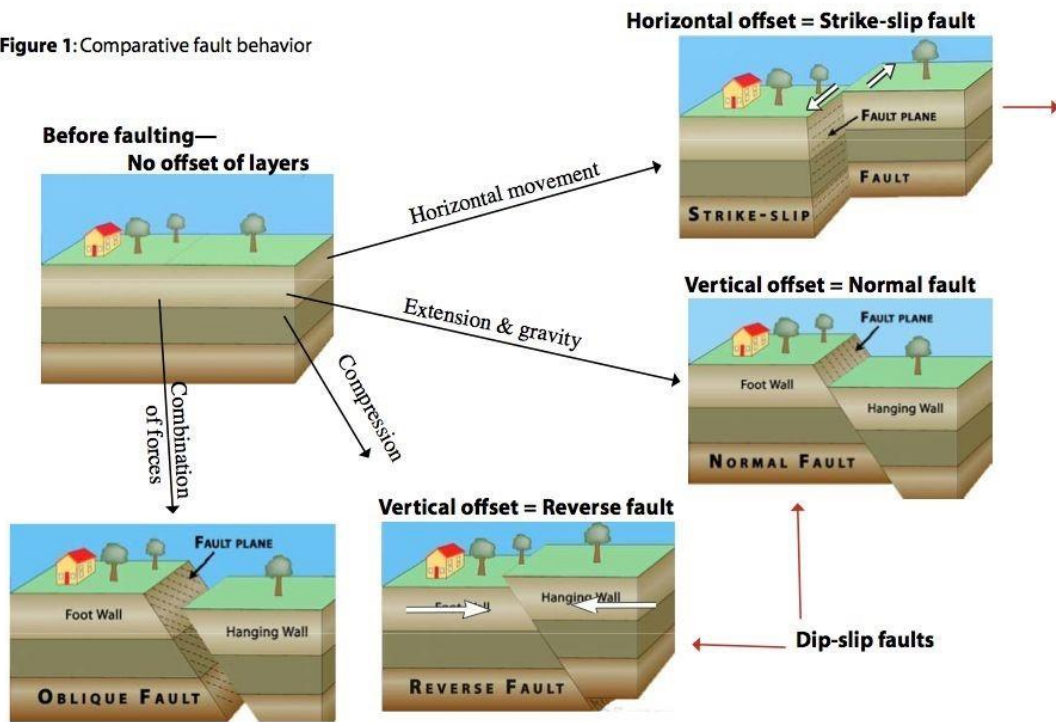


Figure 1: Comparative fault behavior



Types of Earthquakes:

- **Tectonic:** A tectonic earthquake occurs when the earth's crust breaks due to geological forces on rocks and adjoining plates that cause physical and chemical changes.
- **Volcanic:** A volcanic earthquake is any earthquake that results from tectonic forces that occur in conjunction with volcanic activity.
- **Collapse:** A collapse earthquake is a small earthquake in underground caverns and mines that is caused by seismic waves produced from the explosion of rock on the surface.
- **Explosion:** An explosion earthquake is an earthquake that is the result of the detonation of a nuclear and/or chemical device.
- **Reservoir-induced Earthquakes:** These occur in the areas of huge reservoirs like dams.

Seismic Zones of India:

- Seismic zones in the Indian subcontinent are divided into four seismic zones (II, III, IV, and V) based on
- scientific inputs relating to seismicity,
- Earthquakes occurred in the past and
- Tectonic setup of the region.
- The **Bureau of Indian Standards** is the official agency for publishing seismic hazard maps and codes.
- It has brought out versions of seismic zoning maps: a six-zone map in 1962, a seven-zone map in 1966, and a five-zone map 1970/1984

Seismic Active Zones:

- Seismic Zone II
- Seismic Zone III
- Seismic Zone IV
- Seismic Zone V

Mercalli Scale: a twelve-point scale for expressing the local intensity of an earthquake, ranging from I (virtually imperceptible) to XII (destruction).

Richter scale: It is a scale of numbers used to tell the power (or magnitude) of earthquakes.

Causes of Earthquakes in India:

- **North–East region:** Collision zones of the Himalayan belt and Sumatran belt. Kopili fault is currently the most active seismic zone in North East India.
- **Himalayan belt**–Collision between Indo-Austral plate with Eurasian plate and Burma Plate with Java Sumatra.
- **Andaman and Nicobar Islands**–Seafloor displacement and underwater volcanoes.

- **Deccan Plateau**—Fault line and energy build-up along the fault line of the river Bhima (Krishna) near Latur and Osmanabad (Maharashtra).
- **Anthropogenic:** Increasing population and unscientific land use in construction.

Impact of Earthquakes

- Loss of Human Lives
- Change in River Course
- Landslide
- Floods
- Land Slide
- Tsunami
- Floods
- Avalanches
- Damage to property

About Morocco

- It is a hilly country in western North Africa that borders the Strait of Gibraltar.
- It has preserved much of its old architecture as well as many of its traditional practices.
- Casablanca, Morocco's largest city and main Atlantic Ocean port, is an industrial and economic center.
- **Rabat** is the capital.
- It is bounded to the east and southeast by Algeria, to the south by the Western Sahara, to the west by the Atlantic Ocean, and the north by the Mediterranean Sea.
- It is the only African country with coastlines on both the Atlantic and Mediterranean seas.
- Ceuta and Melilla, two small Spanish enclaves, are located on the country's northern coast.
- **Major Mountain Ranges:** Atlas and Rif mountain ranges
- **Spoken Languages:** Arabic and Amazigh (Tamazight).
- **Religion:** Islam predominates, having a rich Islamic heritage.
- Morocco's political system is a constitutional monarchy with two legislative bodies.
- **Economy:** The Moroccan economy is still strongly reliant on raw material exports.

BAGMATI RIVER

In News:

- A boat carrying 32 school students capsized in the Bagmati River in Bihar's Muzaffarpur on Thursday.
- Media reports said that the accident happened when the students were on the boat to go to the school.
- Based on the information, the locals rushed to the spot and rescued at least 18 students. However, more than 10 students are still missing and efforts are underway to rescue them.

Analysis of Background:

About

- Bagmati River is a **transboundary** river between **the Nepal and India**
- It starts its journey from Kathmandu, Nepal and it ends in the **Koshi River** near Bornesthan, Bihar, India.
- The total length of the Bagmati is **3 km**.
- The Bagmati River **flows through the Kathmandu Valley** in Nepal and is separated from Kathmandu through Patan, traveling through Province No. 2 of Nepal's southern section before entering the Indian state of Bihar.
- A pair of religions, Hindus and Buddhists, regard this river as sacred.
- The Nepalese considered the Bagmati to be the source of their culture and urbanization.
- On the banks of the Bagmati, there are numerous cities and shrines. Furthermore, the population on the Bagmati's banks is dense, and the river is heavily polluted and filthy.
- The Bagmati is also significant because Hindus are burned on the ridges of the sacred creek, while Kirants are buried in the rocks by its flank.
- According to the Nepalese Hindu religion, the deceased body should be bathed three times in the Bagmati before entombment to stop the rebirth process.

Location

- The Bagmati River flows through Nepal's Kathmandu Valley.
- The river runs through the valley of Nepal's capital, passing through various important cities.

Origin

- The Bagmati River **originates in the Shivapuri Hills north of Kathmandu** and runs south through the city.
- The **Nagarjun Forest Reserve**, located near where the river begins its downstream journey, is a protected region abounding with species and breathtaking beauty.

Mouth of the Bagmati River

- The river eventually merges with the **Narayani River**.
- This confluence is located in southern Nepal, not far from the city of Triveni.
- The combined waters of the Bagmati and Narayani finally flow southward into the Ganges.

Basin features of Bagmati River

- The area around the Bagmati is full of **beautiful vistas**.
- The Kathmandu Valley, which is rich in history and culture, is right in its path.
- Numerous historical and cultural attractions, including several major temples and ghats (steps down to the river), may be found along the Bagmati's banks.
- Hindus see the Bagmati as sacred and possess great spiritual significance for them.
- **The Pashupatinath Temple**, located on the river's edge, is another famous Hindu pilgrimage site dedicated to Shiva.
- The riverbanks are a popular meeting spot for believers, who frequently gather to light funeral pyres and perform other religious rites.
- The Bagmati basin is also critical to the Kathmandu Valley's water supply.
- It aids farming activities, supplies drinking water, and maintains the local ecosystem.

Tributaries

- Several minor rivers fall into the Bagmati, which then flows downstream as one unit. The following are some of the major branches that feed into the Bagmati:
- **The Bishnumati River** flows across the Kathmandu Valley, past the modern city of Kathmandu and the historic city of Patan, from the Shivapuri Hills. It **meets** the Bagmati **near Teku**.
- **The Manohara River**, which flows through the northern part of the Kathmandu Valley, originates in the Nagarjun Forest Reserve.
- A major tourist spot is the confluence of **the Guheshwori Temple** and the Bagmati.
- **The Dhobikhola River** passes through Kathmandu and **Tripureshwor** on its journey from its headwaters in the **Shivapuri Hills** to the Kathmandu Valley.
- It is joined by the Bagmati shortly below Tripureshwor.
- The Bagmati River is vital to the residents of the Kathmandu Valley because of these and other tributaries, as well as several smaller streams and rivulets.

EL NINO IMPACT ON MONSOON

In News:

India's monsoon weather patterns and their impact during the months of August and September.

Analysis of Background:

- India experienced above-average rainfall in July despite the emergence of El Nino.
- **August**, however, saw **the adverse impacts of El Nino**, making it the driest August in over a century.
- The outlook for September is uncertain, with hopes of a revival in monsoon activity.

Driest August on Record:

- August is typically the second rainiest month in India, accounting for about 22% of the annual rainfall.
- **August 2023 is set to be the driest since 1901**, with a deficit of about 33%.
- States like Gujarat and Kerala had nearly 90% rainfall deficit, while others like Karnataka, Telangana, and Andhra Pradesh had over 50% deficiency.
- Tamil Nadu, relying on winter rainfall, had a shortfall of 23%.

El Nino Impact

- El Nino, the **warming of the equatorial Pacific Ocean**, suppresses monsoon rainfall in India.
- The **Indian Ocean Dipole (IOD) didn't compensate for El Nino's impact** this year.
- The relationship between IOD and the Indian monsoon remains uncertain.

Regional Variances

- **East and northeast India received good rainfall in August** after deficits in June and July.
- However, this rainfall couldn't fully offset the seasonal deficit.

Possible Monsoon Revival

- Experts predict a potential monsoon revival in the first or second week of September.
- It's uncertain how much rainfall this revival will bring, but El Nino's influence may still lead to a deficiency in September.

Reservoir Levels and Concerns

- Monsoon provides 75% of India's annual rainfall, crucial for reservoirs.
- As of last week, major reservoirs were at 94% of normal levels, but this may decline.
- Some states already have critically low reservoir levels (e.g., Kerala, Tamil Nadu, Bihar).
- A dry September could worsen the situation.

Impact on Crops

- Winter crops and standing kharif crops are under stress due to inadequate rainfall.
- Soybean, a relatively low water-intensive crop, requires immediate rain for sustainability.
- The extent of yield loss will depend on the monsoon's behavior in the next 45 days.

About El Nino

- El Nino, Spanish for "the boy child," is a climate phenomenon characterized by the abnormal **warming of sea surface temperatures in the equatorial Pacific Ocean.**
- It is part of the broader El Nino-Southern Oscillation (ENSO) climate pattern, which also includes La Nina.

Causes of El Nino

- El Nino **occurs irregularly, typically every 2 to 7 years**, and is driven by complex interactions between the ocean and the atmosphere.
- It is triggered when the trade winds that usually blow from east to west weaken or reverse direction, allowing warm water to move eastward.

Key Characteristics of El Nino

- **Elevated Sea Surface Temperatures:** The central and eastern Pacific Ocean experiences unusually warm sea surface temperatures during El Nino events.
- **Disruption of Normal Weather Patterns:** El Nino disrupts typical climate patterns worldwide, affecting weather systems and precipitation.
- **Global Impact:** The effects of El Nino are felt globally, influencing weather events, agriculture, ecosystems, and economies.

Impacts of El Nino

On Weather Patterns

1. **Reduced Rainfall:** El Nino tends to suppress rainfall in regions that normally receive it, leading to droughts and water shortages.
2. **Increased Rainfall:** Conversely, it can result in excessive rainfall and flooding in other areas.

On Agriculture and Food Security

1. **Crop Failures:** Droughts or floods caused by El Nino can lead to crop failures, impacting food production.

2. Food Price Volatility: Reduced agricultural output can cause food prices to rise, affecting food security.

On Ecosystems

1. Marine Ecosystems: El Nino can disrupt marine ecosystems, leading to coral bleaching and changes in fish migration patterns.
2. Terrestrial Ecosystems: Forest fires and altered vegetation patterns may occur due to changed precipitation patterns.

On Economics

1. Economic Disruption: Industries such as agriculture, fisheries, and insurance can be negatively affected by El Nino-induced weather extremes.
2. Costly Disasters: The economic costs of responding to El Nino-related disasters, such as floods and wildfires, can be substantial.

El Nino's Counterpart: La Nina

- **La Nina is the opposite phase of ENSO, characterized by cooler-than-average sea surface temperatures in the equatorial Pacific.**
- It often leads to contrasting weather patterns, such as increased rainfall in some regions and more active hurricane seasons.

Prediction and Monitoring

- Scientists use various tools, including ocean buoys and climate models, to monitor and predict El Nino events.
- Early detection and prediction are essential for preparedness and mitigation efforts.

Erg Chech

In News:

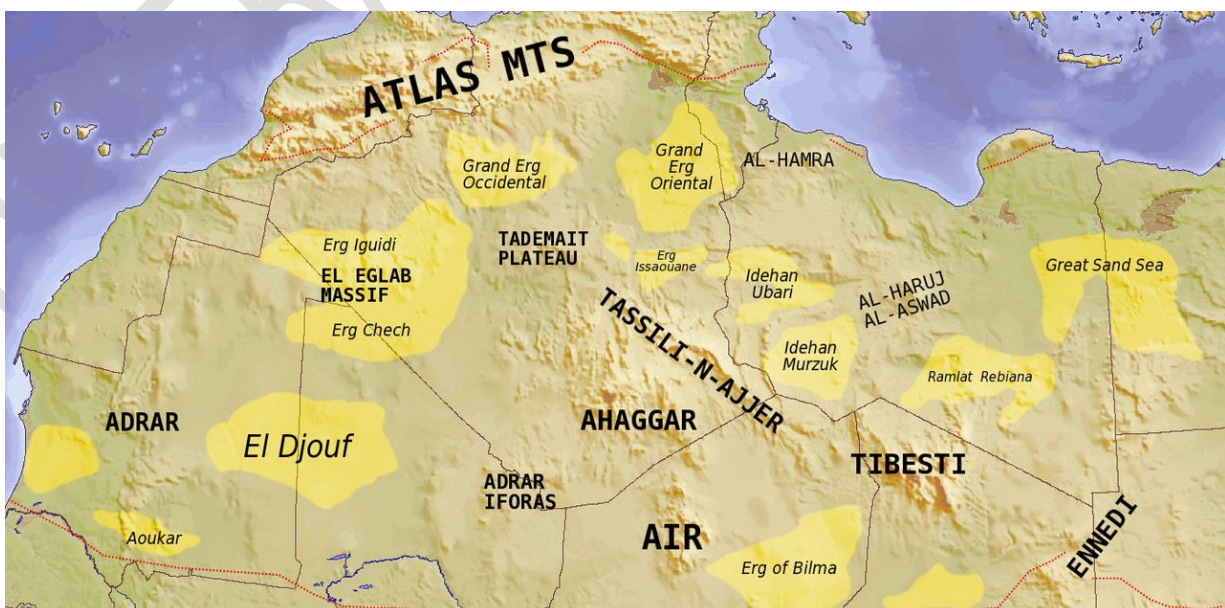
- In May 2020, scientists uncovered unique rocks in the Sahara Desert with characteristic greenish crystals, which were classified as early Solar System remains.
- These rocks are fragments of the Erg Chech 002 meteorite, which is the oldest volcanic rock yet discovered, going back roughly 4.56556 billion years.

Analysis of Background:

- Erg Chech 002 is classified as an "ungrouped achondrite," meaning it was formed from melted planetesimals, and its parent body is unknown.
- The analysis discovered that Erg Chech 002 has a high concentration of lead-206 and lead-207, as well as undecayed uranium-238 and uranium-235.
- Aluminum-26 was dispersed irregularly in the early Solar System, according to comparisons with other achondrites, particularly volcanic angrites.

Key Findings

- The research centered on aluminum isotopes, namely aluminum-26, a radioactive isotope that decays over time and is critical for understanding the creation of the Solar System.
- The disintegration of aluminum-26 was important in heating tiny rocks in the early Solar System, contributing to the formation of planets.
- The researchers used aluminum-26 data with uranium and lead data to establish the distribution and absolute ages of aluminum-26.



More Information about Erg Chech

- Erg Chech 002 - A detailed examination of the rocks containing peculiar greenish crystals revealed that they were from outer space, left over from the Solar System's birth.
- They were all fragments of the Erg Chech 002 meteorite, the oldest volcanic rock yet discovered.
- Chondrites are rocks formed from melted planetesimals, which are solid lumps that formed the Solar System from a cloud of gas and debris. Erg Chech 002, Angrites.
- Chondrites are the most common meteorite class, accounting for more than 85% of all meteorite falls.

HEAT INDEX

In News:

- Earlier in August, Iran recorded a scorching heat index of 70 degrees Celsius (°C) in the coastal part of the country, a metric at which survival of life is unfathomable, if not impossible.
- The country had also declared public holidays on August 2 and 3 on account of "unprecedented heat".

Analysis of Background:

Heat Index

- The heat index, also known as **apparent temperature**, is a measure of how the temperature feels to humans.
- Relative humidity is an important factor that determines heat index, along with air temperature.

How is the heat index calculated?

- **The dew point**, which is the temperature at which gas is transformed into a liquid state, is an important factor in the calculation of heat index.
- In terms of atmospheric moisture, it's the temperature at which air cannot hold any more water vapour, and droplets of water begin to form.
- Some countries have developed their corresponding indices to measure heat index.

Importance of the measurement of Heat Index

- It will aid people in comprehending the effect of humidity on high temperatures.
- This index's data could be used to detect the heat implications for humans and to comprehend temperature ranges that cause discomfort.
- It will also aid in directing folks to take extra precautions to alleviate discomfort.
- It will display the minimum and maximum temperatures for the day, as well as how the current temperature feels.

- It will make use of data on air temperature and relative humidity.
- However, it is experimental, and there is a need to modify and validate it for Indian conditions.

Impact of Humidity on the Human Body

- High humidity can lead to heat stress; meaning the body is unable to get rid of excess heat. Humans usually maintain a core temperature in the range of 36.1 to 37.2 °C.
- When the body is unable to get rid of excess heat, the heart rate increases due to a rise in core temperature, leading to heat-related exhaustion and rashes, among other symptoms. It can also be fatal if not addressed promptly.
- At high temperatures, the human body can lose excess heat through perspiration and cool itself. But when humidity is high as well, it is difficult to sweat and then for that sweat to evaporate because the air around is already saturated with moisture. This makes it difficult for the body to lose heat.
- On the other hand, if the humidity is low, evaporation of sweat is easier, thus making the apparent temperature feel close to the actual air temperature.
- This is why a measure of heat index is more useful than just the temperature to gauge the impact of heat on humans.

Measures to adopt

- A heat index value of 67°C or above can be extremely dangerous for people and animals who have direct and prolonged exposure.
- With climate change, we will likely continue to witness record-breaking heat index values across the world.
- We will need to prepare and adapt to such extreme conditions by investing in early warning, making changes to work timings, and finding.

Studies of IMD on Heatwave

- The IMD conducted a study on the impact of meteorological conditions on heatwaves and the country's **"heat wave hazard zonation."**
- According to the IMD report "Hot Weather Analysis over India," the mechanism by which heat affects humans is complex; it is the result of interactions between temperature, radiation, wind, and humidity.
- There is significant experimental evidence that physiologic stress caused by high temperatures is increased when humidity levels are high.

IMD's Initiatives and Tools to Combat Heat Waves

- Heatwave forecasts must be issued on time to keep the people informed.

- Warnings were issued to disaster management authorities for them to be prepared.
- IMD provides Seasonal outlook and long-term prediction providing more insight into temperature trends.
- Forecasts for the next five days, are updated in real-time.
- Color-coded extreme weather alerts, including heat waves.
- Heat action plans will be developed in collaboration with the National Disaster Management Authority (NDMA) and local health agencies.
- Plan implementation in susceptible areas to reduce heat-related dangers.

Effects of Heat Stress

- Thermal discomfort affects a variety of activities and jobs.
- Workers have to deal with extreme heat stress, which can hurt their work and productivity and even put their lives at risk.
- Occupational health risks ultimately affect the nation's income and economy.
- In India, about 75 percent of workers, which is around 380 million people, experience heat-related stress. The increasing heat intensity poses a substantial risk to human health and life.
- This extreme heat is a health hazard and has continued to grow as a disease burden over the past few years.
- Human health can be severely affected. It can cause dehydration, acute cerebrovascular accidents, and blood clots, which result in cramps, exhaustion, stress, heat stroke and even death in extreme cases.
- The elderly, children, people with psychiatric disorders and other diseases are particularly impacted.
- A significant number of deaths have been reported in different parts of the world due to heat vulnerability.

PARLIAMENT SPECIAL SESSION

In News:

The government announced to convene a five-day special session of Parliament from September 18 to September 22. The government has not yet released any details about the agenda for the special session

Analysis of Background:

Key Highlights

- **Article 85 of the Indian Constitution mandates that Parliament must meet at least twice a year.** The Budget Session, typically held from February to May, primarily focuses on the government's financial proposals and the budget. The Monsoon Session, held in July and August, deals with various legislative matters.
 - The **Constitution also sets a limit on the maximum gap between two sessions of Parliament, which cannot exceed six months.** This ensures that there is regular parliamentary oversight and functioning.
- The **President of India has the authority to summon a special session of Parliament at any time,** beyond the regular sessions. This is usually done to address pressing and urgent matters that cannot wait for the next scheduled session.
- The **President may call a special session for various reasons, including:**
 - Discussing and responding to natural disasters or security threats.
 - Introducing urgent legislation, especially related to raising funds for relief efforts or addressing critical issues.
 - Resolving political crises, such as deadlocks between the government and the opposition.
 - Fulfilling constitutional requirements, such as the need to approve a constitutional amendment.
- The **agenda for a special session is determined by the Cabinet,** which is led by the Prime Minister. While there is flexibility in deciding the agenda, special sessions typically focus on urgent matters, such as natural disasters, security threats, political crises, or fulfilling constitutional requirements.
- **A special session can last for a maximum of 14 days,** as specified in the Constitution. However, if necessary, the President has the authority to extend the session for an additional 14 days. This allows for adequate time to address the specific issues at hand.
- **Rules and Procedures:** During a special session, the same parliamentary rules and procedures that apply to regular sessions are followed. This includes the requirement for a quorum (the minimum number of members required to conduct business) and the same voting procedures.

- The President can call a special session to address urgent matters, but the regular legislative process must still be followed. Legislation introduced during a special session, including money bills, must go through the normal parliamentary procedures and be passed by a majority of the members of Parliament.

ONE NATION, ONE ELECTION

In News:

Recently, the **government has announced to form a committee** to explore the **feasibility of “one nation, one election”**

Analysis of Background:

- The government has constituted a committee **headed by former President of India Ram Nath Kovind** to explore the possibility of **“one nation, one election”**.
- The recent moves by the government have thrown open the possibility of advancing the general elections and some state polls, which are scheduled after and with the Lok Sabha contest

What is Simultaneous election?

- The concept of **“One Nation, One Election”** envisions a system in **which all state and Lok Sabha elections must be held simultaneously**.
- This will **entail restructuring the Indian election cycle** so that **elections to the states and the center coincide**.
- This would imply that **voters will vote for members of the LS and state assemblies on the same day and at the same time**.

What is the history holding of Simultaneous Election in India:

- Simultaneous elections have previously been **conducted in India in 1952, 1957, 1962 and 1967**.
- Soon after, this norm was discontinued following the **dissolution of some Legislative Assemblies between 1968 -69**.
- Since then, the **Indian Electoral system holds polls to Centre and states separately**.

Urge for simultaneous elections:

- The idea of returning to simultaneous elections was **raised in the Election Commission’s annual report in 1983**. It was **also mentioned in the Law Commission’s Report in 1999**.
- Following the Prime Minister of **India’s reintroduction of the idea in 2016**, the **NITI Aayog prepared a working paper on the subject in 2017**.

- The **Law Commission** stated in its **2018** working paper that at least **“five Constitutional recommendations”** would be required to **make simultaneous elections a reality in India again.**
- In **June 2019**, **PM Modi** said that a **committee would be formed to examine the issue** and a meeting with leaders of political parties would be called.

What are the Constitutional challenges involved?

- The **Indian Constitution** provides for the **dissolution of the legislature** if the **ruling party loses majority by passing a vote of no confidence.**
- **Clause (2) of Article 83, Article 172(1)** of Indian constitution **deals with the term of Lok Sabha and State Assemblies** respectively.
- Through **Articles 85(2)(b) and 174(2)(b)** these Houses can be **dissolved ahead of the scheduled expiry of the term of five years**
- However, **there is no provision for extension of the term** unless a **proclamation of Emergency is in operation.**
- **Bringing the terms of all the Houses to sync** with one another necessarily calls for either **extending the terms of several of the Houses or curtailing of terms or a combination of both**, that too by two to three years in some cases.
- In such a case, simultaneous elections could **not be held within the existing framework of the Constitution.**
- These could be held **together through appropriate amendments to:**
 - **The Constitution,**
 - **The Representation of the People Act 1951, and**
 - **The Rules of Procedure of Lok Sabha and state Assemblies.**
- Since it will affect federal character, **at least 50% of the states will require to ratify the constitutional amendments.**

GOVT NOTIFIES ONE-NATION, ONE-ELECTION PANEL SPECIAL SESSION OF PARLIAMENT

In News:

The Centre named an **eight-member high-level committee** to **“examine and make recommendations for holding simultaneous elections”** to Lok Sabha, state assemblies, municipalities and panchayats.

Analysis of Background:

- The **law ministry** has **formed a high-level committee** to study the proposal of simultaneous elections in the country.
- The committee is headed by **former President Ram Nath Kovind**, including Home Minister **Amit Shah**, Congress Lok Sabha leader **Adhir Ranjan Chowdhury**, former Leader of Opposition in Rajya

Sabha Ghulam Nabi Azad, former Finance Commission Chairman N K Singh, former Lok Sabha Secretary General Subhash C Kashyap, senior advocate Harish Salve, and former Chief Vigilance Commissioner Sanjay Kothari

- Law Minister Arjun Ram Meghwal will attend the committee's meetings as a special invitee.
- The panel would "examine and make recommendations" for holding simultaneous polls to Lok Sabha, assemblies and local bodies, and propose changes in the existing law.
- It is also required to examine if any constitutional amendment is required to be ratified by the states, and analyze and recommend possible solution in a scenario of simultaneous elections emerging out of a hung House, adoption of no-confidence motion, or defection, or any such other event.
- The committee has also been asked to "suggest a framework for synchronisation of elections and specifically, suggest the phases and time frame within which simultaneous elections may be held if they cannot be held in one go.
- Crucially, the committee will also examine the modalities of using "a single electoral roll and electoral identity cards" for voters in elections at all three levels – Lok Sabha, state assemblies and local bodies.
- It will also examine the logistics and manpower required, including EVMs, VVPATs

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It will need at least five constitutional amendments. The articles that would require amending are:

1. **Article 83 (2):** It says the Lok Sabha's term should not exceed five years but it may be dissolved sooner.
2. **Article 85 (2) (B):** A dissolution ends the very life of the existing House and a new House is constituted after general elections.

3. **Article 172 (1):** A state assembly, unless sooner dissolved, shall continue for five years

4. **Article 174 (2) (B)** – The Governor has the power to dissolve the assembly on the aid and advice of the cabinet. He Governor can apply his mind when the advice comes from a Chief Minister whose majority is in doubt.

5. **Article 356** – Imposition of President's Rule in states.

- For a Constitutional Amendment, two-third members of the House must be present for the vote. A consensus of all political parties and state governments is needed.
- After the Constitutional Amendment Bill is passed in parliament, it needs to be ratified by half the states in India through resolutions in their assemblies.
- Even if the Constitution is amended to bring about simultaneous Lok Sabha and state polls, huge resources will be needed. This would include over 25 lakhs Electronic Voting Machines (EVMs) and 25 lakh VVPATs (Voter-Verified Paper Audit Trail) to conduct the polls. For perspective, the Election Commission is scrambling with just over 12 lakh EVMs now.
- A parliamentary standing committee had highlighted that in South Africa, elections to national as well as provincial legislatures are held simultaneously for five years and municipal elections are held two years later.
- In **Sweden**, elections to the national legislature (Riksdag) and provincial legislature/county council (landsting) and local bodies/municipal assemblies (Kommunfullmaktige) are held on a fixed date – the second Sunday in September for four years.
- In the **UK**, the term of parliament is governed by the Fixed-term Parliament Act, 2011

WOMEN'S RESERVATION

In News:

The Union Cabinet cleared the women's Reservation bill, which seeks to reserve 33% of seats in Parliament and legislative Assemblies for women. This legislation has been stuck for 27 years and has seen renewed interest.

Analysis of Background:

- Over the years, the **number of women candidates contesting Lok Sabha elections has increased gradually, from 45 in 1957 to 726 in 2019**. However, the representation of women MPs has not seen a similar increase.
- The Women's Reservation Bill, also known as the Women's Reservation (Amendment) Bill, is a crucial piece of legislation in India aimed at promoting gender equality in political representation. The bill has been introduced in Parliament multiple times since 1996, but it has not yet been passed into law due to various political challenges and opposition.

- The Bill **aims to reserve 33% of seats in Parliament and legislative Assemblies** for women is unlikely to be implemented before the 2024 Lok Sabha elections and is expected to be rolled out after the delimitation process, potentially in 2029.

Features of the proposed bill

Reservation Quota

- **Percentage of Seats:** The proposed bill suggests that 33% of the seats in both the Lok Sabha (the lower house of Parliament) and state legislative assemblies would be reserved specifically for women. This means that one-third of the total seats in these legislative bodies would be set aside for female candidates.
- **Affirmative Action:** The reservation quota is a form of affirmative action aimed at addressing historical gender imbalances in political representation. It seeks to ensure that women have a fair and substantial presence in the decision-making processes of the government. This is crucial for promoting gender equality and empowering women in the political sphere.
- **Constitutional Amendment:** Implementing such a reservation quota would require a constitutional amendment, as it involves altering the composition of elected bodies in India. Constitutional amendments typically require a special majority in both houses of Parliament.

Rotation System

- **Purpose:** The bill also incorporates a rotation system for the reserved seats. Under this system, the reserved seats for women would rotate among different constituencies in successive elections. The goal is to prevent the concentration of reserved seats in specific areas or constituencies and to ensure that women from various regions have the opportunity to participate in the political process.
- **Preventing Monopoly:** The rotation system prevents the creation of a permanent women's quota in specific regions, which could lead to a concentration of women representatives from those areas. Rotating the reserved seats encourages geographic diversity in women's representation.
- **Demographic Diversity:** In addition to geographic diversity, the rotation system also promotes demographic diversity among women representatives. It ensures that women from different communities, backgrounds, and social groups have the chance to represent their constituencies over time.
- **Fairness and Inclusivity:** By avoiding the permanent allocation of seats to specific constituencies, the rotation system promotes fairness and inclusivity in women's political representation. It allows women from a wide range of backgrounds to participate in the political process.

Overall, the combination of the reservation quota and the rotation system in the proposed Women's Reservation Bill aims to not only increase the representation of women in Indian politics but also to ensure that this representation is diverse and equitable across different regions and communities.

Significance of the Women's Reservation Bill

Gender Equality

- **Historical Underrepresentation:** Historically, women have been significantly underrepresented in India's political landscape. This underrepresentation perpetuates gender inequality as it restricts women's ability to influence policies and decisions that affect their lives.
- **Political Empowerment:** The Women's Reservation Bill aims to rectify this historical imbalance by reserving a certain percentage of seats in the Lok Sabha and State Legislative Assemblies for women. This proactive measure ensures that women have a fair opportunity to participate in the highest levels of decision-making in the country, promoting gender equality in politics.
- **Symbolic Importance:** Beyond the practical implications, the bill carries immense symbolic importance. It signifies that Indian society recognizes and values the contributions of women in politics, sending a message that women's voices and perspectives are essential in shaping the nation's future.

Empowerment

- **Access to Political Arena:** The Women's Reservation Bill empowers women by granting them equal access to the political arena. It breaks down traditional barriers and prejudices that may have discouraged women from entering politics in the past, such as social norms and lack of opportunities.
- **Enhancing Political Skills:** As more women enter politics and gain experience, it helps in building their leadership and governance skills. This empowerment extends beyond politics, as women who succeed in the political sphere can become role models for others, inspiring greater participation in various fields.
- **Policy Influence:** Through political participation, women gain the power to influence policies that directly impact their lives and those of their communities. This empowerment translates into tangible changes in areas such as healthcare, education, gender-based violence, and economic opportunities.

Diverse Perspectives

- **Addressing Gender-Specific Issues:** Increased female representation in politics brings attention to gender-specific issues that may have been overlooked in the past. Women often advocate for policies related to maternal health, childcare, gender-based violence, and economic opportunities that directly affect women and families.

