



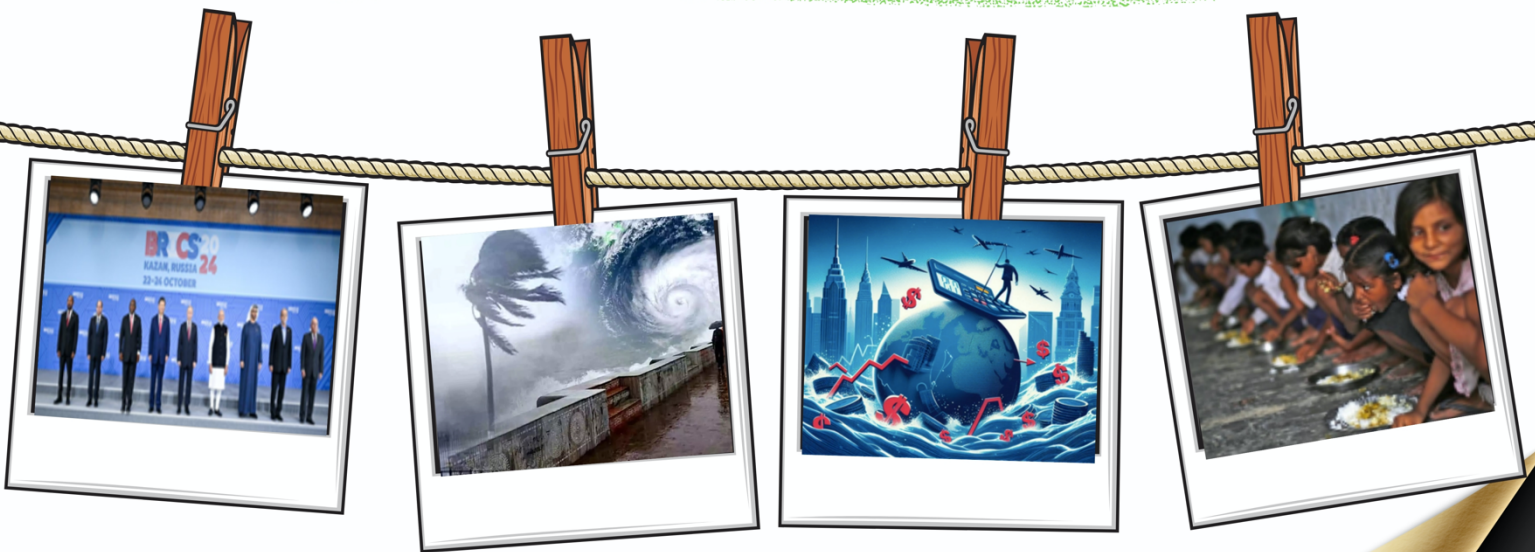
Weekly Current Affairs



To The Point

by Dhananjay Gautam

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Freedom House's "Freedom on the Net Report" 2024

Context: The latest **Freedom on the Net Report 2024** indicates that India's digital space is facing significant constraints, paralleling the restrictions seen in **China**. Here are some key points regarding this assessment.



About the Freedom on the Net Report

The **Freedom on the Net (FOTN)** report is an annual assessment by Freedom House that evaluates internet freedom across **72 countries** worldwide. The report assigns a score from **0 to 100**, where:

- **0** indicates a completely restricted internet environment.
- **100** represents a completely free internet.

Countries are categorized based on their scores:

- **0-39:** Not Free
- **40-69:** Partly Free
- **70-100:** Free

The evaluation of internet freedom is based on three main parameters:

1. **Obstacles to Access:** Barriers to internet access, including infrastructure and affordability.
2. **Limits on Content:** Restrictions on online content, including censorship and filtering.
3. **Violations of User Rights:** Protection of users against violations like surveillance and data privacy breaches.

Key Findings of the 2024 Report

- **Declining Global Internet Freedom:** Global internet freedom has declined for the **14th** consecutive year.
- **Human Rights Protection:** Of the 72 countries assessed, the protection of human rights online decreased in **27 countries**, while **18 countries** showed improvements.
- **Top Performers:**
 - **Iceland** retained its status as the freest online environment, scoring **94 out of 100**.
 - Other top-ranked countries included **Estonia (92)**, **Canada (86)**, **Chile (86)**, and **Costa Rica (85)**.

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- **India's Status:** India was categorized as **partly free**, scoring **50 out of 100**.
- **Lowest Scorers:** **Myanmar** and **China** were tied for the lowest internet freedom scores globally, each scoring **9 out of 100**.
- **Biggest Declines:** **Kyrgyzstan** experienced the largest drop in its score, followed by **Azerbaijan, Belarus, Iraq, and Zimbabwe**.
- **Most Significant Gains:** **Zambia** reported the most significant improvement in its score in 2024.
- **US Stability:** The United States maintained a stable score of **76 out of 100**, but Freedom House expressed concerns about insufficient safeguards against government surveillance.
- **New Assessments:** For the first time, the report included evaluations of internet freedom in **Chile** and the **Netherlands**.

About Freedom House

- **What it is:** The oldest American organization dedicated to supporting and defending democracy globally.
- **Founded:** In **1941** in New York, USA.
- **Immediate Purpose:** To promote American participation in World War II and combat fascism.
- **Goal:** To create a world where all individuals enjoy freedom.
- **Mission:** To expand and protect freedom around the globe.
- **Funding:** Primarily funded by the **U.S. Congress**.
- **Freedom Award:** Since **1943**, Freedom House has presented the **Freedom Award** annually to recognize champions of democracy and human rights worldwide.

Conclusion: The **Freedom on the Net Report 2024** reveals a continuing trend of declining internet freedom, highlighting the need for stronger protections for human rights online. While some countries have made strides, the overall picture indicates a significant challenge ahead for safeguarding digital freedoms globally.



Mass bleaching of corals: NOAA

Context: The National Oceanic and Atmospheric Administration (NOAA) has reported that the ongoing mass coral bleaching event, which began in February 2023, is now the **most extensive on record**. This alarming development has raised significant concerns about the health of coral reefs globally.



Key Findings:

- Extent of Bleaching:** The current bleaching event has subjected **77% of the world's coral reef areas**—spanning the Atlantic, Pacific, and Indian Oceans—to bleaching-level heat stress. This figure represents an increase of more than **11%** compared to previous records, achieved in about half the time.
- Contributing Factors:** The primary driver of this extensive bleaching is **climate change**, which has led to **record and near-record ocean temperatures**. These high temperatures create stressful conditions for corals, resulting in the expulsion of their symbiotic algae, known as **zooxanthellae**.

About Coral Bleaching:

- Coral Structure:** Corals have a symbiotic relationship with zooxanthellae, which provide essential nutrients through photosynthesis. When corals are stressed, they expel these algae, leading to bleaching, which can ultimately result in coral death.
- Historical Context:** The current event is recognized as the **fourth significant bleaching event**, with the first one documented in **1998**, which caused an **8% loss** of the world's corals. Earlier bleaching events in **2010** and **2014-2017** led to an estimated **14% loss** of remaining corals.

Impact of Coral Bleaching:

- Ecological Consequences:** Coral bleaching leads to reduced biodiversity and disrupts food chains, significantly impacting marine ecosystems.
- Socio-Economic Effects:** The decline of coral reefs adversely affects the fisheries sector, diminishes tourism, and threatens livelihoods that depend on healthy coral ecosystems.

Initiatives to Prevent Coral Bleaching:

India:

- Legal Protections:** Coral species are listed under **Schedule I** of the **Indian Wildlife (Protection) Act, 1972**.
- Regulatory Measures:** The **Coastal Regulation Zone (CRZ) Notification, 2019**, and the **Integrated Island Management Plan** prohibit harmful developmental activities and waste disposal in sensitive coastal ecosystems.
- Technological Innovations:** Projects like **bio-rock** installations in the Gulf of Kutch are being employed to promote coral restoration.

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Global Efforts:

- **G20 Initiatives:** The **Coral Research & Development Accelerator Platform** aims to foster international collaboration on coral conservation.
- **International Coral Reef Initiative (ICRI):** As a member, India participates in global efforts to protect and restore coral reefs.

What are Coral reefs?

Coral reefs, are structures made from calcium carbonate left behind by coral organisms located within the ocean. These structures play a significant role in the marine ecosystem.

Key Features:

1. Coral Organisms:

- Corals are lime-rich organisms with a hard structure, scientifically known as *Cnidaria polyps*.
- Inside the hard surface of these corals, colourful algae called *Zooxanthellae* live in a symbiotic relationship. These algae provide energy to the corals through photosynthesis.

2. Biodiversity Hotspot:

Coral reefs are considered hotspots of marine biodiversity worldwide. They are often referred to as the "rainforests of the sea" because they are home to an enormous variety of marine life.

3. Location:

- Barrier reefs are typically found in tropical or subtropical seas where temperatures range from 20-30°C.
- These reefs are situated a little away from the shoreline, forming shallow lagoons between them and the coast.

4. Depth:

Corals are found in shallow waters because, at greater depths, there is a lack of sunlight and oxygen, which are essential for their growth.

5. Water Quality:

Clean and sediment-free water is crucial for coral growth. Sediments can block the corals' mouths, leading to their death.

6. Formation Process:

Coral reefs are formed by the calcium carbonate skeletons of coral polyps, along with carbonate sediments that have been accumulating over these organisms for thousands of years.

7. Coral reefs in India:

Coral reefs in India are found in a lot of areas including the Gulf of Kutch, Gulf of Mannar, Palk Bay, Andaman & Nicobar and Lakshadweep Islands. The Gulf of Kutch in the northwest has some of the most northerly reefs in the world.

Importance: Coral reefs are essential not only for marine life but also provide several benefits to human communities, such as:

- **Fishing:** They provide a habitat for numerous fish and other marine organisms.
- **Tourism:** They are popular sites for marine tourism, boosting the local economy.
- **Protection:** They protect coastlines from storms and waves, ensuring the safety of coastal areas.

Conclusion: The current mass bleaching event highlights the urgent need for concerted global action to mitigate climate change impacts and protect coral ecosystems. Enhanced research, strict regulatory measures, and community engagement are essential for preserving these vital marine habitats.

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What can India do to End the Science Nobel Drought

Context: The recent Nobel Prize announcements have highlighted a concerning trend: only 12 individuals of Indian origin have received the prestigious award since its inception in 1901, with just five being Indian citizens. Notably, **Dr. C.V. Raman** remains the sole Indian laureate in the science category, having won the **Nobel Prize in Physics** in 1930 for the discovery of the **Raman Effect**. The 94-year gap since this significant achievement raises alarms about India's recognition in the global scientific arena.



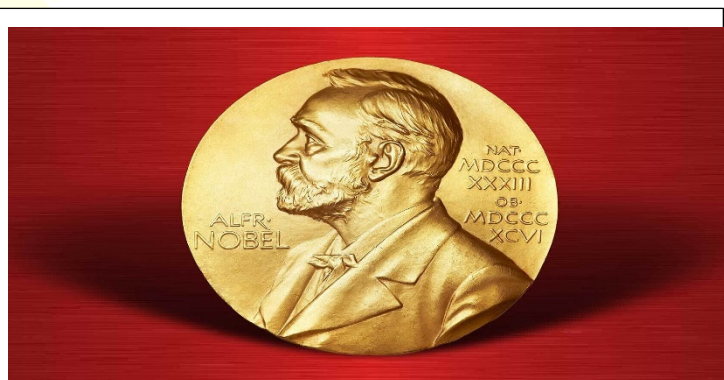
India's Nobel Prize Journey

- **Abhijit Vinayak Banerjee**, an Indian-born American economist, received the **2019 Nobel Prize in Economics** for his work on experimental approaches to alleviate global poverty, underscoring the potential of Indian-origin scientists.

Reasons Behind India's Poor Performance in the Nobel Prize Science Category

1. Limitations in Research:

- **Inadequate Basic Research:** There is insufficient emphasis on fundamental research, which is critical for fostering innovation.
- **Low Public Funding:** Public investment in R&D in India stands at around **0.7% of GDP**, significantly lower than the US's **~3%** and even trailing behind other BRICS nations.
- **Excessive Bureaucracy:** A bureaucratic environment can stifle creativity and slow down the research process.
- **Decay of University Research Capabilities:** Many universities struggle to maintain research standards, limiting breakthroughs.
- **Diminished Pool of Researchers:** India has about five times fewer researchers per capita compared to the global average, reducing the chances of producing Nobel-worthy candidates.



list of Indian Nobel Prize winners

| S.No. | Nobel Prize Recipients | Category | Year |
|-------|----------------------------|------------|------|
| 1 | Rabindranath Tagore | Literature | 1913 |
| 2 | C.V. Raman | Physics | 1930 |
| 3 | Har Gobind Khurana | Medicine | 1968 |
| 4 | Mother Teresa | Peace | 1979 |
| 5 | Subrahmanyan Chandrasekhar | Physics | 1983 |
| 6 | Amartya Sen | Economics | 1998 |
| 7 | Venkatraman Ramakrishnan | Chemistry | 2009 |
| 8 | Kailash Satyarthi | Peace | 2014 |
| 9 | Abhijit Banerjee | Economics | 2019 |



2. **Highly Selective Nobel Selection Process:** Several Indian scientists have been nominated but overlooked for the Nobel Prize, including **Meghnad Saha, Homi Bhabha, S.N. Bose, G.N. Ramachandran, and K.S. Krishnan**. Their contributions were significant, yet none secured the award.
3. **Western Dominance in Nobel Awards:** The majority of Nobel Prizes in sciences are awarded to researchers from the US and Europe, with very few laureates from Asia, Africa, or South America. This highlights an inherent bias in the selection process.

Strategies to Enhance India's Scientific Landscape:

1. Emphasize STEM Education

- Redirect focus from engineering to fundamental scientific education, identifying and nurturing talent early on through scholarships and mentorship programs.
- Revive initiatives like the **Kishore Vaigyanik Protsahan Yojana (KVPY)** to encourage students to pursue pure sciences.

2. **Address Brain Drain:** Improve infrastructure, salaries, and career prospects to retain talent in India, as many Indian-origin scientists conducted their Nobel-winning work abroad.

3. Bolster Research Capabilities

- Increase both public and private investment in scientific research and infrastructure, creating a supportive ecosystem for innovative research that fosters Nobel-worthy discoveries.

4. Foster International Collaborations

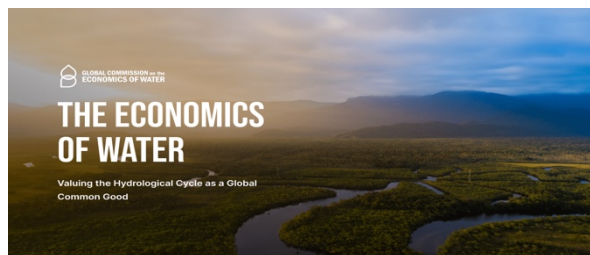
- Promote global partnerships to facilitate interdisciplinary and international collaborations, encouraging young scientists to intern with top research groups worldwide.
- Initiatives like a **"1000 Scholar Programme"** could help facilitate knowledge exchange and innovation.

5. **Cultivate a Culture of Risk-Taking** Reduce bureaucratic constraints and promote a culture of bold experimentation to encourage high-risk, innovative projects essential for transformative discoveries.

Conclusion: To end the science Nobel drought, India must focus on enhancing its scientific landscape through improved education, better funding, international collaboration, and a culture that embraces risk-taking. By addressing these key areas, India can significantly boost its chances of producing future Nobel laureates and strengthening its position in the global scientific community.

"The Economics of Water: Valuing the Hydrological Cycle as a Global Common Good": Report

Context: The **Global Commission on the Economics of Water (GCEW)** has released a report emphasizing the urgent need to govern the water cycle as a **global common good**. It calls for valuing and managing water resources to ensure food security and uphold human dignity.

**Why We Must Govern the Water Cycle as a Global Common Good**

1. **Interdependence and Interconnectedness:** Water systems are linked across local and transboundary boundaries, making cooperation essential for effective governance.
2. **Neglect of Economic Drivers:** Current governance often overlooks economic factors, focusing primarily on “blue water” (surface and groundwater) while neglecting “green water” (soil moisture and water stored in vegetation).
3. **Loss of Natural Capital:** The disruption of the water cycle, exacerbated by climate change and biodiversity loss, significantly affects the planet's natural capital.

Key Findings of the Report

- **Vulnerability:** High-density population areas, such as Northwestern India, are particularly vulnerable to water-related challenges.
- **Precipitation Sources:** The poorest 10% of the global population relies on land-based sources for over 70% of their annual precipitation.
- **Economic Losses:** Lower middle-income countries, including India, face GDP losses of approximately 14% due to climate change, reduced water storage, and limited access to WASH (Water, Sanitation, and Hygiene) services.
- **Agricultural Impact:** If current trends continue, a significant decline in water storage could render irrigation unfeasible, potentially reducing global cereal production by 23%.

Key Recommendations

1. **Governance as a Global Common Good:** The report advocates for treating the hydrological cycle as a global common good, ensuring that water governance aligns with the **17 Sustainable Development Goals (SDGs)**.
2. **Market Innovations:**
 - Promote mission-oriented innovations that foster a comprehensive economic approach, breaking away from siloed and sectoral thinking.
 - Encourage the establishment of a **circular water economy** and a revolution in food systems.
3. **Public-Private Partnerships:** Develop symbiotic partnerships between public and private sectors to enhance the quality, quantity, and reliability of financial resources dedicated to water management.
4. **Global Water Governance:** The establishment of a **Global Water Pact (GWP)** is recommended to set clear, measurable goals for stabilizing the hydrological cycle and safeguarding the world's water resources.

Conclusion: The report highlights the critical importance of valuing and governing water as a shared global resource. By addressing the interconnectedness of water systems and promoting sustainable practices, it aims to foster resilience against the challenges posed by climate change and ensure equitable access to water for all, thereby enhancing food security and human dignity worldwide.

Prohibition of Child Marriage Act (PCMA), 2006

Context: The Supreme Court of India has issued significant guidelines for the effective implementation of the **Prohibition of Child Marriage Act (PCMA), 2006**, in the case of **Society for Enlightenment and Voluntary Action v. Union of India**. The court emphasized that the act cannot be undermined by personal laws or cultural traditions.



Key Observations by the Supreme Court

- **Focus on Prevention:** The court directed that authorities prioritize the prevention of child marriages and the protection of minors, using penal measures only as a last resort.
- **Root Causes:** The court highlighted the necessity to address the root causes of child marriage, which include:
 - Poverty
 - Gender inequality
 - Lack of education
 - Deep-rooted cultural norms
- **Violation of Free Will:** Marriages involving children infringe upon the free will of individuals to choose their life partners.
- **Child Betrothals:** The Supreme Court urged Parliament to amend the PCMA to ban child betrothals (promises of future marriages).

Key Provisions of the Guidelines

1. Legal Enforcement:

- **Appointment of CMPOs:** State governments and Union Territories (UTs) must appoint **Child Marriage Prevention Officers (CMPO)**.
- **Specialized Units:** Establish a **Specialized Police Unit** and a **State Special Child Marriage Prohibition Unit** to handle cases effectively.



2. Judicial Measures:

- **Empowering Magistrates:** Magistrates should be empowered to take **Suo Moto action** and issue preventive injunctions against child marriages.
- **Fast-Track Courts:** The exploration of **Special Fast-Track Courts** specifically for child marriage cases to expedite justice.

3. Other Initiatives:

- **Child Marriage Free Village Initiative:** Adoption of a model similar to the "Open Defecation Free Village" campaign to promote awareness and prevention.
- **Monitoring System:** Establishing a **technology-driven monitoring system** to track the daily attendance of school-going girls up to the 12th grade, thereby encouraging education.

About the Prohibition of Child Marriage Act, 2006 (PCMA)

- **Replacement of CMRA:** The PCMA was enacted to replace the **Child Marriage Restraint Act (CMRA)** of 1929, also known as the **Sharda Act**, with the aim of preventing child marriages in India.
- **Definition of a Child:** Under PCMA, a child is defined as a male under 21 years of age and a female under 18 years of age.
- **Amendment Bill:** The **Prohibition of Child Marriage (Amendment) Bill, 2021** seeks to amend the PCMA to raise the minimum age of marriage for females to 21 years, following recommendations from the **Jaya Jaitly Committee**.

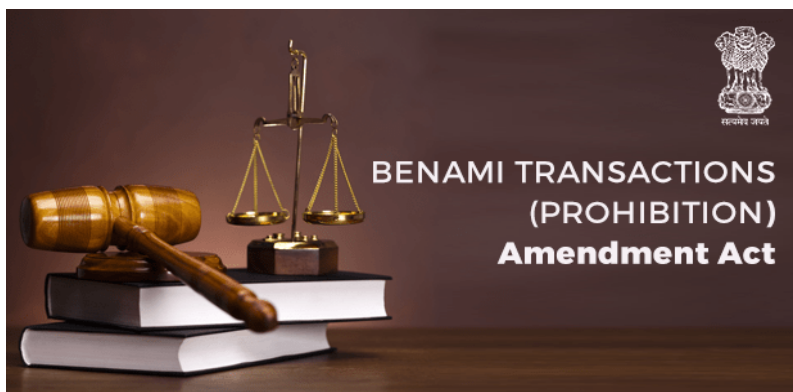
Status of Child Marriage in India

- According to the **National Family Health Survey (NFHS-5)**:
 - **23% of women** and **17.7% of boys** aged 20-24 were married before the age of 18.
- UNICEF reports indicate that over half of the girls and women who marry in childhood reside in five states:
 - **Uttar Pradesh** (largest contributor)
 - Bihar
 - West Bengal
 - Maharashtra
 - Madhya Pradesh

Conclusion: The Supreme Court's guidelines aim to reinforce the legal framework against child marriage in India, addressing its root causes and enhancing prevention measures. This initiative is essential to protect the rights of minors and promote gender equality, education, and social development.

Benami Property Transactions Act (PBPTA), 1988

Context: The Supreme Court of India has decided to review the **2022 judgment** in the case of **Union of India vs. M/S. Ganpati Dealcom Pvt. Ltd.**, which declared certain provisions of the **Prohibition of Benami Property Transactions Act (PBPTA)** unconstitutional. This review follows a petition filed by the **Union Government**.



Overview of PBPTA

- **Purpose:** The PBPTA was enacted to prohibit benami transactions and provide a legal framework for confiscating properties held under such transactions.
- **Definition:** A **benami transaction** refers to a property transaction where the property is held by or transferred to one person, but the consideration for the transaction is paid by another individual.

Key Highlights of the 2022 Judgment

- **Unconstitutional Provision:** The Supreme Court declared **Section 3(2)** of the PBPTA unconstitutional, which prescribed a jail term for entering into benami transactions. The court found this provision to be arbitrary and a violation of **Article 20(1)** of the Indian Constitution, which offers protection against conviction for offenses.
- **Retrospective Application:** The court ruled that the law did not have retrospective application, meaning authorities could not initiate or continue criminal prosecution or confiscation proceedings for transactions that occurred before the legislation came into effect.
- **Contention of the Union:** The Union Government argued that the **Benami Transactions (Prohibition) Amendment Act, 2016** should be applied retrospectively, which the court did not accept due to the lack of explicit provision for such application.

Concerns Related to Benami Transactions or Property

- **Black Money:** Benami transactions are often viewed as a significant means for holding **black money** and facilitating tax evasion.
- **Tax Evasion:** Such transactions promote tax evasion, resulting in substantial revenue loss for the government.
- **Real Estate Market Distortion:** They distort the real estate market by artificially inflating property prices.
- **Fraudulent Asset Diversion:** Benami transactions complicate the tracing of asset ownership and undermine the integrity of the financial system.

Conclusion: The Supreme Court's review of the 2022 judgment on the Prohibition of Benami Property Transactions Act is crucial for clarifying the legal framework surrounding benami transactions in India. The outcome will have significant implications for combating black money, tax evasion, and ensuring transparency in property transactions.

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Society for Worldwide Interbank Financial Telecommunication (SWIFT) System

Context: The Society for Worldwide Interbank Financial Telecommunication (SWIFT) is a cooperative organization that facilitates secure and efficient financial transactions between banks and financial institutions worldwide. Recently, calls have been made for alternatives to the SWIFT system, particularly after Russia was expelled from it due to the ongoing conflict in Ukraine.



About SWIFT System

- **Establishment:** Founded in **1973** by **239 banks** from **15 countries**, SWIFT has grown to be the backbone of international banking communications.
- **Functionality:** SWIFT primarily serves as a network for banks to securely communicate instructions for transferring funds between accounts. It is recognized as the largest and most streamlined method for international payments and settlements.
- **Bank Identifier Code (BIC):** Each financial institution is assigned a unique code, known as the **Bank Identifier Code (BIC)**, which consists of either **eight or 11 characters**. This code helps identify banks in the communication process.
- **Standardization:** By standardizing communication protocols, SWIFT ensures that financial institutions can reliably conduct cross-border transactions, significantly reducing risks and inefficiencies in international banking.

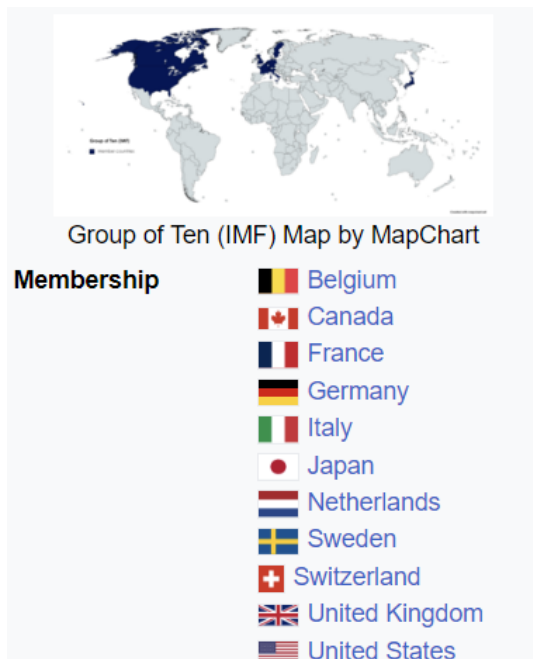
Characteristics of SWIFT

- **Not a Financial Institution:** It is essential to note that SWIFT does not hold or transfer assets; rather, it facilitates secure communication between member institutions. It transmits critical details such as the recipient's account information and the transfer amount.
- **Headquarters:** SWIFT is headquartered in **La Hulpe, Belgium**.
- **Oversight:** The system is overseen by the central banks of the **G10 countries**, the **European Central Bank**, and the **National Bank of Belgium**.
- **Membership:** Approximately **3,500 member organizations** are represented among SWIFT shareholders, who elect a board of **25 directors** to govern the organization and oversee its management.
- **Economic Sanctions:** Membership in SWIFT allows countries to conduct international financial transactions easily. Consequently, exclusion from SWIFT serves as an economic sanction against countries whose actions are condemned by the global community.

What are G10 Countries?

The **Group of Ten (G10)** is a coalition of **11 industrialized nations** that convenes annually to consult and cooperate on international finance. The member countries include:

- Belgium
- Canada
- France
- Germany
- Italy
- Japan
- Netherlands
- Sweden
- Switzerland
- United Kingdom
- United States



Conclusion: SWIFT is a critical component of the global financial infrastructure, enabling secure and efficient transactions between financial institutions. Its significance is underscored by the potential economic impact of exclusion from the system, as seen in the case of Russia following its actions in Ukraine. As discussions around alternative systems grow, the role of SWIFT in facilitating international finance remains paramount.

Yars Missile

Context: Recently, Russia has been testing the combat readiness of units equipped with **Yars intercontinental ballistic missiles (ICBMs)** in a region northwest of Moscow. This missile system is a key component of Russia's strategic nuclear forces.



About Yars Missile

- **Designation:** Officially known as the **Yars RS-24**, it is referred to as **SS-29** by NATO.
- **Type:** The Yars missile is a **mobile nuclear ICBM** that can be launched from **truck-mounted platforms** or from **silos**.
- **Production Timeline:** The production of Yars began in **2004**, and it is believed to have entered operational service in **February 2010**.

Features

- **Dimensions:** The missile is approximately **22.5 meters** in length and **2 meters** in diameter.
- **Propulsion:** It is a **three-stage, solid propellant** missile, which enhances its reliability and rapid launch capability.
- **MIRV Capability:** Yars is **MIRV-capable** (Multiple Independently Targetable Re-entry Vehicles), meaning it can carry multiple warheads, allowing it to hit several targets simultaneously.
- **Weight:** The total launch weight of the RS-24 is estimated at **49,000 kg**.
- **Range:** It has a **minimum range** of **2,000 km** and a **maximum range** of **10,500 km**, making it capable of striking targets across vast distances.
- **Guidance System:** The missile employs an upgraded guidance system that integrates both **inertial navigation** and **GLONASS** (the Russian satellite navigation system), enhancing targeting accuracy.
- **Warheads:** Yars can be armed with up to **10 MIRVs**, each equipped with a **thermonuclear warhead** weighing around **300 kilotons**.
- **Flight Manoeuvrability:** The missile is capable of **manoeuvring during flight**, allowing it to evade interception by missile defence systems. Additionally, it can deploy **active and passive decoys** to further enhance its survivability.

What are Ballistic Missiles?

- **Definition:** A **ballistic missile** is a type of rocket-propelled, self-guided strategic weapon that follows a **ballistic trajectory** to deliver a payload from its launch site to a predetermined target.
- **Launch Mechanism:** Ballistic missiles are powered initially by rockets but transition to an unpowered flight path, which arcs upwards before descending to reach their targets.
- **Payload Capacity:** They can carry various types of payloads, including **conventional high explosives, chemical, biological, or nuclear munitions**.

Conclusion: The Yars missile represents a significant advancement in Russia's strategic nuclear capabilities, combining range, payload versatility, and evasion tactics to enhance deterrence against potential adversaries. Its ongoing testing underscores Russia's commitment to maintaining and modernizing its nuclear forces.

Next Generation Missile Vessels (NGMV)

Context: The Indian Navy's Next Generation Missile Vessels (NGMV) represent a significant advancement in naval warfare technology, with a focus on stealth, speed, and offensive capabilities. Recently, American engine manufacturer General Electric announced that its **LM2500 marine engines** will power these vessels, enhancing their operational effectiveness.



About NGMV:

- **Development:** The NGMVs are being constructed by the **Cochin Shipyard Limited (CSL)**, a government-run shipyard, with a total cost of approximately **₹9,805 crore**.
- **Delivery Timeline:** The first delivery of these ships is expected to commence in **March 2027**.
- **Primary Role:** The NGMVs will primarily serve to provide offensive capabilities against:
 - Enemy warships
 - Merchant vessels
 - Land targets

They will be equipped to conduct **Maritime Strike Operations** and **Anti-Surface Warfare Operations**, functioning as a deterrent against enemy ships, particularly at strategic choke points.

- **Defensive Capabilities:** In addition to their offensive roles, these vessels will also be tasked with **Local Naval Defence Operations** and the seaward defence of **Offshore Development Areas**.

Features:

- **Propulsion System:** The NGMV's propulsion will be powered by the **LM2500** marine gas turbine, known for its ability to deliver high power while maintaining stealth.
- **Speed:** These vessels are designed to achieve a top speed of **35 knots** (approximately 64 km/h).
- **Armament:** NGMVs will be armed with a variety of anti-surface weapons, loitering munitions, unmanned vehicles, and other guided munitions to enhance their combat capabilities.
- **Primary Weapon:** The anticipated primary armament of the NGMVs will be the **BrahMos supersonic cruise missile**, capable of engaging targets at significant distances.

What is a Gas Turbine?

A **gas turbine engine** is an internal combustion engine that uses gas as the working fluid to turn a turbine. Typically, this engine consists of three main components:

1. **Compressor:** Compresses incoming air to increase pressure.
2. **Combustion Chamber:** Where the fuel is mixed with the compressed air and ignited.
3. **Turbine:** Extracts energy from the high-temperature, high-pressure gases produced by combustion to produce mechanical power.

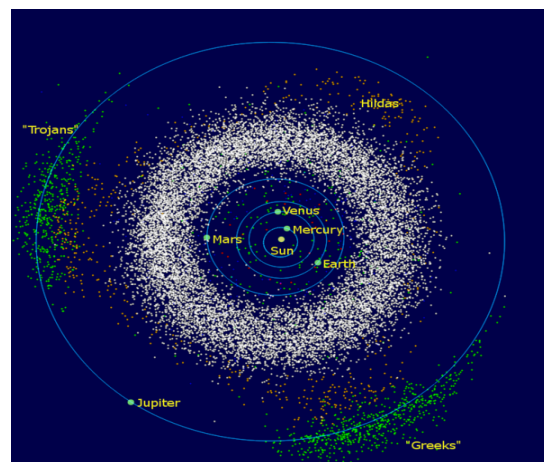
Conclusion: The Next Generation Missile Vessels (NGMV) symbolize a leap forward in India's naval capabilities, focusing on advanced technologies and strategic deterrence. With their sophisticated design and potent armament, these vessels are expected to play a crucial role in ensuring maritime security and operational readiness for the Indian Navy.

Trojan Asteroids

Context: Recently, scientists have discovered a **Trojan asteroid** associated with **Saturn**, marking the presence of these celestial bodies alongside all the giant planets in our solar system.

About Trojan Asteroids

- **Definition:** Trojan asteroids are a specific class of asteroids that occupy stable **Lagrange Points** in a planet's orbit around the Sun.
- **Stable Locations:** They are typically found at **L4** and **L5** points, which are located 60 degrees ahead of and behind the planet in its orbit, respectively. These positions allow them to remain gravitationally stable.
- **Origins:** These asteroids are believed to be remnants of the primordial material that contributed to the formation of the outer planets.
- **Orbital Characteristics:** The orbits of Trojan asteroids around the Sun closely mirror the orbit of the planet they are associated with.
- **Discovery:** Although first identified in **1906** by German astrophotographer **Max Wolf**, the name "Trojan" was assigned later, reflecting their association with the mythology of the Trojan War.
- **Scientific Significance:** Due to their unusual orbits and long-term stability, studying Trojan asteroids can provide valuable insights into the evolution of the solar system.



What are Lagrange Points?

- **Definition:** A **Lagrange Point** is a position in space where the gravitational forces of two large bodies, such as a planet and the Sun, perfectly balance the centripetal force felt by a smaller object (like an asteroid or spacecraft) in that area.
- **Purpose:** These points are advantageous for spacecraft, as they allow for minimal fuel consumption to maintain a stable position.
- **Types:** There are **five** Lagrange points, denoted as **L1, L2, L3, L4, and L5**.
 - **L1:** Located between the Earth and the Sun, it offers an unobstructed view of the Sun. The **Solar and Helio spheric Observatory (SOHO)** satellite is currently stationed here.

What is an Asteroid?

- **Definition:** Asteroids, often referred to as **minor planets**, are rocky remnants from the early formation of our solar system, dating back approximately **4.6 billion years**.
- **Current Count:** As of now, there are at least **1,351,400** known asteroids.
- **Location:** The majority of these ancient space rocks can be found orbiting the Sun between **Mars** and **Jupiter**, primarily within the **main asteroid belt**.

Conclusion: Trojan asteroids play a crucial role in our understanding of the solar system's formation and evolution. Their stable orbits at Lagrange points, combined with their association with giant planets, make them intriguing objects for scientific study, offering insights into the primordial materials that shaped our celestial neighbourhood.

Launch of Global Family Farming Forum at FAO's World Food Forum

Context: At the Food and Agriculture Organization's World Food Forum (WFF), the Global Family Farming Forum (GFFF) was launched, celebrating the vital role of family farmers in creating sustainable agri-food systems and addressing the impacts of the climate crisis. The event also marked the halfway point of the United Nations Decade of Family Farming 2019-2028 (UNDF).



Key Highlights:

- **United Nations Decade of Family Farming (UNDF):**

- Declared by the **United Nations General Assembly**, the UNDF serves as a framework for countries to develop public policies and investments that support family farming.

About Family Farming:

- **Definition:** Family farming refers to agricultural, forestry, fisheries, pastoral, and aquaculture production managed and operated by families, primarily relying on family labor from both women and men.

Significance of Family Farming:

1. **Food Security:**

- With over **550 million farms** globally, family farming is the backbone of food production, contributing to **70-80%** of the world's food in value terms.

2. **Nutritional Diversity:**

- Family farms in low- and middle-income countries grow a variety of nutritious foods, supporting crop biodiversity.

3. **Sustainable Stewardship:**

- Family farmers utilize traditional farming methods and minimal external inputs to maintain soil health and enhance climate resilience naturally.



Challenges Faced by Family Farming:

- **Financial Barriers:** Limited access to financial resources.
- **Limited Assistance:** Challenges in accessing support services.
- **Genetics and Knowledge Gaps:** Insufficient access to agricultural knowledge and genetic resources.
- **Fragmentation of Land:** Small, fragmented plots can reduce efficiency.
- **Market Access Difficulties:** Challenges in reaching markets and obtaining fair prices.
- **Climate Threats:** Vulnerability to climate change impacts.
- **Lack of Generational Succession Support:** Difficulties in transferring knowledge and resources to the next generation.