- **Enhancing Decision-Making:** Diverse perspectives lead to more comprehensive and balanced decision-making. When women are actively involved in policymaking, the resulting laws and regulations are more likely to consider the needs and interests of the entire population, not just a segment of it.
- **Social and Cultural Change:** Female political leaders can challenge traditional gender roles and norms, inspiring broader social and cultural change. Their presence in politics can help break down stereotypes and create a more inclusive and gender-equal society.

Challenges that have hindered the passage of the Women's Reservation Bill

Political Opposition

- **Concerns about Existing Reservations:** One of the primary challenges facing the Women's Reservation Bill is political opposition from some parties and leaders. They express concerns that the bill may dilute or disrupt existing reservations for marginalized communities, particularly Scheduled Castes (SCs), Scheduled Tribes (STs), and Other Backward Classes (OBCs). These reservations were implemented to address historical social and economic disparities.
- **Conflict of Interests:** Some political leaders worry that implementing the bill's reservation quota for women may result in competition for seats between women candidates and those belonging to marginalized communities. This conflict of interests can create resistance to the bill, as political parties seek to balance these considerations.

Lack of Consensus

- **Varying Party Stances:** Building a consensus among India's diverse political parties has proven to be challenging. Different parties have varying stances on the issue of women's reservation. While some parties are strong advocates of the bill and its goals, others remain opposed or are hesitant about supporting it.
- **Political Calculations:** Political parties often make calculations based on their electoral strategies and voter demographics. The bill's impact on these calculations can lead to political divisions and a lack of consensus on its passage.

Social Norms

- **Patriarchal Norms:** Deep-rooted patriarchal norms and gender biases in Indian society continue to be significant obstacles to women's participation in politics. These norms can manifest in various ways, including the belief that women are less capable of leadership or that politics is a male-dominated domain.

- **Family and Societal Pressures:** Women often face family and societal pressures that discourage them from pursuing a career in politics. Concerns about safety, traditional gender roles, and societal expectations can dissuade women from taking an active role in politics.
- **Violence and Harassment:** The political arena in India is not immune to gender-based violence and harassment. Women politicians and candidates have reported instances of threats, harassment, and violence, which can act as deterrents to their participation.

VISHWAKARMA SCHEME LAUNCHED

In News:

The Prime Minister recently launched the Central Sector Scheme “PM Vishwakarma Scheme” to provide collateral-free loans and skills training to 18 categories of traditional artisans and craftspersons. The scheme has a total outlay of Rs 13,000 crore over five years, spanning until 2027-28.

Analysis of Background:

Key highlights of the scheme

- **Objective:** The PM Vishwakarma Scheme is designed to support traditional artisans and craftsmen by offering them financial assistance, skills training, and toolkits to enhance their craft and livelihoods.
- The Ministry of Micro, Small & Medium Enterprise is the nodal ministry of the PM Vishwakarma Yojana.
- **Components of the Scheme:**
 - **Skills Training:** Beneficiaries will attend a five-day skilling workshop.
 - **Toolkits:** Artisans will receive a voucher of Rs 15,000 to purchase necessary tools for their craft.
 - **Interest-Free Loans:** Artisans can avail themselves of an interest-free loan of Rs 1 lakh, repayable within 18 months. Upon repayment, they qualify for a second loan of Rs 2 lakh at an interest rate of 5 percent.
 - **Subsidy:** Beneficiaries will receive a subsidy of up to 8 percent of the interest amount.
 - **Credit Guarantee:** The scheme offers guarantee-free loans.
- **Financial Assistance Verification:** The verification of beneficiaries will take place at three levels: the gram panchayat, district collector, and state levels.
- **Concessional Interest Rate:** A concessional interest rate of 5 percent will be charged from the beneficiary, with an interest subvention cap of 8 percent paid by the Ministry of Micro Small and Medium Enterprises.
- **Expected Beneficiaries:** The scheme is expected to benefit around 30 lakh families of traditional artisans and craftsmen, including weavers, goldsmiths, blacksmiths, laundry workers, and barbers.

- **Promotion of Local Products:** The Prime Minister emphasized the importance of buying local products, especially those created by artisans supported by the Vishwakarma Scheme.
- **Recognition and Certification:** Beneficiaries will receive a PM Vishwakarma certificate and ID card to recognize their skills and craftsmanship.
- **Guru-Shishya Parampara:** The scheme aims to strengthen and preserve the traditional teacher-pupil tradition or family-based practice of traditional skills among artisans and craftspeople.
- **Inclusivity:** The scheme is designed to benefit Scheduled Castes, Scheduled Tribes, OBCs, women, and people belonging to weaker sections of society.

“SKILL INDIA DIGITAL” PLATFORM

In News:

The Union Minister of Skill Development and Entrepreneurship has launched the Skill India Digital (SID), a comprehensive digital platform that aims to transform India's skills, education, employment and entrepreneurship landscape.

Analysis of Background:

- Skill India Digital (SID) is an all-encompassing digital platform to harmonize and revolutionize India's skills, education, job market, and entrepreneurial environment.
- It serves as India's Digital Public Infrastructure (DPI) for skill development, education, employment, and entrepreneurship.

Features of Skill India Digital (SID)

- **Mission and Objectives:** The primary mission of SID is to provide industry-relevant skill training, employment opportunities, and entrepreneurial support to empower Indians. Its ultimate objective is to enhance the prospects and future opportunities of individuals across the country.
- **Digital Technology Focus:** SID places a significant emphasis on digital technology and Industry 4.0 skills. This focus is in alignment with the latest technological advancements across various industries, ensuring that users acquire cutting-edge skills.
- **G20 Framework:** The platform aligns itself with the G20 framework for establishing Digital Public Infrastructure (DPI) and promoting digital skills and literacy. This alignment reflects international best practices and standards.
- **Information Hub:** SID serves as an extensive information hub, consolidating data on government initiatives related to skill development and entrepreneurship. It acts as the go-to destination for individuals seeking opportunities to enhance their careers and engage in lifelong learning.

- **User-Friendly Design:** The platform is meticulously designed to be user-friendly. Its interface is easy to navigate, and it adapts seamlessly to various devices, ensuring accessibility and a positive user experience.
- **Multilingual Support:** Recognizing the linguistic diversity of India, SID offers support for multiple Indian languages. This inclusivity ensures that individuals from different linguistic backgrounds can access and benefit from the platform.
- **Secure Access:** SID prioritizes security by implementing Aadhaar-based eKYC for access to the platform. This authentication method guarantees secure access, instilling confidence in users.
- **Mobile-First Approach:** SID embraces a mobile-first approach, acknowledging the prevalence of mobile devices. Users can access learning resources and other features from their smartphones and tablets, providing flexibility and convenience in the learning process.
- **Digitally Verified Credentials:** Users can present their skills and qualifications in a secure and tamper-proof digital format through Digitally Verified Credentials. This feature enhances the credibility and trustworthiness of qualifications for employers and institutions.
- **Digital CVs:** SID offers Digital CVs that incorporate personalized QR Codes. These QR Codes simplify the sharing of an individual's skills, experiences, and qualifications, streamlining the job application and recruitment process.
- **Integration of Government Programs:** SID seamlessly integrates government training programs from both Central and State governments. This integration creates a unified platform for accessing a wide range of skill development initiatives, recognizing the active participation of various government entities in enhancing skills across diverse sectors and regions.

Significance of Skill India Digital (SID)

Harnessing India's Demographic Dividend

- SID holds significant importance as it **aims to harness India's demographic dividend**. India has a youthful population, and by providing accessible and innovative skill development opportunities, SID can empower and equip the workforce with the necessary skills to contribute effectively to the nation's growth and development.
- It taps into the potential of the young workforce, enabling them to secure promising futures and livelihoods.

Alignment with Global Trends

- SID's alignment with global trends in advocating for digital public infrastructure (DPI) is pivotal. In an increasingly digital world, the promotion of digital skills and literacy is crucial.

- SID not only caters to India's domestic needs but also positions the nation in line with international standards and practices. This alignment with global trends ensures that individuals are equipped with skills that are relevant not only locally but also on a global scale.

Enhancing Qualification Credibility

- The introduction of Digitally Verified Credentials within SID is a **significant step toward enhancing the credibility of qualifications.**
- In a digital format that is secure and tamper-proof, qualifications become inherently authentic and trustworthy. This is especially valuable for individuals seeking employment or further education, as it eliminates doubts regarding the authenticity of their qualifications.

Streamlining Government Programs

- SID's integration of government training programs from both Central and State governments are a vital aspect of its significance. This integration recognizes the active involvement of various government entities in enhancing skills across different sectors and regions.
- By creating a unified hub for these initiatives, SID streamlines skill development efforts. It facilitates better coordination, resource optimization, and ensures that skill development initiatives reach their intended beneficiaries effectively.

Challenges associated with Skill India Digital (SID)

Equitable Access to Digital Resources and Training

- One of the challenges is to ensure equitable access to digital resources and training for all demographic groups. While SID offers valuable opportunities, it's essential to reach individuals from diverse backgrounds, including those in urban and rural areas, and provide them with equal access to the platform's benefits.
- Bridging the gap in access and opportunities is crucial for promoting inclusive skill development.

Addressing the Digital Divide

- Another significant challenge is addressing the digital divide, particularly in rural and underserved areas. Many regions in India still lack reliable internet connectivity and access to digital devices.
- Ensuring that individuals in these areas can benefit from SID is essential. This may require infrastructure development, digital literacy programs, and innovative solutions to reach remote communities.

Data Security and Privacy

- Maintaining data security and privacy in a digital environment is a paramount concern. As SID collects and stores user data, including personal and educational information, **it must implement robust cybersecurity measures to safeguard this sensitive data.**
- Ensuring compliance with data protection regulations and educating users about data privacy practices are essential components of addressing this challenge.

SECTION 6A OF CITIZENSHIP ACT

In News:

The Supreme Court of India has decided to hear a series of petitions challenging the constitutionality of Section 6A of the Citizenship Act, 1955, starting from October 17.

Analysis of Background:

Key Highlights

- **Section 6A is a special provision that was added to the Citizenship Act in line with the 'Assam Accord,'** a Memorandum of Settlement signed in 1985, between the Union government and leaders of the Assam Movement. This provision was introduced to protect and preserve the Assamese culture, heritage, linguistic identity, and social identity.
 - Under Section 6A of the Citizenship Act, foreigners who had entered Assam before January 1, 1966, and had been "ordinarily resident" in the state were granted all the rights and obligations of Indian citizens. Those who had entered Assam between January 1, 1966, and March 25, 1971, were also granted the same rights and obligations, except that they were not allowed to vote for a period of 10 years.
- The Union government has argued that Section 6A is valid and has urged the court to dismiss the petitions challenging its constitutionality.
- This issue is significant as it relates to the rights and status of individuals who entered Assam during specific periods and their eligibility for Indian citizenship.

The Supreme Court's decision on the matter will have implications for the legal and citizenship status of these individuals and the broader question of preserving cultural and linguistic identities in the region.

JAL JEEVAN MISSION

About the mission:

- Jal Jeevan Mission (JJM) is a flagship program **of the Union Ministry of Jal Shakti, which aims to provide safe and adequate drinking water to every rural household in the country by 2024.**
- The mission was launched by the Prime Minister on 15 August 2019, with a budget of Rs. 3.6 lakh crore.

- The **mission is based on the principle of 'Har Ghar Jal' (water in every home)** and seeks to improve the quality of life and health of rural people.

Background

- India is facing a severe water crisis, with about 163 million people lacking access to safe drinking water, according to a report by WaterAid.
- The country is also **ranked 120th among 122 countries** in the water quality index by the World Health Organization.

Aims

- The mission ensures the continued operation of current water supply infrastructure and water connections, as well as water quality monitoring and testing and sustainable agriculture.
- It also guarantees that conserved water is used in conjunction with drinking water source augmentation, drinking water supply system, grey water treatment, and reuse.

Features

- JJM focuses **on integrated demand and supply-side water management** at the local level.
- Local infrastructure for source sustainability measures, such as rainwater collecting, groundwater recharge, and domestic wastewater management for reuse, is being built in tandem with other government programs/schemes.
- The mission is founded on a community-based approach to water, with substantial information, education, and communication as major components.

Implementation

- **Paani Samitis** is responsible for the planning, implementation, management, operation, and maintenance of village water supply systems.
- These groups include 10-15 members, with at least **50% women** and other members from Self-Help Groups, Accredited Social and Health Workers, Anganwadi teachers, and other organizations.
- The committees develop a one-time village action plan that incorporates all available community resources. Before implementation, the plan is authorized by a Gram Sabha.

Funding pattern

- The Centre and states split funds **90:10 for Himalayan and North-Eastern states, 50:50 for other states, and 100% for Union Territories.**

What has JJM's track record been?

- Currently, over 12.3 crore (62%) of rural households have piped water connections, an increase from 3.2 crore (16.6%) in 2019.
- Gujarat, Telangana, Goa, Haryana, and Punjab, as well as three Union Territories – Andaman and Nicobar Islands, Daman Diu & Dadra Nagar Haveli, and Puducherry – have reported 100% coverage.
- Himachal Pradesh, at 98.87%, and Bihar, at 96.30%, are also on track to reach saturation shortly.

What is Jal Jeevan Mission (Urban)?

- **Jal Jeevan Mission (Urban) was declared in the Budget 2021-22** under the Ministry of Housing and Urban Affairs to ensure universal coverage of water supply to all households through functioning taps in all statutory towns in compliance with SDG-6.
- It supplements the **Jal Jeevan Mission (Rural)**, which aims to provide 55 liters of water per person per day to every rural household by 2024 through Functional Household Tap Connections (FHTC).

Objectives of Jal Jeevan Mission (Urban):

- **Securing tap and sewer connections.**
- **Rejuvenation of water bodies.**
- **Creating a circular water economy.**

E-COURTS PROJECT

In News:

The Union Cabinet has approved a substantial budget of Rs 7,210 crore for Phase III of the e-Courts project. This demonstrated the government's unwavering commitment to continuing and expanding this crucial initiative aimed at modernizing the Indian judiciary.

Analysis of Background:

e-Courts project

- The e-Courts project, which commenced in 2007, is a **pivotal component of the National e-Governance Plan**. Its primary objective is to comprehensively transform and modernize the Indian court system by harnessing the power of digital technology.
 - During Phase II, which was allocated a budget of Rs 1,670 crore, significant technological advancements were made in Indian courts. These advancements proved especially invaluable

during the COVID-19 pandemic, enabling intelligent scheduling of cases, prioritizing cases for hearings, and integrating artificial intelligence into the decision-making processes used by judges.

- **Phase III aspired to achieve the highest level of ease of access** to justice by further advancing digital, online, and paperless court procedures. A significant component of this phase was dedicated to the comprehensive digitization of all court records, including legacy records.
- The Supreme Court of India played a pivotal role in planning and providing strategic direction for the e-Courts project. It also oversaw the implementation of the project to ensure its success. Meanwhile, the Department of Justice (DoJ) took on the responsibility of funding the project, thereby ensuring its continuity and progression.

Key components and features

Case Information System (CIS)

- **Automation of Case Management:** CIS automates the entire lifecycle of a case, from its initial filing to its resolution. This reduces manual paperwork and administrative tasks, making the process more efficient.
- **Real-time Case Information:** Users, including litigants and legal professionals, can access up-to-date information about their cases through the system. This transparency enhances accountability and helps in tracking case progress.
- **Docket Management:** Judges can use CIS to manage their caseload effectively, prioritize hearings, and schedule court proceedings efficiently. This contributes to a more organized and expedited legal process.

e-Filing

- **Online Case Filing:** Lawyers and litigants can submit new cases, documents, and petitions electronically through the e-filing feature. This eliminates the need for physical visits to the court, reducing paperwork and saving time and resources.
- **Document Management:** The system can store and organize electronic documents associated with each case, making it easier to manage and access relevant information.

e-Payments

- **Online Payment Processing:** e-Payments enable court fees, fines, and other charges to be paid electronically. This minimizes the need for in-person transactions, improves financial transparency, and provides a convenient payment option for users.

Video Conferencing

- **Remote Hearings:** Video conferencing technology facilitates remote court proceedings, enabling individuals to participate without the need for physical presence. This is especially beneficial for those in remote or rural areas, as it reduces travel costs and logistical challenges.
- **Recording and Documentation:** Video conferencing systems typically record hearings, ensuring a clear record of proceedings for future reference and legal documentation.

Decision Support Systems

- **Data Analytics:** Decision support systems provide judges with access to relevant data and analytics, helping them make more informed and evidence-based decisions. This can include historical case data, legal precedents, and sentencing guidelines.
- **Efficiency and Fairness:** By assisting judges in their decision-making process, these systems aim to promote consistency, fairness, and efficiency in the judicial system.

Key benefits and significance

Access to Justice

- The e-Courts project plays a crucial role in making justice more accessible to all citizens, regardless of their geographical location. Through features like video conferencing and e-filing, individuals in remote or underserved areas can participate in legal proceedings without the need for extensive travel, saving time and resources.

Reduction of Case Backlog

- By streamlining case management and automating various processes, the project contributes to reducing the backlog of pending cases. Courts can handle cases more efficiently, prioritize hearings, and expedite the resolution of legal matters.

Transparency and Accountability

- Enhanced transparency within the judicial system is a significant benefit of the e-Courts project. Real-time case information, online access to documents, and remote hearings promote transparency, allowing the public to track case progress and understand court decisions. This transparency, in turn, fosters accountability and builds public trust in the legal system.

Efficiency

- The project optimizes the use of resources by reducing the reliance on physical paperwork and in-person transactions. Electronic filing, payments, and document management improve overall court efficiency. Judges can better manage their caseloads, leading to faster and more effective adjudication of cases.

Challenges

Digital Divide

- India's digital divide is a major concern when implementing technology-driven projects like e-Courts. While **urban areas may have better access to technology and the internet, rural and remote regions often lack the necessary infrastructure**. This can lead to unequal access to justice, as people in such areas may face difficulties in accessing online court services.
- Addressing this divide requires investments in expanding internet infrastructure and providing access to affordable devices in rural areas.

Capacity Building

- The successful utilization of ICT tools in the legal system relies on the skill and knowledge of judges, lawyers, and court staff. Training a vast number of individuals across the country is a resource-intensive process.
- It requires not only training programs but also ongoing support and updates as technology evolves. Developing a comprehensive capacity-building program and ensuring its effective implementation is crucial to maximize the benefits of e-Courts.

Cybersecurity

- As sensitive legal data becomes digitized and accessible online, the risk of data breaches and cyberattacks becomes a significant concern. **Courts deal with confidential and personal information, and a breach could have severe consequences, including loss of trust in the legal system.**
- Ensuring robust cybersecurity measures, including encryption, firewalls, regular security audits, and employee training in cybersecurity best practices, is essential to protect against these threats. Additionally, having a clear incident response plan in case of a breach is important to minimize damage.

In News:

The Manipur government has decided to extend the imposition of the Armed Forces (Special Powers) Act (AFSPA) for an additional six months, encompassing the entire state, except for the jurisdiction of 19 police stations located in seven districts within the Imphal Valley.

Analysis of Background:

Key Highlights

- The extension implies that the "disturbed area" status under AFSPA will persist in all the hill districts, which primarily house tribal communities. In contrast, the valley districts have seen a gradual withdrawal of AFSPA provisions since 2022 due to what the government perceives as a "significant improvement" in the security situation there.
- **This move to extend AFSPA has come amidst heightened security concerns in Manipur.** The army had been actively advocating for the reinstatement of AFSPA in the valley districts, contending that its absence had impeded their counter-insurgency operations against various insurgent groups.
 - These insurgent factions, predominantly operating from Myanmar, have been advocating for Manipur's secession from India. The National Investigation Agency (NIA) had initiated a case to probe a transnational conspiracy by these groups to wage war against the government.
- **The state witnessed a surge in ethnic violence between the majority Meitei community and the tribal Kuki people in May.** This conflict resulted in the highest number of civilian casualties in Manipur since 1999, with at least 175 people losing their lives. In response to the escalating security situation, the state government is contemplating a "one district, one force" deployment strategy for security personnel.

WHAT IS ARMED FORCES SPECIAL POWERS ACT?

➤ **Introduced in 1958, AFSPA** confers on members of the armed forces special powers to rein in suspects in areas declared "disturbed" on account of insurgent activities or similar threats. It has been in **force in Manipur since 1980**, and the alleged **excesses committed under it are the reasons** why activist **Irom Sharmila** has been on a **hunger strike since 2000**.

WHAT ARE SPECIAL POWERS?

AFSPA allows any commissioned officer, warrant officer and non-commissioned officer – or any other



person of equivalent rank – to:

➤ Fire upon or use force against any person acting 'in contravention of any law for the time being in force in the disturbed area'

➤ Arrest suspicious people without warrant

➤ Destroy any structure suspected to house an arms dump, shelter from which armed attacks are made or are likely to be made

➤ Conduct searches without warrants for evidence, to recover a wrongfully confined person or property or arms or explosives

➤ **AFSPA bars prosecution or proceedings – except with Centre's nod – against personnel for action committed while exercising powers under the Act**

Armed Forces Special Powers Act (AFSPA)

- The Armed Forces Special Powers Ordinance of 1942 was enacted by the British colonial government on 15 August 1942 to suppress the Quit India Movement.
 - After Independence, the Ordinance was imposed by the Indian government to deal with the internal security situation which emerged due to the Partition of India.
- **Article 355 of the Constitution of India confers power to the Central Government to protect every state from internal disturbance.**
- **Armed Forces Special Powers Act (AFSPA) was enacted by the Parliament in 1958.**
- The Act Provides special powers to the Indian Armed Forces to preserve public order in "disturbed areas". AFSPA is to be enacted only when a state, or part of it, is declared as a 'disturbed area'.
- According to the act, once an area is declared as 'disturbed', it remains under the category for a minimum of 6 months.
- In the late 1960s, it was 1st made applicable to the Naga Hills, then part of Assam.
 - One by one, it expanded to the parts of Assam, Nagaland, Manipur, and Arunachal Pradesh.
- In 1983, the law was extended to Punjab and Chandigarh, but it was withdrawn in 1997.
- In 1990, it was applied to Jammu and Kashmir.

Special Powers under AFSPA: According to the Armed Forces Special Powers Act (AFSPA), in an area that is announced as "disturbed", an officer of the armed forces has powers to:

- **Arrest anyone without a warrant** and may use force if needed for the arrest.
- If a person acts against law or order in the disturbed area, then **army personnel are allowed to Fire after giving a warning or use other kinds of force even if it causes death.**
- Enter and search any area or shelter to make arrests, they also have the power to destroy that area or shelter.
- Power to stop and search any vehicle or vessel.
- **Any person arrested and taken into custody shall be handed over to the officer in charge of the nearest police station.**
- **Army officers have legal immunity for their actions.** There can be no prosecution or any other legal proceeding against anyone acting under that law.
- **The Government's Power to declare an area as a 'disturbed area' is not under judicial review.**

Present Status

- The Act was amended in 1972 and the powers to declare an area as a “disturbed area” were granted to the Central government along with the States.
- **For only Nagaland and Arunachal Pradesh, the Union Home Ministry issues a “disturbed area” notification to extend AFSPA.**
- **The notification for Manipur and Assam is issued by the State governments.**
- Tripura revoked the Act in 2015 and Meghalaya revoked it in 2018.
- Jammu and Kashmir have had a separate Armed Forces (Special Powers) Act 1990.
- In 2016, the Supreme Court of India ended the immunity of the armed forces from prosecution under AFSPA.

Arguments in the support of AFSPA

- Neither the soldiers nor their superiors have any training in civilian law or policing procedures. That is why a special law like AFSPA needed to legitimize the presence and acts of armed forces in extraordinary situations.
- **Repealing the act will encourage insurgency and militancy and also threaten the peace and unity of the nation.**
- The Army needs such powers because the army is only deployed when national security is at serious risk. **“Extraordinary circumstances demand extraordinary measures”.**

Arguments against AFSPA

- The act has been **criticized for human rights** violations in the regions of its enforcement. It provides immunity from human rights abuses and fuels cycles of violence.
- **This law started a Vicious cycle of Violence in the North East:** The use of the AFSPA drives the demand for more autonomy, giving the people of the North East more reason to secede from a state which enacted such powers and these agitations justify the use of the AFSPA from the point of view of the Indian Government.
- The Second Administrative Reforms Commission (ARC) recommended the repeal of the Armed Forces Special Powers Act, 1958. It commented that its **scrapping would remove sentiments of discrimination and alienation among the people of North-East India.**

FIVE EYES

In News:

Canada confirmed that the shared intelligence among 'Five Eyes' partners" led Prime Minister Justin Trudeau to make allegations against India in the killing of Khalistani militant Hardeep Singh Nijjar.

Analysis of Background:

'Five Eyes' – the Intelligence Alliance

- The Five Eyes, **founded in 1941**, is an intelligence alliance comprising nations **including Australia, Canada, New Zealand, the United Kingdom, and the US.**

Origin

- The origins of the FVEY can be traced to **informal secret meetings during World War II between British and American code-breakers**, which started before the US formally entered the war, **followed by the Allies' 1941 Atlantic Charter** that established their vision of the post-war world.

Part of the UK-USA Agreement

- These countries are **parties to the multilateral UK-USA Agreement**, a treaty for joint cooperation in signals intelligence.

Mandate

- These partner nations exchange a wide spectrum of intelligence within one of the world's most tightly-knit multilateral agreements as part of the collaboration.

Features

- The Five Eyes agreement parties are "diverse societies, governed by rule of law and robust human rights and are bonded by a common language.
- These characteristics **aid the partners in sharing information with one another to protect their shared national interests.**

Evolution

- Following its origin, **the agency later enlarged its core group to 'Nine Eyes' and 14 Eyes alliances as well, encompassing more countries as security partners.**
- The 'Nine Eyes' group expands to cover the Netherlands, Denmark, France and Norway, whereas the 14 Eyes bloc further includes Belgium, Italy, Germany, Spain, and Sweden.

AZERBAIJAN LAUNCHES OPERATION AGAINST NAGORNO-KARABAKH AND DEMANDS SURRENDER

In News:

- For the past nine months, Azerbaijan has imposed an effective blockade on the only route into the enclave from Armenia, known as the Lachin Corridor.
- Azerbaijan said it had launched its operation in response to the deaths of six people, including four police officers, in two landmine explosions on Tuesday morning.

Analysis of Background:

Nagorno-Karabakh Region:

- Nagorno-Karabakh is a **mountainous and heavily forested region that under international law is recognised as part of Azerbaijan.**
- **The landlocked mountainous region of Nagorno-Karabakh is the subject of an unresolved territorial dispute between Azerbaijan, in which it lies, and its ethnic Armenian majority, backed by neighbouring Armenia.**
- It is **internationally recognized as part of Azerbaijan** but much of it is governed by the unrecognised Nagorno-Karabakh Republic, also known as the Republic of Artsakh.
- In 1988, towards the end of Soviet rule, fighting between Azerbaijani troops and Armenian secessionists left the de facto independent state in the hands of ethnic Armenians when a truce was signed in 1994.
- Russian peacekeepers have been deployed since 2020 to monitor a new Moscow-brokered ceasefire, and also to ensure safe passage through the so-called “Lachin corridor” – which separates Nagorno-Karabakh from Armenia.
- While Armenia itself has never officially recognised the region’s independence, it has become its main financial and military backer and the breakaway territory functions as a de facto part of Armenia.
- Talks have so far failed to produce a permanent peace agreement. Russia, France and the US co-chair the OSCE’s Minsk Group, which had been attempting to end the dispute but this has been thrown into doubt by Russia’s 2022 invasion of Ukraine, The EU is also seeking to aid a peaceful resolution of the issue.
- However, **ethnic Armenians who constitute the vast majority of the population** there reject Azeri rule (the legal system of Azerbaijan).
- After Azerbaijan’s troops were pushed out of the region following a war in the 1990s, these **ethnic Armenians have been in administrative control of Nagorno-Karabakh, with support from Armenia.**

Strategic Significance:

- The energy-rich Azerbaijan has built several gas and oil pipelines across the Caucasus (the region between the Black Sea and the Caspian Sea) to Turkey and Europe.
- Some of these pipelines pass close to the conflict zone (within 16 km of the border).
- In an open war between the two countries, the pipelines could be targeted, which would impact energy supplies and may even lead to higher oil prices globally.



US PALAU MARITIME AGREEMENT

In News:

- The United States has signed a new agreement with Palau, which gives American ships the authorization to unilaterally enforce maritime regulations in the tiny Pacific Island nation's exclusive economic zone, the U.S. Coast Guard.

Analysis of Background:

Highlights of the Agreement

- The US Coast Guard will have **an expanded right to board vessels in Palau's waters** under a new maritime law enforcement agreement. The Agreement **comes after incursions by Chinese ships into the Pacific Island country's exclusive economic zone.**

Chinese Incursions

- Palau, one of a handful of nations to **recognise Taiwan rather than Beijing and an ally of the US**, has reported at least four unwanted incursions into its remote North Pacific waters by Chinese research vessels since 2018.
- The Palau agreement allows the Coast Guard to enforce regulations in the country's waters without a Palauan officer present.
- In May 2023, a Chinese research vessel, appeared to show interest in Palau's undersea **Fibre Optic Cable** during a days-long foray into the country's exclusive economic zone.
- The **China-US competition for influence in the Pacific** has added to the tensions between the two countries in East Asia and other regions.
- Beijing's influence in the Pacific has **increased over the past two decades through a combination of trade, infrastructure and aid as it seeks to isolate Taiwan diplomatically, gain allies in international institutions** and advance its economic and security interests.
- Thus, the US has recently sought to **reinforce its close relationships with Palau, Micronesia and the Marshall Islands** in the militarily strategic northwestern Pacific as part of a broader effort to respond to China's inroads in the region. It provides **economic assistance to the three countries and has exclusive rights for military access to their territories under compacts of free association.**

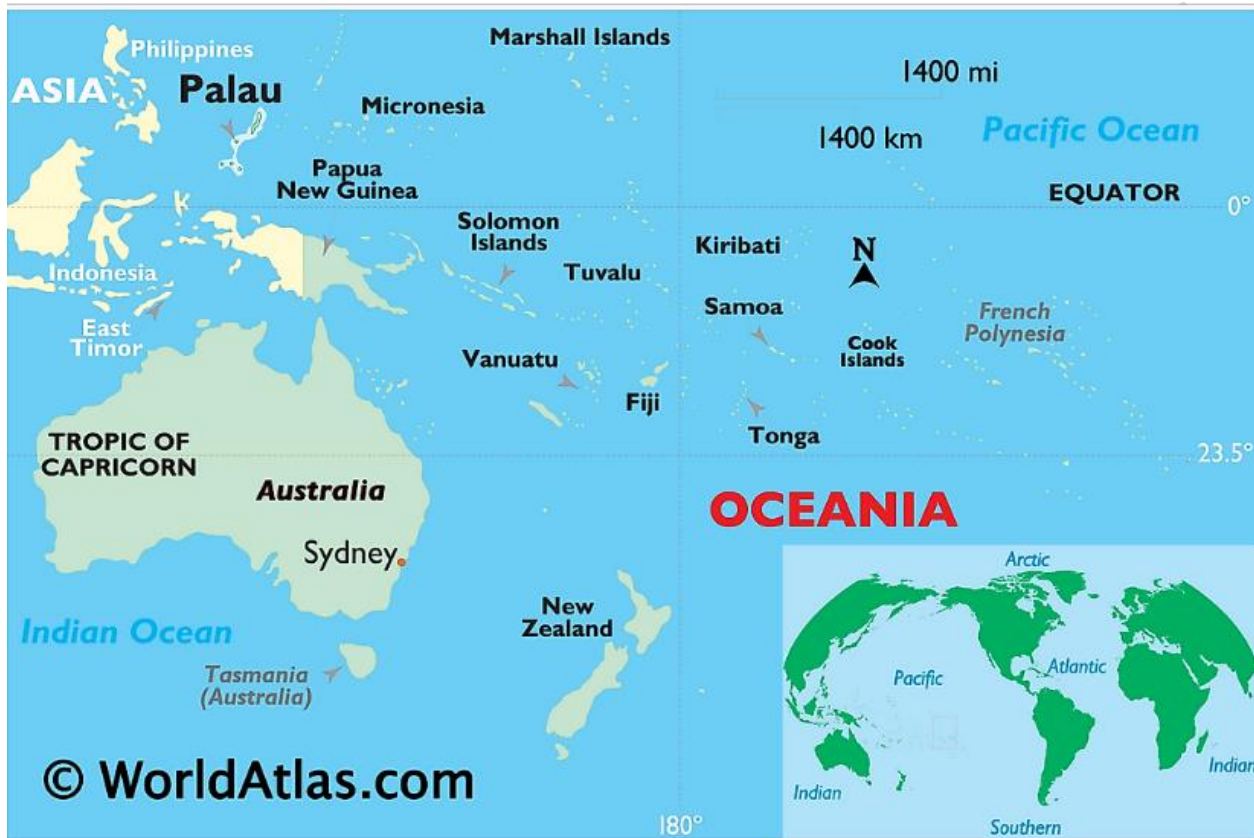
Importance of the Agreement

- The agreement will help Palau monitor its exclusive economic zone, combat illegal fishing and **deter uninvited vessels from conducting questionable manoeuvres within our waters.**
- This agreement **helps Palau monitor our exclusive economic zone, protect against illegal, unreported, and unregulated fishing, and deter uninvited vessels from conducting questionable manoeuvres within our waters.**
- It's these types of partnerships that help us work toward our common goal of peace and prosperity in the region.