Related News:

- Alongside the GFFF, the **FAO** and the **Global Framework on Water Scarcity in Agriculture (WASAG)** adopted the **Rome Declaration on Water Scarcity in Agriculture**.
- **WASAG Initiative:**
 - Launched at the **United Nations Climate Conference** in Marrakesh in **2016**, WASAG aims to support countries in addressing water scarcity challenges.

Objectives of WASAG:

- Mobilize greater political support regarding policies, legal frameworks, institutional frameworks, access to financing, and responsible water governance.

Conclusion: The launch of the GFFF at the WFF highlights the crucial role of family farming in food security and sustainability, as well as the need for ongoing support and investment in this sector to address the myriad challenges faced by family farmers worldwide. The related discussions on water scarcity further emphasize the interconnectedness of agricultural practices and environmental sustainability.



India Chem 2024: 13th Edition Organized by DCPC and FICCI in

Context: The 13th Edition of “India Chem 2024” was organized by the **Department of Chemicals & Petrochemicals** in collaboration with **FICCI** in Mumbai. This event is one of the largest composite gatherings for the chemical and petrochemical industry in the Asia-Pacific region, featuring both an **International Conference** and an **Exhibition**.

Overview of India’s Chemical and Petrochemical Industry:

1. Market Segments:

- **Bulk Chemicals:** These are produced in large quantities but have lower market value. They include both **alkali** and **organic/inorganic chemicals**, serving primarily as inputs for downstream industries.
- **Petrochemicals:** Known as **petroleum distillates**, these chemicals are derived from the refining of petroleum and natural gas. This category encompasses **polymers, synthetic fibers, performance plastics**, and more.
- **Specialty Chemicals:** These chemicals are characterized by high value and low production volume. Examples include **surfactants, textile chemicals, paints and coatings, dyes, and agrochemicals**.

2. Economic Significance:

- The chemical and petrochemical industry contributes over **9%** to India’s manufacturing gross value added and accounts for about **7%** of total exports.
- Currently valued at approximately **\$178 billion**, the industry is projected to surpass **\$300 billion** by **2028** and is on track to reach **\$1 trillion** by **2040**.

Initiatives to Promote the Industry:

1. Foreign Direct Investment (FDI):

- The government has allowed **100% FDI** in manufacturing through the automatic route, which has attracted significant investments amounting to **\$12.48 billion** over the past decade.

2. Petroleum, Chemical and Petrochemical Investment Regions (PCPIRs):

- These regions are designed to be hubs with high-class infrastructure, creating a competitive environment conducive to the establishment of new firms in the sector.

3. Plastic Parks:

- The initiative aims to enhance investment, production, and exports within the plastics sector, fostering growth and innovation.

Conclusion: The **India Chem 2024** event serves as a platform to highlight the significant role of the chemical and petrochemical industry in India's economy and its growth potential. With supportive initiatives and investments, the sector is poised for substantial development, contributing to both domestic and global markets.



Environmental Risks of Rocket and Satellite Launches

Context: The rapid growth in space activities, with a significant rise in rocket launches and the number of satellites in orbit, has raised serious environmental concerns. Over the past 15 years, the number of rockets launched annually has tripled, and the satellites in orbit have increased tenfold, causing a notable increase in **space debris** re-entry. The burning of this debris as it re-enters the atmosphere results in toxic emissions, while the emissions from rocket launches also pose severe threats to the environment.



Key Environmental Impacts of Rocket and Satellite Launches:

1. Atmospheric Impact:

- **Alumina (Al₂O₃) and Soot:** Rocket engines release alumina and black carbon (soot) into the atmosphere. These particles absorb and trap Earth's long-wave radiation, causing **stratospheric warming**, which accelerates **ozone depletion** by speeding up chemical reactions.
- **Ozone Depletion:** Compounds like **chlorine**, **alumina**, and **nitrogen oxides** in rocket plumes contribute directly to the depletion of the ozone layer, increasing the vulnerability of the planet to harmful ultraviolet (UV) radiation. Notably, the **Montreal Protocol**, which protects the ozone layer, does not currently address rocket emissions.
- **Carbon Dioxide (CO₂):** Rocket launches produce significant carbon emissions, with estimates ranging from **50 to 75 tonnes of CO₂ per passenger**, far surpassing emissions from airplanes, which range between 1 and 3 tonnes of CO₂ per passenger.
- **Upper Atmospheric Pollution:** Approximately **two-thirds of rocket propellant exhaust** is released into the **stratosphere** (12–50 km) and **mesosphere** (50–85 km), where these pollutants can persist for **2-3 years**, affecting global atmospheric circulation and contributing to warming.
- **Water Vapor Emissions:** Even so-called **green rockets**, such as those using **liquid hydrogen** as propellant, release **water vapor**, which acts as a greenhouse gas in the upper atmosphere, further contributing to warming at high altitudes.

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- **Metallic Ash:** The release of metallic ash into the atmosphere could disrupt **Earth's magnetic field**, potentially allowing more harmful cosmic radiation to reach the planet's surface.

2. Space Debris Re-entry:

- The re-entry of **space debris** has doubled over the last decade, and as it burns up in the atmosphere, it releases harmful **metal oxides** and other pollutants, further contributing to environmental degradation.

Measures to Control Pollution from Rocket Launches:

1. Horizontal Launches of Small Satellites:

- Launching small satellites from under the wings of aircraft like **Boeing 747s** is a more fuel-efficient option, using about **1/20th of the fuel** compared to traditional ground-launched, heavy-lift rockets.

2. Trajectory Control for Re-entry:

- Developing new technologies to ensure space debris burns up at **lower altitudes** (12-18 miles) can help metal oxides settle back to Earth more quickly, reducing the long-term environmental impact.

3. Alternative Fuels and Design Improvements:

- **Bio-propane** and other alternative fuels can be used to reduce the toxic emissions from rockets. Additionally, developing **reusable launch systems** can significantly minimize waste and reduce the overall environmental footprint of space missions.

Conclusion: The surge in rocket launches and satellite deployment is increasingly contributing to climate change and ozone depletion. Addressing these environmental impacts requires adopting **cleaner fuels**, improving **launch technology**, and pushing for international regulations that include rocket emissions in climate agreements like the **Montreal Protocol**. This shift towards sustainability in space activities is essential to mitigating the growing environmental threat posed by the space industry.

MHA Advisory on Section 479 BNSS for Undertrial Prisoner Relief

Context: The Ministry of Home Affairs (MHA) has issued an advisory to all states and union territories regarding the implementation of **Section 479** of the **Bharatiya Nagarik Suraksha Sanhita (BNSS)**, focusing on the rights and relief of undertrial prisoners. This advisory is in response to the **Supreme Court of India's recent order** addressing the prolonged detention of undertrial prisoners and aims to ensure compliance with newly introduced legal provisions under the BNSS.



Key Points of the Advisory:

- **Scope of Section 479:** The advisory clarifies that **Section 479** of the BNSS, which came into effect on **1st July 2024**, applies to all undertrial prisoners, regardless of when their case was registered. This expands the scope of relief to all undertrial detainees, addressing the issue of long-term imprisonment without trial.

Bail Provisions Under BNSS:

1. **Regular Cases:** Undertrials are eligible for release if they have been detained for a period equivalent to **half of the maximum specified imprisonment** for the offense they are charged with.
2. **First-Time Offenders:** First-time undertrial offenders can be released if they have been in detention for **one-third** of the maximum specified imprisonment. However, this provision excludes offenses punishable by death or life imprisonment.

Undertrial Prisoners in India:

- According to the **National Crime Records Bureau (NCRB)**, India's prisons are heavily overpopulated, with an occupancy rate of **131.4%**. Around **75%** of prisoners in Indian jails are undertrials, highlighting the gravity of the issue.
- An undertrial prisoner refers to someone who is detained in prison while their case is being tried in court.



Reasons for the High Number of Undertrial Prisoners:

- **Indiscriminate arrests** by the police.
- **Ignorance of legal rights** among the accused.
- **Delays in trials**, leading to extended detention.
- **Reluctance of courts to grant bail**.
- **Inability to provide surety** due to financial constraints.

Measures Taken to Alleviate Hardships for Undertrials:

1. **Support to Poor Prisoners Scheme:** Provides relief to undertrials who are financially incapable of paying fines or securing bail bonds.
2. **E-Prisons Portal:** Enables quick access to data on inmates, helping in identifying eligible undertrials for bail.
3. **Model Prison Manual 2016:** Offers detailed guidelines on the facilities and treatment of undertrial prisoners.
4. **Legal Aid: State Legal Services Authorities** have set up **Legal Service Clinics** in jails to provide **free legal assistance** to undertrials.

Conclusion: The advisory underscores the importance of ensuring that the legal provisions under **Section 479 of BNSS** are effectively implemented to address the issue of prolonged detention of undertrial prisoners. It highlights the need for states and UTs to take swift action to prevent the violation of basic human rights, promote fair trials, and alleviate overcrowding in prisons.

8 years of Regional Connectivity Scheme (RCS) – UDAN (Ude Desh)

Context: The **Regional Connectivity Scheme (RCS) – UDAN (Ude Desh Ka Aam Nagrik)** has completed **8 years**, marking significant achievements in enhancing air travel accessibility across India. Recently, Prime Minister **Narendra Modi** inaugurated the **Saharanpur, Rewa, and Ambikapur airports** in Uttar Pradesh as part of the celebrations under this scheme.



Key Features of the RCS-UDAN Scheme:

- **Nodal Ministry:** Ministry of Civil Aviation
- **Genesis:** Launched in **2016** as a vital component of the **National Civil Aviation Policy (NCAP)**.
- **First Flight:** The inaugural RCS-UDAN flight connected **Shimla to Delhi** in **2017**.
- **Type:** Central Sector Scheme
- **Purpose:** To enhance infrastructure and connectivity, particularly in remote and underserved regions of India, making air travel affordable for the general populace.

Benefits of the Scheme:

1. **Subsidised Seats for Passengers:** The travel fee is capped (initially set at **₹2,500** per passenger) to ensure affordability.
2. **Support to Airlines:** The government compensates airlines through **Viability Gap Funding (VGF)** for losses incurred due to low fares.
3. **Regional Connectivity Fund (RCF):** This fund supports the scheme's self-financing mechanism by levying fees on certain domestic flights to fund the VGF.
4. **Market-Driven Model:** Airlines evaluate demand on specific routes and submit proposals during bidding rounds to optimize service delivery.
5. **Recent Changes:** Currently, the **5th phase** of the scheme is ongoing, which has reduced the distance gap for flights to **600 km** and enhanced VGF.

Implementing Agency:

- The **Airports Authority of India (AAI)** oversees the execution of the scheme.

Key Achievements:

- **Demand for Aircraft:** The scheme has spurred an increasing demand for new aircraft of all sizes due to enhanced connectivity.

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- **Promoting Tourism:** UDAN 3.0 introduced tourism routes, successfully connecting destinations like **Khajuraho** (Madhya Pradesh), **Deoghar** (Jharkhand), **Amritsar** (Punjab), and **Agatti Island** (Lakshadweep).
- **Boosting Air Connectivity:** RCS-UDAN has connected **34 states/UTs**, facilitating air travel from places like **Mundra** (Gujarat) to **Tezu** (Arunachal Pradesh) and from **Kullu** (Himachal Pradesh) to **Salem** (Tamil Nadu).
- **Operationalized Aerodromes:** A total of **86 aerodromes** have been made operational under the UDAN scheme.

Airports Authority of India (AAI)

The Airports Authority of India (AAI) was established on April 1, 1995, through an Act of Parliament. This formation was the result of the merger between the erstwhile National Airports Authority and the International Airports Authority of India, creating a unified organization responsible for managing and developing civil aviation infrastructure across India.

Key Functions of AAI

1. As an Airport Developer

- **Airport Management:** Design, develop, operate, and maintain both international and domestic airports, as well as civil enclaves throughout India.
- **Operational Area Expansion:** Enhance the operational areas of airports, including runways, aprons, and taxiways, to support increased air traffic.
- **Passenger Terminals:** Construct, modify, and manage passenger terminals and other airport facilities to improve passenger experience and operational efficiency.
- **Cargo Management:** Develop and manage cargo terminals through its subsidiary, AAI Cargo Logistics and Allied Services Company Limited, ensuring efficient cargo handling and logistics.
- **Passenger Facilities:** Provide essential passenger facilities and information systems to ensure a seamless travel experience.

2. As an Air Navigation Service Provider

- **Airspace Management:** Control and manage Indian airspace that extends beyond the country's territorial limits, in accordance with the standards set by the International Civil Aviation Organization (ICAO).
- **Safety and Efficiency:** Ensure the safety and efficiency of all flights operating within Indian airspace.

Conclusion: The RCS-UDAN scheme has played a crucial role in transforming the aviation landscape in India by enhancing connectivity, promoting tourism, and making air travel accessible to a larger segment of the population. The ongoing efforts under this initiative are expected to further bolster the growth of the aviation sector in the country.

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Moonlight Programme

Context: The **Moonlight Programme** is a significant initiative launched by the **European Space Agency (ESA)** aimed at establishing lunar communications and navigation services.

Overview:

- **Launch:** The programme was unveiled at the **International Astronautical Congress**.
- **Purpose:** To create a dedicated satellite constellation for telecommunications and navigation on the Moon, supporting various lunar missions.



Key Features of the Moonlight Programme:

1. **Satellite Constellation:**
 - The programme plans to deploy a constellation of about **five lunar satellites**:
 - **One satellite** for high data rate communications.
 - **Four satellites** dedicated to navigation.
 - This will facilitate **accurate autonomous landings, high-speed communication, and surface mobility** on the Moon.
2. **Communication Range:**
 - The satellites will enable data transfer over a distance of approximately **250,000 miles (400,000 kilometres)** between the Earth and the Moon.
3. **Focus Area:**
 - The primary focus will be on providing coverage at the **Moon's South Pole**, which is crucial for many missions due to its unique lighting conditions and the potential presence of **water ice** in permanently shadowed craters.
4. **Initial Steps:**
 - The first step in the programme will involve the launch of the **Lunar Pathfinder**, a communications relay satellite developed by **Surrey Satellite Technology LTD**, scheduled for **2026**.
 - Initial services are expected to begin by the end of **2028**, with a fully operational system anticipated by **2030**.
5. **Collaboration:**
 - ESA is collaborating with **NASA** and the **Japanese space agency JAXA** on a framework known as **LunaNet**, which aims to standardize communication and navigation services for the Moon.

Importance of Telecommunications:

- **Telecommunications** (or telecom) refers to the exchange of information over significant distances and encompasses various sectors. It involves:
 - **Transmitters and receivers** to facilitate communication.
 - Transmission mediums including **fiber optics, electromagnetic fields, light, and cables**.

Conclusion: The Moonlight Programme represents a crucial step towards establishing a comprehensive communication and navigation infrastructure on the Moon, supporting future exploration and utilization efforts, particularly in the promising region of the Moon's South Pole.

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Smart Insulin (NNC2215)

Context: Recent advancements in diabetes management have led to the development of a novel insulin called NNC2215 by scientists from Denmark, the UK, Czechia, and the University of Bristol. This smart insulin automatically adjusts its activity in response to changing blood glucose levels.

Key Features of NNC2215

- **Structure:** NNC2215 consists of two main components:
 - **Ring-Shaped Structure:** Central to its function.
 - **Glucoside Molecule:** This molecule resembles glucose in shape.



Mechanism of Action

- **Low Blood Sugar Levels:** When glucose levels are low, the glucoside binds to the ring structure, keeping the insulin inactive and preventing further drops in blood sugar.
- **Rising Blood Sugar Levels:** As glucose levels increase, glucose molecules replace the glucoside, causing a conformational change in the insulin that activates it. This activation allows the insulin to help lower blood glucose levels to safer ranges.

Efficacy

- Research shows that NNC2215 is as effective as human insulin in lowering blood glucose levels in animal models (rats and pigs).

Understanding Diabetes

Diabetes is a chronic condition characterized by the body's inability to produce or effectively use insulin, a hormone crucial for regulating blood glucose levels.

Types of Diabetes

1. **Type 1 Diabetes:**
 - Often begins in childhood.
 - Occurs when the pancreas produces little to no insulin.
2. **Type 2 Diabetes:**
 - Results from the body's ineffective use of insulin.
 - More common in adults and linked to lifestyle factors.
3. **Gestational Diabetes (GDM):**
 - High blood glucose during pregnancy.
 - Can lead to complications for both mother and child.

Glycaemic Index (GI):

The **Glycaemic Index** is a system that ranks carbohydrate-containing foods based on their impact on blood glucose levels after consumption.

- **High GI Foods:** These cause a rapid increase in blood sugar levels.
- **Low GI Foods:** These result in a slower, more gradual increase in blood glucose.

Conclusion: The development of smart insulin NNC2215 marks a significant advancement in diabetes treatment, potentially improving the management of blood glucose levels for individuals with diabetes. Understanding the types of diabetes and the concept of the glycaemic index is crucial for effective dietary management and overall health.

What is Vitiligo?

Context: Vitiligo is a chronic skin disorder characterized by the loss of pigmentation, resulting in white patches on the skin. This condition often carries social stigma and misconceptions, particularly in India, where it is the subject of stereotypes and ignorance.



About Vitiligo:

- **Cause:** Vitiligo occurs when melanocytes, the cells responsible for producing melanin (the pigment that gives skin its colour), are destroyed or malfunction.
- **Symptoms:** The condition leads to depigmented patches that can appear anywhere on the body, including:
 - Skin
 - Hair
 - Lining of the mouth
- **Etiology:** While the exact cause of vitiligo is not fully understood, several factors may contribute, including:
 - **Autoimmune Response:** The immune system mistakenly attacks melanocytes.
 - **Genetic Predisposition:** Family history may play a role.
 - **Environmental Factors:** Possible triggers include oxidative stress, physical trauma, severe sunburn, or exposure to certain chemicals.
- **Age of Onset:** Vitiligo can develop at any age, but it is most commonly seen before the age of 30.
- **Prevalence:** The disease affects between 0.5% and 2% of the global population, with estimates suggesting that up to 100 million people worldwide live with the condition. It affects both men and women equally.

Treatment Options

Currently, there is no permanent cure for vitiligo; however, various treatments can help manage symptoms and restore skin pigmentation:

- **Topical Corticosteroids:** These can help reduce inflammation and slow depigmentation.
- **Calcineurin Inhibitors:** These medications may help stimulate melanocyte activity.
- **Phototherapy:** This treatment involves exposing the skin to ultraviolet (UV) light to encourage repigmentation.

What is Melanin?

Melanin is a natural substance in the body that contributes to pigmentation in hair, eyes, and skin. The level of melanin produced can influence:

- **Skin Color:** More melanin leads to darker skin tones.
- **Eye Color:** Melanin affects the hue of the eyes.
- **Hair Color:** The amount of melanin determines the darkness or lightness of hair.

Factors Influencing Melanin Production:

- **Genetics:** Hereditary traits determine melanin levels.
- **Sun Exposure:** Ancestral exposure to sunlight can influence melanin production, as the body may adapt to protect against UV radiation.

Conclusion: Vitiligo is a complex skin condition that can impact individuals physically and psychologically. Raising awareness and understanding of the condition is essential to dispel myths and reduce stigma, allowing those affected to seek support and appropriate treatment.

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What is Kala Azar?

Context: India could be at the threshold of eliminating Kala-azar as a public health problem, with the country having managed to keep the number of cases under one in 10,000 as per the WHO parameters for elimination certification for two consecutive years now.



Key Features of Kala Azar:

- Kala Azar, also known as visceral leishmaniasis, is a serious parasitic disease caused by the protozoan parasite *Leishmania donovani*, which is transmitted through the bite of infected female sandflies. It is considered the second deadliest parasitic disease after malaria in India.
- **Symptoms:** The disease is characterized by:
 - Irregular bouts of fever
 - Significant weight loss
 - Enlargement of the spleen and liver (splenomegaly and hepatomegaly)
 - Anemia
- **Global Distribution:** While most cases occur in Brazil, East Africa, and India, it remains a significant public health concern in the Indian subcontinent.
- **Complications:**
 - **Post Kala-Azar Dermal Leishmaniasis (PKDL):** A recognized complication that causes scaly skin patches and nodular lesions in individuals who have seemingly been cured of Kala Azar, sometimes up to two years after the initial infection.
 - **Leishmania-HIV Co-infection:** Individuals living with HIV and infected with leishmaniasis face higher risks of developing severe forms of the disease, along with increased relapse and mortality rates.
- **Treatment:**
 - Kala Azar is treatable and curable, requiring an immunocompetent system. The treatment generally involves an intravenous (IV) drip of medication that takes about two hours.

Types of Leishmaniasis

1. **Visceral Leishmaniasis (VL):** This form, which includes Kala Azar, is fatal in over 95% of untreated cases and involves systemic symptoms as described above.
2. **Cutaneous Leishmaniasis (CL):** The most common form, characterized by skin lesions, primarily ulcers on exposed body parts. It can cause life-long scars and social stigma.
3. **Mucocutaneous Leishmaniasis:** This form leads to partial or total destruction of mucous membranes of the nose, mouth, and throat.



India's Progress Towards Elimination

- **Current Status:** India is on the verge of achieving a significant milestone by seeking certification from the World Health Organization (WHO) for eliminating Kala Azar as a public health problem. The country has maintained the required elimination criteria of less than one case per 10,000 people for two consecutive years.
- **Historical Goals:** India's National Health Policy initially aimed to eliminate Kala Azar by 2010. This target has been revised several times, with the latest goal set for 2020. The WHO also set a global target to eliminate Kala Azar by 2020, which has now been extended to 2030 due to delays.
- **Certification Criteria:** A disease is declared eliminated when a country proves that local transmission has been interrupted for a specific time period and implements preventive measures to avoid a resurgence. For certification, India must maintain a rate of fewer than one case per 10,000 people at the sub-district level for another year.

Vulnerable Regions:

The highest number of Kala Azar cases in India is reported from:

- **Bihar:** Accounts for approximately 70% of the country's cases, driven by factors like poor sanitation and climate conditions conducive to sandfly breeding.
- Other affected states include **Jharkhand, West Bengal,** and parts of **Uttar Pradesh.**

India's ongoing efforts to eliminate Kala Azar highlight the importance of public health initiatives, awareness, and sustainable practices to combat vector-borne diseases effectively.

Key Fact About Kala-Azar (Visceral Leishmaniasis)

- **Origin of the Name:** The term "kala-azar" derives from the Hindi word "kala," meaning "black," and the Persian word "azar," meaning "disease." This nomenclature reflects the characteristic grayish or blackish discoloration of the skin that can occur during infection.
- **Discovery:** The disease was first identified in West Bengal, India, in the late 19th century.
- **Spread:** Following its initial discovery, kala-azar spread to the northern regions of Bengal and Assam.
- **Endemic Areas:** Kala-azar is endemic in rural areas of tropical regions, notably in Asia, East Africa, and Brazil. It poses significant public health challenges in countries such as India, Bangladesh, Nepal, and Sudan..

Convention on Biological Diversity (CBD)

Context: The Convention on Biological Diversity (CBD) is a landmark international treaty aimed at conserving biological diversity, promoting its sustainable use, and ensuring fair and equitable sharing of benefits arising from the utilization of genetic resources. The 16th Conference of the Parties (COP16) to the CBD is set to begin in Cali, Colombia.



Key Features of the CBD:

- **Establishment:** The CBD was opened for signing at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992.
- **Membership:** It currently has 196 contracting parties, making it one of the most comprehensive binding international agreements in the field of nature conservation.

Objectives of the CBD:

The CBD has three overarching objectives:

1. **Conservation of Biological Diversity:** This includes the preservation of genetic diversity, species diversity, and habitat diversity.
2. **Sustainable Use of Biological Diversity:** Ensuring that biodiversity is used in a way that meets the needs of current generations without compromising the ability of future generations to meet their own needs.
3. **Fair and Equitable Sharing of Benefits:** This focuses on sharing the benefits arising from the utilization of genetic resources fairly and equitably among stakeholders, particularly indigenous communities and local populations.

Scope of the CBD:

The CBD covers biodiversity at all levels, including:

- **Ecosystems:** The complex networks of living organisms and their physical environments.
- **Species:** The variety of life forms on Earth.
- **Genetic Resources:** The genetic material of plants, animals, and microorganisms.

Governance and Implementation

- **Conference of the Parties (COP):** The governing body of the CBD, which consists of representatives from all ratifying countries. The COP meets every two years to review progress, set priorities, and develop work plans.
- **Secretariat:** Based in Montreal, Canada, the Secretariat facilitates the implementation of the CBD.

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Related Protocols:

To support the objectives of the CBD, two internationally binding agreements have been adopted:

1. **Cartagena Protocol:** Adopted in 2000 and entered into force in 2003, this protocol regulates the transboundary movement of living modified organisms (LMOs) and aims to ensure the safe handling, transport, and use of these organisms.
2. **Nagoya Protocol:** Adopted in 2010, this protocol establishes a legally binding framework for access to genetic resources and the fair and equitable sharing of benefits derived from their utilization.

What is the Montreal Protocol?

Overview

The Montreal Protocol on Substances that Deplete the Ozone Layer is a significant multilateral environmental agreement that regulates the production and consumption of nearly 100 man-made chemicals known as ozone-depleting substances (ODS).

Key Features of the Montreal Protocol:

- **Adoption Date:** The Protocol was adopted on 16 September 1987.
- **Objective:** Its primary goal is to protect the stratospheric ozone layer, which serves as Earth's protective shield against harmful levels of ultraviolet radiation from the sun.

Significance:

- The Montreal Protocol is considered one of the most successful environmental treaties in history, having achieved universal ratification by all 197 countries, including all UN member states.
- It has significantly reduced the emissions of ODS, contributing to the recovery of the ozone layer and reducing the incidence of skin cancer and other harmful effects associated with increased UV radiation.

Both the CBD and the Montreal Protocol are essential for global efforts to protect the environment, conserve biodiversity, and promote sustainable practices worldwide.

India and China Restore Patrolling Rights Along the LAC in Ladakh

Context: India and China have reached a significant diplomatic breakthrough by agreeing to resume patrolling at key friction points along the Line of Actual Control (LAC) in eastern Ladakh. This agreement comes after years of military standoffs following the 2020 Galwan Valley clash.

Galwan Clash and Situation Thereafter:

Galwan Clash:

- In May 2020, Indian and Chinese troops clashed at various points along the LAC, including Pangong Tso, Galwan Nalah, and Demchok in Ladakh, and at Naku La in Sikkim.
- A violent clash occurred on June 15, 2020, in Galwan Valley, resulting in significant troop deployments and heavy weaponry from both sides.

Corps Commander Level Talks: Multiple rounds of talks at the Corps Commander level have taken place to resolve the standoff since the Galwan incident.

Friction Points:

- There are seven key friction points in eastern Ladakh where confrontations have occurred since May 2020:
 - PP 14 (Galwan)
 - PP 15 (Hot Springs)
 - PP 17A (Gogra)
 - North and south banks of Pangong Tso
 - Depsang Plains
 - Charding Nullah



Key Highlights of the Recent Patrolling Agreement

1. Restoration of Patrolling Rights in Depsang Plains and Demchok

- Both countries have agreed to restore patrolling rights in these regions, addressing long-standing issues that predate the 2020 incursions.
- Indian troops can now patrol up to Patrolling Points (PP) 10 to 13 in Depsang and Charding Nullah in Demchok.

2. Agreement on Patrolling Protocols

- Both sides will conduct patrols up to the old points along the LAC, with Indian patrols occurring twice a month.
- Each patrol will consist of 14-15 troops to minimize the risk of clashes.
- Coordination of patrol programs will be emphasized to avoid misunderstandings on clashing dates.

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3. Eastern Theatre and Other Friction Points

- While agreements have been made for Depsang and Demchok, issues in areas like Galwan Valley and Pangong Tso remain unchanged.
- Discussions regarding sensitive areas in Arunachal Pradesh are still ongoing.

4. Confidence-Building Measures

- The agreement includes plans for monthly commander-level meetings and case-specific discussions.
- A mutual aim is to reduce troop deployments along the LAC, with preparations for winter already in motion.

Significance of This Agreement

- 1. Rekindling Hope:** The pact has renewed hopes for restoring diplomatic and bilateral political ties, especially as China had been reluctant to discuss such matters previously.
- 2. Significance of Depsang Plains**
 - The Depsang Plains are strategically important, located 30 km southeast of the Daulat Beg Oldie post near the Karakoram Pass.
 - The terrain offers a flat surface conducive for military operations, making it a focal point for both countries.

Bottleneck Area: A key area in the Depsang Plains, known as Bottleneck, connects crucial locations and is strategically significant for military logistics.

Border Dispute Settlement Mechanism:

India and China have signed five agreements to manage disputes along the Line of Actual Control (LAC):

| Agreements | Focus |
|----------------|--|
| 1993 Agreement | Focused on maintaining peace and tranquility along the LAC |
| 1996 Agreement | Established confidence-building measures in military operations |
| 2005 Protocol | Detailed implementation of military confidence-building measures |
| 2012 Agreement | Created a Working Mechanism for Consultation & Coordination on India-China Border Affairs (WMCC) |
| 2013 Agreement | Enhanced border defence cooperation |

Connection Between Volcanic Eruption & Ionospheric Disturbances

Context: A recent study conducted by the **Indian Institute of Geomagnetism (IIG)** has highlighted the significant role volcanic eruptions play in influencing **space weather** and its impact on satellite communication and navigation systems.



Key Findings:

1. Ionospheric Disturbances:

- **Volcanic eruptions** produce **strong atmospheric gravity waves** that trigger the formation of **Equatorial Plasma Bubbles (EPBs)** in the ionosphere.
- EPBs are typically observed near the Earth's equator and are characterized by **plasma density depletions** in the ionosphere, primarily occurring after sunset.

2. Impact on Satellite Communication and Navigation Systems:

- The formation of EPBs can cause **disruptions** in satellite signals, affecting **satellite-based communication systems** and **GPS** technologies, which are vital for various sectors like aviation, defence, and disaster management.

Volcanism and Its Impacts:

A **volcano** is an opening in Earth's crust that releases **lava, ash, gases, and steam** during an eruption. Recent examples of volcanic activity include **Mount Ruang (Indonesia, 2024)** and **Whakaari/White Island (New Zealand, 2024)**.

Positive Impacts of Volcanic Activities:

- **Cooling Earth's Atmosphere:** Volcanic particles can block incoming solar radiation, causing a short-term cooling effect on Earth's climate.
- **Geothermal Energy:** Volcanic regions are rich sources of **geothermal energy**, providing sustainable electricity to local populations.
- **Soil Fertility:** **Volcanic ash** is rich in minerals that enhance soil fertility, benefiting agriculture.
- **Mining Opportunities:** Volcanic eruptions bring valuable minerals such as **gold, silver, and copper** to the surface, supporting mining activities.
- **Tourism Potential:** Volcanic landscapes often attract tourists, boosting local economies.

Negative Consequences of Volcanic Activity:

- **Impact on Climate:** The release of dust, ash, and gases like sulphur dioxide into the atmosphere can affect global climate patterns and lead to **acid rain**.
- **Disasters:** Volcanic eruptions can trigger secondary disasters like **tsunamis**, as witnessed during the **Tonga eruptions in 2022**.

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- **Damage to Life and Property:** Volcanic eruptions can lead to the **destruction of homes**, infrastructure, and entire landscapes, posing significant threats to human life and ecosystems.

What is a Volcano?

A **volcano** is an opening in the Earth's crust through which **gases, molten rock (lava), ash, and steam** are expelled during an eruption. These vents typically form in areas of the Earth's crust where the rock layers are weak, allowing magma from the mantle to reach the surface.

About Volcanoes:

- **Volcanic activity** is part of the Earth's **endogenic processes**, which are processes driven by internal heat.
- Depending on the **explosiveness** of a volcano, different **landforms** are created:
 - **Non-explosive eruptions** can create flat **plateaus** as lava spreads out over large areas.
 - **Explosive eruptions** can form **mountains** or cones due to the forceful ejection of materials.
 - **Intrusive landforms**, such as **batholiths** and **laccoliths**, are formed when magma cools and solidifies before reaching the surface.

Magma vs Lava:

- **Magma** refers to the **molten rock** material found **beneath** the Earth's surface, typically originating from a weak layer in the mantle called the **asthenosphere**.
- **Lava** is what magma is called **once it reaches the Earth's surface** through a volcanic vent.

Tools and Methods to Predict Volcanic Eruptions:

1. **Seismic Data:** Monitoring **earthquakes** and **tremors** can help identify early warning signs of volcanic activity, as magma movement causes seismic disturbances.
2. **Ground Deformation:** Tracking changes in the Earth's surface using instruments like **GPS** or **InSAR** (Interferometric Synthetic Aperture Radar) can indicate magma buildup beneath a volcano.
3. **Gas Emissions and Gravity Changes:**
 - **Volcanic gas emissions**, including sulfur dioxide (SO₂), carbon dioxide (CO₂), and water vapor, can signal rising magma.
- Changes in **gravity** and **magnetic fields** can also suggest magma movement or accumulation.

Conclusion: This study underscores the importance of understanding the broader impact of volcanic activity, not just on Earth's surface but also on **space weather**, especially in relation to the increasing reliance on satellite technologies.

India's Solar imports could reach \$30 billion annually by 2030

Context: The **Global Trade Research Initiative (GTRI) Report** highlights significant concerns for India's solar industry, emphasizing the growing dominance of China and the challenges faced by domestic solar manufacturing. According to the report, India's **solar imports** could reach **\$30 billion annually by 2030**, underscoring the need to strengthen local production.



Key Findings of the GTRI Report:

- 1. China's Dominance:** China currently controls **over 80%** of global solar production and exports, which has a direct impact on other countries' solar industries, including India.
- 2. Challenges in India's Solar Manufacturing:**
 - **High Dependency on Imports:** India heavily relies on imports, especially from China, for critical components like solar modules and cells, limiting domestic capacity.
 - **Limited Raw Material Supply:** India lacks the capacity to produce **high-purity polysilicon** and **wafers**, which are essential for solar cell manufacturing.
 - **R&D and Technology Gaps:** India is behind in adopting advanced solar cell technologies like **PERC, bifacial, and thin-film**.
 - **High Capital Costs:** Setting up solar manufacturing facilities requires significant investment, making it financially challenging.

Recommendations from the Report:

- 1. Expansion of the Production Linked Incentive (PLI) Scheme:**
 - The PLI scheme should be expanded to cover early-stage solar manufacturing, focusing on **upstream production** to build local capacity for materials like polysilicon and wafers.
- 2. Investment in R&D:**
 - Increase investment in **research and development** and advanced manufacturing technologies to create a fully integrated domestic supply chain.
- 3. Reassessment of Import Duties:**
 - Current import duties on solar modules and cells should be reassessed to promote local manufacturing and reduce reliance on imports.
- 4. International Collaborations:**
 - India should collaborate with other countries, such as the **US, EU, and Japan**, to reduce global dependence on China and boost local production.



India's Initiatives to Boost Solar Manufacturing:

- Approved List of Models and Manufacturers (ALMM):** Ensures that government-backed solar projects use **BIS-certified** modules to maintain quality standards and promote domestic manufacturing.
- Production Linked Incentive (PLI) Scheme:** Targets **fully integrated solar PV manufacturing** units by providing financial incentives for companies to establish local production facilities.
- PM-KUSUM Scheme:** Promotes the use of domestically sourced solar cells and modules, particularly for agricultural and rural electrification projects.

These steps aim to reduce India's dependence on imports, foster a robust solar manufacturing ecosystem, and strengthen India's position in the global solar market.

Current Status of India's Solar Sector

- India is the **3rd largest energy-consuming country** in the world.
- It ranks **5th in solar power capacity** according to the **REN21 Renewables 2024 Global Status Report**.

Commitments:

- At **COP26**, India pledged to achieve **500 GW of non-fossil fuel-based energy by 2030** as part of the **Panchamrit initiative**, which is recognized as the **world's largest renewable energy expansion plan**.

Solar Energy Growth:

- Installed solar energy capacity has seen a **30-fold increase in the last 9 years**, reaching **89.4 GW** by August 2024.
- India's solar potential is estimated at **748 GWp**, as reported by the **National Institute of Solar Energy (NISE)**.

Investment and Foreign Direct Investment (FDI):

- The sector allows for **100% Foreign Direct Investment (FDI)** under the automatic route for renewable energy generation and distribution projects, as per **The Electricity Act 2003**.

GUESS India 2023 survey report of IIT Mandi

Context: The GUESS India 2023 survey report from IIT Mandi emphasizes the vibrant entrepreneurial spirit among Indian students, reflecting significant trends and insights into the current landscape of entrepreneurship in the country.



Major Trends Highlighted by the Report:

- **Nascent Entrepreneurship:** Approximately 33% of college students in India identify as nascent entrepreneurs, surpassing the global average of 26%.
- **Entrepreneurship as an Emerging Career Choice:** About 14% of students express intentions to pursue entrepreneurship after graduation.
- **High Entrepreneurship Intent:** Indian students demonstrate the highest entrepreneurial intent globally.