Palau

About and Location

- Palau is a Micronesian country of about 340 islands in the Pacific Ocean to the southeast of the Philippines. Other neighbors are Indonesia and Papua New Guinea.
- The islands of Palau constitute the westernmost part of the Caroline Islands chain.



G20 WORKSTREAMS

In News:

The 18th annual G20 Heads of State and Government Summit will take place in Pragati Maidan.

Analysis of Background:

G20

- Established in 1999, the G20, for about a decade worked, at the level of finance ministers and central bank governors only. After the financial and economic crisis of 2008, it became a leaders' forum.
- The summit is essentially the culmination of all the G20 processes and meetings held throughout the year in cities across the host country, among ministers, government officials, and civil society members and organizations.

How is the G20 structured?

- The G20 works in three major tracks — **two of them are official and one is unofficial.**
- The official tracks are the **Finance Track and the Sherpa Track.**
- The unofficial track includes engagement groups or civil society groups.

Finance Track

- The Finance Track is **headed by the finance ministers and central bank governors**, who usually meet four times a year, with two meetings being held on the sidelines of the World Bank and International Monetary Fund (IMF) meetings.
- It mainly **focuses on fiscal and monetary policy issues such as the global economy, infrastructure, financial regulation, financial inclusion, international financial architecture, and international taxation.**
- The Finance Track started as a grouping of finance ministers and central bank governors.
- After 1999, it was the most important track because there was no Sherpa track.
- The track's working groups are the Framework Working Group, International Financial Architecture Working Group, Infrastructure Working Group, Sustainable Finance Working Group, Global Partnership for Financial Inclusion, Joint Finance and Health Task Force, International Taxation Issues, and Financial Sector Issues.

Sherpa Track

- The Sherpa Track was **established after the forum became a leaders' summit in 2008.** It consists of representatives of heads of state, and it focuses on socio-economic issues such as agriculture, anti-corruption, climate, digital economy, education, employment, energy, environment, health, tourism, trade, and investment.
- **Each representative is known as a Sherpa** — it is the metaphor from the mountaineering domain, where the Sherpa is supposed to do the heavy lifting or assist the mountaineer. There are **13 working groups within the Sherpa Track.**
- **They are:** Agriculture Working Group, Anti-corruption Working Group, Culture Working Group, Development Working Group, Digital Economy Working Group, Disaster Risk Reduction Working Group, Education Working Group, Employment Working Group, Energy Transitions Working Group, Environment and Climate Sustainability Working Group, Health Working Group, Tourism Working Group, and Trade and Investment Working Group.

Engagement Groups

- The unofficial track comprises engagement or civil groups. These groups often draft recommendations to the G20 Leaders that contribute to the policy-making process.
- The engagement groups are as follows: **Business20, Civil20, Labour20, Parliament20, Science20, SAI20, Startup20, Think20, Urban20, Women20, and Youth20.**

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

In News:

The **International Atomic Energy Agency (IAEA)** said its experts deployed at the Russia-occupied Zaporizhzhia Nuclear Power Plant reported hearing numerous explosions over the past week, in a possible indication of increased military activity in the region.

Analysis of Background:

International Atomic Energy Agency (IAEA)

About

- The International Atomic Energy Agency (IAEA) is an **intergovernmental organization that seeks to promote the peaceful use of nuclear energy and to inhibit its use for any military purpose, including nuclear weapons.**

Establishment

- It was **established in 1957 as an autonomous organization** within the United Nations system; though **governed by its own founding treaty**, the organization reports to both the General Assembly and the Security Council of the United Nations.

HQ

- It is headquartered at the UN Office at **Vienna, Austria.**

Creation

- The IAEA was created in response to growing international concern toward nuclear weapons, especially amid **rising tensions between the foremost nuclear powers, the United States and the Soviet Union.**

Mandate

- The IAEA serves as an intergovernmental forum for scientific and technical cooperation on the peaceful use of nuclear technology and nuclear power worldwide.
- It maintains several programs that encourage the development of peaceful applications of nuclear energy, science, and technology; provide international safeguards against misuse of nuclear technology and nuclear materials; and promote and implement nuclear safety (including radiation protection) and nuclear security standards.

- The organization also conducts research in nuclear science and provides technical support and training in nuclear technology to countries worldwide, particularly in the developing world.
- Following the ratification of the **Treaty on the Non-Proliferation of Nuclear Weapons in 1968**, all non-nuclear powers are required to negotiate a safeguards agreement with the IAEA, which is given the authority to monitor nuclear programs and to inspect nuclear facilities.

Missions

The IAEA is generally described as having three main missions:

1. **Peaceful uses:** Promoting the peaceful uses of nuclear energy by its member states,
2. **Safeguards:** Implementing safeguards to verify that nuclear energy is not used for military purposes, and
3. **Nuclear safety:** Promoting high standards for nuclear safety.

Membership

- Any member of the UN or of any of the specialized agencies that signed the statute within 90 days after 26 October 1956 thereby became a charter member of the IAEA upon ratification of the statute.
- Other countries, even if not members of the UN or any of the specialized agencies, may be admitted by the General Conference of the IAEA upon recommendation of the Board of Governors.

Functions

- The main functions of the IAEA are to: encourage and assist research, development and practical application of atomic energy for peaceful uses throughout the world; establish and administer safeguards designed to ensure that such activity assisted by the Agency is not used to further any military purpose; apply safeguards to relevant activities at the request of Member States; apply, under the Nuclear Non-Proliferation Treaty (NPT) and other international treaties, mandatory comprehensive safeguards in non-nuclear weapon States (NNWS) Parties to such treaties.
- In carrying out its functions, the Agency conducts its activities in accordance with the purposes and principles of the UN Charter to promote peace and international cooperation, and in conformity with policies of the United Nations for furthering the establishment of worldwide disarmament through safeguards.

Reporting

- The IAEA is an independent international organization that reports annually to the UN General Assembly.

- When necessary, the IAEA will report to the UN Security Council in regard to instances of members' noncompliance of safeguard and security obligations.

Verification

- Under Safeguards Agreements, IAEA inspectors regularly visit nuclear facilities to verify records maintained by State authorities on the whereabouts of nuclear material under their control, to check IAEA-installed instruments and surveillance equipment, and to confirm physical inventories of nuclear material.
- These and other safeguard measures provide independent, international verification that governments are abiding by their commitments to the peaceful use of nuclear technology. A precondition for the implementation of safeguards is a formal safeguards agreement between the Agency and the State.

There are four types of inspections:

1. Ad Hoc (to verify a state's initial nuclear report)
2. Routine (the most common inspections which are performed routinely)
3. Special (supplementary inspections executed in unusual circumstances)
4. Safeguard Visits (inspections to declared facilities to confirm the safeguards design information)

The Additional Protocol is a more intensive, and voluntary, form of safeguarding, which allows for extended inspections with the most advanced technique. As a legal document, the Additional Protocol aims to provide assurances to both declared and undeclared nuclear sites.

Compliance

- In accordance with the Statute and existing practice, the Board is responsible for approving safeguards procedures and Safeguards Agreements, and for general supervision of the Agency's safeguards activities. In a case of non-compliance with a safeguards commitment, the Board of Governors of the IAEA is to call upon the State in question to remedy any outstanding issues; the Board will then decide on its referral to the UN Security Council and General Assembly.

Issues and Challenges

- IAEA mission are growing, but its resources are still limited. Raising funds from the private sector or from public-private partnerships can lead to conflict of interest.
- It has no authority to act on its own; it relies on the willingness of nations to cooperate, or on a UN mandate. Therefore, the agency enjoys only "uneven authority".
- Non-cooperation from NPT non-signatory nuclear powered countries such as North Korea, Israel makes it almost impossible for the agency to monitor nuclear activities.

- Nuclear Suppliers Group (NSG) is a multilateral export control regime that seeks to prevent nuclear proliferation by controlling the export of materials, equipment and technology that can be used to manufacture nuclear weapons. It was founded in response to Indian nuclear test in 1974.
- The **Non-Proliferation Treaty (NPT)** is an international treaty whose objective is to prevent the spread of nuclear weapons and weapons technology, to promote cooperation in the peaceful uses of nuclear energy, and to further the goal of achieving complete nuclear disarmament. India is neither a signatory to NPT nor a member of NSG.
- IAEA has been accused of restricting the transfer of nuclear know-how to developing countries, hindering their social and economic development citing its statute as the reason behind this restriction
- IAEA response to Fukushima nuclear disaster was highly criticised as the agency failed to play a proactive role in nuclear safety after witnessing Chernobyl.

India and IAEA

- India is a founding member of the IAEA.
- Presently, 26 Indian nuclear facilities are under this international nuclear energy watchdog.
- India is actively contributing to the work of IAEA and assisting other countries in developing aspects of nuclear science.
- India signed **the Comprehensive Safeguards Agreement (CSA) and Additional Protocol (AP)** with the IAEA in 2009 to send a strong signal to the international community that it is a “serious and responsible” nuclear weapons state amid its keen to become a member of NSG.
- IAEA can assist India to internationalise its Indigenous technologies developed by the Bhabha Atomic Research Centre, such as Bharat Kavach, a carbon nanotube-based bullet proof jacket, and Bhabhatron, a cobalt therapy machine for treating cancer, to other countries.
- **Comprehensive Safeguards agreement:** IAEA inspectors regularly visit declared nuclear facilities to verify records maintained by State authorities on the whereabouts of nuclear material under their control.
- **Additional Protocol:** It is a more intensive, and voluntary form of safeguarding, which allows for extended inspections with the most advanced technique. This legal document, aims to provide assurances to both declared and undeclared nuclear sites.

EASTERN ECONOMIC FORUM, 2023

In News:

- The **8th Eastern Economic Forum 2023** is taking place between 10–13 September 2023 in Vladivostok.
- The Union Minister of Ports, Shipping & Waterways and Ayush left for Russia to represent India at the Eastern Economic Forum which is being held at the Russian port city of Vladivostok.

Analysis of Background:

Eastern Economic Forum

About

- Eastern Economic Forum is **an international forum held each year in Vladivostok, Russia.**
- The Eastern Economic Forum is a key international platform for **establishing and strengthening ties within the Russian and global investment communities**, and for **comprehensive expert evaluation of the economic potential of the Russian Far East**, the investment opportunities it offers, and business conditions within advanced special economic zones.

Establishment

- The Eastern Economic Forum was **established by decree of the President of the Russian Federation Vladimir Putin in 2015** to support the economic development of Russia's Far East and to expand international cooperation in the Asia-Pacific region.

Sponsors

- The Far East Economic Forum is **sponsored by the organizing committee appointed by Roscongress**, an association of the Russian Government, which also sponsors other international forums, such as St. Petersburg International Economic Forum.

India in the 8th Eastern Economic Forum 2023

- The Union Minister of Ports, Shipping & Waterways and Ayush, Shri Sarbananda Sonowal **left for Russia to represent India at the Eastern Economic Forum.**
- Shri Sonowal will be addressing the **India-Russia Business Dialogue at the Eastern Economic Forum** where he will be highlighting the pivotal role of trade, commerce, and business in fostering stability and sustainability within the special and privileged strategic partnership between India and Russia.
- India's Shipping Minister will also be speaking **at the session on Eastern Maritime Corridor. Aim:** To further strengthen the bilateral relation between the two countries, including exploring possibilities of the Northern Sea Route and establishing a Trans-Shipments Hub in the Bay of Bengal.

Eastern Maritime Corridor [Vladivostok-Chennai Maritime]

- Vladivostok-Chennai Maritime Corridor is a proposed full-fledged sea route of **approximately 5,600 nautical miles between Russia's eastern port city, Vladivostok, and Chennai on the Eastern Indian seaboard.**
- This shipping link **would enable to transfer of cargo between Chennai and Vladivostok in 24 days in comparison to over 40 days** currently taken to transport goods from India to Far East Russia via Europe.
- **Passing through the Sea of Japan, South China Sea, and Strait of Malacca**, the maritime corridor aims to counterbalance China's growing influence in Southeast Asia by posing grave security and economic challenges to their Maritime Silk Road.
- The Eastern Maritime Corridor is **aimed at reducing cargo transit times between our nations.** The journey from Indian ports to the Russian Far East takes just 24 days, compared to 30 days through the port of Novorossiysk.
- This corridor **holds immense potential to unlock new opportunities for trade and cooperation for both India and Russia.**



ECONOMY

INFLATION LEVEL IN INDIA

In News:

In August, India's retail inflation saw a reduction, primarily due to a moderation in food prices, but it remained above the upper limit of the central bank's target range for the second consecutive month. The annual retail inflation rate for August stood at 6.83%, a decrease from July's 7.44%, which was a 15-month high.

Analysis of Background:

Key Highlights

- **Food inflation, which constitutes nearly half of the overall consumer price basket**, increased by 9.94% in August, down from the 11.51% recorded in July. Economists noted that this slight relief in consumer price inflation was primarily due to lower vegetable prices and some moderation in clothing and footwear, housing, and miscellaneous items.
- Food prices have been a significant **concern for policymakers due to erratic weather conditions affecting the production of vegetables, milk, and cereals**. Inflation has exceeded the central bank's target band of 2%-6% for seven months out of the past 12.
- In an attempt to control domestic inflation, the Indian government imposed various restrictions, including banning exports of non-basmati white rice, imposing a 20% duty on parboiled rice exports, and implementing a 40% tax on onion exports. Wheat exports have been banned since the previous year.
- Crude oil prices have also been on the rise, with Brent crude surpassing \$90 per barrel for the first time in 10 months. Additionally, India has reduced the prices of cooking gas cylinders for 330 million households and is considering extending its free food program beyond December.
- **Core inflation, which excludes volatile food and energy prices**, was estimated to range between 4.6% and 4.9%, according to three economists, though the Indian government does not officially release core inflation figures.

Inflation

Meaning and Types of Inflation

- Inflation is the rate at which the general price level of goods and services rises, leading to a decrease in the purchasing power of a country's currency. In India, as in most countries, inflation is measured using the Consumer Price Index (CPI) and the Wholesale Price Index (WPI).

Demand-Pull Inflation

- **Cause:** This type of inflation is driven by increased demand for goods and services within an economy. When demand rises rapidly and exceeds the available supply, it leads to upward pressure on prices.
- **Example:** During a period of economic growth, consumers may have more disposable income, leading to higher spending. If businesses cannot quickly expand production to meet this increased demand, they may raise prices.
- **Effect:** Demand-pull inflation is typically associated with economic expansion and can be a sign of a healthy economy. However, if it becomes too rapid, it can erode purchasing power and create uncertainty.

Cost-Push Inflation

- **Cause:** Cost-push inflation occurs when production costs rise, compelling producers to increase prices. This can be due to various factors, including higher labour wages, increased costs of raw materials, or supply chain disruptions.
- **Example:** An increase in the minimum wage can lead to higher labour costs for businesses. They may respond by raising prices on their products to maintain profit margins.
- **Effect:** Cost-push inflation can be challenging for consumers and businesses. It can reduce real incomes and profitability, potentially leading to reduced economic growth.

Structural Inflation

- **Cause:** Structural inflation is a long-term phenomenon rooted in structural issues within an economy. These issues may include labour market inefficiencies, inadequate infrastructure, or regulatory constraints that hinder the efficient functioning of markets.
- **Example:** In an economy with rigid labour laws that make it difficult to hire and fire workers, there may be persistently high labour costs, leading to higher prices for goods and services.
- **Effect:** Structural inflation is more challenging to address as it requires fundamental changes to an economy's structure. It can lead to reduced competitiveness and hinder economic growth.

Built-In Inflation (Wage-Price Inflation)

- **Cause:** Built-in inflation is a self-reinforcing cycle where inflation expectations become embedded in the behaviour of both businesses and workers. Workers demand higher wages to keep up with expected price increases, and businesses raise prices to cover increased labour costs.

- **Example:** If workers anticipate annual inflation of 5%, they may negotiate for a 5% wage increase. In response, businesses raise prices by 5% to cover the higher labour costs, creating a cycle of inflation.
- **Effect:** Built-in inflation can be difficult to break because it becomes a self-fulfilling prophecy. It can lead to a persistent and high inflationary environment if not addressed.

Factors contribute to inflation in India

Food Price Volatility

- India's economy is heavily dependent on agriculture, and fluctuations in agricultural production can directly impact food prices. Factors like monsoon variability, droughts, floods, and crop diseases can lead to supply shocks, causing food prices to rise.
- Inefficiencies in the supply chain, such as waste during transportation and storage, also contribute to food price volatility.

Supply Chain Disruptions

- Events like the COVID-19 pandemic highlighted the vulnerabilities in India's supply chain. Lockdowns and disruptions in transportation and logistics disrupted the flow of goods, leading to shortages and price spikes. Addressing supply chain inefficiencies is crucial to stabilizing prices.

Global Commodity Prices

- India is a net importer of commodities like crude oil, metals, and edible oils. Changes in global prices of these commodities, influenced by factors like geopolitical tensions and international demand, can affect India's inflation rate.
- A rise in global commodity prices often translates into higher costs for Indian consumers.

Monetary Policy

- The Reserve Bank of India (RBI) plays a significant role in controlling inflation through its monetary policy tools.
- When the RBI adopts an expansionary monetary policy, like reducing interest rates or increasing money supply, it can stimulate aggregate demand in the economy. While this can spur economic growth, it may also lead to demand-pull inflation if production capacity cannot keep pace with increased demand.

Fiscal Policy

- When the government engages in excessive spending, particularly if it's financed by borrowing, it can lead to an increase in the money supply. This **excess money in circulation can drive up demand for goods and services, potentially causing demand-pull inflation.**
- Maintaining prudent fiscal policies is crucial to avoid inflationary pressures stemming from government expenditure.

Exchange Rates

- Fluctuations in the exchange rate can significantly impact inflation in India, especially for a country that relies on imports for critical commodities like oil.
- A depreciation of the Indian rupee can make imported goods more expensive, contributing to imported inflation. This effect can be mitigated through effective management of exchange rates and foreign exchange reserves.

Wage Price Spiral

- When wages in certain sectors of the economy increase rapidly, it can lead to higher production costs. These increased costs are often passed on to consumers in the form of higher prices for goods and services. This wage-price spiral can contribute to inflation, particularly if it becomes a self-reinforcing cycle.

Inflation Expectations

- People's expectations about future inflation can indeed influence their economic behaviour. If individuals and businesses anticipate that prices will rise significantly in the future, they may demand higher wages and increase prices of goods and services in anticipation. These actions can become self-fulfilling and contribute to inflationary pressures.
- Managing inflation expectations is a key aspect of central bank communication and policy.

Inflation has several implications for an economy

Reduced Purchasing Power

- Inflation reduces the purchasing power of a currency, which means that consumers can buy fewer goods and services with the same amount of money. This can lead to a decrease in the standard of living for individuals on fixed incomes or with limited wage growth.
- It also affects consumers' ability to afford essential items, which can impact their overall well-being.

Uncertainty

- High and unpredictable inflation can create uncertainty in financial markets and investment decisions. When inflation is volatile or significantly higher than expected, it becomes challenging for businesses and investors to make long-term plans.
- This uncertainty can hinder economic growth as it may lead to delayed investments and decreased consumer spending.

Income Redistribution

- Inflation can lead to a redistribution of income within an economy. **Borrowers tend to benefit from inflation because the real value of their debt decreases over time.**
- On the other hand, lenders, especially those holding fixed-interest loans, can lose purchasing power as the real value of the money they are repaid diminishes. This can affect financial stability and wealth distribution within the society.

Impact on Savings and Investments

- Inflation erodes the real returns on savings and investments. When the nominal interest rate on savings or investments is lower than the inflation rate, the real (inflation-adjusted) returns become negative. This discourages people from saving and investing, which can have long-term economic consequences.
- It's especially problematic for retirees and individuals saving for retirement, as their savings may not keep up with the rising cost of living.

Steps Taken to Address Inflation

Monetary Policy

- The Reserve Bank of India (RBI) plays a central role in controlling inflation through its monetary policy tools. It uses mechanisms such as interest rates, reserve requirements, and open market operations to influence the money supply and interest rates in the economy. By adjusting these tools, the **RBI aims to strike a balance between controlling inflation and promoting economic growth.**
- If inflation is rising, the RBI may raise interest rates to curb excessive demand and reduce inflationary pressures.

Food Price Controls

- Given the significant impact of food prices on overall inflation in India, the government often intervenes in food markets to stabilize prices. This intervention can take the form of price controls, subsidies on essential food items, and maintaining buffer stocks of food grains.

- Price controls can prevent sudden spikes in food prices, which can be particularly beneficial for low-income households.

Supply-Side Reforms

- Improving the agricultural sector and addressing supply chain inefficiencies are essential for controlling inflation in India. The government has initiated structural reforms aimed at modernizing agriculture, reducing post-harvest losses, and enhancing supply chain efficiency.
- These reforms can help ensure a consistent and stable supply of essential goods, reducing the volatility in prices caused by supply disruptions.

Challenges in managing inflation

Supply Chain Disruptions

- Supply chain disruptions, such as those experienced during the COVID-19 pandemic, can have a substantial impact on inflation. When the flow of goods and services is disrupted, it can lead to shortages and price spikes.
- India's vast and complex supply chains can be vulnerable to various disruptions, including natural disasters, transportation bottlenecks, and logistical challenges. Addressing these vulnerabilities is crucial to maintaining price stability.

Structural Issues

- India grapples with long-term structural issues in various sectors, including agriculture, labour markets, and infrastructure. These issues can contribute to supply-side constraints and inefficiencies, making it difficult to meet rising demand for goods and services without causing inflationary pressures.
- Implementing and sustaining policy reforms in these areas is essential to address the root causes of inflation.

Global Factors

- India's reliance on imports for critical commodities like oil makes it vulnerable to global price fluctuations. Geopolitical tensions, changes in international demand, and supply disruptions in global markets can lead to significant price volatility.
- Developing strategies to mitigate the impact of global factors on domestic inflation is a challenge for Indian policymakers.

Balancing Act

- Balancing the objectives of controlling inflation and supporting economic growth is a perennial challenge for policymakers. Tightening monetary policy to curb inflation can slow down economic growth, while overly expansionary policies can fuel inflation. Achieving the right balance requires careful consideration of both short-term and long-term economic goals.

PUBLIC DEBT

In News:

Government's total gross debt increased by 2.2 per cent quarter on quarter to ₹159.53 lakh crore in April-June this fiscal, a Finance Ministry report said. The liabilities stood at ₹156.08 lakh crore at March end.

Analysis of Background:

- Since Apr-June (Q1) 2010-11, Public Debt Management Cell (PDMC), Budget Division, Department of Economic Affairs, Ministry of Finance has been bringing out a quarterly report on debt management on a regular basis. The current report pertains to the quarter April-June (Q1 FY24).
- During Q1 of FY24, the Central Government on issuance/settlement basis of dated securities raised gross amount worth ₹4,08,000 crore and ₹2,71,415 crore after adjusting for switches. The **weighted average yield (WAY)** of issuances during the quarter stood at 7.13% and it was 7.34% for Q4 FY23. The **weighted average maturity (WAM)** of the issuances worked out to 17.58 years for Q1 FY24 and 16.58 for Q4 FY23. The gross amount raised through 91-day, 182-day and 364-day Treasury Bills during the quarter amounted to ₹4,96,266 crore while total repayments were ₹3,07,278 crore. During April-June 2023, the cash position of the Central Government remained in surplus mostly.
- Total gross liabilities (including liabilities under the 'Public Account') of the Government, as per provisional data, increased marginally to ₹1,59,53,703 crore at end-June 2023 from ₹1,56,08,634 crore at end-March 2023. This represented a quarter-on-quarter increase of 2.2 per cent in Q1 FY24. Further, nearly 26.6 per cent of the outstanding dated securities had a residual maturity of less than 5 years.
- The yield on the 10-year benchmark security softened from 7.31% at the close of the quarter on March 31st, 2023 to 7.12% at the close on June 30th, 2023, thus softening by 19 bps during the quarter.
- In secondary market, trading activities were concentrated in 7–10-year maturity bucket during the quarter mainly because of more trading observed in 10-year benchmark security. Private sector banks emerged as dominant trading segment in secondary market during the quarter under review with a share of 22.59 per cent in "Buy" deals and 25.00 per cent in "Sell" deals in the total outright trading activity, followed by foreign banks, public sector banks, primary dealers, and mutual fund. On a net basis, foreign banks, insurance companies, private sector banks and primary dealers were net sellers while public sector banks, co-operative banks, FIs, mutual funds and 'Others' were net buyers in the secondary market.

What is Public Debt?

- In the Indian context, public debt includes the total liabilities of the Union government that have to be paid from the Consolidated Fund of India.
 - Sometimes, the term is also used to refer to the overall liabilities of the central and state governments.
 - However, the Union government clearly distinguishes its debt liabilities from those of the states.
 - It calls overall liabilities of both the Union government and states as General Government Debt (GGD) or Consolidated General Government Debt.
 - Union government relies heavily on market borrowing to meet its operational and developmental expenditure. The study of public debt involves the study of various factors such as debt-to-GDP ratio, and sustainability and sources of government debt.
 - The fact that almost a fourth of the government expenditure goes into interest payment explains the magnitude of the liabilities of the Union government.

What are the types of Public Debt?

- The Union government broadly classifies its liabilities into two broad categories.
- The debt contracted **against the Consolidated Fund of India** is defined as public debt and includes all other funds received outside Consolidated Fund of India under Article 266 (2) of the Constitution, where the government merely acts as a banker or custodian.
- The second type of liabilities is called **public account**.

Internal Public Debt versus External Public Debt

- Over the years, the Union government has followed a considered strategy to reduce its dependence on foreign loans in its overall loan mix.
- **External loans** are not market loans. They have been raised from institutional creditors at concessional rates. Most of these external loans are fixed-rate loans, free from interest rate or currency volatility.
- **Internal debt** constitutes more than 93% of the overall public debt.
 - Internal loans that make up for the bulk of public debt are further divided into two broad categories – marketable and non-marketable debt.
 - Dated government securities (G-Secs) and treasury bills (T-bills) are issued through auctions and fall in the category of **marketable debt**.
 - Intermediate treasury bills (with a maturity period of 14 days) issued to state governments and public sector banks, special securities issued to National Small Savings Fund (NSSF) are classified as **non-marketable debt**.

Sources of Public Debt

- Dated government securities or G-secs.
- Treasury Bills or T-bills
- External Assistance
- Short term borrowings
- Public Debt definition by Union Government

The Union government describes those of its liabilities as public debt, which are contracted against the Consolidated Fund of India. This is as per Article 292 of the Constitution.

Public Debt Management in India

- As per Reserve Bank of India Act of 1934, the Reserve Bank is both the banker and public debt manager for the Union government.
- The RBI handles all the money, remittances, foreign exchange and banking transactions on behalf of the Government.
- The Union government also deposits its cash balance with the RBI.

Public Debt versus Private Debt

- Public Debt is the money owed by the Union government, while private debt comprises of all the loans raised by private companies, corporate sector and individuals such as home loans, auto loans, personal loans.

What is Debt-to-GDP ratio?

- The debt-to-GDP ratio indicates how likely the country can pay off its debt. Investors often look at the debt-to-GDP metric to assess the government's ability of finance its debt. Higher debt-to-GDP ratios have fuelled economic crises worldwide.
- The NK Singh Committee on FRBM had envisaged a debt-to-GDP ratio of 40 per cent for the central government and 20 per cent for states aiming for a total of 60 per cent general government debt-to-GDP.

Suggested measures to make public debt sustainable –

- Privatisation of loss-making PSUs
- Prudential stance as per the Fiscal Responsibility Budget Management (FRBM) Act 2003
- Leveraging of Public Financial Management System (PFMS)
- PPP model in social schemes
- Investment in infrastructure
- Harmonisation of tax regime
- Thrust on renewable energy

REGIONAL RURAL BANKS (RRBs)

In News:

The Union Finance Minister underscored the significance of enhancing the digital capabilities of Regional Rural Banks (RRBs) and expanding their outreach through the Pradhan Mantri Mudra Yojana.

Analysis of Background:

During a review meeting, the Finance Minister emphasized on:

- All sponsor banks have initiated steps to introduce customer-oriented banking services in RRBs. The Finance Minister stressed the need for RRBs to enhance their digital capabilities to provide efficient and modern banking services to their customers. The aim is to ensure that RRBs adopt digital onboarding capability by November 1.
- She urged **RRBs to focus on increasing their penetration in rural areas, especially by facilitating financial inclusion schemes**. The Ministry of Micro, Small, and Medium Enterprises (MSME) has identified cluster areas where RRBs should establish rural branches to serve local communities effectively.
- The finance minister called for RRBs to play a role in supporting the agricultural sector. She emphasized the need to provide storage facilities for apple growers in Jammu & Kashmir and Himachal Pradesh, which can enhance the income and livelihoods of farmers in these regions.
- She stressed the **importance of developing a roadmap for completing designated activities within a specific timeframe**. This approach ensures that the planned initiatives are implemented efficiently and in a timely manner, contributing to the overall growth of RRBs and rural economies.

Regional Rural Banks (RRBs)

About

- Regional Rural Banks (RRBs) are scheduled commercial banks in India that operate at the regional level. They were **established under the Regional Rural Banks Act 1976** to provide banking and financial services to the rural and semi-urban areas of the country.
- They were conceptualized **to bridge the gap in rural credit availability, enhance financial inclusion, and promote rural development**. RRBs were introduced as a result of the **recommendations made by the Narasimham Committee** in 1975.
- The Reserve Bank of India (RBI) and the NABARD (National Bank for Agricultural and Rural Development) are the two prime regulators of the RRBs.

Features of RRBs

Ownership Structure

- RRBs are government-owned scheduled commercial banks that function at the regional level within different states and union territories of India. The ownership structure involves various stakeholders.
- The **Government of India holds a 50% stake** in RRBs, reflecting its commitment to promoting financial inclusion and rural development.
- Sponsor nationalized banks or public sector banks contribute to RRBs as sponsors, **holding a 35% stake**. Sponsor banks provide financial support and expertise.
- **State governments have a 15% stake** in RRBs, reflecting their involvement and interest in the development of rural areas.

Area of Operation

- RRBs primarily operate in rural and semi-urban regions. They have a strategic focus on providing banking and financial services to rural communities, agricultural activities, and small businesses.

Financial Services

- RRBs offer a diverse range of banking and financial services tailored to the needs of rural customers.
- RRBs provide various types of loans, such as agricultural loans, rural housing loans, and loans for small businesses.
- They offer savings accounts to encourage savings habits among rural individuals and households.
- RRBs facilitate the transfer of funds and remittances, making it easier for people in rural areas to access and manage their finances.

Share Capital

- The share capital of RRBs is contributed by multiple entities according to a predetermined ratio. This includes contributions from the Central Government, State Government, and the sponsor bank. This capital infusion strengthens the financial foundation of RRBs.

Management

- RRBs are governed by a Board of Directors responsible for overseeing the bank's operations and decisions. The board composition typically includes representatives from various stakeholders, such as the Central Government, State Government, sponsor bank, and other relevant parties.

Priority Sector Lending

- **RRBs are mandated to allocate a significant portion of their lending to priority sectors**, which include agriculture, small-scale industries, weaker sections of society, and other sectors that are crucial for rural development. This emphasis ensures that the bank's resources are directed towards areas that have a significant impact on rural economies

Financial Inclusion

- One of the primary missions of RRBs is to **promote financial inclusion in rural and underserved areas**. They bridge the gap between traditional banking services and remote regions, enabling people to access formal financial services and products. This, in turn, contributes to economic growth and development in these regions.
RRBs play a vital role in supporting rural economies, providing access to credit, encouraging savings, and fostering economic development in India's rural areas.

Significance of RRBs

Rural Development

- **Credit Facilities:** RRBs play a pivotal role in rural development by providing credit facilities to various segments of the rural population. This credit is extended to farmers, artisans, small entrepreneurs, and other individuals engaged in rural economic activities.
- **Economic Growth:** The availability of credit from RRBs stimulates economic growth in rural areas. Farmers can invest in modern agricultural practices, and purchase better seeds, fertilizers, and machinery, which can lead to increased agricultural productivity and higher incomes.
- **Infrastructure Development:** RRBs also support infrastructure development in rural regions. Funds disbursed for rural businesses and projects can contribute to the construction of roads, storage facilities, and irrigation systems, further enhancing the economic landscape of these areas.

Financial Inclusion

- **Reaching Marginalized Communities:** RRBs are instrumental in extending banking services to remote and marginalized communities that are often excluded from the formal financial system. This includes tribal areas, remote villages, and geographically challenging terrains.

- **Basic Banking Services:** RRBs facilitate the opening of savings accounts, provision of affordable loans, and access to other financial services for individuals who were previously unbanked. This empowers them with financial tools to save, invest, and protect their earnings.
- **Government Schemes:** RRBs actively participate in government-sponsored financial inclusion initiatives, such as the Pradhan Mantri Jan Dhan Yojana (PMJDY), which aims to ensure that every household in India has access to a bank account.

Employment Generation

- **Supporting Rural Businesses:** RRBs provide financial assistance to small-scale rural entrepreneurs, helping them establish or expand their businesses. This, in turn, generates employment opportunities within rural communities.
- **Micro and Small Enterprises:** RRBs often focus on financing micro and small enterprises (MSEs) in rural areas. These enterprises are significant contributors to rural employment, and RRBs' support helps them flourish.