Factors Propelling Entrepreneurship Among Students

- **Favourable Macroeconomic Environment:** India ranks 39th out of 133 in the Global Innovation Index, indicating a supportive environment for innovation.
- **Thriving Startup Ecosystem:** With over 110 unicorns (startups valued at over \$1 billion), India has the third-largest startup ecosystem, following the USA and China.
- **Educational Ecosystem:** Diverse and specialized courses cater to entrepreneurial skills.
- **Supportive Government Initiatives:** Various programs and policies are in place to foster entrepreneurship.

Existing Challenges:

- **Low Active Entrepreneurs:** There is a significant gap in transitioning nascent ventures into active businesses.
- **Limited Reach and Accessibility:** Entrepreneurship education and incubation programs are not widely accessible.
- **Mismatch in Support Programs:** There's a disconnect between available support programs and the actual needs of student ventures.

Way Forward:

- **Encouraging Entrepreneurship Education:** Implementing compulsory entrepreneurship courses in universities to better prepare students.
- **Expanding the Incubation Network:** Providing more mentorship, funding, and resources to budding entrepreneurs.

Supportive Government Initiatives:

- **NIDHI Umbrella Programs (2016):** Established by the Department of Science and Technology to create a robust network of incubation centers and support for startups.
- **Atal Innovation Mission (2016):** Aims to promote innovation at the school level through Atal Tinkering Labs.
- **National Innovation and Startup Policy (2019):** Focuses on strengthening the innovation and entrepreneurial ecosystem within campuses.

This report showcases a promising landscape for entrepreneurship in India, driven by a strong intent among students and an evolving ecosystem, despite existing challenges.

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Offshore Areas Operating Right Rules, 2024

Context: The Government of India has notified the **Offshore Areas Operating Right Rules, 2024** under the **Offshore Areas Mineral (Development and Regulation) Act, 2002**. These rules are designed to regulate the exploration and production of minerals in specified offshore regions, marking a significant step towards managing offshore mineral resources effectively.



Key Highlights of the Rules

- **Applicability:** The rules cover all minerals in offshore areas, excluding mineral oils, hydrocarbons, and specified atomic minerals.
- **Lease Surrender:** The rules stipulate that a lease may be surrendered after 10 years if the production operations are deemed uneconomic.
- **Priority Access:** Government and government-owned companies are given priority access for operating rights in reserved offshore zones.

Significance of Offshore Mining

- **Definition:** Also known as deep sea mining, offshore mining involves retrieving mineral deposits from the ocean's deep seabed, specifically below 200 meters.
- **Meeting Demand:** Offshore mining aims to meet the growing demand for metals, especially in light of depleting terrestrial mineral deposits, and to reduce dependence on mineral imports.

Challenges in Offshore Mining:

- **Environmental Concerns:** Offshore mining poses potential environmental risks, including habitat destruction, underwater noise pollution, and threats to biodiversity.
- **Impact on Fishing Communities:** The mining operations may adversely affect fish populations, jeopardizing the livelihoods of fishing communities.
- **Technological Gaps:** There is a lack of adequate research and technological development for efficient and safe deep-sea mining practices.

Initiatives for Offshore Mining:

- **Offshore Areas Mineral (Development and Regulation) Act, 2002:** This act provides the framework for the development and regulation of mineral resources in offshore areas.
- **Deep Ocean Mission:** Initiated by the Ministry of Earth Sciences, this mission focuses on deep-sea mineral exploration, including initiatives like the Samudrayaan Mission and MATSYA 6000.
- **International Seabed Authority (ISA):** In 2016, the ISA allocated an area of 10,000 square kilometres to India for the exclusive exploration of polymetallic nodules in the Indian Ocean.

Conclusion: The Offshore Areas Operating Right Rules, 2024, are a crucial step in regulating offshore mineral resources, addressing both the increasing demand for metals and the associated environmental and social challenges. The government's initiatives reflect a balanced approach to harnessing resources while considering ecological sustainability and the well-being of local communities.

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Role of Wetlands in National Biodiversity Strategies and Action Plans (NBSAP)

Context: A new assessment commissioned by **Wetlands International** and conducted by **35 per cent Ltd** underscores the critical role of wetlands in the **National Biodiversity Strategies and Action Plans (NBSAP)** submitted post-COP15 to the UN Convention on Biological Diversity. This assessment aligns with the **Kunming-Montreal Global Biodiversity Framework (KMGBF)**, which aims to halt and reverse biodiversity loss by 2030.



Key Highlights of the Assessment

- **Inclusion of Wetlands:**
 - **83%** of NBSAPs mention wetlands, inland waters, or freshwater in their targets.
 - **71%** of NBSAPs in Asia explicitly refer to these ecosystems.
 - The assessment notes an increasing acknowledgment of various types of wetlands—such as mangroves, rivers, lakes, and peatlands—in national strategies, reflecting their growing significance in environmental objectives.
- **Underrepresentation of Significant Areas:**
 - Certain crucial wetland regions, like the **Amazon River Basin** and **Hudson Bay Lowland**, are rarely included in national biodiversity targets, indicating a gap in comprehensive biodiversity strategies.

Role of Wetlands in Biodiversity Conservation

- **Biodiversity Hotspots:** Wetlands, which cover only **6%** of the Earth's surface, are home to approximately **40%** of global biodiversity, highlighting their importance as habitats for diverse species.
- **Nutrient Cycling:** Wetland plant diversity plays a crucial role in nutrient cycling and water purification, enhancing overall water quality and supporting various forms of life.
- **Carbon Sequestration:** Wetlands act as significant carbon sinks by storing carbon in plant biomass and sediments. This function aids in climate change mitigation and provides additional benefits such as flood control.

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Recommendations from the Assessment:

- **Establishing Clear Goals:** Setting measurable goals for wetland restoration and protection to support both regional and global ecological health.
- **Enhanced Focus:** Greater emphasis on integrating wetlands into biodiversity conservation strategies, ensuring that significant wetland areas are recognized and protected.

What are Wetlands?

Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. They occur where the water table is at or near the surface of the land, or where the land is covered by water. Wetlands are defined as "lands transitional between terrestrial and aquatic ecosystems where the water table is usually at or near the surface or the land is covered by shallow water."

Wetlands in India:

In India, wetlands cover approximately **1,52,600 square kilometres (sq km)**, which is about **4.63%** of the total geographical area of the country. Of this area:

- **Inland-natural wetlands** account for **43.4%**
- **Coastal-natural wetlands** account for **24.3%**

India has **19 types of wetlands**. The state-wise distribution shows:

- **Gujarat** is the leader with **34,700 sq km** (17.56% of the total geographical area of the state), which constitutes **22.7%** of the total wetland areas in the country.
- Followed by **Andhra Pradesh** with **14,500 sq km**,
- **Uttar Pradesh** with **12,400 sq km**, and
- **West Bengal** with **11,100 sq km**.
- Wetlands play a crucial role in biodiversity conservation, water purification, carbon sequestration, and more, underscoring their significance in environmental strategies and policies.

Conclusion: The assessment highlights the integral role wetlands play in biodiversity conservation and underscores the need for their inclusion in national biodiversity strategies. As nations revise their NBSAPs, a stronger focus on wetlands is essential to achieving the goals set out in the KMGBF and ensuring the health of our planet's ecosystems.

Malaria

Context: Recently, **Egypt** was officially declared 'malaria-free' by the **World Health Organization (WHO)**, marking a significant achievement in global health.

About Malaria:

- **Cause:** Malaria is an **acute febrile illness** caused by **Plasmodium parasites**, transmitted to humans through the bites of infected female **Anopheles mosquitoes**.
- **Location:** It is primarily a **life-threatening disease** found in tropical and subtropical regions.



Transmission:

- Malaria is **not contagious** and cannot spread from one person to another.
- The disease is transmitted exclusively through the bites of infected female Anopheles mosquitoes.
- **Parasite Species:** Five species of Plasmodium can cause malaria in humans; of these, **Plasmodium falciparum** and **Plasmodium vivax** pose the greatest threat.

Symptoms:

- Symptoms usually appear **10–15 days** after the bite from an infected mosquito.
- Common symptoms include:
 - **Fever**
 - **Headache**
 - **Chills**
- Symptoms may be mild and difficult to recognize as malaria, especially in endemic areas where individuals may develop partial immunity and experience no symptoms despite being infected.

Prevention:

- **Vector Control Interventions:** The primary method to prevent malaria is through vector control, which includes strategies like insecticide-treated bed nets, indoor spraying, and environmental management to reduce mosquito populations.

Treatment:

- Malaria is both **preventable and curable**.
- **Early Diagnosis and Treatment:** Timely diagnosis and treatment reduce the severity of the disease, prevent deaths, and contribute to lowering transmission rates.

Conclusion: Malaria remains a critical public health challenge in many parts of the world, but with effective prevention and treatment strategies, significant progress can be made toward reducing its incidence and impact.

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International Atomic Energy Agency (IAEA)

Context: The 2024 edition of the IAEA's **Climate Change and Nuclear Power** report has been released, emphasizing the urgent need for a significant increase in investment to achieve goals for expanding nuclear power.



About the IAEA

- The IAEA is the world's foremost **intergovernmental forum** for scientific and technical cooperation in the nuclear field.
- It is recognized as the "**Atoms for Peace and Development**" organization within the **United Nations** family.
- The agency focuses on the **safe, secure, and peaceful** uses of nuclear science and technology.

History

- Although established as an autonomous organization through its own international treaty, the **IAEA Statute**, it reports to both the **United Nations General Assembly** and the **Security Council**.

Headquarters

- The IAEA is headquartered in **Vienna, Austria**, and currently has **178 member states**.

Structure

- **General Conference:** Comprising all members, this conference meets annually to approve budgets and programs and to discuss general policies.
- **Board of Governors:** This board consists of **35 members** who meet approximately five times a year to perform statutory functions, approve safeguards agreements, and appoint the director general.
- **Secretariat:** Responsible for day-to-day operations, the Secretariat is led by the director general.

Functions of the IAEA

- The agency collaborates with member states and global partners to promote the **safe, secure, and peaceful use** of nuclear technologies.
- It applies **nuclear safeguards**, including monitoring, inspection, and information analysis, to ensure that nuclear activities remain peaceful and to detect and deter diversion for weapons purposes.
- The IAEA implements **comprehensive safeguards agreements** mandated by the **Nuclear Non-Proliferation Treaty (NPT)**, serving as a primary defence against the proliferation of nuclear weapons.
- It assists member states and promotes the exchange of scientific and technical information.
- The agency enhances capacities to respond to **nuclear and radiological incidents**, which is crucial for minimizing their impact.

What is the Nuclear Non-Proliferation Treaty (NPT)?

- The **NPT** is an international treaty aimed at preventing the spread of nuclear weapons and technology, fostering the peaceful use of nuclear energy, and promoting disarmament.
- It is the only binding multilateral treaty commitment towards nuclear disarmament by nuclear-armed states.
- A total of **191 states** have joined the NPT, including the five recognized nuclear-weapon states. However, **South Sudan, India, Pakistan, and Israel** have never joined the treaty, while **North Korea** withdrew in **2003** after joining in **1985**.

Conclusion: The IAEA plays a vital role in promoting safe nuclear practices and preventing nuclear proliferation worldwide. Its efforts are crucial in addressing climate change and fostering international cooperation in nuclear technology for peaceful purposes.

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India's fourth nuclear-powered ballistic missile submarine (SSBN)

Context: India has quietly launched its **fourth nuclear-powered ballistic missile submarine (SSBN)** at the **Ship Building Center (SBC)** in **Visakhapatnam**, significantly enhancing its nuclear deterrence capabilities.



About the Fourth SSBN

- **Codename:** The fourth SSBN is codenamed **S4***.
- **Indigenous Content:** It boasts nearly **75% indigenous content**, reflecting India's efforts to enhance self-reliance in defence production.
- **Armament:** The submarine is equipped with **K-4 ballistic missiles**, which have a range of **3,500 km** and are launched through **vertical launching systems**.
- **Successor Development:**
 - The first of its class, **INS Arihant**, carries **K-15 nuclear missiles** with a range of **750 km**.
 - Its successors, **INS Arighaat** and **INS Aridhaman**, are upgrades that carry only **K-4 ballistic missiles**.

Recent Developments

- The launch of **S4*** follows the commissioning of **INS Arighaat** in **August 2024**.
- **INS Aridhaman** is set for commissioning next year.
- Both **INS Arihant** and **INS Arighaat** are currently conducting deep sea patrols.

Naming Convention

- India's first leased nuclear attack submarine, **INS Chakra**, was designated as **S1**.
- Subsequent submarines were named: **INS Arihant (S2)**, **INS Arighaat (S3)**, and **INS Aridhaman (S4)**.
- The newly launched submarine is the last of its class, **S4***, with its formal name yet to be announced.

Significance of SSBNs

- **SSBNs** (Submarine-Launched Ballistic Missile Submarines) are potent and highly specialized military assets.
- Operated only by a few countries—including the **United States, Russia, China, the United Kingdom, France, and India**—these submarines are armed with submarine-launched nuclear ballistic missiles.
- They provide a reliable **second-strike capability** and underpin strategic nuclear deterrence based on the principle of **mutual assured destruction**.
- With **unlimited range** and **endurance**, SSBNs are primarily limited by food supplies, crew fatigue, and maintenance requirements.

What is the K-4 Ballistic Missile?

- The **K-4 ballistic missile** is a solid-fuel missile developed by **DRDO (Defence Research and Development Organisation)** to arm India's nuclear-powered submarines, such as **INS Arihant** and its under-development sister vessels.
- It has a range of **3,500 km**, enabling it to target almost all areas of **Pakistan** and several regions in **China**.

Conclusion: The addition of the **S4*** submarine to India's fleet enhances its strategic deterrence posture and reflects the country's commitment to advancing its indigenous defence capabilities in the face of evolving regional security challenges.

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eShram Portal

Context: Recently, the **Union Minister of Labour & Employment and Youth Affairs & Sports** launched the **eShram One Stop Solution** in **New Delhi**.

About eShram - One Stop Solution



- **Purpose:** The primary aim of the **eShram One Stop Solution** is to simplify the registration process for unorganised workers and facilitate their access to government welfare schemes.
- **Functionality:** This platform serves as a bridge, connecting workers to the numerous benefits offered by the government, making the registration process easier and more transparent.
- **Data Integration:** It consolidates and integrates data from various Central Ministries/Departments into a single repository, streamlining access to welfare schemes.
- **Integrated Schemes:** Key welfare schemes integrated with eShram include:
 - **One Nation One Ration Card**
 - **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)**
 - **National Social Assistance Programme**
 - **National Career Service**
 - **Pradhan Mantri Shram Yogi Maandhan**

What is eShram Portal?

- **Launch:** The eShram Portal was launched by the **Ministry of Labour and Employment** in **2021** to register and create a comprehensive **National Database of Unorganised Workers**.
- **Registration Process:**
 - The registration in the portal is fully **Aadhaar verified** and **Aadhaar seeded**.
 - Unorganised workers can register themselves on the portal based on self-declaration.
 - The portal covers **400 occupations** across **30 broad occupation sectors**.

What is Social Security?

- **Definition:** Social security refers to measures established by legislation to maintain individual or family income or to provide income when some or all sources of income are disrupted or terminated. It also covers exceptionally heavy expenditures, such as those incurred in bringing up children or paying for healthcare.

Conclusion: The **eShram Portal** and its **One Stop Solution** aim to enhance the accessibility of social security schemes for unorganised workers, promoting transparency and efficiency in the registration process. By integrating various welfare schemes, it provides a comprehensive platform to support the livelihood and welfare of a significant segment of India's workforce.

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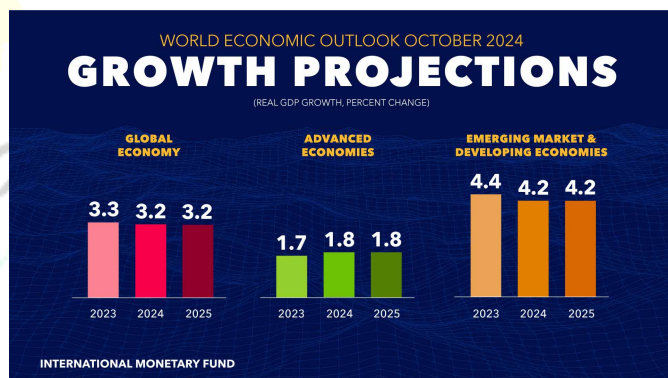
International Monetary Fund (IMF) World Economic Outlook (October 2024) Report

Context: The IMF's World Economic Outlook (WEO) is published twice a year and provides comprehensive analyses and projections of the global economy for the short and medium term. The October 2024 report presents key insights into global growth and highlights the importance of structural reforms.



Key Highlights of the Report:

- Global Growth:** Projected to remain stable at **3.2%** in both 2024 and 2025.
- Uncertainty Factors:**
 - The global economic landscape faces uncertainties stemming from:
 - Geopolitical conflicts
 - Increasing trade tensions
 - Upcoming elections and leadership changes in major economies
- India's Growth:** India is expected to grow at **6.5%** in the fiscal year 2025-26.
- Urgency of Structural Reforms:**
 - The report emphasizes the necessity for structural reforms in economies to promote growth and stability.
 - It discusses strategies to enhance the social acceptability of these reforms.



Structural Reforms:

- Definition:** Structural reforms are policy changes aimed at modifying acquired rights and economic rents to improve resource allocation within the economy.
- Social Acceptability:** Gaining social acceptance for structural reforms is challenging, as the benefits and drawbacks are often unevenly distributed across different societal groups and time periods.

Determinants of Attitude Towards Structural Reforms:

- Personal Beliefs and Perceptions:**
 - Individual beliefs about the effects of policies significantly influence attitudes towards reforms.
 - Misinformation and misconceptions about how policies work can skew public perception.
- Socioeconomic Characteristics:** Individuals' economic self-interest, shaped by their socioeconomic background, also affects their views on policies.

Strategies for Boosting Support for Structural Reforms:

1. **Information:** Providing clear, unbiased information to correct misperceptions about reforms.
2. **Engagement:** Facilitating two-way dialogue between policymakers and the public, allowing citizens to contribute to shaping policies.
3. **Mitigation:** Recognizing that reforms may negatively impact certain groups and addressing these concerns with targeted measures (e.g., temporary cash support, capacity building).
4. **Trust:** Establishing credible and independent government bodies, along with first-generation reforms aimed at combating corruption and enhancing governance.

About the IMF

The IMF is a global organization that works to achieve sustainable growth and prosperity for all of its 191 member countries. It does so by supporting economic policies that promote financial stability and monetary cooperation, which are essential to increase productivity, job creation, and economic well-being. The IMF is governed by and accountable to its member countries.

- **Membership:** 191 member countries,
- **Voting Power:** Countries with larger economies have more voting power, reflecting their influence in global economic governance.
- **Objectives:**
 - Foster global monetary cooperation.
 - Secure financial stability.
 - Facilitate international trade.
 - Promote high employment and sustainable economic growth.
 - Reduce poverty worldwide.
 - Support macro-economic growth.
 - Provide policy advice and financing for developing countries.
 - Promote exchange rate stability and an international payment system.
- **Critical Missions:**
 - Encourage international monetary cooperation.
 - Expand trade and economic growth.
 - Discourage harmful economic policies.
- **Collaboration:** Works with member countries and international organizations to achieve its goals.
- **Financial Support:** Provides financial assistance to countries facing economic difficulties to stabilize their economies.
- **Surveillance:** Monitors global economic trends and advises member countries on policy measures.



Conclusion: The IMF's October 2024 WEO underscores the critical role of structural reforms in fostering economic growth while highlighting the challenges of securing social acceptance. By addressing misinformation, engaging the public, and implementing supportive measures, policymakers can enhance the effectiveness and acceptance of necessary reforms in their economies.

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Implementation of Stage II of Graded Response Action Plan (GRAP) in Delhi NCR

Context: The Commission for Air Quality Management (CAQM) has ordered the implementation of **Stage II** of the **Graded Response Action Plan (GRAP)** in the **Delhi NCR** region to address deteriorating air quality. This decision was made by the Centre's Sub-Committee tasked with operationalizing GRAP, and all relevant agencies in the NCR have been directed to enforce the measures outlined in this stage.



Key Features of GRAP Stage II:

- **Ban on Coal and Firewood:** The use of coal and firewood is prohibited, along with the operation of diesel generator sets, except for emergency and essential services.

Overview of GRAP:

The **Graded Response Action Plan (GRAP)** is an emergency response mechanism tailored to the **Air Quality Index (AQI)** levels in Delhi, categorized into four stages based on the severity of air pollution:

- **Stage 1:** Poor category (AQI 201-300)
- **Stage 2:** Very poor category (AQI 301-400)
- **Stage 3:** Severe category (AQI 401-450)
- **Stage 4:** Severe + category (AQI 451 and above)

The CAQM oversees the implementation of GRAP across the NCR and adjoining areas.

Reasons for Increased Air Pollution in Winter:

Several factors contribute to the rise in air pollution levels during winter months in Delhi:

- **Wind Patterns:** After the monsoon, the wind direction shifts to north-westerly, bringing dust from Rajasthan and sometimes from neighbouring countries like Pakistan and Afghanistan.
- **Reduced Wind Speed:** The winter season experiences a decrease in wind speed, which hampers the dispersion of pollutants.
- **Agricultural Practices:** Crop residue burning, particularly paddy stubble, significantly contributes to air pollution.
- **Other Sources:** Dust from construction sites and vehicular emissions also play a major role in worsening air quality.

Initiatives to Combat Air Pollution:

The CAQM has proposed an **11-point action plan** to mitigate air pollution, which includes:

- Mechanical sweeping of roads
- Use of dust suppressants
- The **System of Air Quality and Weather Forecasting and Research (SAFAR)**
- Spraying **PUSA bio-decomposer** on farmlands to facilitate the breakdown of stubble.

About Air Quality Index (AQI):

- The **Air Quality Index (AQI)** is issued by government agencies to assess air pollution levels and communicate health risks to the public.
- It takes into account eight pollutants: PM10, PM2.5, NO2, SO2, CO, O3, NH3, and Pb.

About the Commission for Air Quality Management (CAQM):

- The CAQM was established under the **Commission for Air Quality Management in NCR and Adjoining Areas Act, 2021**, replacing the Environment Pollution (Prevention and Control) Authority.
- Its purpose is to manage air quality in the NCR and adjoining areas, ensuring better coordination, research, and resolution of air quality issues.

Graded Response Action Plan (GRAP)

GRAP Stages

| State | Category | AQI | AQI Color Code |
|---------|-------------|---------------|----------------|
| Stage 1 | Poor | 201-300 | |
| Stage 2 | Very poor | 301-400 | |
| Stage 3 | Severe | 401-450 | |
| Stage 4 | Severe plus | 451 and above | |

Health Statements for AQI Categories

| AQI | Category | Possible health impact |
|---------|--------------|---|
| 0-50 | Good | Minimal impact |
| 51-100 | Satisfactory | Minor breathing discomfort to sensitive people |
| 101-200 | Moderate | Discomfort to people with lung, asthma, and heart diseases |
| 201-300 | Poor | Discomfort to most people on prolonged exposure |
| 301-400 | Very poor | Respiratory illness on prolonged exposure |
| 401-500 | Severe | Affects healthy people and seriously impacts those with existing diseases |

Conclusion: The enforcement of Stage II of GRAP reflects a proactive approach to address the alarming levels of air pollution in Delhi NCR, particularly during the winter months when pollution levels typically rise. Implementing these measures is crucial for safeguarding public health and enhancing air quality in the region.

Standard Operating Procedures (SOPs) for 'White Revolution 2.0

Context: The Ministry of Cooperatives recently released Standard Operating Procedures (SOPs) for 'White Revolution 2.0,' aimed at accelerating growth in the dairy sector. This initiative was launched during the diamond jubilee celebrations of the National Dairy Development Board (NDDB).

About NDDB:

- **Foundation:** Established by Dr. Verghese Kurien, the father of India's White Revolution, in 1965, NDDB played a central role in transforming India's dairy industry.
- **Operation Flood (1970-1996):** NDDB implemented the world's largest dairy development program, leading to the first White Revolution, making India the largest milk producer globally.
- **NDDB Act, 1987:** The institution was declared one of national importance following its merger with the Indian Dairy Corporation.



White Revolution 2.0:

- **Goals:** The primary objective is to increase milk procurement by dairy cooperative societies by **50%** over the next five years, targeting **1,007 lakh kg/day by 2028-29**.
- **Focus Areas:** It aims to empower women, create employment opportunities, and expand cooperative coverage.

National Programme for Dairy Development (NPDD) 2.0:

- **Integration:** The targets of White Revolution 2.0 have been integrated into the newly proposed Central Sector Scheme, NPDD 2.0, which offers financial support to enhance village-level milk procurement systems, build milk chilling facilities, and strengthen overall dairy infrastructure.
- **Dairy Cooperative Societies (DCS):** There is a plan to establish or strengthen **1 lakh DCS** to meet the program's goals.

Other Initiatives Boosting the Dairy Sector:

- **Rashtriya Gokul Mission:** Aimed at conserving and developing indigenous bovine breeds.
- **National Programme for Dairy Development (NPDD):** Focuses on infrastructure and capacity-building in dairy.
- **Livestock Health & Disease Control Programme (LHDCP):** Addresses animal health issues.
- **Animal Husbandry Infrastructure Development Fund:** Provides financial assistance to support infrastructure in the livestock sector.

White Revolution 2.0 aims to build on India's past successes in dairy production, strengthen the dairy cooperative movement, and ensure sustainable growth in the sector.

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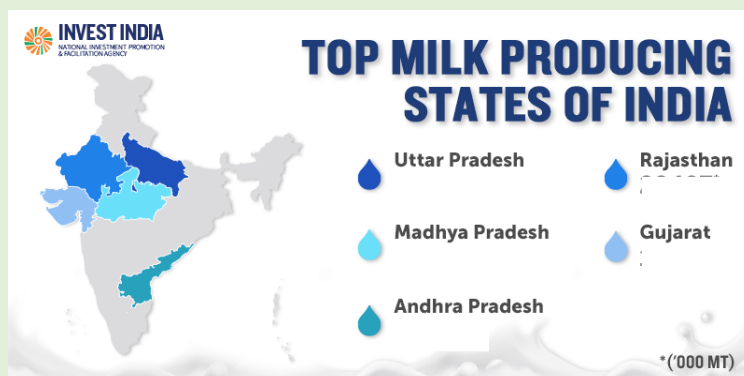
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Current Status of Milk Production in India

Global Ranking: India is the world's leading milk producer, with production reaching **231 million tonnes** during the **2022-23** period. This marks a significant increase from just **17 million tonnes** in **1951-52**.

Top Milk-Producing States: According to the Basic Animal Husbandry Statistics (BAHS) 2023, the top five milk-producing states in India are:

1. **Uttar Pradesh:** 15.72%
2. **Rajasthan:** 14.44%
3. **Madhya Pradesh:** 8.73%
4. **Gujarat:** 7.49%
5. **Andhra Pradesh:** 6.70%



These states collectively contribute to **53.08%** of the country's total milk production.

Per Capita Availability of Milk: The national per capita availability of milk in India is **459 grams/day**, which is significantly higher than the global average of **323 grams/day**. However, this availability varies across states, ranging from **329 grams/day** in **Maharashtra** to **1,283 grams/day** in **Punjab**.

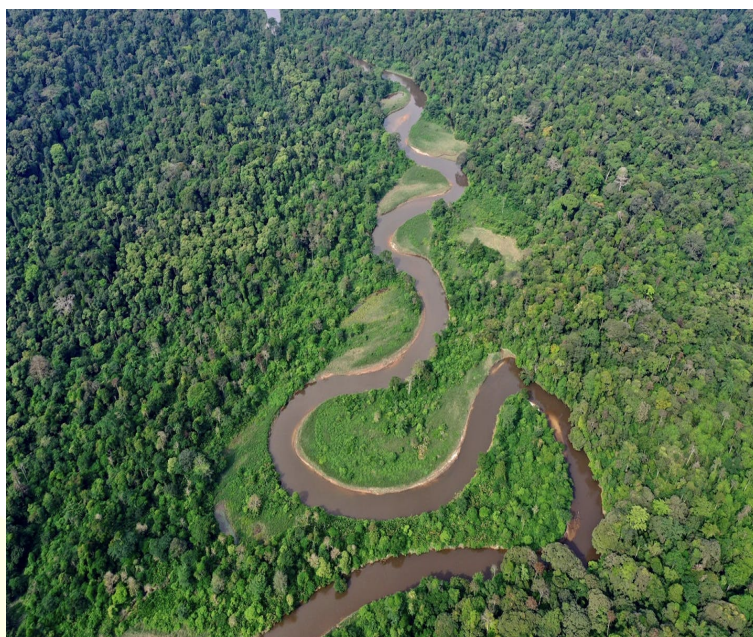
Milk Production by Animal Type:

- Approximately **31.94%** of the total milk production comes from indigenous buffaloes.
- **29.81%** is contributed by crossbred cattle.
- Goat milk accounts for **3.30%** of the total production, while exotic cows contribute **1.86%**.

Contribution of Dairy to the Agriculture and Livestock Sector: In the 2022-23 period, the milk group (which includes milk, ghee, butter, and lassi) accounted for about **40%** of the total output value from agriculture, livestock, forestry, and fishing sectors. This amounted to approximately **Rs 11.16 lakh crore**, making dairy a much larger contributor to the agricultural sector than cereals.

Closing Window of Opportunity Report: Key Biodiversity Areas (KBAs) at Risk

Context: The newly released report, *Closing Window of Opportunity: Mapping Threats to Important Areas for Conservation in Pantropics*, highlights the pressing threat posed by oil, gas, and mining concessions to Key Biodiversity Areas (KBAs) across some of the world's most ecologically critical regions—the Amazon Basin, Congo Basin, and Southeast Asia. Launched at the Convention on Biological Diversity (COP16) in Cali, Colombia, the report underscores the urgency of conserving these regions, which play a crucial role in regulating the global climate and maintaining biodiversity.

**Key Findings:**

- **518 KBAs** (18% by area in the pantropics) are under active or potential oil and gas concessions.
- In the **Amazon**, oil and gas blocks overlap with **14% of KBAs** and **12% of Indigenous Territories**.
- Across the pantropics, over **180 million hectares of high-integrity forests** are subject to ongoing or planned fossil fuel extraction projects.

Challenges in Protecting KBAs

The report outlines several challenges to safeguarding these areas:

- **Competing interests** between conservation and resource extraction, particularly due to the growing demand for minerals used in renewable energy technologies (e.g., nickel mining).
- **Unprotected KBAs** face spillover effects from infrastructure development linked to oil, gas, and mining projects, leading to degradation and habitat loss.

Recommendations:

1. Empower **Indigenous peoples** with resources and authority for self-governance while upholding their sovereignty over traditional lands.
2. Strengthen and enforce **legal frameworks** to stop new resource extraction in protected areas and phase out existing operations.
3. Restrict **green energy resource extraction** to non-critical habitats, with rigorous environmental standards to protect vital ecosystems.

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Global Initiatives for KBAs:

The **Global Standard for the Identification of Key Biodiversity Areas** (2016) by the International Union for Conservation of Nature (IUCN) serves as an essential tool for identifying and protecting KBAs.

Key Biodiversity Areas (KBAs)

- The concept of Key Biodiversity Areas (KBAs) originated from Birdlife International's initiative to identify Important Bird and Biodiversity Areas (IBA).
- The success of the IBA model prompted the expansion of the framework to include other taxonomic groups, such as plants, butterflies, and freshwater and marine biodiversity.
- Recognizing the need for a unified framework, the International Union for Conservation of Nature (IUCN) established the **global KBA Standard** in 2016 during the World Conservation Congress in Bangkok in 2004.

About KBAs:

KBAs are designated sites that significantly contribute to the global persistence of biodiversity. These areas are essential for maintaining the health of the planet and may contain:

- Unique species
- Species found only in limited areas

Criteria for Recognition:

To qualify as a KBA, a site must meet at least one of the 11 criteria grouped under five categories:

1. **Threatened Biodiversity**
2. **Geographically Restricted Biodiversity**
3. **Ecological Integrity**
4. **Biological Processes**
5. **Irreplaceability**

Global KBA Presence:

- Over **16,000 KBAs** have been mapped worldwide, highlighting their importance for global biodiversity conservation.
- The **Key Biodiversity Areas Partnership**, consisting of 13 global conservation organizations, works collaboratively to identify, map, and conserve these critical areas across the globe.

KBAs in India:

India has **862 KBAs**, which play a vital role in conserving the country's rich biodiversity. Notable examples include the **Western Ghats**, recognized for their unique species and ecosystems.

Conclusion: This report serves as a stark reminder of the delicate balance between meeting global energy demands and preserving the world's most essential ecosystems. Effective conservation strategies and collaborative efforts are urgently needed to prevent irreversible damage to these vital regions.

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The Remove Debris In-Orbit Servicing (RISE) Mission

Context: The *Remove Debris In-Orbit Servicing (RISE) Mission*, a pioneering initiative by the European Space Agency (ESA), is set to play a crucial role in advancing the circular economy in space. Scheduled for launch in 2028, RISE is ESA's first in-orbit servicing mission, designed to refuel, refurbish, and assemble satellites in orbit—key components of a sustainable, circular space economy. The mission will dock and control geostationary satellites, raising them to the geostationary graveyard, an area about 100 km above the operational satellite orbit, where retired satellites are stored.



Circular Space Economy:

The concept of a circular space economy is based on minimizing waste and maximizing resource efficiency, much like its terrestrial counterpart. Key components include:

- **Satellite refurbishment and repair**
- **Space debris removal**
- **Resource utilization** (extracting materials from asteroids or the Moon)

Significance of a Circular Space Economy:

- **Reduced space debris**, minimizing the risk of collisions and preventing the generation of more debris.
- **Resource conservation** by reusing and recycling materials in space.
- **Cost reduction** through extending the operational lifespan of satellites.
- **Faster development times** by assembling and manufacturing space systems directly in orbit.

Challenges: Despite its promise, the circular space economy faces several hurdles:

- **Technological limitations**, such as developing in-orbit servicing, recycling, and asteroid mining capabilities.
- **Funding requirements** for specialized equipment, research, and development.
- **Regulatory challenges** related to the establishment of global standards for space sustainability.

Global and Indian Initiatives:

- **ESA's Circular Economy in Space Goal** by 2050, with debris neutrality by 2030.
- **NASA's COSMIC Initiative**, promoting in-space servicing, assembly, and manufacturing.
- **Reusable launch vehicles** like SpaceX's Falcon 9.
- **India's ISRO**, advancing reusable launch vehicle technology and aiming for debris-free space missions by 2030.

The RISE mission represents a major step forward in making space activities more sustainable and ensuring long-term resource efficiency in orbit.

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What is a Cloud Chamber?

Context: India is establishing its first cloud chamber at the **Indian Institute of Tropical Meteorology (IITM)** in Pune. This innovative facility will enable advanced research into cloud formation and dynamics, particularly in relation to the Indian monsoon.

About Cloud Chamber:

A **cloud chamber** is a scientific apparatus designed to replicate the conditions necessary for cloud formation. Key features include:



- **Structure:** It typically resembles a closed cylindrical or tubular drum.
- **Function:** Inside the chamber, water vapor, aerosols, and other components are injected.
- **Conditions:** By controlling humidity and temperature, researchers can facilitate cloud development.

India's cloud chamber will be specifically engineered with convection properties to study the unique characteristics of Indian monsoon clouds. Currently, only a few such convective cloud chambers exist worldwide.

Objectives: The primary goals of establishing a convective cloud chamber include:

- **Understanding Cloud Physics:** The facility will enable scientists to study cloud behavior under various conditions that affect Indian weather systems.
- **Weather Modification Strategies:** Insights gained from this research can inform strategies for weather modification and improved weather forecasting.

The Pune facility will allow for the sustained study of **seed particles** that contribute to the formation of cloud droplets and ice particles.

Cloud Physics: Research in cloud physics encompasses several aspects, including:

- Behaviour of clouds under normal and extreme conditions
- Interactions between particles within a cloud
- Formation of rain droplets and ice particles
- Influence of moisture added to the atmosphere by cyclones or low-pressure systems
- Interactions between different layers of clouds

Significance:

The establishment of the cloud chamber will provide scientists with the flexibility to adjust physical and atmospheric parameters, enabling tailored experiments that consider the environmental factors influencing Indian weather and climate.

What is Convection?

Convection refers to the process of heat transfer through the movement of fluids, such as air or water. Key points include:

- **Heat Transfer Mechanism:** Convection is one of the primary methods through which heat is transferred in a fluid.
- **Driving Force:** This process is driven by temperature differences within the fluid, leading to the movement of warmer, less dense fluid rising and cooler, denser fluid sinking.

Understanding convection is crucial for studying weather patterns, cloud formation, and various atmospheric processes.