Agricultural Growth

- **Credit for Farming:** RRBs are a vital source of credit for farmers, enabling them to invest in agricultural activities. Farmers can use these funds to purchase seeds, fertilizers, pesticides, and modern farming equipment.
- **Increased Productivity:** Access to credit from RRBs can lead to increased agricultural productivity. Farmers can adopt advanced farming techniques, switch to high-yield crop varieties, and implement better irrigation practices, all of which contribute to higher crop yields.
- **Food Security:** As agricultural productivity improves, it leads to enhanced food security for the nation. RRBs, by supporting agricultural growth, play an essential role in ensuring a steady food supply.

Reducing Dependence

- **Mitigating Exploitation:** RRBs help reduce the dependence of rural borrowers on informal moneylenders who often charge exorbitant interest rates. Access to affordable credit from RRBs provides an alternative to vulnerable rural populations, protecting them from exploitation.
- **Financial Empowerment:** By offering accessible and reasonably priced credit options, RRBs empower rural individuals and communities to make informed financial decisions and break free from the cycle of indebtedness.

Challenges faced by RRBs

Capital Constraints

- **Limited Capital Base:** RRBs typically have a limited capital base, which constrains their lending capacity. With insufficient capital, they may be unable to meet the credit needs of the rural population effectively.
- **Dependence on Government and Sponsoring Banks:** RRBs heavily rely on the government and sponsoring banks for capital infusion. Delays or inadequacies in the capital injection can hinder their growth and operational capabilities.
- **Impact on Expansion:** Inadequate capital can limit RRBs' ability to expand their branch network, offer new financial products, and diversify their services, which are crucial for their sustainability and outreach.

Technological Upgradation

- **Limited Technological Infrastructure:** Many RRBs struggle with outdated or inadequate technological infrastructure. This hampers their ability to offer modern banking services, such as online banking, mobile banking, and digital payments.
- **Customer Service:** Technological deficiencies can lead to subpar customer service, affecting the overall banking experience for rural customers who may increasingly expect digital and convenient banking options.
- **Operational Efficiency:** Manual processes and outdated technology can result in inefficiencies, longer processing times, and higher operational costs for RRBs.

Credit Quality

- **Rural Credit Risk:** Lending to rural customers, especially in agriculture, involves unique risks related to weather, crop yield, and market fluctuations. RRBs must carefully assess these risks to maintain a healthy loan portfolio.
- **Loan Recovery:** Due to the nature of rural lending, RRBs may face challenges in recovering loans, particularly from distressed farmers or small entrepreneurs facing financial difficulties.
- **Non-Performing Assets (NPAs):** The accumulation of NPAs can erode the financial health of RRBs. Managing and reducing NPAs is a constant challenge that requires effective credit risk assessment and monitoring.

Competition

- **Competing Financial Institutions:** RRBs face competition not only from other RRBs but also from commercial banks, cooperative banks, and microfinance institutions (MFIs) operating in rural areas. This competition can impact their market share and growth prospects.
- **Customer Attraction:** RRBs must actively compete for customers, offering competitive interest rates, innovative financial products, and excellent customer service to retain and attract clients.
- **Strategic Positioning:** In the evolving financial landscape, RRBs must strategically position themselves to meet the changing needs and preferences of rural customers while differentiating themselves from competitors.

MS SWAMINATHAN

In News:

M. S. Swaminathan passed away on September 28, 2023, at the age of 98 at his residence in Chennai. His contributions to Indian agriculture and his commitment to improving the lives of farmers will be remembered for generations to come.

Analysis of Background:

Key Highlights

- S. Swaminathan was born in 1925, in Tamil Nadu, India. He completed his education in agricultural science, earning a Bachelor's degree from the University of Madras and later obtaining a Ph.D. in Genetics from the University of Cambridge.
- Swaminathan is often referred to as the "**Father of India's Green Revolution**" for his groundbreaking work in agricultural research and development. He played a crucial role in the development of high-yielding varieties of rice and wheat, which helped transform India from a food-deficit nation to a self-sufficient one.
- **Key Roles in Agricultural Research:** Throughout his career, Swaminathan held various significant positions in agricultural research and policy-making, including Director of the Indian Agricultural Research Institute, Director General of the Indian Council of Agricultural Research (ICAR), and Secretary to the Government of India, Department of Agricultural Research and Education.
- **Scientific Contributions:**
 - Swaminathan made significant contributions to the understanding of potato genetics and the development of frost-resistant potato varieties.
 - He conducted research on the cytogenetics of hexaploid wheat, contributing to the development of high-yielding wheat varieties.

- He played a role in efforts to grow rice with C4 carbon fixation capabilities, which would improve photosynthesis and water usage.
- Swaminathan's work on radiation botany included the study of mutagens and the effects of radiation on plant responsiveness to fertilizers.
- **National Commission on Farmers:** In 2004, he was appointed as the chair of the National Commission on Farmers, which aimed to address farmer distress and improve the agricultural sector. The commission's recommendations, including the proposal for a Minimum Support Price (MSP) at least 50% higher than production costs, had a significant impact on Indian agriculture.
- **Awards and Recognitions:** Swaminathan received numerous awards and honours for his contributions to agriculture and science. Notably, he was awarded the first World Food Prize in 1987 and received the Padma Shri, Padma Bhushan, and Padma Vibhushan, among other accolades.
- **MS Swaminathan Research Foundation:** Following his World Food Prize win, Swaminathan established the MS Swaminathan Research Foundation (MSSRF) in Taramani, Chennai, to continue his work in agricultural research and sustainable development.

GLOBAL INNOVATION INDEX 2023

In News:

India's 40th rank in the Global Innovation Index (GII) 2023 reflects the country's continuous progress in the field of innovation. Over the years, India has steadily climbed the GI rankings, moving from 81st place in 2015 to 40th place in 2023.

Analysis of Background:

- The GI is an important tool for governments worldwide to gauge their countries' innovation-driven social and economic changes. It serves as a policy instrument, helping governments assess and reflect on their current innovation status.
- India's retention of the 40th rank out of 132 economies in the Global Innovation Index (GI) for 2023 is a noteworthy achievement. This ranking indicates India's continued progress in the field of innovation and highlights its commitment to fostering a culture of innovation and entrepreneurship.

This improvement can be attributed to several key factors:

- **Knowledge Capital:** India's strong emphasis on education and research has led to a well-educated workforce, which is a crucial foundation for innovation. The availability of skilled professionals contributes significantly to the country's innovative capabilities.

- **Vibrant Start-up Ecosystem:** India's thriving start-up ecosystem has been instrumental in driving innovation. Start-ups often bring fresh and disruptive ideas to the market, and their contributions to various industries have enhanced India's innovation profile.
- **Research Organizations:** Both public and private research organizations have played a pivotal role in fostering innovation. Government departments such as the Department of Science and Technology, Department of Biotechnology, Department of Space, and Department of Atomic Energy have supported research and innovation initiatives across various sectors.
- **Government Initiatives:** Government departments and ministries have actively participated in promoting innovation through various policies and programs. Their support and funding have enabled innovative projects and research in areas like electronics, telecommunications, agriculture, and healthcare.
- **Atal Innovation Mission:** The Atal Innovation Mission has been a driving force in nurturing innovative ideas and projects, particularly among students and young entrepreneurs. It has created a platform for innovation and entrepreneurship to flourish.
- **NITI Aayog's Efforts:** NITI Aayog's role in promoting policy-led innovation in critical sectors like electric vehicles, biotechnology, nanotechnology, space, and alternative energy sources is noteworthy. Their efforts in expanding innovation ecosystems to different regions of India have had a positive impact.
- **Monitoring and Evaluation:** Continuous monitoring and evaluation of India's position in global innovation rankings, such as the Global Innovation Index (GII), are essential for tracking progress and identifying areas for improvement. NITI Aayog's involvement in this process reflects a commitment to enhancing India's innovation capabilities.

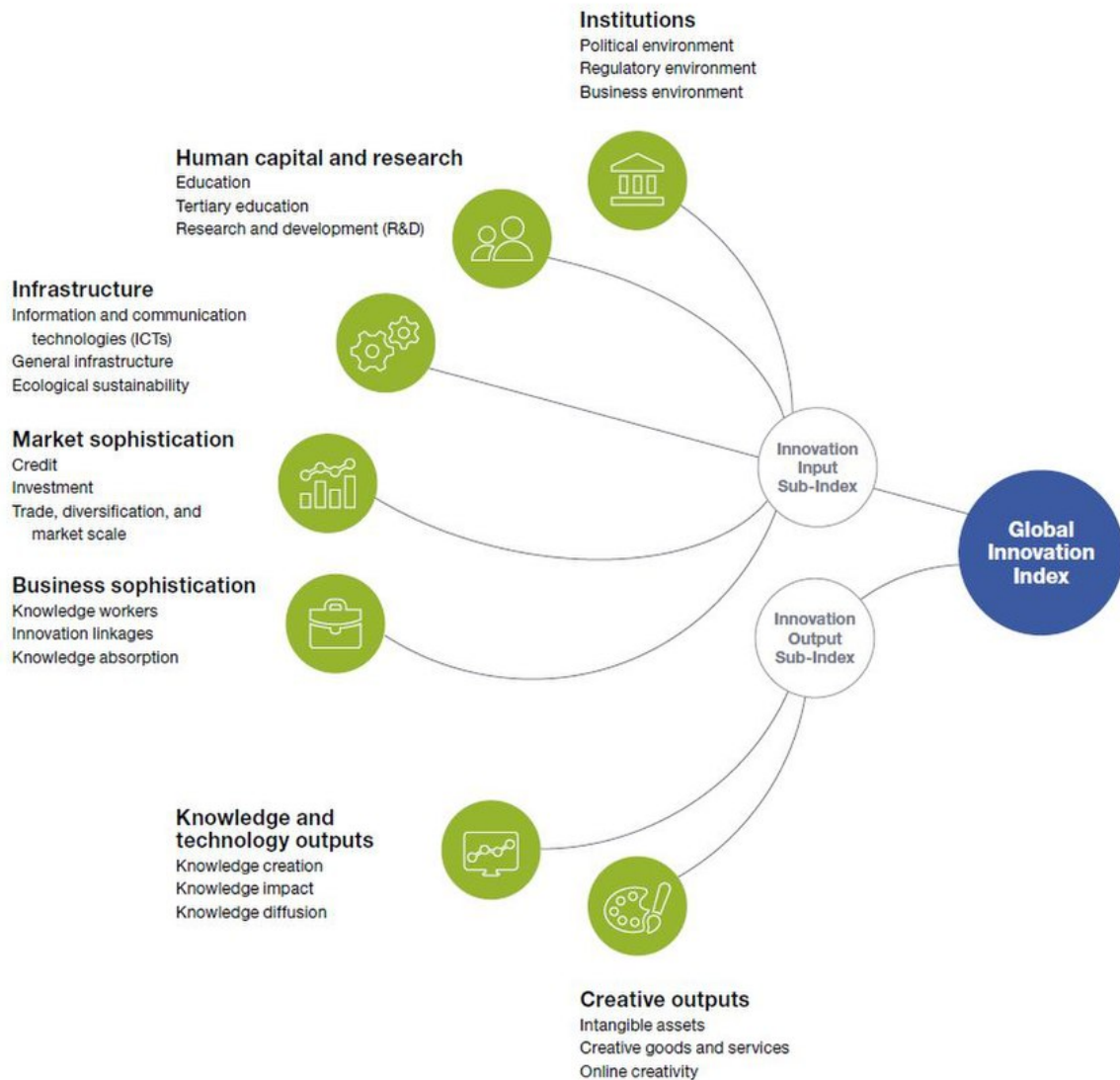
Global Innovation Index (GII)

- The Global Innovation Index (GII) is an influential annual publication that assesses and measures the innovation performance of economies around the world. It serves as a valuable benchmarking tool used by policymakers, business leaders, and various stakeholders to evaluate and track a country's progress in the field of innovation.
- The GI was **published by the World Intellectual Property Organization (WIPO)** in partnership with Cornell University, INSEAD, and other organizations and institutions.

Methodology

- The GI is computed by taking an average of scores from **two sub-indices: the Innovation Input Index and the Innovation Output Index.**
- The Innovation Input Index is composed of five pillars that describe attributes of innovation, with each pillar consisting of up to five indicators.

- The Innovation Output Index comprises two pillars.
- Scores for each indicator are calculated using a weighted average method.



Source: Global Innovation Index 2021, WIPO.

Key points about the GII and its findings in 2023:

- **Top 3 Innovative Economies in 2023**
 - Switzerland (1st)
 - Sweden (2nd)
 - United States (3rd)
- China is ranked 12th in 2023, dropping one rank from the previous year. It remains the only middle-income economy to secure a position among the top 30 and retains 3rd place in the Southeast Asia and Oceania (SEAO) region.

Mixed Performance in Innovation Investment

- In 2022, science and innovation investment exhibited mixed results, primarily due to several challenges and a decline in innovation finance. While the number of scientific publications continued to grow, it did so at a slower rate.
- Global government budgets for research and development (R&D) were expected to increase in real terms, and top corporate spenders significantly increased their R&D expenditure. However, it remains uncertain whether this growth can offset the effects of rising inflation. Additionally, international patent filings stagnated, and venture capital investments decreased significantly compared to the previous year.

Technological Progress in Key Areas

- There was notable progress in various technological fields, including information technology, health, mobility, and energy. Advancements in computing powers were particularly strong, and costs associated with renewable energy and genome sequencing continued to decline. These developments create new opportunities for global development.

Increasing Technology Adoption

- There has been a gradual increase in the adoption of technology, leading to improved access to safe sanitation and connectivity. Electric vehicle (EV) adoption has been on the rise, and there is a growing desire for greater automation, as evidenced by increased robot installations. However, while some progress has been made, overall penetration rates for many innovation indicators remain medium-to-low. Additionally, the availability of radiotherapy for cancer treatment remains inadequate in many countries.

Limited Socioeconomic Impact of Innovation

- Despite advancements in innovation, the socioeconomic impact remains relatively low. The COVID-19 pandemic has led to volatility in labour productivity, which has stagnated. Life expectancy also experienced a decline for a second consecutive year, although healthy life expectancy continued to increase, albeit at a slower pace. Carbon dioxide emissions continued to grow, albeit at a lower rate compared to the post-pandemic surge in 2021, with no significant global reductions in sight.

INCREMENTAL CRR

In News:

To deal with the excess liquidity in the banking system, which was partly caused by the inflow of Rs 2,000 notes, the RBI announced the Incremental Cash Reserve Ratio (I-CRR) on August 10, 2023. This was a temporary measure to mop up the extra cash and maintain the stability of the financial system.

Analysis of Background:

- The **Reserve Bank of India (RBI)** introduced the **I-CRR (Incremental Cash Reserve Ratio)** on August 10, 2023, as a **temporary measure to absorb excess liquidity from the banking system**. This decision was made to address the surplus liquidity generated by various factors, including the return of Rs 2,000 notes to the banking system, RBI's surplus transfer to the government, increased government spending, and capital inflows. The excessive liquidity in the system was seen as a potential risk to price stability and financial stability.
- **After reviewing the liquidity conditions, the RBI has decided to discontinue the I-CRR in a phased manner**. The aim is to release the impounded funds gradually to avoid sudden shocks to the system and ensure that money markets function smoothly.
- The RBI has outlined a schedule for releasing the funds maintained by lenders under the I-CRR:
 - 25% of the funds will be released on September 9.
 - Another 25% will be released on September 23.
 - The remaining 50% will be released on October 7.
- The phased release of funds is intended to provide banks with sufficient liquidity to meet higher credit demand during the upcoming festival season.

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.

RUPAY NCMC PREPAID CARD

In News:

The State Bank of India (SBI) has introduced the "RuPay NCMC Prepaid Card" to simplify digital ticketing fare payments for various modes of transportation such as metro, buses, water ferries, parking, and more, all through a single card.

Analysis of Background:

- The "**RuPay NCMC Prepaid Card**" is part of the **National Common Mobility Card (NCMC) program**, allowing individuals not only to use the card for transportation but also for making retail and e-commerce payments.
- The introduction of the "RuPay NCMC Prepaid Card" by the State Bank of India (SBI) is part of a broader initiative by the Indian government to modernize and streamline payment systems for public transportation and retail services.

Features

Multi-Utility Card

- The RuPay NCMC Prepaid Card is a versatile payment instrument **designed to simplify the payment process for various modes of transportation and related services.**
- Users can use the card to pay for metro rides, making it convenient for daily commuters in cities with metro systems.
- The card is accepted for bus fare payments, allowing passengers to board buses without the need for cash or multiple travel cards.
- For areas with water-based transportation systems, like ferries, the card streamlines the ticketing process, making it seamless for travellers.

- The card can also be used to pay for parking fees, eliminating the hassle of searching for change or using different payment methods when parking vehicles.

Retail and E-commerce Payments

- In addition to its utility in the transportation sector, **the RuPay NCMC Prepaid Card is equally applicable in the retail and e-commerce domains.**
- Users can make purchases at physical retail stores by swiping or tapping the card, providing a convenient and secure payment option.
- The card can be used for online shopping, enabling users to make digital payments for goods and services from e-commerce websites.
- This feature makes the card an all-encompassing payment solution, suitable for a wide range of daily transactions.

National Common Mobility Card (NCMC)

- **The RuPay NCMC Prepaid Card is an integral part of the National Common Mobility Card (NCMC) program,** which has far-reaching implications for public transportation in India.
- NCMC's primary objective is **to create a unified and interoperable payment ecosystem for public transportation throughout India.**
- It ensures that the card can be used across different cities, states, and modes of transportation, promoting seamless travel and payment experiences.
- This initiative aligns with the government's vision of "One Nation, One Card," simplifying travel and payment processes for commuters nationwide.

Integration

- The State Bank of India (SBI) is actively involved in integrating the RuPay NCMC Prepaid Card into specific metro lines, such as MMRC Metro Line 3 and Agra Metro.
- These integrations mean that passengers on these metro lines can use the card as a convenient and universal payment method for their travel expenses.
- By expanding the card's usability through such integrations, SBI contributes to the wider adoption of the NCMC program and its benefits.

Significance

Simplified Commuting

- **Reduction of Card Clutter:** Commuters often need multiple cards or payment methods for different modes of transportation, like metro cards, bus passes, and parking cards. The RuPay NCMC Prepaid Card streamlines this process by consolidating these payment needs into a single card.
- **Convenience:** With this card, passengers can seamlessly access various transportation services without having to carry an assortment of cards or resort to cash payments. It simplifies the daily commute, saving time and reducing the hassle of managing different payment instruments.
- **Interoperability:** The card's interoperability across different transportation systems ensures that commuters can use it regardless of the city or mode of travel, making it highly convenient for both residents and tourists.

Financial Inclusion

- **Access to Digital Payments:** The RuPay NCMC Prepaid Card plays a crucial role in advancing financial inclusion by offering easy access to digital payment options. It caters to individuals who may not have traditional bank accounts but still need to make digital payments for transportation and other services.
- **Reducing Cash Dependency:** By providing a cashless payment alternative for essential services like transportation, the card reduces the reliance on physical currency, thereby promoting financial inclusion and encouraging more people to participate in the formal financial system.

Promotion of Digital Payments

- **Urban and Rural Reach:** The promotion of digital payments through cards like RuPay NCMC isn't limited to urban areas. It extends to rural regions, where access to banking infrastructure may be limited. These cards bring the benefits of digital transactions to a broader population.
- **Government Initiatives:** The Indian government has been actively advocating for a cashless economy through campaigns like "Digital India." Initiatives like the RuPay NCMC Prepaid Card align with this vision by encouraging people to adopt digital payment methods.
- **Enhanced Security:** Digital payments are often more secure than cash transactions, reducing the risk of theft or loss. This added layer of security contributes to the overall safety of financial transactions.

Challenges associated with the implementation

Infrastructure and Technology

- **Complex Infrastructure:** Building and maintaining a unified payment infrastructure that spans various cities and modes of transportation is a complex and resource-intensive task. It involves setting up digital payment systems, card readers, and data networks that are compatible with different transportation providers and retail outlets.

- **Upkeep and Maintenance:** Ensuring the reliability and security of this infrastructure is an ongoing challenge. It requires regular updates, maintenance, and troubleshooting to prevent system failures or vulnerabilities.

Interoperability

- **Coordination among Stakeholders:** Achieving interoperability between different transportation networks, banks, and retail establishments demands extensive coordination among various stakeholders. These entities often have different operational procedures and technologies that need to be aligned.
- **Standardization:** Establishing common standards for payment protocols, card formats, and data security is essential to make the NCMC program truly interoperable. Differences in standards can hinder smooth transactions and compatibility.

User Awareness

- **Education and Promotion:** One of the critical challenges is ensuring that users are aware of the NCMC program and its advantages. Many potential users may not know about the program or how to obtain and use the cards effectively.
- **Changing Habits:** Encouraging individuals to switch from traditional payment methods, such as cash or local travel cards, to the NCMC card can be met with resistance. People may be comfortable with their existing payment habits and may need incentives or education to make the transition.

WORLD FOOD PRICE INDEX

In News:

The United Nations Food and Agriculture Organization (FAO) reported that the world food price index for food commodities fell to a new two-year low in August. This decline reversed a rebound that was observed in the previous month.

Analysis of Background:

- The FAO's price index, which tracks globally traded food commodities, averaged 121.4 points in August, compared to a revised 124.0 points for the previous month. The July reading had initially been reported as 123.9, representing a rebound from a two-year low in June.
- The August figure was the lowest since March 2021 and marked a 24% decrease from the all-time high reached in March 2022 following Russia's invasion of Ukraine.

- The overall index decline was driven by decreases in the prices of dairy products, vegetable oils, meat, and cereals, despite a significant increase in the FAO's rice benchmark to a 15-year high due to Indian export restrictions

World Food Price Index

About

- The World Food Price Index is a key metric that tracks the prices of globally traded food commodities. It is published by the Food and Agriculture Organization (FAO) of the United Nations on a regular basis, typically on a monthly or quarterly basis.
- The Index was established to monitor and report on the price movements of essential food commodities in international markets.

Features

Comprehensive Basket

- The World Food Price Index tracks a comprehensive basket of food commodities. This basket is carefully selected to represent a wide range of globally traded food products. The inclusion of these commodities is essential because they are considered staples and have a significant impact on both food production and consumption worldwide. The **specific commodities typically included in the index are:**
 - **Cereals:** This category includes grains like wheat, rice, and maize (corn), which are fundamental staples in many diets around the world.
 - **Dairy Products:** Dairy products encompass items such as milk, cheese, and butter, which are important sources of nutrition and protein.
 - **Meat:** Meat commodities like beef, poultry, and pork are widely traded and constitute essential sources of animal protein in diets.
 - **Vegetable Oils:** Vegetable oils, such as soybean oil, palm oil, and sunflower oil, are used in cooking and food processing globally.
 - **Sugar:** Sugar is a widely consumed sweetener and ingredient in many food and beverage products.

Monthly Updates

- The World Food Price Index is updated on a regular basis, typically on a monthly schedule. This frequent updating allows policymakers, traders, businesses, and the public to stay informed about the latest developments in global food markets.

- Monthly updates are especially crucial because they capture short-term price fluctuations and trends, helping stakeholders make timely decisions related to food security, trade, and investment.

Weighted Averages

- The index calculates weighted averages of individual commodity prices within the basket. These weights reflect the relative importance of each commodity in international food trade. The concept of weighted averages recognizes that some commodities have a more substantial impact on global food prices due to their higher trade volumes or greater significance in diets worldwide.
- The use of weighted averages ensures that the index reflects the overall price movements of these commodities more accurately. For example, if wheat and rice are more heavily traded and essential staples in global diets compared to other commodities like sugar, their prices will have a more significant

Significance of the World Food Price Index

Early Warning

- **Food Price Crises:** One of the primary roles of the World Food Price Index is to serve as an early warning system for potential food price crises. Sharp and sustained increases in food prices can indicate underlying issues in the global food supply chain. These issues could be triggered by factors like adverse weather conditions, supply chain disruptions, or geopolitical tensions.
- **Impact on Vulnerable Populations:** Food price crises can have severe consequences, particularly for vulnerable and low-income populations. When the prices of essential food items rise significantly, it can lead to reduced food access and affordability, potentially resulting in hunger and malnutrition.

Policy Planning

- **Informed Decision-Making:** Governments and international organizations rely on the World Food Price Index to make informed policy decisions related to food security, trade, and agricultural production. When the index detects upward or downward trends in food prices, policymakers can adjust strategies and interventions accordingly.
- **Targeted Interventions:** For instance, if the index indicates rising prices for a particular staple food item, governments may implement measures such as subsidies or food assistance programs to mitigate the impact on vulnerable populations.

Market Signals

- **Strategic Decision-Making:** The index provides valuable information to traders, businesses, and investors operating in global food markets. It serves as a critical tool for these stakeholders to make

strategic decisions based on price trends. Traders can adjust their buying and selling strategies, businesses can plan for production and pricing, and investors can assess opportunities in the food sector.

- **Risk Management:** By monitoring the index, market participants can manage risks associated with price volatility. Understanding the direction of food prices can help them hedge against potential losses or capitalize on opportunities.

Global Food Security

- **Supply and Demand Balance:** Fluctuations in food prices can directly impact global food security. Increases in food prices can strain food supply chains, leading to concerns about food availability, especially in regions that heavily rely on food imports.
- **Consumer and Producer Effects:** Rising food prices can affect both consumers and producers. Consumers may face increased food costs, while producers may benefit from higher prices for their crops and livestock. However, excessive price volatility can disrupt the balance and create challenges for both groups.
- **Long-Term Planning:** The index helps identify trends and patterns in food price movements that may lead to food supply issues or food affordability concerns. This information can inform long-term planning efforts aimed at improving food security on a global scale.

The Index faces several challenges that can impact its accuracy and effectiveness

Volatility

- **External Factors:** Global food prices are susceptible to a wide range of external factors, including weather events (such as droughts and floods), geopolitical tensions (such as trade disputes or conflicts in key food-producing regions), and energy prices (which can affect production and transportation costs). These factors can lead to sudden and unpredictable price fluctuations.
- **Market Speculation:** Speculative trading in commodity markets can amplify price volatility. Traders who engage in speculative activities may not necessarily be driven by supply and demand fundamentals but rather by profit motives. Their actions can lead to rapid price spikes or crashes, making it challenging to determine the true market value of food commodities.

Data Accuracy

- **Data Collection:** Gathering accurate and up-to-date data on food prices from various regions of the world can be a significant challenge. Some countries may lack robust data collection infrastructure, leading to potential gaps or delays in reporting.

- **Quality of Information:** Even when data is available, its quality and reliability can vary. Inaccurate or incomplete data can lead to misrepresentations in the index, which may result in incorrect assessments of global food price trends.

Impact of Speculation

- **Market Distortion:** Speculative trading can distort food prices and create artificial price movements that do not reflect real supply and demand dynamics. This can have negative consequences for both consumers and producers, as it can lead to price instability and unpredictability.
- **Regulatory Challenges:** Regulating speculative activities in commodity markets can be complex, and enforcement may vary from one jurisdiction to another. Addressing the impact of speculation on food prices requires international cooperation and regulatory frameworks that are effective in curbing excessive speculation.

Local Variations

- **Regional and Local Factors:** The World Food Price Index focuses on globally traded commodities, but food prices can vary significantly at the local and regional levels. Factors such as transportation costs, local production, and distribution networks can influence food prices differently in various areas.
- **Consumer Impact:** While the index provides a broad overview of global trends, it may not capture the specific challenges faced by consumers in particular regions or countries. Local variations in food prices can have a profound impact on the affordability of food for local populations.

Way forward for addressing the challenges associated with the World Food Price Index and for promoting food security on a global scale

Improved Data Collection

- **Data Infrastructure:** Investing in data collection infrastructure is crucial, especially in regions where data collection is currently limited or unreliable. This can involve deploying modern technology for data gathering and reporting.
- **Data Sharing:** Encouraging countries to share their food price data with international organizations like the FAO can enhance the accuracy and completeness of the index.

Enhanced Market Transparency

- **Regulation:** Implementing and enforcing regulations on commodity markets can promote transparency and curb excessive speculation. This may involve setting position limits on futures contracts or enhancing reporting requirements for market participants.

- **Market Surveillance:** Enhancing market surveillance mechanisms can help detect and prevent market manipulation, ensuring that food prices are driven by genuine supply and demand factors.

Diversified Food Sources

- **Agricultural Diversification:** Governments and farmers should be encouraged to diversify their agricultural production. This can involve supporting the cultivation of a variety of crops and the rearing of different livestock to reduce dependence on a single commodity.
- **Crop Rotation:** Promoting sustainable farming practices like crop rotation and intercropping can help improve soil health and resilience to pests and diseases, contributing to stable food production.

Policy Coordination

- **International Cooperation:** Global food security challenges require coordinated efforts among nations and international organizations. Collaboration on food aid, trade policies, and crisis response strategies can enhance overall food security.
- **Early Warning Systems:** Establishing and strengthening early warning systems for food price crises can facilitate timely interventions and policy responses when price spikes are detected.

Sustainable Agriculture

- **Research and Innovation:** Investment in research and innovation in agriculture can lead to the development of sustainable farming practices, improved crop varieties, and technologies that enhance yield and resilience.
- **Climate Resilience:** Sustainable agriculture practices should also focus on building resilience to climate change. This may involve drought-resistant crop varieties, water-efficient irrigation systems, and climate-smart farming techniques.

RUBBER PLANTATION IN INDIA

In News:

The Rubber Board, in collaboration with the Central government and the Automotive Tyre Manufacturers' Association, is undertaking a project to increase the cultivation of natural rubber in the Northeastern States of India.

Analysis of Background:

Key Highlights

- Currently, there are approximately 8.5 lakh hectares of land dedicated to rubber cultivation in India. Out of this, Kerala and the Kanyakumari district of Tamil Nadu account for almost 5 lakh hectares, while Tripura has 1 lakh hectares under rubber cultivation.
- The Rubber Board **aims to expand rubber cultivation in states that are not traditionally associated with rubber production.** This includes the Northeastern States of India, excluding Sikkim, but including West Bengal.
- The **potential for rubber cultivation in these Northeastern States is estimated to be around 4 lakh hectares.** The project acknowledges challenges like landslides in these hilly regions. Therefore, it has been decided to plant rubber on 2 lakh hectares to mitigate such challenges.
- In the previous financial year, approximately 27,000 hectares were brought under rubber cultivation. The plan is to cover about 40,000 hectares in the current year. The remaining areas are expected to be converted for rubber cultivation within the next two years.
- The **expansion of rubber cultivation is expected to bring about socio-economic benefits to these states.** For example, states like Chattisgarh have expressed interest in adopting rubber cultivation.

Rubber Production in India

- **India has a tropical climate, which is suitable for rubber production.** Rubber plants require a warm and humid climate with adequate rainfall throughout the year. The average temperature range of 20-35°C and an annual rainfall of 1500-3000 mm are ideal conditions for rubber cultivation.
- Rubber plants thrive in well-drained, loamy soils that are rich in organic matter. The soil should have good moisture retention capacity while allowing proper drainage. **Acidic soils with a pH range of 4.5 to 6.5 are most suitable for rubber cultivation.**
- **Rubber cultivation in India is primarily concentrated in the following states:**
 - Kerala is the leading rubber-producing state in India, with the largest area under rubber cultivation.
 - The Kanyakumari district in Tamil Nadu also contributes significantly to rubber production.
 - Karnataka has a growing rubber industry, particularly in the Malnad region.
 - In the Northeastern region, Tripura is a major rubber-producing state.

Significance of Rubber Production

Economic Contribution

- Rubber cultivation and the rubber industry play a pivotal role in the Indian economy **by providing employment opportunities to a substantial workforce, particularly in rural areas.**
- The rubber sector generates jobs across various stages, from planting and harvesting rubber trees to processing and manufacturing rubber products. This employment not only sustains livelihoods but also contributes to poverty reduction and the overall economic development of rural communities.

Foreign Exchange Earnings

- India's rubber exports make a substantial contribution to the country's foreign exchange earnings.
- Rubber and rubber products are in demand worldwide, and India's position as a major rubber exporter allows it to earn valuable foreign currency. This foreign exchange income helps stabilize the balance of payments and strengthens India's position in international trade.

Industrial Use

- Rubber is an indispensable raw material for a wide range of industries in India, including the automotive and manufacturing sectors.
- In the automotive industry, rubber is used for manufacturing tires, hoses, gaskets, and various components. In manufacturing, rubber is used in the production of belts, seals, and a multitude of other products. The availability of high-quality rubber locally is essential for these industries to thrive. Therefore, the rubber sector is not only essential for the industrial growth of the country but also plays a vital role in supporting other sectors of the economy.

Challenges in Rubber Production

Pests and Diseases

- Rubber plants are vulnerable to a range of pests and diseases, including leaf diseases, fungi, and insect infestations. These pests and diseases can cause significant damage to rubber trees and reduce rubber yields.
- Effective management and control measures, such as the use of pesticides and disease-resistant varieties, are necessary to mitigate these risks and maintain healthy rubber plantations.

Price Volatility

- Rubber prices are subject to considerable fluctuations in the global market. Factors such as changes in demand, supply disruptions, and fluctuations in crude oil prices (since rubber is a petrochemical-based

product) can lead to rapid price swings. This price volatility can pose challenges for rubber farmers, as it can affect their income and profitability.

- Farmers may face difficulties in predicting and planning for their earnings, making financial stability a concern.

Environmental Concerns

- Rubber cultivation, especially when not managed sustainably, can have adverse environmental impacts.
- **Deforestation:** To create rubber plantations, natural forests are often cleared, leading to deforestation and habitat loss. This can have negative consequences for biodiversity and local ecosystems.
- **Soil Degradation:** Intensive rubber cultivation practices, such as monoculture farming and excessive use of agrochemicals, can lead to soil degradation. This includes soil erosion, loss of soil fertility, and increased susceptibility to landslides.
- **Chemical Runoff:** The use of pesticides and fertilizers in rubber farming can result in chemical runoff into nearby water bodies, potentially polluting them and harming aquatic life.