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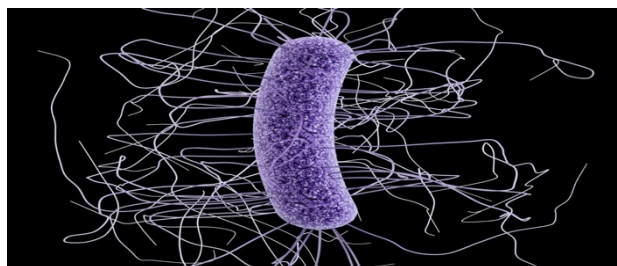
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Clostridioides difficile Bacteria

Context: Researchers are making strides in developing the first effective vaccine against **Clostridioides difficile**, a highly contagious and challenging-to-treat bacterium. This vaccine is leveraging the mRNA technology that proved successful in combating COVID-19.



About Clostridioides difficile:

- **Nature of the Bacterium: Clostridioides difficile** (C. difficile) is a bacterium that primarily causes an infection in the colon, which is the longest segment of the large intestine.
- **Symptoms:** Symptoms of C. difficile infection can range from mild to severe and include:
 - **Watery diarrhea**
 - **Mild abdominal cramping and tenderness**
 - Severe infections can lead to dehydration due to excessive fluid loss.
 - In extreme cases, the infection can cause **toxic megacolon**, where the colon becomes inflamed and significantly enlarged.

Risk Factors and Affected Populations:

- C. difficile infections are particularly prevalent among:
 - **Older adults** in hospitals or long-term care facilities.
 - Individuals outside of healthcare settings can also contract the infection, although the risk is lower.
- **Antibiotic Use:** Illness often arises following the use of antibiotics, which can disrupt the balance of bacteria in the gut, allowing C. difficile to thrive.

Transmission

- **Patient-to-Patient Spread:** The bacterium can be transmitted from one patient to another, primarily via the hands of healthcare workers who have come into contact with contaminated surfaces or materials.

Recurrence: Approximately **one-third** of individuals infected with C. difficile will experience recurrent infections, highlighting the persistent nature of this bacterium and the challenges in treatment.

Treatment Options: Treatment strategies for C. difficile infection include:

- **Antibiotics:** A prolonged course of strong antibiotics is commonly used; however, this can also eliminate beneficial gut bacteria.
- **Fecal Transplants:** This procedure delivers healthy bacteria to the gut, helping to restore a balanced microbiome and combat infection.

Significance of Vaccine Development: The development of a vaccine against C. difficile could dramatically reduce the incidence of infections, particularly in vulnerable populations, and alleviate the burdens associated with antibiotic treatment and recurrence.

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Space Docking Experiment (SPADEX)

Context: Recently, a Hyderabad-based company delivered two 400 kg class satellites to ISRO, which will be part of the **Space Docking Experiment (SPADEX)** planned for later this year. This experiment represents a significant advancement for ISRO in developing autonomous docking technology.



About Space Docking Experiment (SPADEX):

- **Autonomous Docking Technology:** SPADEX is one of ISRO's most significant steps toward developing autonomous docking capabilities.
- **Mission Structure:** The mission involves two vehicles: the 'Chaser' and the 'Target', which will come together and connect in space.
- **Docking Systems:** These systems allow two spacecraft to connect in orbit, enabling critical operations such as:
 - Assembling space stations
 - Refueling
 - Transferring astronauts and cargo
- **Stability and Control Testing:** The experiment will also assess how well the combined spacecraft maintains stability and control after docking, ensuring smooth operations for future missions.

Unique Aspects:

- **Indigenous and Cost-Effective:** India's SPADEX experiment is unique because it focuses on developing indigenous, scalable, and cost-effective docking technology.
- **Precision and Navigation:** The experiment will demonstrate precision, navigation, and control capabilities critical for future missions and is designed to accommodate various spacecraft sizes and mission objectives, including potential collaborations for building space stations or conducting deep space exploration.

Historical Context:

- **First Successful Docking:** The history of docking systems dates back to the Cold War when the Soviet Union achieved the first successful docking in space. On **October 30, 1967**, the Soviets completed the historic docking of **Kosmos 186** and **Kosmos 188**, marking the first fully automated docking between two unmanned spacecraft.
- **Impact on Space Exploration:** This achievement paved the way for later space exploration efforts, including long-term stays aboard space stations.

Significance: SPADEX is crucial for achieving India's long-term space exploration goals, which include:

- Manned spaceflight
- Satellite maintenance
- Future construction of space stations

What is Outer Space?

Outer space, often referred to simply as **space**, is the vast expanse that exists beyond the atmospheres of celestial bodies. It starts around **100 km** above Earth at the **Kármán line**, where the atmosphere transitions into space. This term is used to distinguish it from airspace and terrestrial locations. Outer space is characterized by a near vacuum, with extremely low pressure and density, and is the realm where various astronomical phenomena and activities, including satellite deployment and space exploration, occur.

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Key Fact About Black Sea

Context: Recent attacks by Russia on Ukrainian Black Sea ports have significantly impacted the delivery of vital aid to Palestinians and hindered grain supplies to the Global South, as noted by the British Prime Minister.

About the Black Sea:

- **Location:** The Black Sea is a large inland sea located at the southeastern extremity of Europe.
- **Classification:** It is classified as one of the marginal seas of the Atlantic Ocean.
- **Area:** The sea covers approximately **436,000 square kilometers** (about **168,000 square miles**).
- **Geography:**
 - To the **west**, it is bordered by the **Balkan Peninsula** in Southeastern Europe.
 - To the **east**, it is bounded by the **Caucasus**.
 - To the **north**, the **East European Plains** border it.
 - To the **south**, it is bordered by **Anatolia** in Western Asia.



Bordering Countries: The Black Sea is bordered by:

- **North:** Russia and Ukraine
- **South:** Turkey
- **West:** Bulgaria
- **East:** Georgia
- **Other:** Romania also has access to the Black Sea.
- The **Crimean Peninsula** extends into the sea from the north.



Coastline Lengths:

- Russia: **2,300 km**
- Turkey: **1,329 km**
- Ukraine: **1,282 km**

Connections:

- The Black Sea is connected to the **Aegean Sea** (an arm of the Mediterranean Sea) via:
 - **Bosporus Strait**
 - **Sea of Marmara**
 - **Dardanelles Strait**
- It connects to the **Sea of Azov** through the **Kerch Strait**.

Formation and Hydrology:

- The Black Sea was formed when geological upheavals in Asia Minor separated the Caspian basin from the Mediterranean Sea, leading to its gradual isolation.
- Its salinity is now less than half that of the world's oceans.
- The sea receives freshwater from several rivers, including the **Danube, Southern Bug, Dnieper, Rioni, and Dniester**.
- It is known as the largest **meromictic basin**, meaning water movement between its upper and lower layers is rare.
- The Black Sea is also one of the world's largest **anoxic basins**, with areas having very low dissolved oxygen levels.

Islands:

The Black Sea features several islands, with the largest being:

- **Snake Island** (Ukraine)
- **Giresun Island** (Turkey)
- **St. Ivan Island** (Bulgaria)

What is the Balkan Peninsula?

The **Balkan Peninsula** is the easternmost of Europe's three main southern peninsulas. While there is no universal agreement on its exact composition, the region is generally considered to include:

- **Countries:**
 - Albania
 - Bosnia and Herzegovina
 - Bulgaria
 - Croatia
 - Kosovo
 - Montenegro
 - North Macedonia
 - Romania
 - Serbia
 - Slovenia

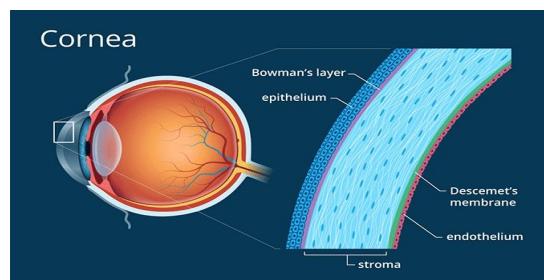


Additional Territories: Portions of **Greece** and **Turkey** are often included in descriptions of the Balkan Peninsula.

What is Cornea?

Context: The Ministry of Health and Family Welfare in India is considering amendments to the **Transplantation of Human Organs and Tissues Act (THOTA), 1994**, to facilitate the retrieval of corneas from all Indian patients who die in hospitals, without requiring consent from the family. This initiative aims to increase the availability of corneal transplants.

About the Cornea:



- **Definition:** The **cornea** is the clear, dome-shaped outer layer at the front of the eye. It plays a crucial role in vision by refracting and focusing light as it enters the eye.
- **Anatomical Features:**
 - **Covers Key Structures:** The cornea covers the pupil (the opening at the center), iris (the colored part), and the anterior chamber (the fluid-filled space inside the eye).
 - **Lack of Blood Vessels:** The cornea contains no blood vessels except at its margins. It relies on tears and the **aqueous humor** (a watery fluid in the anterior chamber) for nourishment.
 - **Nerve Endings:** The cornea is highly sensitive due to the many nerve endings it contains, making it sensitive to pain and touch.
- **Functions:**
 - **Light Refraction:** The primary function of the cornea is to refract, or bend, light, helping to focus most of the light that enters the eye.
 - **UV Protection:** The cornea also filters some ultraviolet (UV) rays from sunlight, protecting the internal structures of the eye.
- **Vision and Shape:**
 - The cornea's curvature is spherical in infancy but changes with age, affecting its focusing power.
 - An irregular curvature can lead to **astigmatism**, a condition where images appear elongated or distorted.
- **Healing and Damage:** The cornea can repair itself quickly from minor abrasions, but deeper abrasions may result in scarring, which can reduce its transparency and lead to visual impairment.

What Are Ultraviolet (UV) Rays?

- **Definition: Ultraviolet (UV) rays** are a form of non-ionizing radiation emitted by the sun and artificial sources, such as tanning beds. They fall between visible light and X-rays on the electromagnetic spectrum.
- **Benefits:** UV rays play a role in the production of **Vitamin D** in the skin, which is essential for various bodily functions.

Health Risks: While there are benefits to UV exposure, excessive exposure can lead to health risks, including skin damage, cataracts, and other eye disorders. Therefore, protection from UV rays is important for eye health, and wearing sunglasses that block UV radiation can help safeguard the cornea and other ocular structures.

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Adoption of Kazan Declaration at 16th BRICS Summit

Context: The **Kazan Declaration**, adopted at the **16th BRICS Summit** held in Kazan, Russia, encapsulates the bloc's commitment to multilateralism, global development, and security.

- The summit focused on "**Strengthening Multilateralism for Just Global Development and Security**," highlighting the importance of cooperative efforts among member countries in addressing global challenges.

Key Points of the Kazan Declaration:

- The declaration emphasizes:
 - Enhanced cooperation among BRICS nations.
 - A unified stance on critical global issues, including the promotion of peace and sustainable development.
- **BRICS Payment System:** Russia advocated for a BRICS-led payment system as an alternative to **SWIFT**, particularly in light of the restrictions placed on Russian banks since 2022.
- **Regional Issues:** Discussion on escalating situations in West Asia was a significant focus.
- **Initiatives:**
 - Proposal of a **BRICS Grain Exchange** and a **BRICS (Re)Insurance Company** to bolster food security and insurance mechanisms among member nations.
 - Introduction of a **BRICS Partner Country** category to allow non-member countries to collaborate on various projects.
 - Announcement of a **BRICS R&D Vaccine Center** to promote vaccine research and development.
- Recognition of **India's initiative** for an **International Big Cats Alliance**, showcasing India's commitment to wildlife conservation.





Overview of BRICS

- **Formation:** The term BRIC was first used by economist **Jim O'Neill** in 2001, representing emerging economies. The group transitioned to BRICS with South Africa's induction in 2010.
- **Expansion:** Recent additions include **Ethiopia, Egypt, Iran, Saudi Arabia, and the UAE**, broadening the bloc's influence.
- **Economic Significance:** BRICS nations collectively represent about **41%** of the global population, **24%** of the global GDP, and **16%** of global trade.

Significance of BRICS for India:

1. **Strengthening South-South Cooperation:** It serves as a platform for developing countries to collaborate and voice their concerns in global institutions.
2. **Balancing Global Power:** BRICS provides a counterweight to Western alliances like the G7, diversifying India's foreign relations.
3. **Trade Diversification:** Encourages economic cooperation and investment among member states.
4. **New Development Bank (NDB):** Offers funding for infrastructure and sustainable development projects aligning with India's growth strategies.

Challenges Faced by BRICS:

- **Varying Agendas:** Differences in priorities, especially concerning issues like terrorism and regional security.
- **Geopolitical Rivalry:** China's growing influence raises concerns about the bloc becoming pro-China, especially with the inclusion of nations with strong ties to China.
- **Middle Eastern Alliances:** New members from the Middle East complicate India's regional relationships.
- **Trade Barriers:** Existing tariffs and regulatory differences limit intra-BRICS trade potential.

Future Directions:

- **Strategic Engagement:** India must leverage its position within BRICS to enhance its national interests and contribute to global governance.
- **Resource Utilization:** Effective use of the NDB's resources can facilitate critical infrastructure projects in India.
- **Trade Networks:** India should aim to diversify its trade networks and attract investments through BRICS initiatives.

Conclusion: The Kazan Declaration and the summit's outcomes reflect BRICS' commitment to multilateralism and collaborative development. India's role as a founding member positions it to influence the group's trajectory, ensuring it remains a viable platform for emerging economies to assert their global influence while navigating the challenges of geopolitical dynamics and intra-bloc cooperation.

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SC Upholds State's Power to Regulate Industrial Alcohol

Context: The **Supreme Court** upheld the power of **states** to tax and regulate **industrial alcohol**, which is not intended for human consumption. The case centered on the interpretation of "intoxicating liquor" to determine if it includes industrial alcohol and whether states or the Centre have regulatory authority over it.

**Dispute:**

- The dispute arises from overlapping entries in the **Seventh Schedule** of the Indian Constitution, which allocates law-making powers.
 - Entry 8 of List II (State List):** Empowers states to regulate the production, manufacture, possession, transport, purchase, and sale of intoxicating liquors.
 - Entry 52 of List I (Union List):** Grants the Centre the authority to regulate industries.
- The **Centre** argued that it had exclusive control over industrial alcohol, while **states** contended that they needed to regulate it to prevent illegal production of consumable alcohol.

Industrial Alcohol:

- Definition:** Industrial alcohol is denatured alcohol mixed with chemicals (like benzene and gasoline) to make it unfit for human consumption, significantly reducing its price.
- Uses:** It is used in pharmaceuticals, perfumes, cosmetics, and cleaning products but can also be misused to create illicit liquor, which poses health risks.

Supreme Court Ruling:

- The Court emphasized that taxation on alcohol is vital for state revenue, often supplemented by excise duties.
- It clarified the Centre-state relationship regarding industry control, affirming that states can legislate on matters in the **State List**, despite the Centre's broad powers.
- The ruling overturned a previous 1990 judgment that limited the definition of intoxicating liquor to potable alcohol only, preventing states from taxing industrial alcohol.
- The Court stated that when faced with multiple interpretations of constitutional entries, the one that upholds federal balance should be chosen.

Seventh Schedule Overview:

- Article 246:** Defines the distribution of powers between the Union and State governments, preventing overlapping legislation.
- Lists:**
 - Union List:** Subjects exclusively for Parliament (e.g., defence, foreign affairs).
 - State List:** Subjects exclusively for State Legislatures (e.g., police, public health).
 - Concurrent List:** Subjects for both (e.g., education, marriage), where Union law prevails in case of conflict.

Conclusion: The Supreme Court's ruling represents a significant shift in how industrial alcohol is regulated in India, reaffirming the authority of states to legislate on this issue. It underscores the importance of maintaining a federal balance in governance and addresses the complexities of taxation and regulation of substances that can impact public health and safety.

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Rights of Persons with Disabilities (Amendment) Rules, 2024

Context: The Rights of Persons with Disabilities (Amendment) Rules, 2024 have been notified by the Union Ministry of Social Justice and Empowerment under the Rights of Persons with Disabilities Act, 2016.



Key Highlights of the Amended Rules

1. **Application for Disability Certificate: Required Documents:**

Applicants must provide proof of identity, a recent photograph (not older than six months), and an Aadhaar card to apply for a disability certificate.

2. **Issuance Authority:** Only a **medical authority** or a **notified competent medical authority** at the district level is authorized to issue disability certificates, which must be done in the applicant's district of residence.

3. **Processing Time:** The time frame for processing applications has been extended from **one month to three months**.

4. **Application Lapse Clause:** Applications will lapse or become "inactive" if not decided within **two years**. Applicants will need to reapply or contact the authority to reactivate their applications.

5. **New Colour-Coded UDID Cards:**

- **White Card:** For disabilities below 40%.
- **Yellow Card:** For disabilities between 40% and 80%.
- **Blue Card:** For disabilities of 80% or above.

Concerns with the Amended Rules

1. **Exclusion of Persons without Aadhaar:** The requirement of an Aadhaar card may exclude persons with disabilities who do not possess one, particularly affecting those in rural areas or marginalized communities.

2. **Longer Processing Time:** The extension of processing time to three months may hinder access to essential services and entitlements for individuals with disabilities, delaying their identification and support.

Overview of the Rights of Persons with Disabilities Act, 2016

- **Definition of Disability:** The Act defines a person with a disability as one who has a physical, mental, intellectual, or sensory impairment.
- **Recognition of Disabilities:** It recognizes **21 categories of disabilities**, promoting inclusivity.
- **Prohibition of Discrimination:** The Act prohibits discrimination against persons with disabilities across various sectors, including **employment, education, and healthcare**.

Conclusion: While the amendments aim to streamline the process of obtaining disability certificates and enhance the identification system through colour-coded UDID cards, concerns regarding the exclusion of individuals without Aadhaar and extended processing times need to be addressed. The focus should remain on ensuring that all persons with disabilities have equitable access to certification and the rights and entitlements afforded to them under the law.

Commitment to Reducing Inequality (CRI) Index 2024

Context: The **Commitment to Reducing Inequality (CRI) Index 2024**, released by Oxfam and Development Finance International, evaluates the commitment of 164 countries and regions to combating inequality.

Key Highlights of the CRI Index 2024



1. Ranking:

- **Top Performers:** Norway, Canada, and Australia topped the index, demonstrating strong commitments to reducing inequality.
- **Worst Performers:** South Sudan and Nigeria ranked among the lowest, indicating significant challenges in addressing inequality.
- **India's Rank:** India ranked **127** out of 164 countries. Other South Asian nations performed better, with Nepal at **115** and Sri Lanka at **118**.

2. Rising Inequality:

- The gap between the **Global South** and the **Global North** has widened more rapidly than at any time since World War II.
- Many people are facing severe hardships due to rising food prices and hunger, while the number of billionaires has doubled in the past decade.
- Key driving factors include conflict, debt crises, and climate shocks, which are limiting spending in low- and lower-middle-income countries. Notably, **84%** of countries have reduced spending on education, health, and social protection.