Way forward to promote sustainable growth in rubber production

- **Research and Development:** Investing in research and development is crucial for the rubber industry's future. This includes developing disease-resistant rubber varieties and sustainable cultivation practices. Research can also focus on improving yield and quality, reducing production costs, and enhancing the overall efficiency of rubber farming.
- **Market Diversification:** To reduce dependence on price fluctuations in the global rubber market, India should explore new markets and product avenues for rubber exports. This can include the development of value-added rubber products and finding niche markets where Indian rubber can gain a competitive advantage.
- **Sustainable Practices:** Promoting sustainable rubber farming practices is essential to address environmental concerns. This involves implementing practices like agroforestry, which integrates rubber cultivation with other tree species to reduce deforestation and soil degradation. Additionally, adopting organic farming methods and responsible pesticide use can minimize the environmental impact of rubber production.
- **Farmer Training:** Providing training and support to rubber farmers is crucial for enhancing their productivity and income. This can include educating farmers on modern farming techniques, efficient resource management, and pest/disease management. Training programs can also emphasize the importance of sustainable and environmentally friendly practices.

- **Government Support:** Encouraging government support is vital for the rubber industry's growth. Governments can provide subsidies and incentives for rubber cultivation, infrastructure development, and research initiatives. Access to credit and insurance for rubber farmers can also help stabilize their income and provide a safety net in times of adversity.

KORAPUT KALAJEERA RICE

In News:

'Koraput Kalajeera Rice' receiving the Geographical Indications (GI) tag is a significant development that celebrates the unique agricultural heritage of the Koraput district in Odisha, India.

Analysis of Background:

Key Highlights

- The Jaivik Sri Farmers Producer Company Limited, supported by the Odisha government, applied for the GI status for 'Koraput Kalajeera Rice'.
 - The Geographical Indications Registry issued an advertisement on August 31, 2023, confirming the grant of GI status to 'Koraput Kalajeera Rice.'
- **The rice variety has been cultivated and domesticated by the tribal communities of the Koraput district, Odisha** for thousands of years. Their traditional farming practices have not only preserved the crop but also contributed to its uniqueness.
- **'Koraput Kalajeera Rice' is known as the 'Prince of Rice'** due to its unique characteristics. It has a distinct appearance resembling coriander seeds and is highly regarded for its nutritional and cooking qualities. **The rice is known for its black colour, delightful aroma, excellent taste, and appealing texture.**
- According to ancient texts, 'Kalajeera Rice' is believed to offer various health benefits. It is thought to **enhance memory, regulate diabetes, increase haemoglobin levels, and boost metabolism.** Additionally, this fragrant rice variety is attributed with medicinal properties such as being antispasmodic, stomachic, carminative, antibacterial, astringent, and sedative.
- The Geographical Indications (GI) status provides legal protection to products that have specific geographical origins and unique qualities. This recognition not only helps preserve traditional knowledge but also supports the economic well-being of local farmers and communities.

Geographical Indications (GI)

About

- Geographical Indications (GI) are a **form of intellectual property rights** that protect the products or goods that originate from a specific geographical region and have distinctive qualities or reputations associated with that region.
- GI can be **applied to agricultural, handicraft, industrial, or food products**. For example, Darjeeling tea, Basmati rice, Kanchipuram silk, and Champagne are some of the well-known GI products in the world.
- Geographical Indication tags in India are **valid for 10 years, and after this period, they can be renewed** to continue safeguarding the product's unique identity and reputation.

GI Tag can provide various benefits to the producers and consumers

- It can **enhance the market value and competitiveness of the products** by creating a brand identity and recognition among consumers.
- It can **promote the local culture, tradition, and heritage** of the region and foster a sense of pride and belonging among the producers and communities.
- It can **contribute to the socio-economic development** of the region by generating employment, income, and livelihood opportunities for the producers and related stakeholders.
- It can also support the conservation of biodiversity, natural resources, and traditional knowledge of the region by encouraging sustainable production practices and quality standards.

Steps taken to promote and protect GI products

- India is one of the leading countries in terms of GI registration and protection. **India enacted the Geographical Indications of Goods (Registration and Protection) Act in 1999**, which came into force in 2003.
 - The act provides a legal framework for the registration, protection, and promotion of GI products in India. The act also establishes a Geographical Indications Registry under the Controller General of Patents, Designs and Trademarks, which is responsible for administering the registration process and maintaining a register of GI products.
- Established a Geographical Indications Cell under the Department for Promotion of Industry and Internal Trade (DPIIT) to coordinate and monitor various activities related to GI products in India.
- Set up a Geographical Indications Tagged World Premium Products Exhibition-cum-Sale Center at Goa International Airport to showcase and market its GI products to domestic and foreign tourists.
- Launched a logo and tagline for its GI products in 2018 to create a common identity and branding for its GI products across the world. The **logo features a "tricolour" flying wheel with "G.I." written on it along with "Invaluable Treasures of Incredible India" as the tagline.**

- India has also **signed bilateral agreements with several countries** such as Switzerland, Chile, Japan, Bhutan, etc. to protect its GI products in those countries. India has also joined multilateral agreements such as the Lisbon Agreement for the Protection of Appellations of Origin and their International Registration under the World Intellectual Property Organization (WIPO) to protect its GI products globally.

SCIENCE AND TECHNOLOGY

RED BLOOD CELLS

In News:

A study on '**Red Blood Cells' Protective Role in Heart Attack and Dietary Enhancement**' was conducted by Karolinska Institutet in Sweden, in collaboration with Karolinska University Hospital.

Analysis of Vackground:

Key Findings:

- **Protective Role of Red Blood Cells:** Red blood cells, which transport oxygen from the lungs to cells and carbon dioxide back to the lungs, have an intrinsic function of protecting against heart injury caused by myocardial infarction (heart attack). This protection occurs when red blood cells are exposed to low oxygen levels.
- **Enhancement with a Nitrate-Rich Diet:** The protective effect of red blood cells against heart injury is further enhanced by a diet rich in nitrates. Nitrates are commonly found in nitrate-rich vegetables like arugula and other green leafy vegetables.

Significance:

- The research findings indicate that **red blood cells may play a crucial role in protecting against heart injury during conditions of low oxygen levels.**
- The study suggests that a **simple dietary intervention, such as increasing the consumption of nitrate-rich vegetables, could enhance the protective properties of red blood cells against heart injury.**
- The results may have significant implications for individuals at risk of myocardial infarction (heart attack).

About RBC:

- Red Blood Cells (RBCs), also known as erythrocytes, are one of the major components of blood and play a crucial role in the circulatory system.
- These small, biconcave-shaped cells are primarily responsible for transporting oxygen from the lungs to various tissues and organs throughout the body and returning carbon dioxide to the lungs for elimination.

Structure of Red Blood Cells

- **Shape:** RBCs are biconcave discs, which means they have a depression on both sides, resembling a donut without a hole. This unique shape increases the surface area of the cell, allowing for efficient gas exchange.
- **Size:** They are small cells, with an average diameter of about 6-8 micrometers in humans.
- **Lack of Nucleus:** Unlike most other cells in the body, RBCs lack a nucleus. This absence of a nucleus allows for more space to carry hemoglobin, the oxygen-binding protein.
- **Hemoglobin:** Hemoglobin is the iron-containing molecule that gives RBCs their red color and enables them to transport oxygen. Each RBC contains millions of hemoglobin molecules.

Functions of Red Blood Cells

- **Oxygen Transport:** The primary function of RBCs is to transport oxygen from the lungs to the body's tissues. Hemoglobin binds to oxygen in the lungs and releases it in tissues where oxygen is needed.
- **Carbon Dioxide Transport:** RBCs also play a role in carrying carbon dioxide, a waste product of metabolism, from tissues to the lungs, where it is exhaled.

Production of Red Blood Cells

- RBCs are produced in the bone marrow through a process called erythropoiesis, which is regulated by the hormone erythropoietin (EPO) produced by the kidneys.
- The process involves the maturation of hematopoietic stem cells into mature RBCs.

Lifespan of Red Blood Cells

- The average lifespan of an RBC is about 120 days.
- After this period, they are removed from circulation by the spleen and liver, and their components are recycled.

Red Blood Cell Disorders

- **Anemia:** Anemia is a condition characterized by a lower than normal number of RBCs or a decreased amount of hemoglobin. This leads to reduced oxygen-carrying capacity, resulting in fatigue, weakness, and other symptoms.
- **Polycythemia:** Polycythemia is a condition in which there is an excess of RBCs in the blood, making the blood thicker and more viscous. This can lead to increased risk of clot formation and other complications.
- **Sickle Cell Disease:** Sickle cell disease is a genetic disorder that causes RBCs to take on a crescent or sickle shape. These abnormal cells can block blood flow, leading to pain and organ damage.
- **Thalassemia:** Thalassemia is a group of genetic blood disorders that result in abnormal hemoglobin production, leading to anemia and other health issues.

Significance in Healthcare

- **Blood Transfusions:** RBC transfusions are essential in the treatment of anemia, blood loss due to surgery or injury, and certain medical conditions that affect RBC production.
- **Diagnostics:** RBC counts, hemoglobin levels, and hematocrit values are routinely measured in blood tests to diagnose and monitor various medical conditions.
- **Medication Development:** Understanding RBC physiology is crucial for developing medications to treat conditions like anemia, sickle cell disease, and thalassemia.

CE 20 ENGINE

In News:

- The Indian Space Research Organisation's **Liquid Propulsion Research Centre (IPRC) in Mahendragiri has successfully tested the cryogenic rocket engine intended for use in its ambitious 'Mission Gaganyaan.'**
- As the ISRO is gearing up to use the CE-20 cryogenic engine in 'Mission Gaganyaan' to send humans to space in 2024 and safely bring them back to Earth after a three-day stay in a 400 km orbit, the engine is currently undergoing a range of rigorous tests.

Analysis of Background:

The CE-20 Cryogenic Engine

- The CE-20 is a **cryogenic rocket engine developed by the Liquid Propulsion Systems Centre (LPSC), a subsidiary of the Indian Space Research Organisation (ISRO).**

- This high-thrust cryogenic engine has been meticulously engineered to power the upper stage of the Launch Vehicle Mark-3 (LVM3), marking a significant milestone in India's space exploration endeavors.
- Notably, the CE-20 stands as the **first Indian cryogenic engine to incorporate a gas-generator cycle**, adding to its exceptional performance credentials.

Overview

- Capable of **producing a nominal thrust of 200 kN**, it offers an **operating thrust range spanning from 180 kN to 220 kN**, providing adaptability in various mission profiles.
- The engine's combustion chamber effectively burns liquid hydrogen and liquid oxygen at 6 MPa with a 5.05 engine mixture ratio.
- Noteworthy is the engine's thrust-to-weight ratio, measured at 34.7, coupled with a specific impulse of 442 seconds (4.33 km/s) in vacuum, attesting to its remarkable efficiency.

Thrust-to-Weight Ratio and Specific Impulse

- The thrust-to-weight ratio, a dimensionless metric, serves as an indicator of an engine's or vehicle's performance.
- Specific impulse (ISP), often abbreviated as Isp, quantifies the efficiency with which a reaction mass engine generates thrust, especially crucial for rocket engines.

Gas Generator Cycle

- The Gas Generator Cycle, **also called open cycle**, is one of the most commonly used power cycles in **bipropellant liquid rocket engines**.
- Part of the unburned propellant is burned in a gas generator (or preburner) and the resulting hot gas is used to power the propellant pumps before being exhausted overboard, and lost.
- Because of this loss, this type of engine is termed open cycle.
- The gas generator cycle exhaust products pass over the turbine first. Then they are expelled overboard. They can be expelled directly from the turbine, or are sometimes expelled into the nozzle (downstream from the throat) for a small gain in efficiency.
- The main combustion chamber does not use these products. This explains the name of the open cycle.
- The major disadvantage is that this propellant contributes little to no thrust because they are not injected into the combustion chamber.
- The major advantage of the cycle is reduced engineering complexity compared to the staged combustion (closed) cycle.

The Launch Vehicle Mark-3 (LVM3)

- LVM3, a **three-stage medium-lift launch vehicle** developed by ISRO, plays a pivotal role in India's space missions.
- Its primary mission objective is to **launch communication satellites into geostationary orbit, with a payload capacity surpassing its predecessor, GSLV.**
- Total development cost for the LVM3 project amounted to ₹2,962.78 crore in 2023, reflecting the substantial investment in advancing India's launch capabilities.
- **LVM3's multifaceted missions include launching CARE, India's space capsule recovery experiment module, and missions such as Chandrayaan-2, Chandrayaan-3, and the momentous Gaganyaan, marking India's first crewed mission under the Indian Human Spaceflight Programme.**

The Liquid Propulsion Systems Centre (LPSC)

- LPSC, functioning under the Indian Space Research Organisation (ISRO) since 1985, serves as a key research and development center.
- It operates from two units located at Valiamala, in Thiruvananthapuram (Kerala), and Bengaluru (Karnataka).
- LPSC is at the forefront of developing liquid and cryogenic propulsion stages for launch vehicles and auxiliary propulsion systems for both launch vehicles and satellites.
- LPSC has played a vital role in various aspects of India's space endeavors, including the development of liquid propellant stages for PSLV, control systems for SLV-3, ASLV, PSLV, and GSLV.
- One of LPSC's notable achievements is the successful development of an indigenous cryogenic upper stage for the Geosynchronous Satellite Launch Vehicle (GSLV), successfully test-fired by ISRO on August 4, 2007.

COMET NISHIMURA

In News:

- Comet Nishimura could become visible this week
- Comet Nishimura, **officially known as C/2023 P1 Nishimura, was discovered in mid-August by amateur astronomer Hideo Nishimura.**
- It has been increasing in brightness as it travels along its path in the inner solar system.

Analysis of Background:

Discovery and Characteristics

Orbital Characteristics

- NASA's Jet Propulsion Laboratory (JPL) has calculated that **this comet completes an orbit around the Sun approximately once every 435 years.**
- On September 12, the comet is expected to make a close approach to Earth, possibly coming as close as 125 million kilometers away.

Visibility and Location

- Currently, the **comet is situated in the constellation Leo.**
- Given its angular proximity to the Sun, it will likely only be visible shortly before sunrise or after sunset.
- EarthSky suggests that September 8 may be a good date for observers to attempt to spot the comet with the unaided eye, particularly before dawn.
- On September 8, the comet could be located near the crescent moon in the eastern sky, with Venus nearby, and it may be found near the star Adhafera in Leo's Sickle.

Comets

Definition of Comets

- Comets are celestial objects primarily composed of ice, dust, and rocky material.
- **They are often described as "dirty snowballs" or "icy dirtballs" due to their mixture of volatile and non-volatile components.**
- Comets typically have highly elliptical orbits that take them from the distant regions of the solar system into the inner solar system, where they become visible to observers on Earth.

Structure and Composition

- **Nucleus:** The core of a comet is called the nucleus. It is the solid, central part of the comet and can range in size from a few meters to several kilometers in diameter. The nucleus is composed of water ice, frozen gases (such as carbon dioxide and methane), dust, and rocky material.

- **Coma:** As a comet approaches the Sun, solar radiation causes the nucleus to heat up and release gas and dust into space. This forms a glowing, cloud-like envelope around the nucleus called the coma.
- **Tail:** The interaction of solar wind and radiation pressure pushes the released gas and dust away from the Sun, forming a visible tail. Comets can have two types of tails: a dust tail, which is bright and curved, and an ion tail, which is fainter and points directly away from the Sun.

Orbital Characteristics

- Comets have highly eccentric (elongated) orbits, which can take them from the outer reaches of the solar system (Kuiper Belt or Oort Cloud) to close approaches to the Sun.
- When comets approach the Sun, they become more active, developing a coma and tails, making them visible from Earth.
- The period of a comet's return to the inner solar system can vary widely, from a few years to thousands of years.

Missions to Study Comets

- Several spacecraft have been sent to study comets up close, including NASA's Stardust, Deep Impact, and ESA's Rosetta mission, which successfully landed a probe, Philae, on the comet 67P/Churyumov-Gerasimenko.

Asteroids

Definition

- Asteroids are rocky or metallic objects that orbit the Sun, primarily found in the asteroid belt, a region located between the orbits of Mars and Jupiter.

Characteristics

- Asteroids vary in size, from a few meters to hundreds of kilometers in diameter.
- They are primarily composed of rock and metal, with some containing water ice and organic materials.
- Asteroids have a wide range of shapes and compositions.

Significance

- Asteroids are considered remnants from the early solar system and can provide information about its formation and evolution.
- Some asteroids are of interest for potential resource extraction in the future.

Meteors

Definition

- Meteors are the streaks of light produced when small objects from space, called meteoroids, enter Earth's atmosphere and vaporize due to friction with the air. They are often colloquially referred to as "shooting stars."

Characteristics

- Meteors can vary in brightness, from faint streaks to bright fireballs.
- They typically travel at high speeds, with velocities ranging from 11 to 72 kilometers per second.

Significance

- Meteors provide a visual spectacle when they produce bright trails across the night sky.
- Meteor showers occur when the Earth passes through the debris left by a comet, resulting in an increased number of meteors.

Meteorites

Definition

- Meteorites are fragments of meteoroids that survive their journey through Earth's atmosphere and land on the surface. They are solid remnants of space objects.

Characteristics

- Meteorites come in three main types: stony meteorites (silicate-rich), iron meteorites (mostly metallic iron-nickel), and stony-iron meteorites (a combination of both).
- They can vary in size from tiny pebbles to large masses weighing several tons.

Significance

- Meteorites provide valuable information about the composition of asteroids and the early solar system.
- They can help scientists understand the geological and chemical processes occurring on other celestial bodies.

Meteoroids

Definition

- Meteoroids are small, solid objects in space that range in size from a grain of sand to a few meters in diameter. They are the precursors to meteors when they enter Earth's atmosphere.

Characteristics

- Meteoroids can be composed of rock, metal, or a combination of materials.
- They can travel at high speeds through space.

LAB GROWN HUMAN EMBRYO

In News:

- Scientists have **successfully created a model of a human embryo in a lab setting without utilizing sperm or egg cells.**
- This achievement was **made possible through the use of stem cells, which are undifferentiated cells capable of transforming into various cell types in the body.**
- The process involved introducing specific chemicals that directed the stem cells to differentiate and form an embryo-like structure, mimicking the early stages of embryonic development.

Analysis of Background:

Creating the Embryo Model

- Stem cells played a pivotal role in this breakthrough. These cells possess the remarkable ability to transform into different cell types, and in this case, they were programmed to simulate the characteristics of early-stage embryonic cells.
- Chemical cues were introduced into the laboratory environment to provide the necessary signals and instructions for the stem cells to differentiate into the diverse cell types required for embryonic development.
- This process led to the spontaneous assembly of a portion of these cells into an embryo-like structure, which underwent differentiation to represent various components of an embryo, including fetal cells, cells providing nutrients to the fetus, cells directing body development, and cells forming supporting structures like the placenta and umbilical cord.

Efficiency

- While the achievement is groundbreaking, it's important to note that only approximately 1% of the cell mixture successfully assembled into an embryo-like structure, indicating that the process remains relatively inefficient and presents room for improvement.

Ethical Importance

- Studying the early stages of embryo development has always been ethically challenging because it becomes difficult to observe embryos once they have implanted in the uterus.

- These laboratory-grown embryo-like models provide an ethically responsible means of studying the initial stages of embryonic development, eliminating the need for donated embryos or in-vivo studies.

Significance of Embryo Research

- Research into early embryonic development holds immense importance as the majority of miscarriages and birth defects occur during these crucial early stages.
- By understanding the genetic and epigenetic factors that influence embryonic development, scientists aim to uncover the causes of these issues and potentially develop more effective treatments.

The 14-Day Limit

- In many countries, including the UK, there is a legal and ethical limit on conducting research on embryos, which restricts growing them in a laboratory beyond a 14-day period.
- This limit aligns with the approximate time when embryos naturally complete implantation in the uterus and marks the point at which individualization begins.

Insights from Models

- Embryo-like models, such as the one created by the Israeli team, have yielded valuable insights into early development.
- Researchers have gained a better understanding of errors occurring during DNA duplication and the roles of specific genes in fetal development.
- These models enable controlled experiments on gene functions that are difficult to conduct with natural embryos.

Future Possibilities

- While these laboratory-created embryo models are not intended for reproductive purposes, they offer a unique opportunity for scientists to manipulate genes and explore their developmental roles in a controlled setting.
- This research could advance our understanding of embryonic development and potentially contribute to medical advancements, particularly in the field of genetic medicine.

About Human Embryo

Definition of a Human Embryo

- A human embryo is the earliest developmental stage of a human organism following fertilization (the union of a sperm cell and an egg cell). It represents the initial phase of human life.

Embryonic Development Timeline

- Human embryonic development is divided into several stages:
 - **Fertilization:** Occurs when a sperm cell penetrates and fertilizes an egg cell, forming a zygote.
 - **Cleavage:** The zygote undergoes multiple rounds of cell division, producing a ball of cells called a morula.
 - **Blastocyst Formation:** The morula continues to divide and eventually forms a blastocyst, consisting of an inner cell mass (which becomes the embryo) and an outer layer (which becomes the placenta).
 - **Implantation:** The blastocyst attaches to the uterine wall and begins to grow.
 - **Gastrulation:** The embryo undergoes a process called gastrulation, during which it forms three primary germ layers: ectoderm, mesoderm, and endoderm.
 - **Organogenesis:** The germ layers differentiate into specific cell types, leading to the formation of organs and tissues.

Critical Periods in Embryonic Development

- Certain periods during embryonic development are particularly critical for the proper formation of organs and body structures. These stages are highly susceptible to genetic, environmental, or teratogenic (causing birth defects) influences.
- The first trimester is the most critical period, during which organogenesis occurs.

Importance of the Human Embryo

- The human embryo is of paramount importance in the context of human reproduction and development.
- It represents the beginning of an individual's life and has unique genetic characteristics determined by the combination of genetic material from both parents.
- Understanding embryonic development is crucial for addressing issues related to fertility, birth defects, and genetic diseases.

Ethical and Legal Considerations

- Due to its significance, research involving human embryos is subject to stringent ethical and legal guidelines.
- Many countries have established limits on embryo research, including a 14-day rule, beyond which embryos cannot be cultured in the laboratory.

Medical and Scientific Research

- The study of human embryos plays a vital role in advancing medical knowledge and treatments.
- It provides insights into early human development, helping researchers understand genetic, epigenetic, and environmental factors that influence development.

Assisted Reproductive Technologies (ART)

- In vitro fertilization (IVF) is a common ART technique that involves the manipulation and observation of human embryos in a laboratory setting before implantation in the uterus.
- Preimplantation genetic diagnosis (PGD) allows for the screening of embryos for genetic abnormalities before implantation, reducing the risk of certain inherited diseases.

KUIPER BELT

In News:

Astronomers have found compelling **evidence suggesting the existence of an Earth-like planet in the distant Kuiper Belt of our solar system**, offering new insights into planetary formation and the potential for habitable environments beyond Earth.

Analysis of Background:

Introduction to the Kuiper Belt

- The Kuiper Belt is a region in our solar system that **stretches from about 30 to 50 astronomical units (AU) from the Sun**.
- One AU is the average distance from the Earth to the Sun, approximately 93 million miles (150 million kilometers).
- It is named after Dutch-American astronomer Gerard Kuiper, who first proposed the existence of this region in 1951.

Formation of the Kuiper Belt

The Kuiper Belt is believed to be a relic from the early days of our solar system. It is thought to contain remnants from the solar system's formation, making it a crucial area of study for astronomers and planetary scientists. Some key points about its formation include:

- After the formation of the Sun, a rotating disk of gas and dust surrounded it.
- Within this disk, small particles began to collide and stick together, forming planetesimals.
- Some of these planetesimals eventually grew into the planets, while others remained as smaller objects in the Kuiper Belt.

Composition of Kuiper Belt Objects (KBOs)

The Kuiper Belt is populated by a variety of objects, with different sizes and compositions. These objects are primarily composed of:

- **Ices:** KBOs are rich in volatile ices such as water, ammonia, and methane. These ices give them their distinctive appearance.
- **Rock and Metal:** KBOs also contain significant amounts of rock and metal, though these are often buried beneath the surface layers of ice.
- **Organic Compounds:** Some KBOs contain organic molecules, which are of great interest to scientists studying the origins of life.

Notable Kuiper Belt Objects

There are several notable objects within the Kuiper Belt, including:

- **Pluto:** Perhaps the most famous KBO, Pluto was once considered the ninth planet in our solar system but was reclassified as a dwarf planet in 2006.
- **Eris:** Another dwarf planet in the Kuiper Belt, Eris is similar in size to Pluto and played a role in redefining the criteria for classifying celestial bodies.
- **Haumea, Makemake, and Quaoar:** These are other notable dwarf planets in the Kuiper Belt.
- **Ultima Thule (486958 Arrokoth):** This is a KBO visited by NASA's New Horizons spacecraft in 2019, providing valuable data about the region.

Significance of the Kuiper Belt

The Kuiper Belt holds significant importance in our understanding of the solar system:

- **Planetary Formation:** It offers insights into the early stages of planetary formation and the materials present in the solar nebula.
- **Dwarf Planets:** The discovery of numerous dwarf planets in the Kuiper Belt has led to a reevaluation of how we categorize celestial bodies in our solar system.
- **Origin of Comets:** Many short-period comets originate in the Kuiper Belt, and studying these objects can help us understand the origins of cometary bodies and their composition.

Future Exploration Missions

Several missions have or are planned to explore the Kuiper Belt, including:

- **New Horizons:** This NASA spacecraft, launched in 2006, conducted a flyby of Pluto and continued its mission to explore the Kuiper Belt.

- **Lucy:** NASA's Lucy mission is set to launch in the future and will explore Jupiter's Trojan asteroids, which may have Kuiper Belt origins.
- **OSIRIS-REx:** While primarily a mission to study the asteroid Bennu, OSIRIS-REx will return a sample to Earth, providing insights into the early solar system.

microRNA

In News:

The team at the University of Massachusetts-Amherst in the US found that the microRNA, called let-7, also has the ability to recognise and remember tumour cells like T-cells.

Analysis of Background:

- **Recognition and Memory:** The researchers at the University of Massachusetts-Amherst identified let-7 as a microRNA that can recognize and remember tumor cells, similar to the way our immune system's T-cells work. This cellular memory is a fundamental aspect of how vaccines function.
- **Immune System and T-Cells:** T-cells are white blood cells that specialize in fighting pathogens and abnormal cells, including tumor cells. When T-cells encounter foreign antigens in the body, they transform into killer T-cells and mount an attack. However, most killer T-cells die after the battle.
- **Formation of Memory Cells:** After a successful encounter, a few T-cells survive and become memory cells. These memory cells retain the ability to recognize specific antigens they have encountered in the past. This memory pool allows the immune system to respond more effectively if the same antigen reappears in the future.
- **Cancer Immune Evasion:** Cancerous tumor cells often evade the immune system by preventing T-cells from forming memory cells. They trick the immune system into not recognizing them as threats, allowing the cancer to spread unchecked.
- **Role of let-7:** The study discovered that let-7, a tiny piece of microRNA that has been conserved throughout evolutionary history, is highly expressed in memory cells. Cells with more let-7 are less likely to be deceived by cancer cells, increasing the chances of these cells becoming memory cells.
- **Longevity of Memory Cells:** Memory cells have a long lifespan and can possess stem-cell-like features. They can persist in the body for decades, up to 70 years, allowing the immune system to remember and respond to specific threats over extended periods.
- **Implications for Cancer Treatment:** Understanding how let-7 is regulated during treatment could enhance the memory and capabilities of the immune system. This knowledge may lead to the development of novel immunotherapies that can boost the immune system's ability to recognize and target cancer cells effectively.

About MicroRNA (miRNA)

- MicroRNAs (miRNAs) are a **class of small, non-coding RNA molecules that play critical regulatory roles in various biological processes.**
- These molecules, typically 18 to 22 nucleotides in length, were discovered in the early 1990s and have since emerged as key players in gene expression regulation.

Discovery of MicroRNAs

- MiRNAs were **first discovered in *Caenorhabditis elegans***, a nematode worm, by Victor Ambros and Gary Ruvkun in 1993. They identified a small RNA molecule called lin-4 that regulated the timing of larval development.
- This discovery led to the realization that small RNA molecules like miRNAs could have widespread regulatory roles in gene expression.

Biogenesis of miRNAs

- MiRNAs are **transcribed from DNA into long primary transcripts (pri-miRNAs) by RNA polymerase II.**
- These pri-miRNAs are processed in the nucleus by the Drosha-DGCR8 complex into shorter hairpin structures called precursor miRNAs (pre-miRNAs).
- Pre-miRNAs are then transported to the cytoplasm and further processed by Dicer into mature miRNAs.
- Mature miRNAs are loaded into the RNA-induced silencing complex (RISC), where they guide the complex to target messenger RNAs (mRNAs).

Functions of MiRNAs

- MiRNAs regulate gene expression post-transcriptionally by binding to the 3' untranslated region (UTR) of target mRNAs, leading to mRNA degradation or translational repression.
- They play vital roles in numerous biological processes, including development, differentiation, cell cycle regulation, apoptosis, and immune responses.
- Dysregulation of miRNAs is implicated in various diseases, including cancer, neurodegenerative disorders, cardiovascular diseases, and metabolic disorders.

Roles in Cancer

- **Aberrant miRNA expression is a hallmark of many cancers.** MiRNAs can act as oncogenes by suppressing tumor suppressor genes or as tumor suppressors by inhibiting oncogenes.
- MiRNAs are potential diagnostic and prognostic markers in cancer and are being explored for therapeutic interventions.

Therapeutic Potential

- MiRNAs are promising targets for drug development, with ongoing research into miRNA-based therapies.
- miRNA mimics and antimiRs (antisense oligonucleotides) are being developed to either restore or inhibit specific miRNAs, respectively, in disease contexts.

Technological Advances

- Advances in high-throughput sequencing and bioinformatics have facilitated the discovery and profiling of miRNAs.
- Researchers use techniques like miRNA microarrays, RNA sequencing, and quantitative PCR to study miRNA expression patterns.

Future Directions

- MiRNAs continue to be an active area of research with ongoing efforts to unravel their roles in various biological processes and diseases.
- Understanding miRNA biology holds the promise of uncovering new therapeutic targets and diagnostic markers.

MONOCLONAL ANTIBODIES

In News:

India has reached out to Australia seeking to restock monoclonal antibody doses to combat the Nipah virus.

Analysis of Background:

- The mortality among the infected is very high in Nipah — between 40% and 70% — compared to the mortality in COVID, which was 2% to 3%
- The monoclonal antibody being used to combat Nipah has passed the phase-one trial and has been administered to 14 individuals globally. None of the 14 individuals who received the antibody have died from the virus.
- **The decision to use monoclonal antibodies depends on the state government, the patient, and the treating physician.**
- The monoclonal antibody was developed in the United States and shared with an Australian university as part of a tech-transfer initiative.
- India received some doses of monoclonal antibodies from Australia in 2018.

- The monoclonal antibody is not an authorized treatment for Nipah, and there is no established treatment for the virus.
- Its safety is confirmed, but its effectiveness remains uncertain. It must be administered in the early stage of the infection.

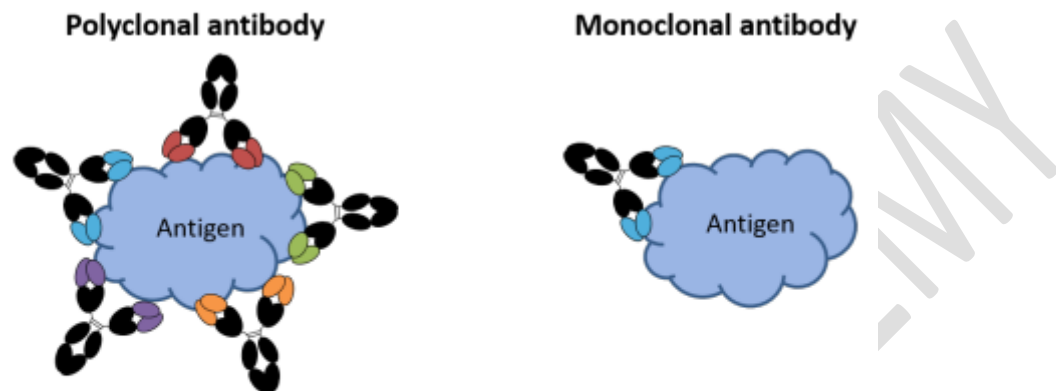


Fig 1. Monoclonal and Polyclonal Antibodies. The polyclonal antibody can bind to a single antigen, but can bind to different forms of it. The monoclonal antibody can only bind to a specific type of antigen.

Introduction to Monoclonal Antibodies

Definition and Basic Concept: Monoclonal antibodies (mAbs) are laboratory-produced molecules designed to mimic the immune system's ability to fight off harmful pathogens, such as bacteria and viruses. They are highly specific, targeting a single antigen or protein, and are used in various medical applications.

Historical Development and Significance: The development of monoclonal antibodies dates back to the 1970s when scientists first devised hybridoma technology, a method to create mAbs. The significance lies in their precision and versatility, making them invaluable tools in both diagnostics and therapies.

How Monoclonal Antibodies Work:

- **Mechanism of Action:** mAbs work by specifically binding to a target antigen, which can be a protein on the surface of a cancer cell, a virus, or an immune checkpoint molecule. This binding can lead to various outcomes, such as blocking the function of the antigen, flagging the target for destruction by the immune system, or delivering a drug payload to the target.
- **Specificity and Selectivity:** Monoclonal antibodies exhibit an extraordinary level of specificity. They are engineered to recognize and interact with a particular target, reducing the risk of off-target effects compared to conventional drugs that may affect multiple processes in the body.

- **Comparison with Traditional Drugs:** Compared to traditional drugs that often have broader effects, mAbs offer a more targeted approach. This specificity can lead to enhanced therapeutic efficacy and reduced side effects, though they can also be more expensive to develop and produce.

Production of Monoclonal Antibodies:

- **Hybridoma Technology:** Hybridoma technology involves fusing a specific antibody-producing B cell with a myeloma cell to create immortalized hybrid cells that continuously produce a single type of antibody. This method was the basis for the first monoclonal antibodies and is still used today.
- **Recombinant DNA Technology:** Recombinant DNA technology allows the production of mAbs in cell lines derived from animals or even humans. This approach can create antibodies with reduced immunogenicity, as they closely resemble human antibodies.
- **Phage Display Technology:** Phage display is an alternative method that utilizes bacteriophages to display antibodies on their surface. This technique enables the selection of antibodies with specific binding properties.

Types of Monoclonal Antibodies:

- **Murine (Mouse-Derived) Antibodies:** These antibodies are entirely derived from mice and can elicit an immune response when administered to humans, limiting their clinical use.
- **Chimeric Antibodies:** Chimeric antibodies combine mouse-derived antigen-binding regions with human constant regions, reducing immunogenicity.
- **Humanized Antibodies:** Humanized antibodies have the majority of their structure derived from human components, with only the antigen-binding region from mice.
- **Fully Human Antibodies:** Fully human antibodies are entirely derived from human sources and have minimal immunogenicity, making them suitable for therapeutic use.

Applications of Monoclonal Antibodies:

- **Cancer Therapy:** Monoclonal antibodies play a pivotal role in targeted cancer therapies. They can be designed to recognize specific antigens on cancer cells, hindering their growth, signaling the immune system to attack, or delivering toxic payloads directly to cancer cells.
- **Autoimmune Diseases:** In the treatment of autoimmune disorders, mAbs help modulate the immune system's response, reducing inflammation and damage to healthy tissues.
- **Infectious Diseases:** Monoclonal antibodies have applications in treating viral and bacterial infections. They can neutralize pathogens or inhibit their entry into host cells.

- **Neurological Disorders:** While less common, mAbs are being explored as potential treatments for neurological diseases, including Alzheimer's and multiple sclerosis.

Monoclonal Antibodies in Diagnosis:

- **ELISA (Enzyme-Linked Immunosorbent Assay):** Monoclonal antibodies are crucial components of ELISA tests used for the detection of antigens or antibodies in various diagnostic applications.
- **Flow Cytometry:** In flow cytometry, mAbs are used to label specific cell populations for analysis, aiding in disease diagnosis and research.
- **Immunohistochemistry:** Monoclonal antibodies are applied to tissue samples to identify specific proteins or antigens, aiding in the diagnosis of diseases such as cancer.

Challenges and Limitations:

- **Immunogenicity:** Some mAbs, especially those with non-human components, can provoke immune responses in patients, potentially reducing their effectiveness or causing adverse reactions.
- **High Production Costs:** The development and production of mAbs can be expensive, limiting their accessibility to patients, particularly in resource-constrained healthcare systems.
- **Limited Penetration into Certain Tissues:** Monoclonal antibodies may have difficulty penetrating certain tissues or crossing the blood-brain barrier, which can limit their effectiveness in treating diseases that affect these areas.

Future Trends and Developments:

- **Advancements in Antibody Engineering:** Ongoing research continues to refine antibody engineering techniques, enhancing their specificity and reducing immunogenicity.
- **Personalized Medicine:** The use of mAbs is aligning with the concept of personalized medicine, tailoring treatments to individual patients based on their unique biology.
- **New Therapeutic Targets:** As our understanding of disease mechanisms improves, novel therapeutic targets are emerging, and mAbs are likely to play a critical role in these treatments.

Economic and Ethical Considerations:

- **Cost-Effectiveness of Monoclonal Antibodies:** Assessing the cost-effectiveness of mAbs is crucial, as their high production costs can impact healthcare budgets and patient access.
- **Access and Affordability:** Ensuring equitable access to mAb therapies is an ethical concern, as these innovative treatments should be available to those who need them, regardless of their economic status.
- **Ethical Issues:** The use of animals in antibody production raises ethical questions. Efforts are made to minimize animal use and explore alternative methods.

VANADIUM

In News:

Vanadium, a critical raw material for many industrial applications, has been found in sediment samples collected from Gulf of Khambhat, which opens into the Arabian Sea off Alang in Gujarat.

Analysis of Background:

Details of Vanadium:

- **Scarce Resource:** Vanadium is considered a critical raw material due to its essential role in strengthening steel and making batteries. Its scarcity in India has made this discovery all the more important, as it could potentially reduce India's dependence on imports for vanadium.
- **Vanadium in Sediments:** The finding of vanadium in sediment samples from the Gulf of Khambhat is noteworthy because vanadium is rarely found in its pure form naturally. Instead, it is typically present in various minerals, making its production costly and often requiring specialized extraction techniques.
- **Titanomagnetite Deposits:** Vanadium in this region has been found in a mineral called titanomagnetite, which forms when molten lava cools rapidly. This type of deposit can be a valuable source of vanadium.
- **Geological Origins:** The Geological Survey of India (GSI) suggests that the vanadium deposits in the Gulf of Khambhat may have been drained from the Deccan basalts, primarily through the rivers of Narmada and Tapi. Understanding the geological origins of these deposits is essential for further exploration and exploitation.
- **Strategic and Industrial Importance:** Vanadium is crucial for several strategic sectors such as defense and aerospace. It is used in the production of vanadium-containing alloys that find applications in jet engine components and high-speed airframes. Additionally, vanadium is utilized in energy storage systems, critical electronic components, and the manufacture of alloys known for their resistance to corrosion, wear, and high temperatures.
- **Energy Storage:** The mention of vanadium redox flow batteries highlights its role in large-scale energy storage. These batteries have the potential to play a pivotal role in renewable energy integration and grid stabilization.
- **Geographical Distribution:** While vanadium has been found in various regions of India, including Arunachal Pradesh, Karnataka, Odisha, and Maharashtra, the discovery in the Gulf of Khambhat adds to the diversity of potential sources within the country.

Introduction to Vanadium

- Vanadium is a chemical element with the symbol "V" and atomic number 23.
- It is a transition metal that has several interesting properties and a variety of applications

What is Vanadium?

- Vanadium is a metallic element that belongs to the transition metal group in the periodic table. It is known for its versatility in various industrial applications and its unique role in certain biological processes.

Vanadium's Symbol and Atomic Number

- Symbol: V
- Atomic Number: 23

Discovery of Vanadium

- Vanadium was discovered by the Spanish-Mexican mineralogist Andrés Manuel del Río in 1801.
- However, his discovery was initially dismissed, and the Swedish chemist Nils Gabriel Sefström rediscovered the element in 1830.

Physical and Chemical Properties of Vanadium

Atomic Structure

- Vanadium has an atomic number of 23 and an atomic weight of approximately 50.94 amu (atomic mass units).
- Its electron configuration is $[\text{Ar}] 3d^3 4s^2$.

Physical Properties

- Vanadium is a silvery-grey metal with a relatively high melting point of 1910°C and a boiling point of 3407°C.
- It has a density of about 6.11 grams per cubic centimeter (g/cm^3).

Chemical Properties

- Vanadium exhibits a variety of oxidation states, with +2, +3, +4, and +5 being the most common.
- It readily forms compounds with oxygen, sulfur, and other elements.
- Vanadium compounds often exhibit vibrant colors, which can be used for various applications, such as pigments.

Allotropes of Vanadium

- Vanadium has two allotropic forms: alpha (α) and beta (β).
- These forms have different crystal structures and properties.

- Alpha-vanadium is more ductile and has a body-centered cubic structure, while beta-vanadium is harder and has a hexagonal close-packed structure.

Occurrence of Vanadium

Natural Abundance

- Vanadium is relatively abundant in the Earth's crust, with an estimated abundance of about 0.015% by weight.
- It is typically found in various minerals, including vanadinite, carnotite, patronite, and vanadium pentoxide.

Extraction Methods

- Vanadium is primarily extracted from vanadium-rich minerals through processes that involve roasting, leaching, and various chemical treatments.
- The most common source of vanadium is vanadium pentoxide (V_2O_5), which can be converted into metallic vanadium.

Vanadium in Biology

Biological Role

- Vanadium has a limited biological role and is not considered an essential element for most organisms.
- However, some marine organisms, including certain species of tunicates and sea squirts, can accumulate vanadium in their blood and tissues, where it may play a role in oxygen transport and defense mechanisms.

Health Considerations

- Vanadium is not classified as an essential element for humans, and there is no established Recommended Dietary Allowance (RDA) for it.
- Some vanadium compounds have been investigated for potential medicinal uses, but their safety and efficacy remain subjects of ongoing research.

Industrial Uses of Vanadium

Steel Production

- Vanadium is commonly used as an alloying element in steel production.
- Vanadium steel, known for its strength, toughness, and resistance to corrosion, is used in various applications, including construction, aerospace, and toolmaking.

Aerospace Applications

- Vanadium alloys are used in aerospace applications due to their high strength-to-weight ratio and resistance to fatigue.
- Components in aircraft engines and structures often contain vanadium alloys.

Energy Storage

- Vanadium is a key component in vanadium redox flow batteries (VRFBs), a type of energy storage system.
- VRFBs have potential applications in grid energy storage and renewable energy integration.

Chemical Catalysts

- Vanadium compounds serve as catalysts in various chemical reactions, including those in the production of sulfuric acid and maleic anhydride.

Other Industrial Uses

- Vanadium compounds are used as pigments in ceramics and glass.
- Vanadium oxide is employed as a catalyst in the manufacture of sulfuric acid and as a corrosion inhibitor.

Future Applications of Vanadium

Vanadium Redox Flow Batteries

- Vanadium redox flow batteries are considered a promising technology for large-scale energy storage due to their scalability and long cycle life.
- They can help stabilize renewable energy sources by storing excess energy for later use.

Potential in Sustainable Energy

- Vanadium may play a role in the development of sustainable energy technologies, such as hydrogen production and fuel cells.

Emerging Technologies

- Ongoing research is exploring vanadium's potential in emerging technologies, including superconductors and advanced electronics.

Health and Safety Considerations

Vanadium Exposure

- Occupational exposure to vanadium dust and fumes may occur in industries like steel production and alloy manufacturing.
- Safety precautions and ventilation systems are essential to minimize exposure.

Health Effects

- Inhalation or ingestion of vanadium compounds can have adverse health effects, including respiratory irritation, gastrointestinal distress, and potential toxicity.
- Chronic exposure to high levels of vanadium may lead to more severe health issues.

Environmental Impact

Vanadium in the Environment

- Vanadium can be released into the environment through mining and industrial processes.
- It may accumulate in soil and water, potentially affecting ecosystems.

Environmental Concerns

- Elevated levels of vanadium in the environment can have adverse effects on aquatic life and terrestrial organisms.
- Proper disposal and management of vanadium-containing waste are important to mitigate environmental impacts.

ENVIRONMENT

AIR QUALITY LIFE INDEX (AQLI) ANNUAL UPDATE 2023

In News:

- Air pollution is a critical concern in South Asia, with countries like Bangladesh, India, Nepal, and Pakistan facing alarming levels of particulate pollution.
- **A recent report titled 'Air Quality Life Index (AQLI) Annual Update 2023' by the University of Chicago's Energy Policy Institute sheds light on the extent of this issue and its profound effects on the region's population.**

Analysis of Background:

Life Expectancy Reduction

- Air pollution in South Asia is **reducing the average lifespan of individuals by a staggering 5.1 years.**
- The most affected countries are Bangladesh, India, Nepal, and Pakistan, collectively accounting for more than half of the global life years lost due to high pollution.

Comparative Impact on Health Threats

- Poor air quality **diminishes life expectancy by an average of 5.3 years per person in India.**
- In contrast, cardiovascular diseases lead to a reduction of around 4.5 years, while child and maternal malnutrition shorten life expectancy by 1.8 years.
- Notably, tobacco use reduces life expectancy by up to 2.8 years, demonstrating the severe impact of air pollution.

Rising Pollution Levels

- The average person in South Asia **experiences particulate pollution levels that are 51.3% higher than those in 2000.**
- Had pollution levels remained constant from 2000, residents would have faced a loss of 3.3 years in life expectancy, as opposed to the 5.2 years projected in 2021.

Country-specific Impact

Bangladesh

- Ranked as the **most polluted country globally.**
- Despite a 2.1% decrease in particulate pollution in 2021, pollution levels have remained significantly high.
- The country faces an average life expectancy reduction of 6.8 years per person.

India

- **Second most polluted nation** with all 1.3 billion people living in areas exceeding WHO guidelines for particulate pollution.
- Over the years, particulate pollution increased by 67.7%, leading to a decline in average life expectancy by 2.3 years.
- 5 levels in India increased from 56.2 $\mu\text{g}/\text{m}^3$ to 58.7 $\mu\text{g}/\text{m}^3$ between 2020 and 2021, which is ten times the WHO guideline.
- Delhi's annual average PM2.5 level in 2021 was 126.5 $\mu\text{g}/\text{m}^3$, causing a reduction in life expectancy by 11.9 years.

Causes of Pollution Increase

- Rapid industrialization, economic development, and population growth have led to increased energy demand and fossil fuel use.
- Vehicle numbers have multiplied, and electricity production from fossil fuels has tripled, contributing to higher pollution levels.

Health Implications

- 5 particles, measuring just 2.5 micrometers, can easily enter the circulatory system.
- Chronic diseases such as asthma, heart attacks, bronchitis, and respiratory problems are associated with exposure to PM2.5 particles.

ANAMUDI SHOLA NATIONAL PARK

In News:

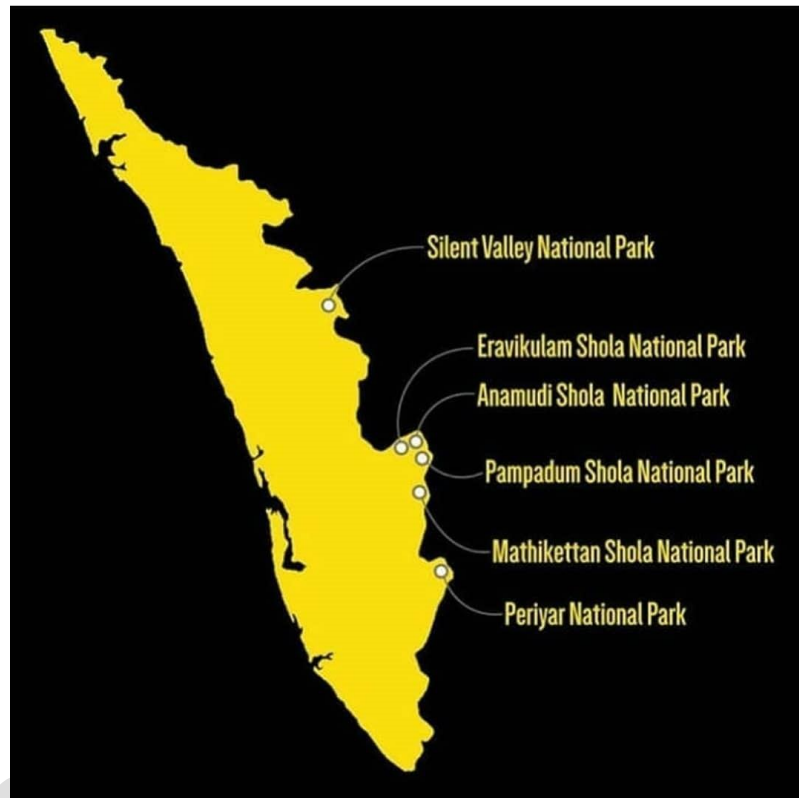
From a stark burnt-out land, the Pazhathottam area in Anamudi Shola National Park has transformed into a green heaven teeming with life due to conservation efforts.

Analysis of Background:

Anamudi Shola National Park

- Anamudi Shola National Park is a protected area **located along the Western Ghats of Idukki district in Kerala state.**
- It lies just **east of Eravikulam National park.**
- It is surrounded by **Eravikulam National Park, Pampadum Shola National park, Chinnar Wildlife Sanctuary and Mathikettan Shola Park.**

- Anamudi shola National Park consists of three Shola Reserve Forests namely **Pannavan shola, Pullaradi shola and Indivara shola** together occupying an area of 42068 Sq.Km.
- It was **declared as a National Park in the year of 2003**.
- The park provides safe and comfortable habitat to the wild species of flora and fauna.
- The rich wildlife includes Elephant, Tiger, Panther, Indian Bison, Nilgiri tahr, Gaur, Spotted Deer, Sambar, Giant Grizzled Squirrel, Hanuman Langur, Sloth Bear, Flying Squirrels etc.



WORLD OZONE DAY

About World Ozone Day:

- On September 16, the world observes World Ozone Day, also known as the International Day for the Preservation of the Ozone Layer.
- Every year, it is observed to raise public awareness of the depletion of the Ozone Layer and the steps done/to be taken to maintain it.
- The theme for World Ozone Day 2023 is “Montreal Protocol: fixing the ozone layer and reducing climate change”.

History

- The International Day for the Preservation of the Ozone Layer was established by the United Nations General Assembly in 1994 to commemorate the signing of the Montreal Protocol on Ozone Depleting Substances in 1987.
- The protocol was signed on September 16, 1987, in Montreal, Canada, to address ozone depletion.

Montreal Protocol

- It is an international pact aimed at reducing the production and consumption of ozone-depleting substances, primarily CFCs, halons, carbon tetrachloride, and other chemicals.
- These chemicals were widely employed in refrigeration, air conditioning, and aerosol propellants.

Kigali Agreement

- The Kigali Agreement is a modification to the Montreal Protocol.
- It was adopted as an extension of the Montreal Protocol on October 15, 2016, in Kigali, Rwanda.
- While the original Montreal Protocol focused on phasing out ozone-depleting compounds, the Kigali Amendment focuses on phasing out hydrofluorocarbons (HFCs), which are used as ozone-depleting substance replacements.
- The Kigali Amendment's major goal is to minimize HFC production and use in order to mitigate their contribution to global warming.

Facts on Ozone

- Ozone (O₃) is a gas composed of three oxygen atoms (O₃).
- It is both a natural and man-made product that occurs in the Earth's upper (stratosphere) and lower (troposphere) atmospheres.
- The "ozone layer," or naturally occurring ozone in the stratosphere, forms a protective barrier that inhibits ultraviolet sunshine (UV-B) radiation from the sun from reaching the Earth's surface and destroying plant and animal life. This is usually known as "good ozone."
- Tropospheric or ground-level ozone, which humans breathe, is principally generated by photochemical processes involving two primary groups of air pollutants: volatile organic compounds (VOC) and nitrogen oxides (NO_x).
- High amounts of ozone at ground level are hazardous to humans and plants.

ELEPHANT CORRIDORS

In News:

- A new elephant corridor report released by the central government showed a 40 per cent increase in elephant corridors across 15 elephant range states in India.
- Elephant corridors can be described as a strip of land that enables elephant movement between two or more friendly habitats.

Analysis of Background:

Highlights of the new Report

- **The number of elephant corridors have increased to 150 against 88 registered by the Government of India in 2010.**
- **The elephant population in the country is estimated to be over 30,000.**
- **West Bengal has the most elephant corridors — 26 —** amounting to 17 per cent of the total corridors, the report said. East central region contributed to 35 per cent, that is 52 corridors, while North East region was second largest with 32 per cent number meaning 48 corridors in total.
- **Southern India registered 32, that is 21 per cent of the elephant corridors,** while northern India was lowest with 18 corridors or 12 per cent.
- Majority of the corridors were noted to be within state boundaries and the intensity of the use of corridors has increased by 40 per cent. However, it showed that 19 per cent of the corridors, that is 29, showed a decrease in use while 10 others were seen impaired and demanding restoration for facilitating elephant movement.
- **The decrease in corridor use is attributed to the habitat fragmentation, shrinkage and destruction.**
- **The increase in the elephant corridors also reflected that elephants have expanded their ranges in Vidarbha region of Maharashtra neighbouring Chhattisgarh and southern Maharashtra bordering Karnataka.**
- Elephants have also seen a **increased presence in Madhya Pradesh found in Sanjay Tiger reserves and Bandhavgarh.**
- Besides that, ranges have also increased in northern Andhra Pradesh where the elephants access movement from Odisha.
- In these states, long- term viability of habitats to support elephant populations, followed by a data-driven approach in identifying corridors would be pertinent.
- Similarly, data on elephant movement remains sketchy in many northeastern states that harbour a relatively small population of elephants.

GLOBAL BIODIVERSITY FRAMEWORK FUND

In News:

At the ongoing 78th session of the United Nations General Assembly in New York, the government of Germany pledged to contribute 40 million euros to the Global Biodiversity Framework Fund (GBFF).

Analysis of Background:

Global Biodiversity Framework Fund (GBFF)

Launch

- The Global Biodiversity Framework (GBF) Fund was ratified and launched at the Seventh Assembly of the Global Environment Facility (GEF) on 24 August, 2023. Two countries announced initial contributions to start its capitalization.
- This included 200 million Canadian dollars from Canada and 10 million pounds from the United Kingdom.

Purpose

- Global Biodiversity Framework Fund (GBFF) has been **designed to mobilize and accelerate investment in the conservation and sustainability of wild species and ecosystems, whose health is under threat from wildfires, flooding, extreme weather, and human activity including urban sprawl.**

Mandate

- The GBF Fund is uniquely dedicated to support the implementation of the **Kunming-Montreal Global Biodiversity Framework**, its goals and its targets.
- It provides an opportunity to receive funding from all sources, quickly disburse through streamlined procedures, with enhanced access for indigenous peoples and local communities, according to their own priorities.
- The Fund also provides the opportunity for a greatly enhanced involvement of Multilateral Development Banks and Development Finance Institutes, which will facilitate the mainstreaming of biodiversity necessary to implement the Framework.

THREE CLIMATE CRISIS OF THIS YEAR

In News:

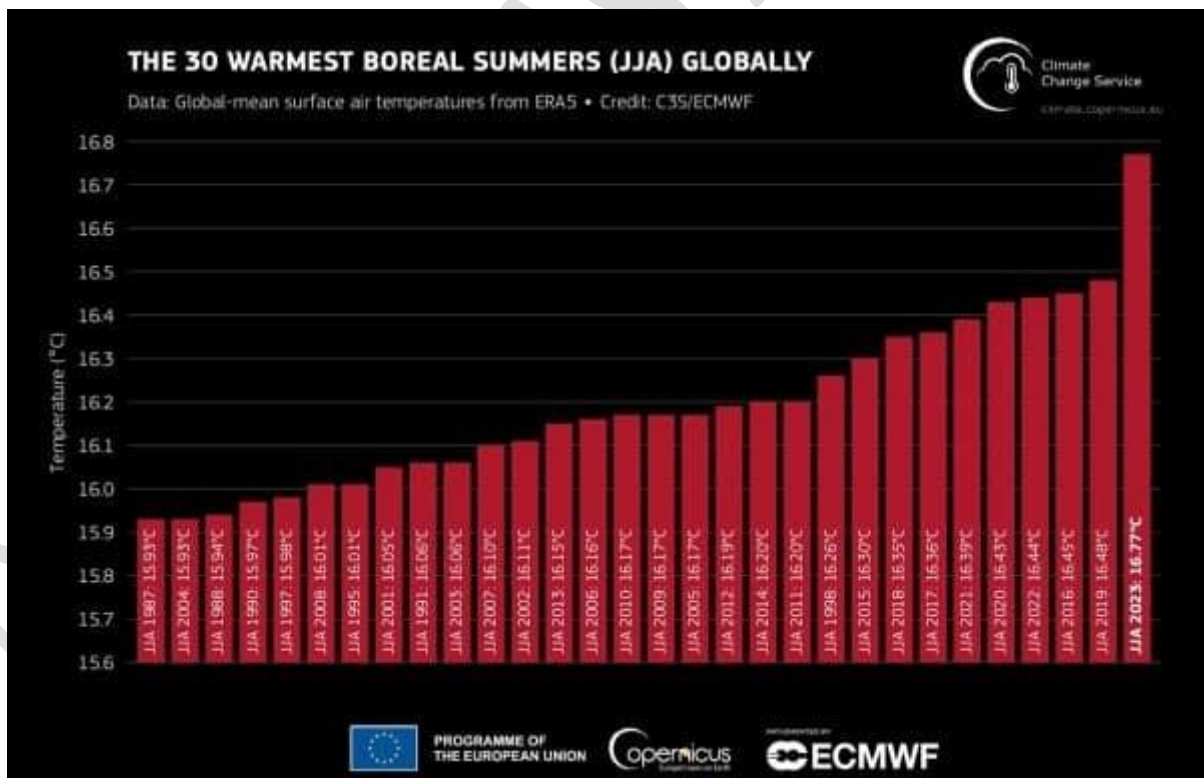
- The recent extreme weather events leave little to no doubt that the climate crisis is here.
- As a result, numerous climate records on temperature, ocean heat, and Antarctic sea ice cover are getting smashed week after week.

- Wildfires rage over Europe and Canada. Floods, cloudbursts, and storms wreak havoc in China, India, and Brazil. Heat waves in several countries.

Analysis of Background:

Hottest summer ever

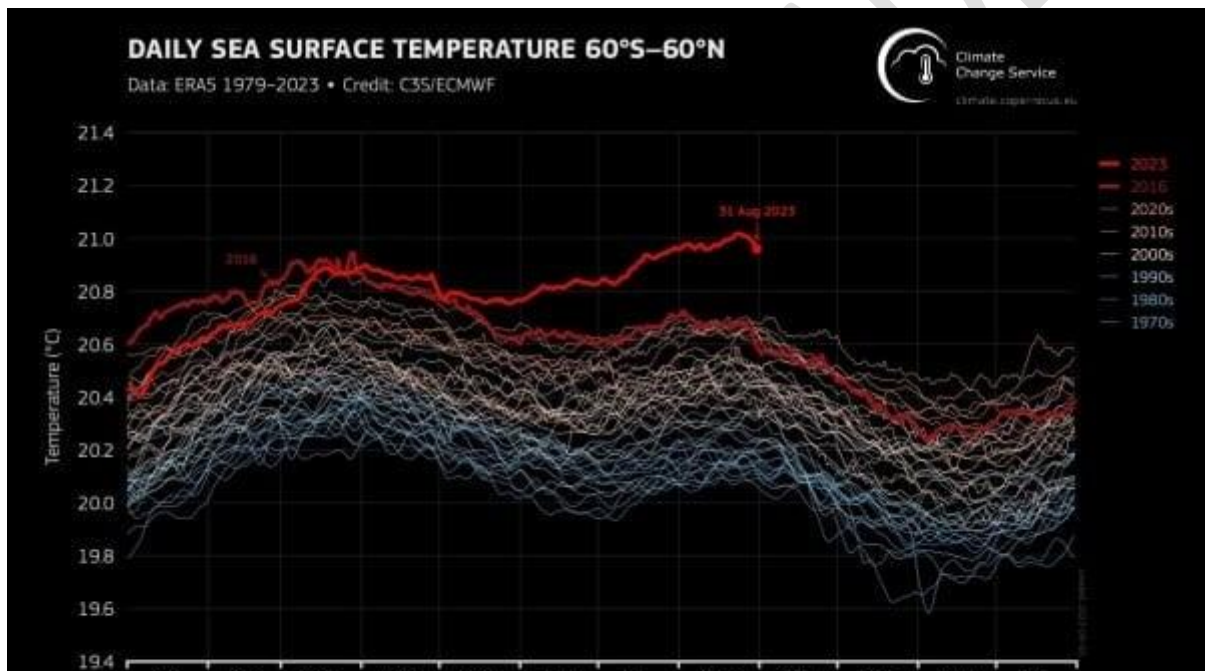
- According to C3S and the World Meteorological Organization (WMO), the summer of this year was the hottest on record.
- With an average temperature of 16.77 degrees Celsius, which was 0.66 degrees Celsius higher than the 1990-2020 average, the three-month period from June to August smashed prior records.
- According to C3S and WMO data, last month was the warmest August on record and the second hottest recorded month after July 2023.
- It also revealed that the average August temperature was 16.82 degrees Celsius, which was 0.71 degrees Celsius higher than the 1991-2020 average.
- In July, the global average daily temperature crossed the mark of 17 degrees Celsius for the first time.
- On July 3, the average temperature reached 17.01 degrees Celsius, on July 6, the mercury soared to 17.08 degrees Celsius. The latter is currently the hottest day recorded on the planet.



Why it matters?

- With such high temperatures and El Nino conditions, the year 2023 could be the warmest in recorded history.
- So far, it is the second-warmest year on record, only 0.01 degrees Celsius below the all-time high of 2016.
- The development highlights the possibility that the planet may soon become 1.5 degrees Celsius warmer than it was during the pre-industrial times.
- Once the limit is breached, there could be irrevocable damage to the Earth's ecosystem, severely impacting humans and other living beings.

Highest sea surface temperature

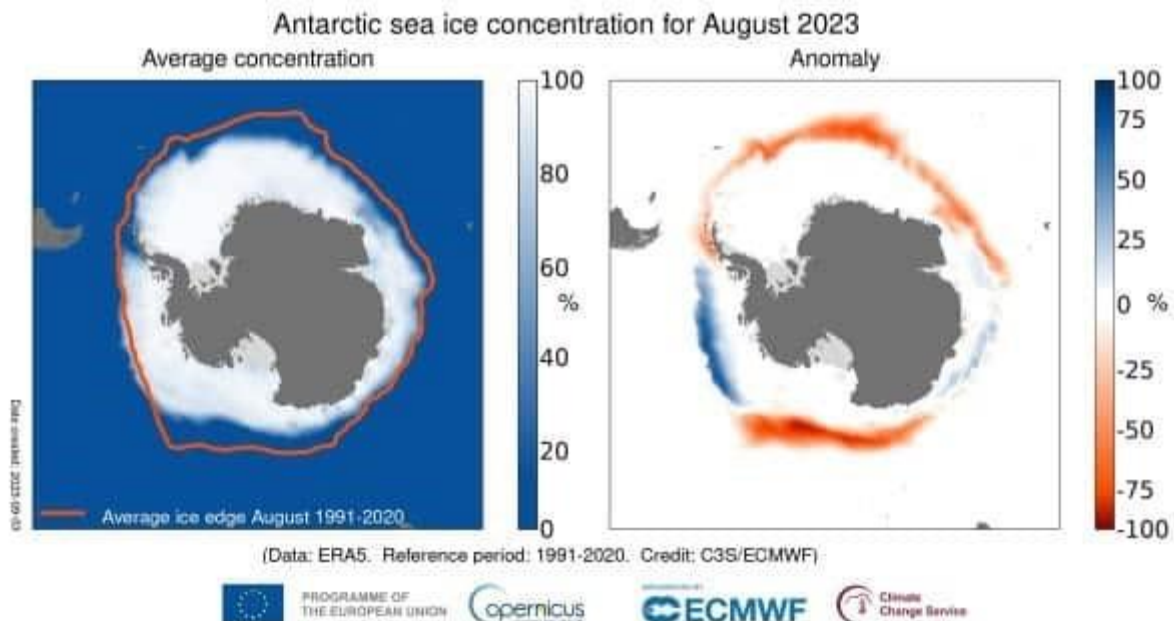


- The global average sea surface temperature is likewise out of this world. Every day from July 31 to August 31, 2023, the worldwide average sea surface temperature was higher than the previous record from March 2016.
- As a result, August had the highest global monthly average sea surface temperature on record across all months, at 20.98 degrees Celsius significantly above average for August, with a 0.55 degree Celsius anomaly, according to C3S.
- Notably, the North Atlantic Ocean's average sea surface temperature reached a new high on August 31, when it touched 25.19 degrees Celsius.

Why it matters?

- Since the second part of the nineteenth century, the oceans have absorbed 90% of the excess heat created by human activities. Marine heat waves (MHWs), which are extreme meteorological phenomena, are frequently caused by rising ocean temperatures.
- MHWs cause the extinction of various marine species, disrupt their migration patterns, induce coral bleaching, and even have an impact on weather patterns. They can also strengthen storms such as hurricanes and typhoons.

Lowest Antarctic sea ice extent



- In 2023, the Antarctic sea ice extent reached a new low.
- According to a NASA Earth Observatory report, sea ice extent averaged 13.5 million square kilometers in July, the lowest levels reported for this time of year since the continuous satellite record began in late 1978.
- According to C3S, the monthly value for sea ice cover was 12% below average in August, the highest negative anomaly for August on record.
- The northern Ross Sea, as well as the South Atlantic and Indian Ocean sectors, was the worst hit.

Why it matters?

- The extreme decline in Antarctica's sea ice sheet has set alarm bells ringing for scientists. Less ice cover may have grave consequences for the world.
- Low sea ice extent leads to higher ocean temperatures, difficulty in the formation of ice, rising sea levels, and disruption of the ocean circulation.

Closing thoughts

- Scalable new technologies and nature-based solutions will enable us all to leapfrog to a cleaner, more resilient world. If governments, businesses, civil society, youth, and academia work together, we can create a green future where suffering is diminished, justice is upheld, and harmony is restored between people and the planet.

SAMBAR DEER

In News:

The presence of a leucistic sambar has been documented in the Sangama range of Cauvery Wildlife Sanctuary during studies carried out on leopards by conservation scientist Sanjay Gubbi and his team.

Analysis of Background:

About Sambar

- The sambar is a large deer **native to the Indian subcontinent, South China and Southeast Asia.**
- It has been **listed as a vulnerable species on the IUCN Red List since 2008.**
- Populations have declined substantially due to severe hunting, local insurgency, and industrial exploitation of habitat.
- The sambar is distributed in much of South Asia as far north as the south-facing slopes of the Himalayas in Nepal, Bhutan and India, in mainland Southeast Asia including Burma, Thailand, Indochina, the Malay Peninsula, Indonesia (Sumatra and Borneo), Taiwan, and South China, including Hainan.
- In the Himalayan foothills, Myanmar, Sri Lanka, and eastern Taiwan, it ranges up to 3,500 m (11,500 ft).
- It **inhabits tropical dry forests, tropical seasonal forests, subtropical mixed forests** with stands of **conifers and montane grasslands, broadleaved deciduous and broadleaved evergreen trees, to tropical rainforests,** and seldom moves far from water sources.
- The sambar **prefers the dense cover of deciduous shrubs and grasses.**
- Sambar **are nocturnal or crepuscular.** The males live alone for much of the year, and the females live in small herds of up to 16 individuals.

INTERNATIONAL DAY OF CLEAN AIR FOR BLUE SKIES

In News:

7th September - The International Day of Clean Air for Blue Skies.

Analysis of Background:

About

- The International Day of Clean Air for Blue Skies is **designated by the United Nations General Assembly on 7 September to strengthen international cooperation in improving air quality and reducing air pollution.**
- The first observance of the International Day was held on 7 September 2020, with events held around the world.

Resolution

- In the resolution, the General Assembly emphasized *"the need to strengthen international cooperation at the global, regional and subregional levels in various areas related to improving air quality, including the collection and utilization of data, joint research and development, and the sharing of best practices."*
- It includes a specific focus on the disproportionate effect of poor air quality on women, children and older persons.

Aim

- The International Day aims to raise awareness on the importance of clean air for health, productivity, the economy, and the environment; demonstrate the close link of air quality to other environmental and developmental challenges such as climate change; promote solutions that improve air quality by sharing actionable knowledge best practices, innovations, and success stories; and bring together diverse actors for concerted national, regional and international approaches for effective air quality management.

2023 International Day of Clean Air and Blue Skies

- The theme chosen for the International Day of Clean Air and Blue Skies this year is ***"Together for clean air"***.
- The idea is to seek stronger partnerships, increased investments and shared responsibility to mitigate air pollution and public health risks. **Regional cooperation becomes critical as air has no boundaries** and action cannot be siloed.

- Science has made it increasingly clear that pollution from the larger airshed continues to influence and undermine local efforts to mitigate air pollution. **Action therefore requires a regional scale.** This local-to-regional connection requires cross-sector and multi-jurisdictional strategy.
- Regional cooperation is also the most efficient way to leverage and maximise outcome of funding that is available for clean air action as well as for all other sectoral action.

GLOBAL BIOFUELS ALLIANCE

In News:

Prime Minister Narendra Modi announced the launch of the Global Biofuels Alliance.

Analysis of Background:

Countries and Organizations

- A total of **19 countries and 12 international organizations** have so far agreed to join the alliance, including both G20 members and non-member countries.
- Apart from India, Brazil, and the US, the other G20 member countries supporting the initiative are Argentina, Canada, Italy, and South Africa. Bangladesh, Singapore, Mauritius, and the UAE are the G20 invitee countries.
- The non-G20 interested in joining the alliance are Iceland, Kenya, Guyana, Paraguay, Seychelles, Sri Lanka, and Uganda and Finland. Further, World Bank, Asian Development Bank, World Economic Forum, World LPG Organization, UN Energy for All, UNIDO, Biofutures Platform, International Civil Aviation Organization, International Energy Agency, International Energy Forum, International Renewable Energy Agency, World Biogas Association are the interested international and multilateral organizations.
- China and oil producers Saudi Arabia and Russia have however decided deciding not to be part of the alliance.

Founding Members

- **India, Brazil, and the US** are the founding members of the alliance.
- The three founding members of alliance, the US, India and Brazil contribute about 85% of the global production and the 81% of the consumption of ethanol.

Biofuel Production and India's Targets:

- The global ethanol market was valued at \$99.06 billion in 2022 and is predicted to grow at a CAGR of 5.1% by 2032 and surpass \$162.12 billion by 2032. According to estimates from the International Energy Agency (IEA), global biofuel production would need to triple by 2030 to put the world's energy systems on track toward net zero emissions by 2050.
- In its ambitious energy transition journey, India has committed to achieving carbon neutrality by 2070. India also has an ambitious biofuel roadmap. The government has advanced its target to achieve 20% ethanol blending in petrol by 2025-26 from an earlier target of 2030. The target of petrol supplies with 10% ethanol blending was achieved in June last year, ahead of the original schedule of November 2022.

Purpose

- Member countries intend to facilitate cooperation, on a voluntary basis, in intensifying the use of sustainable biofuels through strengthening collaboration between producers, consumers and interested countries, bolstering biofuels markets and encouraging the development of standards in the sector.

Note: With an eye on the Organization of the Petroleum Exporting Countries (Opec)-plus grouping -- where both Saudi Arabia and Russia are members -- the Indian-conceptualized alliance is being positioned as a global forum to help boost demand and technology transfer for the production of biofuels and enhance trade.

India is also looking at increasing its biofuel production through varied sources in a bid to cut its import dependence for fuel at a time when the 'Opec+' grouping has enforced successive production cuts.

Focus:

- Being set up at par with the International Solar Alliance, the **biofuel alliance's focus is on accelerated adoption of biofuels, creating new biofuels, setting globally recognized standards, identifying global best practices, and ensuring industry participation.**

Significance

- The launch of the Global Biofuels Alliance marks a **watershed moment in our quest for sustainability and clean energy.**
- The G20 Leaders' Declaration said that the member countries "**recognize the importance of sustainable biofuels in our zero and low- emission development strategies, and note the setting up of a Global Biofuels Alliance**".

ANTARCTIC SEA ICE

In News:

- **Antarctica's sea ice**, a critical component of the Earth's climate system, has been **declining** alarmingly, reaching record lows in recent years.
- This tendency is especially troubling because it defies previous forecasts and has serious implications for **global climate dynamics**.

Analysis of Background:

The Dynamics of Antarctic Sea Ice

- Antarctica's sea ice, a sheet of frozen seawater around the continent, **fluctuates seasonally**, with **the greatest coverage in September** and **minimum coverage in February**.
- It has **consistently declined over the last two seasons**, tracking well below the winter maximum levels observed since satellite monitoring began in the late 1970s.
- Furthermore, the summer minimum has dropped, with **three record lows happening in the last seven years**.
- This is concerning since **sea ice plays an important role in regulating the Earth's temperature**.
- It reflects solar energy into the atmosphere, aiding in global cooling.
- Furthermore, **the production of sea ice leads to the generation of cold, salty water masses that drive global ocean currents**.
- Consequently, any significant changes in Antarctica's sea ice have far-reaching consequences for the Earth's climate system.

Unpredictable Patterns

- Scientists are perplexed by the dramatic loss of Antarctic sea ice, which defies previous predictions.
- While the Arctic has had a long-term trend of decreasing sea ice, Antarctica experienced a minor increase in sea ice extent from 2007 to 2016, followed by a reduction in recent years.
- Climate models have a big problem as a result of this irregular behavior.
- Climate models, which are our major instruments for forecasting future climate, have struggled to represent Antarctic sea ice accurately.
- These models, which have been built over several decades, include several components that describe **the atmosphere, oceans, energy transfer, land surface features, and sea ice evolution**.
- While they have been successful in anticipating ocean and land surface warming, replicating Antarctic sea ice has proven difficult.

Modeling Challenges

- Several variables contribute to the modeling difficulties associated with Antarctic sea ice.
- Wind and wave patterns changing, natural variability, **stratospheric ozone changes**, and meltwater from the Antarctic ice sheet into the Southern Ocean have all been presented as possible explanations for the observed sea ice loss.
- None of these elements, however, have emerged as the ultimate reason.
- The lack of direct observations of sea ice thickness is one of the most fundamental difficulties in comprehending Antarctic sea ice.
- In contrast to the Arctic, where data from submarines and other sources provide insights into sea ice thickness, information on Antarctic sea ice thickness is limited.
- Existing data are largely from land-fast sea ice linked to land or ice shelves.

Sea Ice Thickness Variations

- Recent aberrations in sea ice thickness have complicated matters.
- **Storms in McMurdo Sound drastically weakened the sea ice in 2022**, which regularly reaches a thickness of two meters.
- Snow cover, which was thicker than typical in some regions, slowed ice formation by protecting it from the cold air.
- Although the thinner sea ice was caused by strong winds rather than melting, it seriously impacted Antarctic activities.
- Despite relatively low winter sea ice coverage around most of Antarctica, sea ice in McMurdo Sound formed similarly to most years in 2023.
- The extent to which climate change is responsible for these anomalies is unknown, but they may presage future patterns.

CLIMATE ACTION SUMMIT 2023

In News:

The absence of China, the United States, and India at the Climate Ambition Summit (CAS) held as part of the United Nations General Assembly is notable due to the significant role these countries play in global greenhouse gas emissions.

Analysis of Background:

- **Global Emissions Significance:** China, the U.S., and India are among the top three emitters of greenhouse gases globally, collectively responsible for approximately 42% of global emissions. Their actions and commitments are crucial in the efforts to combat climate change.
- **Purpose of the Summit:** The CAS was organized by the United Nations to showcase leaders who have credible actions, policies, and plans to address climate change and to uphold the goal of limiting global warming to 1.5 degrees Celsius as outlined in the Paris Agreement.
- **Limited Participation:** Despite the summit's importance, only representatives from 34 states and seven institutions were given speaking slots on the day of the event. Notably, India's neighboring countries like Sri Lanka, Nepal, and Pakistan were included as speakers, along with other emerging economies.
- **Criteria for Participation:** Countries seeking speaking slots at the summit were expected to present updated pre-2030 Nationally Determined Contributions (NDCs), net-zero targets, energy transition plans, fossil fuel phase-out plans, renewable energy targets, Green Climate Fund pledges, and adaptation and resilience plans. This indicates a high bar for participation.
- **Future Commitments:** All main emitters, including the G-20 nations, were encouraged to commit to presenting more ambitious economy-wide NDCs with absolute emissions cuts and covering all greenhouse gases by 2025.
- **India's Climate Pledges:** India updated its climate pledges in 2022, aiming to reduce emissions intensity by 45% from 2005 levels by 2030. The government also committed to sourcing 50% of its electric power from renewable, non-fossil fuel sources and increasing carbon sinks through afforestation.

About the Summit

- The Climate Ambition Summit held at the United Nations Headquarters in New York on 20 September 2023 aimed to address the urgent need for climate action in response to the latest scientific assessment by the Intergovernmental Panel on Climate Change (IPCC).

Urgency of Climate Action

- The IPCC's latest scientific assessment emphasized the pressing need for immediate and substantial reductions in greenhouse gas emissions.
- The climate crisis has already caused extensive damage, and emissions remain at record levels.
- To limit global warming to 1.5°C above pre-industrial levels and prevent the worst impacts, rapid and ambitious action is required.

Climate Justice and Equity

- The summit acknowledged that populations least responsible for the climate crisis are suffering the most from its impacts.
- This issue of climate justice and equity calls for immediate assistance and support from governments and international financial institutions to help vulnerable communities adapt and recover from climate-related loss and damage.

Multisectoral Participation

- The summit aimed to accelerate climate action by bringing together governments, businesses, financial institutions, local authorities, and civil society.
- It recognized the need for collective global will to transition to a renewable-energy-based, climate-resilient global economy.

Three Acceleration Tracks

The summit operated on three interrelated acceleration tracks: Ambition, Credibility, and Implementation.

- **Ambition:**
 - Government leaders, especially major emitters, were expected to present updated pre-2030 Nationally Determined Contributions (NDCs) and net-zero targets.
 - They were also encouraged to commit to energy transition plans with no new coal, oil, and gas projects, phase-out plans for fossil fuels, and more ambitious renewable energy targets.
 - The Green Climate Fund pledges and economy-wide plans on adaptation and resilience were part of the agenda.
 - Importantly, all main emitters and G20 governments were urged to commit to presenting more ambitious economy-wide NDCs with absolute emissions cuts by 2025.
- **Credibility:**
 - Leaders of businesses, cities, regions, and financial institutions were expected to align their transition plans with a UN-backed credibility standard outlined in the "Integrity Matters" report.
 - This standard called for net-zero pledges that are fully aligned with the 1.5°C target.
 - It included specific requirements such as 2025 and 2030 targets, addressing scope 3 emissions, phasing out fossil fuels, achieving real emissions cuts without offsets, and advocating for science-based climate action.
- **Implementation:**

- Leaders from various sectors were tasked with presenting existing or emerging implementation partnerships focused on decarbonizing high-emitting sectors like energy, shipping, aviation, steel, and cement.
- Additionally, partnerships addressing climate justice issues, such as reforming the international financial system and improving early warning systems for adaptation and loss and damage, were discussed.

VEERANGANA DURGAVATI TIGER RESERVE

In News:

- Madhya Pradesh Government has officially announced the establishment of the Veerangana Durgavati Tiger Reserve.
- It is the seventh tiger reserve in the state and 54th in the country.

Analysis of Background:

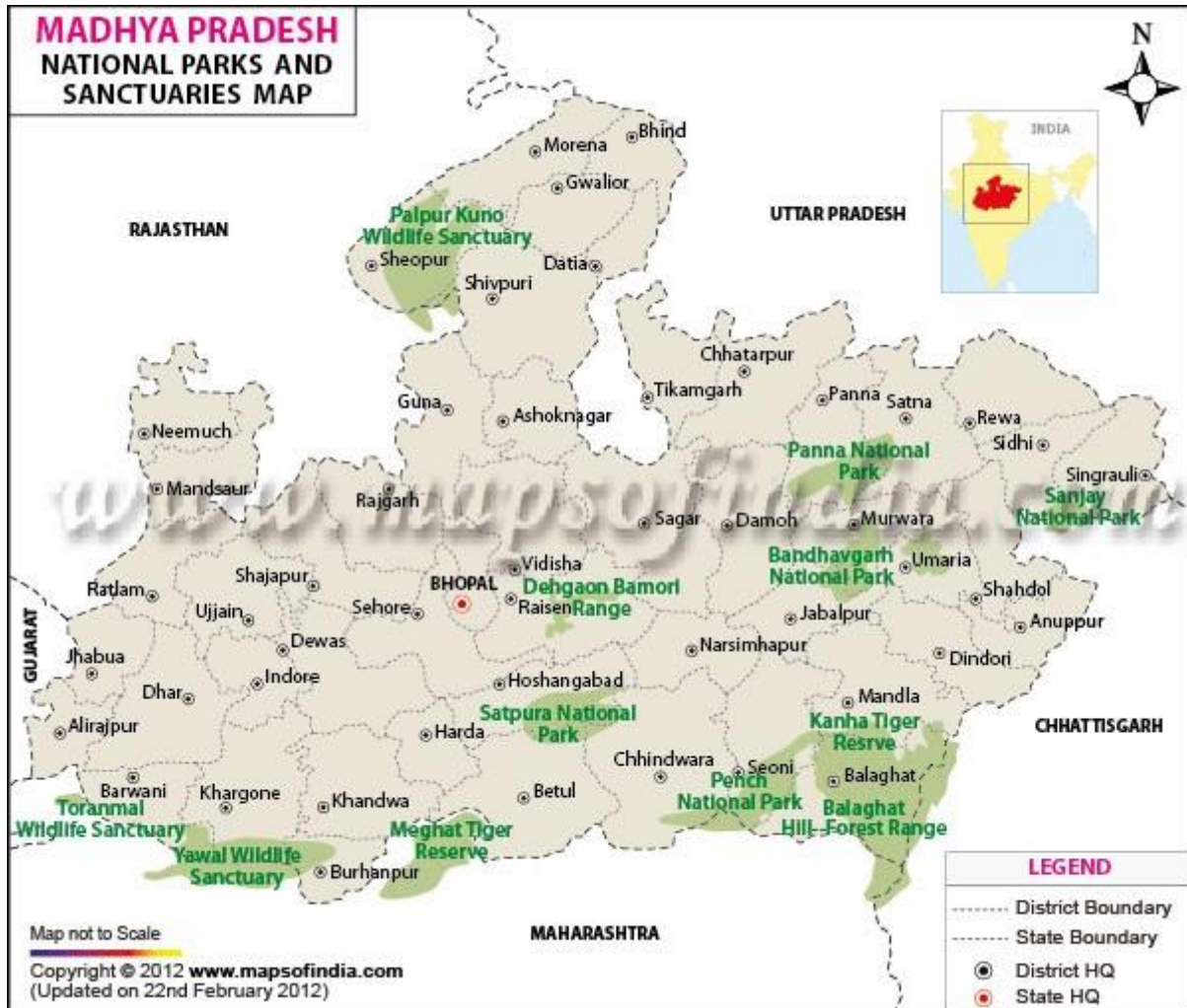
- This newly designated Tiger Reserve will encompass areas **within the Nauradehi (Wild Life) & Veerangana Drugavati Sanctuary, recognized for their ecological significance** in preserving biodiversity, including flora, fauna, geology, and zoology. Presently, the sanctuary is home to **approximately 15 tigers**, making it a vital habitat for the endangered species.
- The declaration is in accordance with the provisions of clause (ii) of sub-section (iv) of section 38V of the **Wildlife (Protection) Act, 1972 (53 of 1972)**.
- The combined protected area, formed by notifying Nauradehi and Durgavati Wildlife Sanctuaries, comprises two core areas.
- The newly established Veerangana Durgavati Tiger Reserve covers an extensive area of 2,339 square kilometers and is located approximately 20 kilometers from Bhopal. It **spans three districts—Narsinghpur, Sagar, and Damoh**.

Significance

- The National Tiger Conservation Authority (NTCA) recently granted preliminary approval for the creation of this new tiger reserve during a meeting of its technical committee.
- The establishment of this reserve is a **crucial requirement for the Ken-Betwa River linking project, adding another layer of significance to its preservation**.

Tiger Reserves in MP

- Madhya Pradesh is renowned for its six existing tiger reserves: Kanha, Bandhavgarh, Panna, Pench, Sanjay Dubri, and Satpura.



RED SEA CORAL REEFS AND SEA URCHINS

In News:

- The Red Sea's spectacular coral reefs face a new threat. Marine biologists warn—the mass death of sea urchins that may be caused by a mystery disease.

Analysis of Background:

Red Sea Coral Reefs

- Red Sea coral reefs are the **northernmost in the Indian Ocean**. Most of the Red Sea coast is rimmed by shallow submarine shelves and extensive **fringing reef systems**, by far the dominant reef type found here.
- **Red Sea fringing reef platforms** are over 5000 years old, and the entire coastal reef complex extends along some 2,000 km of shoreline.
- Most such reefs **grow directly from the shoreline**. The dominant, most actively growing corals include most notably highly branched species of the **genera *Acropora* and *Porites***.
- Such Red Sea coral reef formations are almost certainly the result of the active and unusual tectonic forces that have been at work here for millennia and continue today.
- There are a few true atolls in the Red Sea (several off the coast of Sudan), but **no true barrier reefs**.

Characteristics of Red Sea Coral Reefs

- Red Sea corals have developed an unusually **high tolerance to the extreme temperatures, salinity, and occasional turbidity (caused by huge seasonal dust storms) that occur in the region**. Such conditions that would be lethal or highly damaging to most hard corals found elsewhere.
- Also, water **clarity is exceptional in the Red Sea because of the lack of river discharge and low rainfall**. Thus, Red Sea reefs are **not heavily impacted by the suspension and dissipation of fine sediments** that plague reefs in tropical oceans near large land masses.
- Red Sea coral reefs are particularly well developed in the north and central portions (off the coasts of Egypt, Saudi Arabia, Sudan), with large sizable offshore reef complexes containing small islands, fringing reefs, and a variety of reef-associated habitats.
- Further south, coral growth is somewhat inhibited by the influx of nutrient-laden water where the Indian Ocean enters the Red Sea. The surface waters of the more southerly areas are also subject to far greater mixing with deeper water caused by strong winds coming off a high mountainous coast.
- In general, the **marine biota of Red Sea coral reefs is characterized by high endemism**. For example, of the 1200 or so Coral Reef Fish species recorded, about 10% are endemic (found nowhere else).
- Despite the extreme conditions characteristic of the region, Red Sea coral reefs are generally healthy. There is usually **minimal coral bleaching evident**, although some localized outbreaks are reported from time to time.

Sea Urchins

- Sea urchins are members of the phylum Echinodermata, **which also includes sea stars, sea cucumbers, sand dollars, brittle stars, and crinoids**.

- Like other echinoderms, they have five-fold symmetry (called **pentamerism**) and move by means of hundreds of tiny, transparent, adhesive "tube feet".
- Urchins **typically range in size from 3 to 10 cm**, but the largest species can reach up to 36 cm.
- Sea urchins are **benthic creatures and eat plant and animal matter**, largely preferring kelp, algae, and sponges in their rocky habitats, as well as decaying matter that settle down from the water column.



KAIMUR WILDLIFE SANCTUARY

In News:

- Officials have been working towards obtaining the National Tiger Reserve Conservation Authority's approval for declaring Kaimur Wildlife Sanctuary as Bihar's 2nd tiger reserve.

Analysis of Background:

Kaimur Wildlife Sanctuary

- Kaimur Wildlife Sanctuary is **situated in Kaimur District and Rohtas District of Bihar**.
- It is the **largest sanctuary in the state** and extended in the plateaued landscape of Kaimur Range.
- It **was established in 1979**.
- The major forest types are **Tropical Dry Mixed Deciduous, Dry Sal Forests, Boswellia Forests and Dry Bamboo Brakes**.
- It is home to rare and endangered flora and fauna. **Rohtasgarh Fort and Shergarh Fort are also located in these forests**.

- It also has **numerous Megaliths, Rock painting of prehistoric age and stone inscription from a bygone era.**
- The Government of Bihar has planned to developed it into Tiger Reserve.

Geography

- This Wildlife Sanctuary is located in **Rohtas Plateau and Kaimur plateau of Kaimur Range in the south-western part of Bihar.**
- In the valley portions there are several waterfalls of which the finest are Karkat Waterfall, Manjhar Kund, Dhua Kund, Tutla Bhawani waterfall, Geeta ghat waterfall, Kashish Waterfall, and Telhar.
- There are several Dams and lakes, including **Anupam Lake, Karamchat dam and Kohira Dam.**

Fauna

- The **main animals found** at Kaimur Wildlife Sanctuary are Bengal tigers, Indian leopards, Indian boars, Indian pangolins, sloth bears, sambar deers, Indian muntjacs, Four-horned antelopes, chitals, nilgais and various species of reptiles, insects and butterflies.
- It is **home to more than 70 species of resident birds**, which stay here all year around. The number increases in the migratory season i.e. during the winters, when there is an influx of birds from the Central Asian region.
- **Common birds species** are peafowl, grey partridge, quail, Malabar, pied hornbill, swallow, nightjar, drongo, paradise flycatcher, kingfisher, bulbul, mynas, pigeon, wood pigeon, blue jay, owl, falcon, kites, eastern imperial eagle, greater spotted eagle, white-tailed eagle, Pallas's fish eagle, grey-headed fish eagle, and the lesser kestrel and vultures.
- Birds such as the lesser white-fronted goose, ferruginous duck, Baer's pochard duck and lesser adjutant, greater adjutant, black-necked stork, and Asian openbill stork migrate from Central Asia to the park during winter.
- Fishes are found in Anupam Lake and Kalidah near Rameshwar kund. Among snakes, cobra and kraits are of common occurrence while pythons are occasionally seen.

Kaimur Range

- **Kaimur Range is the eastern portion of the Vindhya Range**, about 483 kilometres long, extending from around Katangi in Jabalpur district of Madhya Pradesh to around Sasaram in Rohtas district of Bihar. It passes through the Rewa and Mirzapur divisions.
- The range never rises more than a few hundred metres above the surrounding plains and has a maximum width of around 80 km.

- The southern part of the Vindhyan Range up to Katangi is called Bhandar Range. Beyond this point the escarpment enclosing the land-locked valley of Sirampur and the hill range in continuation is called the Kaimur Range.
- Kaimur escarpment forms the watershed or divide for two of the major rivers of peninsular India, the Son on the south and Tamsa or Tons on the north.
- A series of plateaus runs along the Kaimur Range. These fluvial plateaus, consists of a series of descending plateaus, starting with the Panna Plateau in the west, followed by Bhandar Plateau and Rewa Plateau and ending with Rohtas Plateau in the east.

Protected areas in the Kaimur Range include:

- Kaimoor Wildlife Sanctuary in Uttar Pradesh
- Chandra Prabha Wildlife Sanctuary in Uttar Pradesh
- Kaimur Wildlife Sanctuary in Bihar

ONE SUN, ONE WORLD, ONE GRID (OSOWOG)

In News:

In the run-up to the 18th G20 Summit, a day-long conference on "**Transnational Grid Interconnections for One Sun, One World, One Grid (OSOWOG)**" was held in New Delhi, on 6th September 2023.

Analysis of Background:

OSOWOG

- Green Grids Initiative — One Sun, One World, One Grid (GGI — OSOWOG) is an **initiative by the International Solar Alliance (ISA), India, France and United Kingdom to build a Global Green Energy Grid, primarily focusing on solar and wind energy.**
- The One Sun One World One Grid (OSOWOG) is an initiative to introduce a transnational electricity grid that supplies power worldwide.

Vision Behind the Initiative

- The vision behind the OSOWOG initiative is the mantra that "***the sun never sets***".
- The OSOWOG initiative aims to connect different regional grids through a common grid that will be used to transfer renewable energy power and, thus, realize the potential of renewable energy sources, especially solar energy.

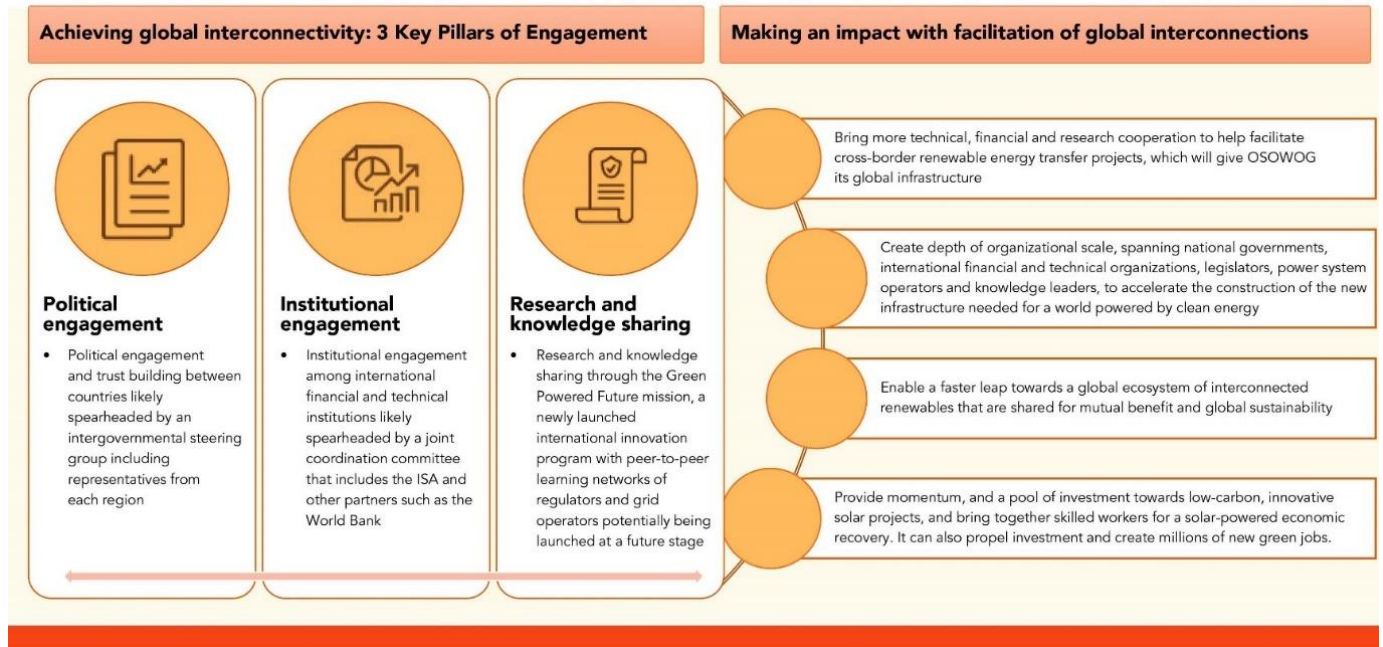
History

- The idea for this initiative was first proposed by Prime Minister Narendra Modi, during the assembly of the International Solar Alliance (ISA) 2018. The Green Grids initiative (GGI) was launched by the United Kingdom (UK).
- This initiative intends to create a framework for international collaboration on the optimal use of renewable resources to ensure that clean and efficient energy is a reliable alternative for all countries to meet their energy requirements by 2030.
- At the Conference of Parties (COP-26) climate summit held in Glasgow in 2021, both initiatives were launched together by India and the UK as a part of bilateral cooperation in partnership with the International Solar Alliance (ISA) and the World Bank Group (WB).
- As both initiatives focused on the transition to renewable energy at a global level, they merged and became a single initiative for a common purpose called the GGI-OSOWOG.

What is its objective?

- While the sun is the source of all energy and solar energy is totally clean and sustainable, it is available only during the daytime and is dependent on the weather. OSOWOG is the solution to this challenge.
- Its objective is to **aid in developing a worldwide grid** through which clean energy can be transmitted anywhere, anytime (use power at night in one part of the world from solar energy generated on another side of the world where it is daytime).
- It also aims to help reduce storage needs and enhance the viability of solar projects. Its ultimate goal is to reduce carbon footprints and energy costs.
- By 2030, ISA hopes to raise \$ 1 Tn in finance to help developing nations build their solar power infrastructure to meet their energy demands.
- The use of fossil fuels aided the industrialisation and development of numerous nations but at the expense of the planet's ecosystem. The OSOWOG initiative will, in a way, use renewable energy, that is, solar energy and help in the generation of power all over the world. This initiative will help in three transitions:
 - Switch of energy production from fossil fuel to clean energy
 - Switch of energy allocation from local balance to cross-border and global distribution
 - Switch of energy consumption from coal, oil and gas to electric-centric consumption

OBJECTIVES & IMPACT



How will it be implemented?

OSOWOG is divided into three main phases.

1. In the first phase, the Indian grid would be connected to the grids of Middle East, South Asia and South-East Asia to develop a common grid. This grid would then be used to share solar energy as per need, in addition to other renewable energy sources.
2. The second phase would connect the functional first phase to the pool of renewable resources in Africa.
3. The third phase would look at achieving true global interconnection. The idea will be to integrate as many countries as possible to create a single power grid of renewable energy. This can then be accessed by all countries.



How will it help the world become more sustainable?

- All participants in the initiative will focus on attracting effective investments in renewable energy sources by utilizing technology, finance, and skill. When all stakeholders coordinate, it is expected to bring down project cost, and lead to higher efficiencies and increased asset utilisation for all involved.
- The initiative may have a spillover effect, as the cost-effective source of energy production could be used in other areas such as poverty alleviation, provision of drinking water, sanitation facilities, and food security. Global collaboration will bring in increased investment into research and development.

What are the challenges expected in its implementation?

- One of the big challenges for implementation will be maintaining a stable grid over a large geographical area.
- The Electricity Grid is vulnerable to accidents, weather, and cyber-attacks that are prone to increase and disrupt the electricity supply on a mass scale.
- The mechanism of cost-sharing will also be challenging as participating countries are both rich and poor nations.

Why is OSOWOG important?

- Climate change is a cause of concern not only in India but across the globe. A significant portion of the pollution produced by various non-renewable methods of power production can be ascribed to the rising levels of greenhouse gas emissions that are hastening global warming. Extreme weather changes, increases in temperature, floods, and droughts are frequent occurrences. This is not only causing the problem in a particular area or country but is affecting the globe.
- For example, deforestation in Amazon rainforests affects Brazil's ecosystem and increases carbon dioxide (CO₂) in the atmosphere, increasing global temperature. At this point, renewable energy and such initiatives become the need of the hour.
- A report by Ernst & Young (EY) claims that due to coordinated effort, India is currently positioned third in the Renewable Energy Country Attractive Index for 2021. The following figure explains the steps taken toward forming this common grid.



- This will develop a common grid to increase cooperation and relation between the nations and reduce reliance on non-renewable resources.
- Non-renewable energy will deplete over time and get expensive due to a lack of availability and increasing transportation costs. This will hurt the economy as export can often be affected by war, conflict, lack of cooperation or extreme conditions. Thus, an increase in dependence on renewable energy is essential that will also prevent climate change.
- So, investing in this is beneficial as renewable energy is abundant. This will enable the creation of a single renewable energy power grid that all countries will access.

What will nations gain through OSOWOG?

- This will enable increased access to energy on a large scale. It will not only be an investment towards low-carbon emissions due to a decrease in usage of fossil fuel and other non-renewable energy but will also include cheaper living expenses and better livelihoods

- This will also reduce storage needs and enhance the viability of solar projects. Countries like India, near the equator, mostly witness the sun every day. This initiative will make total usage of solar energy, which is efficient, clean, and cost-effective and will never deplete
- It will also open a new avenue for cooperation between different countries and regions as it includes nations all over the world
- It will enable countries to meet the Paris Agreement target to prevent climate change by transitioning to renewable energy. This will also lead to sustainable development
- It will give low-carbon solar projects momentum and bring together skilled workers and new technology for a solar-powered economic recovery. Additionally, it can spur economic growth and provide millions of new green employment
- This would enable a quicker transition to an integrated global ecosystem of renewable energy sources that are shared for everyone's benefit and long-term sustainability.

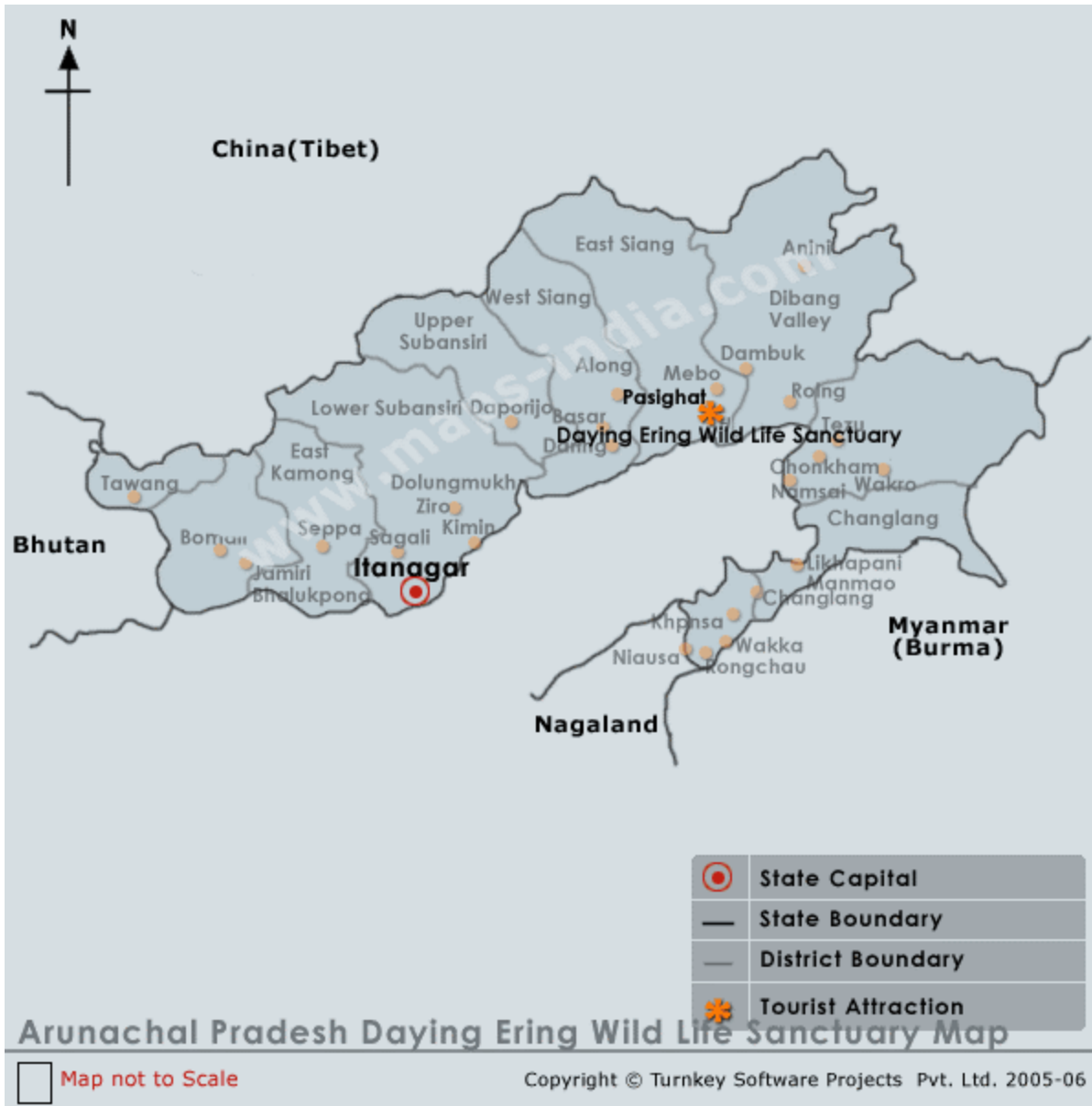
D. ERING WILDLIFE SANCTUARY

In News:

Two rescued wild animals, a Fishing Cat and a Python, were released in the **Ering Wildlife Sanctuary in Arunachal Pradesh's East Siang district.**

Analysis of Background:

- D'Ering Memorial Wildlife Sanctuary is a **protected area in Arunachal Pradesh.**
- It was **established in 1978.**
- Most of this sanctuary, about **80% is covered with grass, the rest are riverine forests mixed with bamboo and secondary forests.**
- The sanctuary is **13km away from Pasighat**, home to a variety of plants, trees and animals.
- It is home to two of the great cats-**the Tiger and the Leopard.**
- Here, one can find the endangered Takin, Hoolock Gibbon, Red Panda, Slow Lories and Capped Langur.
- This park is **situated between the Siang and Sibya rivers, east of Pasighat town.**



- The rivers, through their meandering courses, create several large and small islands or **chaporis** that form the sanctuary.
- **Eighty per cent of the sanctuary comprises alluvial wet grassland**, while the remaining consists of woodland and waterbodies.
- The sanctuary is **divided into three ranges namely Borguli, Anchalghat, and Namsing**.
- Borguli and Anchalghat are the major entry points to the sanctuary.
- Apart from these animals, wild buffaloes, wild elephants, Hog Deer, etc. are found here in abundance.
- The sanctuary becomes home to migratory birds during the winter season and shelters species of birds from Siberia and Mongolia.
- The Anchalghat range, characterized by shorter grasslands, is **one of the world's best sites for the critically endangered Bengal florican**.

- Other birds of interest include pied harriers, hen harriers, greater thick-knees, Himalayan rubythroats, bright-headed cisticolas, graceful prinias, chestnut-crowned warblers, and cinereous vultures.
- Among other wildlife, the most ubiquitous residents of the national park include **Asian elephants and Asiatic buffaloes.**

DHEERAN IAS ACADEMY

MAHENDRAGIRI

In News:

India's latest warship, Mahendragiri, will be launched at the Mazagon Dock Shipbuilders Limited, Mumbai, on September 1, the Indian Navy said.

Analysis of Background:

- Mahendragiri, named **after a mountain peak in the eastern Ghats located in Odisha**, is the seventh ship of the Project 17A frigates.
- Project 17 Alpha frigates (P-17A) were launched by the Indian Navy in 2019.
- The first ship under P17A borrows its name from an old frigate of the Navy, INS Nilgiri that was named after Nilgiri Hills.
- Six other ships of Project 17 A were called -- '**Nilgiri**', '**Himgiri**', '**Udaygiri**', '**Dunagiri**', '**Taragiri**' and '**Vindhyagiri**'.

Mahendragiri Warship

- The newly christened Mahendragiri is **a technologically advanced warship and stands as a symbol of India's determination to embrace its rich naval heritage while propelling itself towards a future of indigenous defence capabilities.**"
- Aligning with the country's resolute commitment to the 'Aatma Nirbharata', **a substantial 75% of the orders for equipment and systems for Project 17A ships** including Mahendragiri have been placed by indigenous firms, including micro, small, and medium enterprises (MSMEs).
- The launch of Mahendragiri is an apt testament to the incredible progress our nation has made in building a self-reliant naval force.

Mahendragiri Mountain

- Mahendragiri, is **a mountain in Rayagada block of the district of Gajapati, Odisha, India.**
- It is **situated amongst the Eastern Ghats at an elevation of 1,501 metres (4,925 ft).**
- It is **second biodiversity Heritage Site of Odisha.**
- This is the **second highest mountain peak of Odisha after Deomali in Koraput district.**
- Mahendragiri hill and its surrounding areas are recognized as a biodiversity hot spot due to numerous medicinal plants and other species that are found here.

In News:

The participation of Indian Naval Ships Ranvijay and Kavaratti, along with the submarine INS Sindhukesari, in the 30th edition of the Singapore India Maritime Bilateral Exercise (SIMBEX) highlights the continued commitment of the Indian Navy and the Republic of Singapore Navy (RSN) to strengthen maritime cooperation.

Analysis of Background:

Longstanding Bilateral Exercise

- SIMBEX is an annual bilateral naval exercise that has been conducted since 1994, making it the longest continuous naval exercise that the Indian Navy engages in with any other country. It reflects the enduring maritime partnership between India and Singapore.

Exercise Phases

- SIMBEX-2023 is structured into two phases:
 - **Harbour Phase:** This phase takes place in Singapore from September 21 to 24, 2023. It involves professional interactions, cross-deck visits, Subject Matter Expert Exchanges (SMEE), and sports fixtures. These activities are designed to enhance interoperability and mutual understanding between the Indian Navy and the RSN.
 - **Sea Phase:** The Sea Phase focuses on complex and advanced naval operations. It includes air defense exercises, gunnery firings, tactical maneuvers, anti-submarine exercises, and various other maritime operations. The objective is to improve war-fighting skills and strengthen the capability of both navies to conduct multi-discipline operations jointly in the maritime domain.

Participating Assets

- The Indian Navy has deployed several assets for SIMBEX-2023, including:
 - Indian Naval Ships (INS) Ranvijay and Kavaratti.
 - The submarine INS Sindhukesari.
 - Long-Range Maritime Patrol Aircraft P8I.

Interoperability and Mutual Learning

- SIMBEX offers an opportunity for both navies to enhance their interoperability by conducting joint exercises and sharing best practices.
- It promotes mutual learning and the exchange of knowledge in various aspects of naval operations.

Regional Maritime Security

- The exercise contributes to strengthening regional maritime security in the Indo-Pacific.
- It enhances the ability of the Indian Navy and the RSN to work together effectively in countering emerging security challenges, including piracy, maritime terrorism, and ensuring the safety of sea lanes of communication.

Diplomatic Relations

- SIMBEX not only serves military objectives but also contributes to the diplomatic relationship between India and Singapore.
- It underscores their shared commitment to a free and open Indo-Pacific and regional stability.

C-295 TRANSPORT AIRCRAFT

In News:

Indian Air Force takes delivery of the **first C-295 Transport Aircraft in Spain.**

Analysis of Background:

- The CASA C-295 (now Airbus C295) is a **Medium Tactical Transport Aircraft** that was designed and initially manufactured by the Spanish aerospace company CASA.
- During 2021, it was agreed that, as a part of a larger purchase, a batch of 40 C-295s would be license-manufactured in India by Tata Advanced Systems Limited.
- It is **capable of carrying up to nine tonnes of payload or as many as 71 troops at a maximum cruise speed of 260 kts.**
- Adding to its flexibility is the capability of being **equipped for the air-to-air refueling of fixed-wing aircraft and helicopters.**
- Beyond its use as a **tactical transporter**, the C-295 is capable of performing a wide variety of missions effectively. These included **parachute and cargo dropping, electronic signals intelligence (ELINT), medical evacuation (MEDEVAC), and maritime patrol.**
- The C295 cruises at altitudes up to 30,000 ft., while also retaining excellent low-level flight characteristics. It has remarkable short take-off & landing (STOL) performance from unpaved, soft, and sandy/grass airstrips.
- The C295 is the **perfect “workhorse”** offering unique versatility and proven reliability for the needs, of military forces, governments and non-governmental agencies – today and tomorrow.

TRISHUL EXERCISE

In News:

The Indian Air Force kickstarted its annual mega training **exercise Trishul**.

Analysis of Background:

About

- Trishul training mission is a massive event, with **large fleets of fighter aircraft participating, including the Rafale, Mirage 2000, and Su-30MKIs**.
- The military drills will also **include heavy-lift transport planes and choppers such as the Chinook and Apache**.
- Garud Special Forces are also participating in the drills, in which all elements of air power are expected to be used.

Aim of the Exercise

- The exercise is **aimed at testing the command's operational preparedness and given its scale and complexity, a high-level of coordination and preparedness involved**.

Location

- The drills will take place in the northern sector, which includes **Ladakh, Himachal Pradesh, Jammu & Kashmir, and Punjab**.

MISCELLANEOUS

MS SWAMINATHAN AWARD

In News:

Dr P V Satyanarayana, a Principal Scientist at the Agricultural Research Station, Acharya N.G. Ranga Agricultural University, Ragolu, was honoured with the prestigious 8th Dr MS Swaminathan Award for his remarkable contributions to the field of agriculture during the period 2021-2022.

Analysis of Background:

Key Highlights

- MS Swaminathan Award award, presented at the Indian Institute of Rice Research (IIRR) in Hyderabad, is a biennial national award jointly instituted by the Retired ICAR Employees Association (RICAREA) and Nuziveedu Seeds Limited (NSL). The award includes a cash prize of Rs. 2 Lakhs and a Gold Medal.
- Satyanarayana's groundbreaking work primarily focuses on the development of high-yielding rice varieties that demonstrate resilience against various pests and environmental challenges, including BPH (Brown Plant Hopper), BLB (Bacterial Leaf Blight), Blast, Submergence, and salinity.
 - In addition to these achievements, he has made substantial contributions to the development of fine-grain varieties and hybrid rice, which have had a transformative impact on agriculture across India.
- The Dr MS Swaminathan Award has a history of recognizing outstanding contributors to the field of agriculture.

M.S Swaminathan

- Mankombu Sambasivan Swaminathan is a renowned **Indian agronomist, agricultural scientist, plant geneticist, administrator, and humanitarian**. His contributions to agriculture, particularly in the development of high-yielding varieties of wheat and rice, have had a significant impact on food production and food security in India and beyond.

Early Life and Education

- Swaminathan was born in 1925, in Kumbakonam. His family initially wanted him to pursue a career in medicine, but he was deeply concerned about food security issues, particularly inspired by the Bengal famine of 1943 and the recurring shortages of rice in India. This **concern led him to choose agriculture as his field of study and career**.
- He began his academic journey by completing his undergraduate degree in zoology at Maharaja's College in Trivandrum, which is located in the state of Kerala.

- After his undergraduate studies, he went on to study agricultural science at the University of Madras, specifically at the Madras Agricultural College. He earned a Bachelor of Science degree in agricultural science during this period.
- In 1947, **Swaminathan moved to the Indian Agricultural Research Institute (IARI)** in New Delhi to further his education in the field of genetics and plant breeding. At IARI, he pursued post-graduate studies in cytogenetics, which he completed in 1949.

Contributions to Agriculture

Green Revolution in India

- Swaminathan is best known for his **collaboration with American scientist Norman Borlaug in the 1960s. Together, they played a pivotal role in introducing high-yielding varieties of wheat and rice to India**, which is often referred to as the Green Revolution. These high-yielding varieties significantly increased agricultural productivity and helped India achieve self-sufficiency in food production. This revolution had a profound impact on India's food security and its ability to feed its growing population.

Adaptation of Mexican Dwarf Wheat Varieties

- Swaminathan's efforts in **adapting Mexican dwarf varieties of wheat to Indian agro-climatic conditions** were instrumental in boosting wheat production in the country. These adapted wheat varieties were resistant to diseases and pests while also producing higher yields, contributing significantly to food production and alleviating hunger.

Development of High-Yielding Basmati Rice

- Swaminathan's work extended to rice production as well. He played a **key role in developing high-yielding basmati rice varieties**. Basmati rice is known for its unique aroma and long grains, and Swaminathan's efforts in improving its yield helped meet the growing demand for this premium rice variety.

C4 Rice Research

- Swaminathan also contributed to research on C4 carbon fixation in rice. **C4 plants are known for their more efficient photosynthesis process, which results in higher water and nitrogen use efficiency**. His work aimed to develop rice varieties with C4 photosynthesis capabilities to improve rice productivity while using water and nutrients more efficiently. This research is important for addressing the challenges of water scarcity and environmental sustainability in agriculture.

Administrator and Educator

Administrative Positions

- **Director-General of the Indian Council of Agricultural Research (ICAR):** He served as the Director-General of ICAR, the apex body for coordinating agricultural research and education in India. In this capacity, he played a central role in shaping agricultural policies and research agendas in India.
- **Secretary to the Government of India:** Swaminathan also served as Secretary to the Government of India, where he was responsible for advising the government on agricultural matters and policy formulation.

Promoting Technical Literacy

- **Swaminathan was a strong advocate for promoting technical literacy among farmers.** He believed that empowering farmers with scientific knowledge and techniques was essential for improving agricultural productivity. He worked to bridge the gap between scientific research and its practical application in farming.

Monitoring Weather and Crop Patterns

- Swaminathan **recognized the importance of monitoring weather and crop patterns to protect against malnutrition and food shortages.** He emphasized the need for accurate data collection and analysis to predict and mitigate the impact of adverse weather conditions on crops.

Integration of Women and Environmental Considerations

- Swaminathan was a **proponent of integrating women and environmental considerations into India's development plans.** He recognized the crucial role that women play in agriculture and emphasized their empowerment in agricultural activities. Additionally, he advocated for sustainable and environmentally friendly agricultural practices.

International Role at IRRRI

- In 1982, Swaminathan **became the first Asian Director General of the International Rice Research Institute (IRRI), based in the Philippines.** In this global leadership role, he continued to promote rice research and development, benefiting not only India but also rice-producing countries around the world.

Institution Builder

International Crop Research Institute for the Semi-Arid Tropics (ICRISAT)

- Swaminathan was instrumental in the **establishment and growth of ICRISAT, an international agricultural research organization headquartered in Hyderabad, India**. ICRISAT focuses on improving crop productivity in the semi-arid tropics, which are regions prone to drought and other challenging environmental conditions. Swaminathan's efforts in supporting ICRISAT's research and development activities have had a significant impact on enhancing food security and agricultural sustainability in these regions.

International Board for Plant Genetic Resources (IBPGR)

- Swaminathan played a **key role in the establishment of IBPGR, an organization dedicated to the conservation and utilization of plant genetic resources for food and agriculture**. The organization's mission is to safeguard the genetic diversity of crop plants and ensure their availability for future generations. Swaminathan's involvement in IBPGR helped address issues related to crop diversity and genetic resources, which are essential for crop improvement and adaptation to changing environmental conditions.

International Council for Research in Agro-Forestry (ICRAF)

- Swaminathan was also **involved in the promotion of ICRAF, an international research centre that focuses on agroforestry and the integration of trees into farming systems**. Agroforestry practices help improve soil fertility, provide wood and other forest products, and enhance the sustainability of agriculture. Swaminathan's support for ICRAF's work contributed to the development and dissemination of agroforestry practices globally.

Later Years

- **United Nations Millennium Project on Hunger:** Swaminathan co-chaired the United Nations Millennium Project on Hunger from 2002 to 2005. This initiative aimed to develop practical strategies for achieving the Millennium Development Goal of halving the proportion of people suffering from hunger and poverty.
- **National Commission on Farmers:** In 2004, he chaired the National Commission on Farmers in India, which was established to recommend ways to improve the farming system and the livelihoods of farmers in the country. The commission's recommendations played a significant role in shaping agricultural policies and reforms in India.

- **Member of the Indian Parliament:** In 2007, Swaminathan was nominated to the Rajya Sabha, the upper house of the Indian Parliament. His tenure in Parliament allowed him to advocate for important agricultural and social issues.
- **Women Farmers' Entitlements Bill 2011:** During his parliamentary tenure, he introduced the Women Farmers' Entitlements Bill in 2011. This legislation aimed to recognize and address the rights and concerns of women farmers, who play a crucial role in agriculture but often face challenges and discrimination.

Honours and Awards

- S. Swaminathan received numerous awards and honours for his outstanding contributions to agriculture, food security, and sustainable development.
- **Ramon Magsaysay Award:** He was awarded the Ramon Magsaysay Award for Community Leadership in 1971 for his contributions to the Green Revolution and agricultural development.
- **Albert Einstein World Science Award:** Swaminathan received the Albert Einstein World Science Award in 1986 for his significant achievements in science and technology.
- **World Food Prize:** He was the recipient of the inaugural World Food Prize in 1987, which recognized his role in improving global food security through agricultural research and development.
- **Civilian Awards in India:** Swaminathan was honoured with several civilian awards in India, including the Padma Shri (1967), Padma Bhushan (1972), and Padma Vibhushan (1989), which are among the highest civilian honours in the country.

Publications

- Throughout his career, M.S. Swaminathan authored numerous scientific papers and books. His publications covered a wide range of topics, including crop improvement, genetics, biodiversity conservation, and sustainable agriculture. These publications have contributed to the body of knowledge in agriculture and have guided researchers and policymakers in addressing global food security and agricultural sustainability challenges.

Matsya 6000

About Matsya 6000

- The National Institute of Ocean Technology (NIOT) in Chennai created the manned submersible vehicle.
- It was created as part of the Samudrayaan program to help humanity explore mineral resources in the deep ocean.

- It would make India one of just six countries (the United States, Russia, Japan, France, and China) to have piloted a crewed undersea expedition deeper than 5,000 meters.

Mission Objectives

- Its goals will be to investigate chemosynthetic biodiversity in hydrothermal vents and low-temperature methane seeps in the ocean.
- It will also promote ocean literacy and tourism.

Features

- It is meant to function in the deep water for 12 hours, but it can also run for up to 96 hours in an emergency, with all the necessary human safety procedures.
- It is made of an 80mm thick titanium alloy and can withstand pressures 600 times greater than at sea level.
- It is powered solely by gravity, water, and lithium-ion batteries.
- The ultra-short baseline acoustic positioning system (USBL) will also be included. This allows the mothership carrying the transponder to send information and the submersible to respond, informing the mothership of the submersible's location.
- This is a flotation device that will rise to the surface of the water, assisting in the recovery of the submersible even if it is unable to resurface.

Facts about the Samudrayaan Mission:

- It is India's first manned deep-sea exploration mission.
- It is intended to explore deep ocean resources as well as conduct biodiversity surveys.
- Because the submersible is only used for exploration, the mission will have little impact on the environment.
- The project is part of the wider Deep Ocean Mission, which supports the Blue Economy strategy of the Central Government.
- The Ministry of Earth Sciences (MoES) is the nodal ministry in charge of putting this multi-institutional ambitious mission into action.

PROJECT NAMAN

In News:

The Indian Army has initiated a new initiative called 'Project Naman' to provide support and assistance to the ex-servicemen and the families of the martyrs. The project aims to facilitate the rehabilitation and reintegration of veterans into civilian society, as well as to honour the sacrifices of the brave soldiers who laid down their lives for the nation.

Analysis of Background:

- 'Project Naman' launched by the Indian Army holds significant importance for the welfare of ex-servicemen and the families of martyrs.
- By launching this project, the Indian Army reaffirms its commitment to recognizing and respecting the service and sacrifices of its personnel. It sends a powerful message of gratitude to veterans and their families.

Key Highlights

- **The welfare of Veterans and Kin:** The project focuses on the welfare of army veterans and the next of kin, particularly the families of personnel who have made the ultimate sacrifice for the nation. It acknowledges and addresses the needs and concerns of these individuals who have served the country.
- **Facilitation and Grievance Redressal:** 'Naman' establishes facilitation and grievance redressal centres, which will serve as a one-stop solution for veterans and their families. These centres will provide assistance and support in various matters, including government services and grievance resolution.
- **Access to Services:** The Common Service Centre within 'Naman' will offer government-to-customer services. This means that veterans and their relatives can access a range of essential services conveniently, making it easier for them to navigate bureaucratic processes.
- **Digital Integration:** The project aims to facilitate the updating of pensioners' accounts on the SPARSH portal. This digital integration is crucial as it streamlines the process of updating pension-related information, ensuring that veterans receive their entitled benefits accurately and on time.
- **Expansion Plans:** The initiative plans to expand with the establishment of 13 more centres at various military stations across India in Phase II. This expansion indicates the commitment of the Indian Army to extend its support network to veterans and their families on a broader scale.
- **Collaboration:** 'Project Naman' is a collaborative effort involving the Indian Army, HDFC Bank Limited, and CSE e-Governance India Limited. Such partnerships can lead to more efficient implementation and a wider reach for the project.

NIPAH VIRUS

In News::

A new outbreak of the Nipah virus has been reported in Kerala. The state government has set up a control room to monitor the situation and has intensified surveillance and contact tracing measures. The district has been put on high alert to prevent the spread of the virus, which can cause severe respiratory and neurological complications.

Analysis of Background:

Nipah virus

Origin

- The Nipah virus was **first identified in 1998 during an outbreak in Malaysia and Singapore**. The virus gets its name from the Malaysian village of Sungai Nipah, where one of the first major outbreaks occurred.
- It is classified as a **zoonotic virus, meaning it can be transmitted from animals to humans**.
- The **natural reservoir hosts of Nipah virus are fruit bats (Pteropus species)**, which do not typically show symptoms of the disease but can shed the virus in their urine, saliva, and faeces.
- Human infections often occur through the consumption of contaminated fruit or close contact with infected animals.

Symptoms of Nipah Virus Infection

- Nipah virus infection can vary widely in its presentation, from mild to severe. This variability makes early diagnosis challenging.
- **Initial Symptoms:**
 - Most patients with Nipah virus infection initially experience a high fever.
 - Severe headaches are a common early symptom.
 - Muscular aches and pain are often reported.
 - Nausea and vomiting may occur.
 - Sore throat is another early symptom.
- As the disease progresses, **individuals may develop more severe symptoms, which can include:**
 - Altered mental state, confusion, and disorientation are common as the virus affects the central nervous system.
 - Vertigo and a feeling of unsteadiness may be present.
 - Patients with severe Nipah virus infection can experience a loss of consciousness or a coma-like state.

- Neurological signs may include seizures and focal neurological deficits.
- **Encephalitis:** Severe Nipah virus infection is characterized by encephalitis, which is the inflammation of the brain. This is a hallmark feature of the disease and contributes to the neurological symptoms.
- **Respiratory Symptoms:** In addition to the neurological symptoms, Nipah virus can also cause respiratory symptoms, including cough and difficulty breathing. These respiratory manifestations may become more pronounced in severe cases.

What is Nipah virus?



NIPAH VIRUS (NiV) INFECTION IS A NEWLY EMERGING ZOOONOSIS THAT CAUSES SEVERE DISEASE IN BOTH ANIMALS AND HUMANS

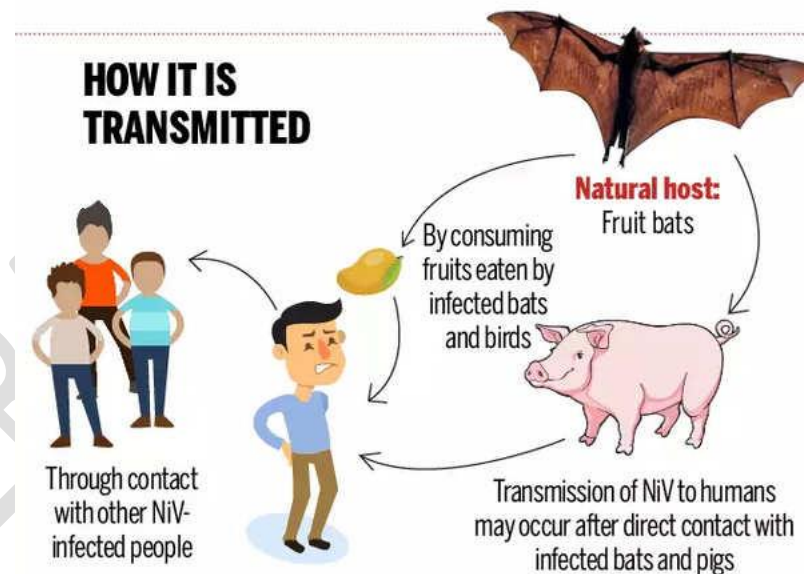


NiV first identified in 1998 during an outbreak in Malaysia



Fruit bats are natural hosts of NiV

HOW IT IS TRANSMITTED



Impact of Nipah Virus Outbreaks

Geographic Spread

- Nipah virus outbreaks have occurred in several countries in Southeast Asia and South Asia, including Malaysia, Singapore, Bangladesh, and India. These outbreaks have demonstrated the **potential for the virus to re-emerge and spread to new areas.**

High Case Fatality Rates

- One of the most concerning aspects of Nipah virus outbreaks is the **high case fatality rates associated with the disease**. The fatality rates often range from 40% to 100%, depending on the outbreak and the healthcare infrastructure in the affected region. This high mortality rate places a significant burden on healthcare systems.

Public Health Burden

- **Healthcare Systems:** Nipah virus outbreaks strain local healthcare systems, particularly in resource-limited regions. The need for specialized care, including intensive care for severe cases, places a heavy demand on medical resources.
- **Community Impact:** Outbreaks can cause fear and panic in affected communities. Public health authorities often need to implement strict isolation and quarantine measures to control the spread of the virus, which can disrupt daily life and create anxiety among the population.
- **Travel and Trade Restrictions:** Outbreaks can lead to travel restrictions and disruptions in trade, affecting the economy and livelihoods of people in the affected areas.

Economic Burden

- **Agriculture:** In some outbreaks, culling of pigs has been implemented as a control measure, leading to significant economic losses in the swine industry.
- **Tourism:** Outbreaks can deter tourists from visiting affected regions, impacting the tourism sector.
- **Workforce:** Illness and fear of infection can lead to absenteeism in the workforce, affecting productivity.

Global Concern

- Nipah virus outbreaks are a global health concern due to their potential to spread to new regions and the lack of specific treatments or vaccines. International cooperation and information sharing are critical in managing and preventing the global spread of the virus.

Challenges in Dealing with Nipah Virus

Diagnosis

- **Nonspecific Symptoms:** The initial symptoms of Nipah virus infection, such as fever, headache, muscle pain, and sore throat, are nonspecific and can be mistaken for other common illnesses like influenza or dengue fever. This can lead to delayed diagnosis and treatment.
- **Limited Diagnostic Resources:** In many regions where Nipah virus outbreaks occur, there may be limited access to specialized diagnostic tests, making it challenging to confirm cases quickly.

Treatment

- **Lack of Specific Antiviral Treatment:** Currently, there is no specific antiviral medication approved for the treatment of Nipah virus infection. This means that patient care primarily involves supportive measures, such as maintaining hydration, managing symptoms, and providing respiratory support for severe cases.
- **Limited Treatment Centers:** Adequate facilities and expertise for managing severe cases of Nipah virus infection may be lacking in affected regions, further complicating patient care.

Prevention

- **Zoonotic Transmission:** The Nipah virus primarily spreads from animals to humans, with bats as the natural reservoir hosts. Preventing transmission from bats and other animals to humans is a complex challenge, as it involves modifying human-animal interactions and behaviours.
- **Human-to-Human Transmission:** During outbreaks, human-to-human transmission can occur, often within healthcare settings or among close contacts of infected individuals. Implementing effective infection control measures is crucial but can be challenging in resource-limited healthcare settings.

Vaccine Development

- **Complexity of the Virus:** The Nipah virus is a highly complex virus with multiple strains. Developing a safe and effective vaccine has proven challenging due to the need to target multiple strains and the limited resources available for research.
- **Lack of Commercial Incentives:** The Nipah virus primarily affects low-resource regions, which may not provide significant commercial incentives for vaccine development. This can result in limited investment from pharmaceutical companies.

Treatment of Nipah Virus Infection

- There is **no specific cure or antiviral medication approved for the treatment of Nipah virus infection.**
- The primary approach to managing Nipah virus infection is providing supportive care to patients. This includes:
 - Maintain hydration and electrolyte balance.
 - In severe cases, patients may require mechanical ventilation to assist with breathing.
 - Medications may be used to alleviate specific symptoms such as fever, pain, and nausea.
- Researchers have been exploring experimental treatments for Nipah virus infection, including:
 - Some antiviral drugs have shown promise in laboratory and animal studies. These drugs aim to inhibit the replication of the virus.
 - Monoclonal antibodies that target the Nipah virus have also been under investigation. They may help the immune system combat the virus.

In News:

India sent a contingent of 655 athletes to participate in the 19th edition of the Asian Games, which began on September 23 and will conclude on October 8, 2023, in Hangzhou, the People's Republic of China.

Analysis of background:

Key Highlights

- The Asian Games 2023 were originally scheduled for 2022 but were postponed by a year due to the COVID-19 pandemic.
- At the **last edition of the Asian Games in Jakarta, Indonesia in 2018**, India had a squad of 570 athletes and achieved a best-ever medal haul of 70 medals, including 16 gold, 23 silver, and 31 bronze medals.
- Athletics has historically been a strong sport for India at the Asian Games, accounting for a significant portion of their medals. In Hangzhou 2023, India has its largest contingent in any sport with 68 athletes participating in track and field events.
- Some of the notable Indian athletes participating in the Asian Games include Neeraj Chopra (javelin throw), Avinash Sable (3000m steeplechase), Jyothi Yarraji (hurdles), Nikhat Zareen and Lovlina Borgohain (boxing), Bajrang Punia and Antim Panghal (wrestling), Manu Bhaker and Rudranksh Patil (shooting), Mirabai Chanu (weightlifting), PV Sindhu (badminton), and archery world champions Aditi Gopichand Swami and Ojas Pravin Deotale.
- For the first time, **India is fielding both men's and women's cricket teams at the Asian Games.**
- The Asian Games in Hangzhou offer 74 Paris 2024 Olympic quotas in various sports, providing athletes with an opportunity to qualify for the next Olympic Games.