Key Recommendations to Reduce Inequality

1. **National Inequality Reduction Plans (NIRPs):** Countries should implement realistic and timebound plans to reduce inequality, with regular monitoring to ensure progress.
2. **Public Spending Targets:** Governments should allocate at least **15% of total public expenditure** to health and **20% to education**.
3. **Progressive Taxation:** Increase progressive taxation by targeting the income of the richest **1%** to redistribute wealth more effectively.

Measures Taken to Reduce Inequality in India:

1. **Job Creation:** The **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)** provides a legal guarantee for at least 100 days of unskilled wage employment in a financial year to every rural household.
2. **Financial Inclusion:** The **Pradhan Mantri Jan Dhan Yojana** aims to provide affordable access to financial services, including banking, savings, and insurance.
3. **Education and Skilling:** The **Right to Education Act, 2009** mandates free and compulsory education for children aged 6 to 14 years, aiming to improve literacy and educational outcomes.
4. **Other Initiatives:** Programs like **Startup India** promote entrepreneurship and job creation, contributing to economic empowerment and inclusion.

Conclusion: The CRI Index 2024 underscores the urgent need for countries to prioritize inequality reduction through effective policies and initiatives. While India has made strides in certain areas, there is still significant work to be done to enhance commitment to equality and ensure equitable growth for all citizens. The recommendations from the index provide a roadmap for achieving these goals.

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Emissions Gap Report 2024

Context: The UN Environment Programme (UNEP) has released the **Emissions Gap Report 2024**, highlighting critical insights into global greenhouse gas (GHG) emissions, future projections, and necessary actions for achieving the long-term temperature goals set by the **Paris Agreement**.

Key Observations:

- Record Emissions:** GHG emissions reached a new high of **57 gigatons (Gt)** of CO₂ equivalent in 2023, reflecting a **1.3% increase** from 2022.
- Emission Rankings:** India ranks **3rd** in total GHG emissions, contributing **4,140 MtCO₂e**. The top two emitters are:
 - **China** (1st)
 - **United States** (2nd)
- Disparities in Emissions:**
 - The six largest GHG emitters account for **63%** of global emissions, while least developed countries contribute only **3%**.
 - Historical context shows that India's total CO₂ emissions from 1850 to 2022 were significantly lower at **83 GtCO₂** compared to China's **300 GtCO₂** and the U.S.'s **527 GtCO₂**.
- NDC Targets:** There is a pressing need for more stringent policies globally to meet the Nationally Determined Contributions (NDC) targets for **2030**.

Recommendations for Limiting Global Warming

- Collective Emission Reductions:** Nations must commit to reducing annual GHG emissions by **42% by 2030** and **57% by 2035** in their next NDCs.
- Comprehensive NDCs:** NDCs should encompass all gases listed in the **Kyoto Protocol**, cover all relevant sectors, and set specific and measurable targets.
- Renewable Energy Deployment:** Increasing the use of solar photovoltaic technologies and wind energy is crucial, as these could contribute to **38%** of the total emission reduction potential by **2035**.

About Nationally Determined Contributions (NDCs)

- **NDCs** are national climate action plans submitted by countries, outlining their strategies to reduce GHG emissions.
- Under the **Paris Agreement**, countries are required to update their NDCs every five years with increasing ambition, considering their respective capacities.
- After the initial NDCs in **2015** and the second round in **2020/2021**, the next set of NDCs, termed "NDCs 3.0", is expected to be due in early **2025**.



United Nations Environment Programme (UNEP)

The **United Nations Environment Programme (UNEP)** plays a pivotal role as the leading global authority on environmental matters. Here's a summary of its mission and key functions:

- **Mission:** UNEP aims to **inspire, inform, and enable** nations and communities to enhance their quality of life while ensuring the sustainability of future generations.
- **Support for Sustainable Development:** Through advanced science, coordination, and advocacy, UNEP supports its **193 Member States** in achieving the **Sustainable Development Goals (SDGs)** and promoting a harmonious relationship with nature.
- **History and Collaboration:** For over **50 years**, UNEP has collaborated with various stakeholders, including:
 - **Governments**
 - **Civil society**
 - **Private sector**
 - **Other UN entities**
- Its initiatives have tackled some of humanity's most critical environmental challenges, such as:
 - **Restoring the ozone layer**
 - **Protecting marine ecosystems**
 - **Promoting a green and inclusive economy**
- **Focus Areas:** UNEP is dedicated to driving **transformational change** by addressing the root causes of the **triple planetary crisis**:
 1. **Climate Change**
 2. **Nature and Biodiversity Loss**
 3. **Pollution**
- **Objectives:** The organization focuses on:
 - Assisting countries in transitioning to **low-carbon and resource-efficient economies**.
 - Strengthening **environmental governance** and legal frameworks.
 - Safeguarding **ecosystems**.
 - Providing **evidence-based data** to inform policy-making.
- **Urgency of Work:** The urgency of UNEP's work has intensified as global environmental challenges escalate, making their mission and initiatives crucial for current and future generations.



Conclusion: The **Emissions Gap Report 2024** emphasizes the urgency for countries to strengthen their climate commitments and implement effective policies to significantly reduce emissions. The report underscores the disparities in contributions to global emissions and the need for equitable and ambitious action from all nations, especially in light of the upcoming NDC updates. The recommended focus on renewable energy technologies highlights a pathway for substantial emissions reductions while addressing climate change impacts.

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Gram Panchayat-Level Weather Forecasting Initiative

Context: The Gram Panchayat-Level Weather Forecasting Initiative has been launched to enhance climate resilience in rural areas of India.

About the Initiative:

- **Ministries Involved:** This initiative is a collaborative effort between the **Ministry of Panchayati Raj**, the **India Meteorological Department (IMD)**, and the **Ministry of Earth Sciences**.

Features:

- **Coverage:** The initiative will provide localized weather forecasts to **2.5 lakh Gram Panchayats** across India.
- **Data Accessibility:** Real-time data on:
 - Current temperature
 - Wind speed
 - Cloud cover
 - Rainfall
 - Relative humidity
- **Digital Platforms:** Weather forecasts will be accessible through platforms like:
 - e-GramSwaraj
 - Gram Manchitra
 - Meri Panchayat
- **Forecast Types:** Provides **5-day** and **hourly** weather forecasts.
- **Alert System:** SMS alerts will be sent to panchayat representatives regarding extreme weather events, such as cyclones and heavy rainfall.



Significance of Localized Weather Forecasts:

- **Agricultural Support:** Enables farmers to make informed decisions regarding sowing, irrigation, and harvesting, thereby safeguarding agricultural livelihoods.
- **Grassroots Governance:** Strengthens rural governance by equipping communities to better address environmental challenges and enhance climate resilience.
- **Disaster Preparedness:** Improves rural readiness for extreme weather events, contributing to reduced mortality and damage from disasters.
- **Global Role:** Highlights India's leadership in global climate resilience, with IMD acting as a UN Early Warning for All advisor to five developing nations.

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Advancements in Weather Forecasting:

- **Forecasting Capabilities:** IMD can now provide forecasts for areas as small as **12 km x 12 km**, representing a **40% improvement** in accuracy over the last decade.
- **Future Goals:** Experimental forecasts are being developed for **3 km x 3 km** grids, with plans to achieve **hyper-local** forecasts for **1 km x 1 km** areas.
- **Weather Information Network:** A new system, **WINDS**, has been launched to generate long-term, hyper-local weather data.
- **Other Initiatives:** The initiative complements existing programs like **Agro Advisory Services (AAS)** and **Gramin Krishi Mausam Sewa (GKMS)**.

The Ministry of Panchayati Raj

- **Role:** Oversees decentralization and local governance in Indian states.
- **Structure:** India has a three-tier government system due to the 73rd and 74th Amendment Acts, 1993.

Government Structure:

- **Federation:** Powers are divided between the Union Government and State Governments.
- **Local Self Governments:** Introduced Panchayati Raj (village level) and Urban Local Bodies (municipalities and municipal corporations).

Establishment:

- **Creation:** The Ministry was established in May 2004.
- **Leadership:** Currently headed by **Shri Rajiv Ranjan Singh alias Lalan Singh**.

Vision: Attain decentralized and participatory local self-government through Panchayati Raj Institutions (PRIs).

Mission: Focus Areas

- **Empowerment:** Strengthening the capacity of PRIs.
- **Enablement:** Providing resources and support for effective functioning.
- **Accountability:** Ensuring transparency and responsiveness of PRIs.
- **Inclusive Development:** Promoting social justice and equitable service delivery.

Functions:

- **Oversight:** Manages all matters related to Panchayati Raj and its institutions.
- **Policy Implementation:** Facilitates the effective execution of programs aimed at local governance

Conclusion: This initiative aims to empower rural communities by providing critical weather information that enhances agricultural practices, strengthens governance, and builds resilience against climate-related challenges. Through improved forecasting and timely alerts, it plays a vital role in preparing communities for the impacts of extreme weather events.

Urbanisation and industries draining groundwater reserves in 5 Hotspots: Study

Context: The study on urbanization and its impact on groundwater reserves highlights significant concerns regarding the depletion of these vital resources in five hotspots across India.

Key Findings of the Study

• Hotspot Areas:

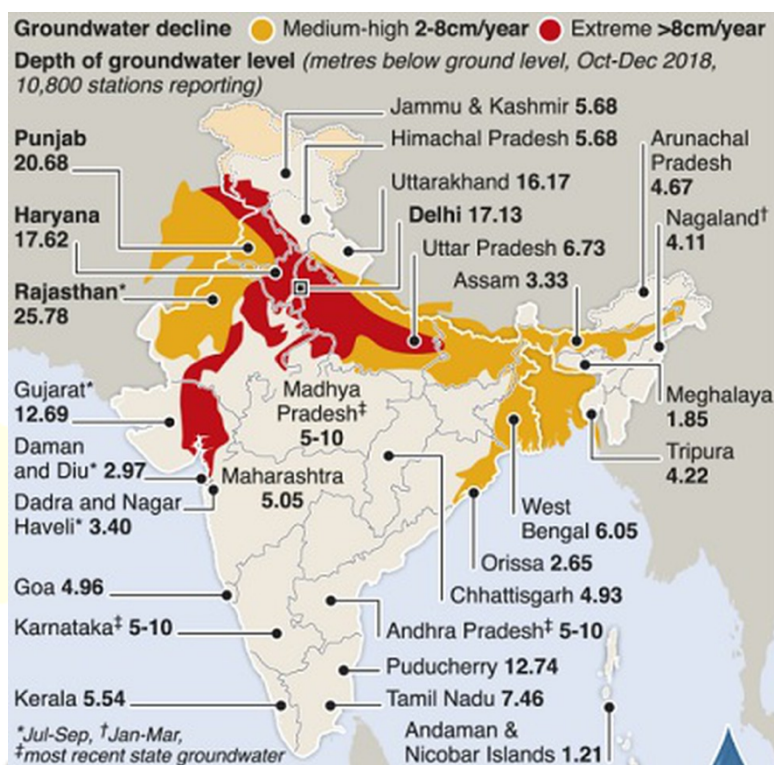
- Punjab and Haryana (Hotspot I)
- Uttar Pradesh (Hotspot II)
- West Bengal (Hotspot III)
- Chhattisgarh (Hotspot IV)
- Kerala (Hotspot V)

• Groundwater Usage:

- India is the largest user of groundwater, accounting for over 25% of the global total.

• Water Loss:

- The northern and north-western hotspots (Punjab, Haryana, and Uttar Pradesh) have lost approximately **64.6 billion cubic meters** of water over the past two decades.
- **Punjab and Haryana** are identified as the most affected regions with the highest decline in groundwater levels.
- **Uttar Pradesh** has shifted water usage from agricultural to domestic needs due to urban expansion.
- **Chhattisgarh** faces reduced groundwater availability due to increased irrigation, domestic, and industrial usage.
- In **West Bengal and Kerala**, domestic and industrial water use surged by **24%** and **34%**, respectively.



Proposed Solutions for Depleting Groundwater Resources

1. User Rights:

- Establish formalized groundwater rights that are detached from land ownership to manage resources more equitably.



2. Community Rights:

- Granting community rights would promote collective responsibility and ensure equal access to groundwater resources, helping mitigate exploitative tendencies often seen under private ownership.

Artificial Groundwater Recharge Techniques

• Direct Surface Techniques:

- Flooding, basins or percolation tanks, and stream augmentation.

• Direct Subsurface Techniques:

- Injection wells, recharge wells, and recharge pits and shafts.

Government Initiatives:

• Atal Bhujal Yojana (ATAL JAL):

- Aims to improve groundwater management in seven states: Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh.

• Jal Shakti Abhiyan - "Catch The Rain":

- Promotes rainwater harvesting and water conservation.

• Master Plan for Artificial Recharge (2020):

- Plans to create **1.42 crore** rainwater harvesting structures to enhance groundwater recharge.

• Financial Assistance to States:

- Financial aid under the **15th Finance Commission** is available for rainwater harvesting initiatives.

Conclusion: The findings underscore the urgent need for sustainable groundwater management practices, particularly in the highlighted hotspots. Implementing community-based solutions, enhancing artificial recharge techniques, and leveraging government initiatives can significantly contribute to the conservation and sustainable use of groundwater resources in India.

Caspian Sea

Context: The Caspian Sea has been shrinking since the mid-1990s, with the rate of disappearance accelerating since 2005.

Geographic and Physical Characteristics:

- **Size:** It is the world's largest inland body of water, covering approximately **386,400 square kilometres**.
- **Location:** The Caspian Sea is situated between **Asia and Europe**, bordered by the **Caucasus Mountains** to the east and the vast **steppe of Central Asia** to the west.
- **Bordering Countries:**
 - **West:** Russia and Azerbaijan
 - **North and East:** Kazakhstan and Turkmenistan
 - **South:** Iran
- **Name Origin:** Named after the ancient **Kaspi** people who once lived on its western shores.



Formation:

- Despite being called a sea, it is technically a **lake** as it is an enclosed water body without a direct outlet to the ocean.
- It was once part of the **ancient Parathethys Sea** (from the Tethys Ocean) around **5.5 million years ago**, becoming landlocked due to tectonic uplift and sea-level fall.
- The seafloor consists of **oceanic basalt** rather than continental granite.
- Water composition varies, being nearly fresh in the northern parts and increasingly saline towards the south, with a mean salinity about **one-third** that of ocean water.

Major Rivers: Volga, Ural, Terek

Major Cities:

- **Baku:** The capital of Azerbaijan and the largest city along the Caspian.
- **Nowshera:** An important city in Iran located along the sea's coast.

Economic Significance

- The Caspian Sea is rich in **energy resources**, including **oil and natural gas** reserves found in offshore fields and along its coast.
- It is a major source of **caviar**, known for its luxurious status and culinary significance.

What is Caviar?

- **Definition:** Caviar is a delicacy made from the salt-cured eggs (roe) of sturgeon fish.
- **Source Regions:** Traditionally sourced from the **Caspian** and **Black Sea** regions.
- **Characteristics:** Caviar is prized for its distinctive taste and comes in various colours, commonly black, grey, or golden. Each type has a unique texture and flavour, making it highly sought after in gourmet cuisine.

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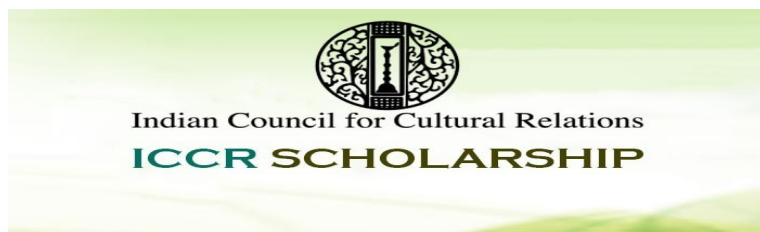
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Indian Council for Cultural Relations (ICCR)

Context: The **Indian Council for Cultural Relations (ICCR)** recently held a conference of Buddhist monks and scholars in Colombo to discuss granting the **Pali language** the status of a classical language in India.



About ICCR:

- **Established:** Founded in 1950 by **Maulana Abul Kalam Azad**, India's first Education Minister.
- **Affiliation:** An autonomous body under the **Ministry of External Affairs**, Government of India.
- **Mandate:** Focused on enhancing India's **external cultural relations** through cultural exchange and fostering people-to-people connections worldwide.
- **Cultural Centres:** Operates a network of cultural centres worldwide, promoting **Indian culture** abroad.

Objectives:

- **Policy Involvement:** Participates in creating and implementing policies related to India's cultural diplomacy.
- **Cultural Relations:** Aims to build mutual understanding and strengthen cultural ties between **India and other nations**.
- **Cultural Exchanges:** Promotes and facilitates cultural exchanges, fostering deeper connections with other countries.

Scholarships and Educational Exchange Programs:

- **Scholarships:** ICCR awards around **3000+ scholarships annually** under 21 different schemes, benefiting foreign students from over 180 countries.
- **Funding:** Six schemes are directly funded by ICCR, while others are managed on behalf of the **Ministry of External Affairs (MEA)** and the **Ministry of Ayush**.
- **Programs Offered:** Scholarships cover a broad range of courses, from undergraduate to postdoctoral levels, across leading Indian universities and educational institutions.

Pali Language

- **Language Family:** Pali belongs to the **Indo-European family**, alongside many European, Iranian, and North Indian languages.
- **Classification:** It is a **Middle Indo-Aryan language**, part of the Prakrit group.
- **Historical Significance:** Pali is one of the oldest surviving Prakrits and serves as the liturgical language of **Theravāda Buddhism**, preserving its sacred texts.

Exercise SIMBEX

Context: The 31st edition of the Singapore India Maritime Bilateral Exercise (SIMBEX) is being held from 23 to 29 October 2024 at the Eastern Naval Command in Visakhapatnam, India.



About SIMBEX

- **Origins and Evolution:** Established in 1994 as *Exercise Lion King*, SIMBEX has evolved into one of the most enduring and significant maritime collaborations between the Indian Navy and the Republic of Singapore Navy (RSN).
- **Historic Significance:** It is the longest continuous naval exercise conducted by the Indian Navy with any nation.
- **Structure:** This year's exercise is divided into:
 - **Harbour Phase (at Visakhapatnam):** Includes Subject Matter Expert Exchanges (SMEEs), cross-deck visits, sports events, and pre-sail briefings.
 - **Sea Phase (in the Bay of Bengal):** Involves advanced naval drills such as live weapon firings, anti-submarine warfare (ASW) training, anti-surface and anti-air operations, seamanship exercises, and tactical manoeuvres.

Objectives: SIMBEX aims to:

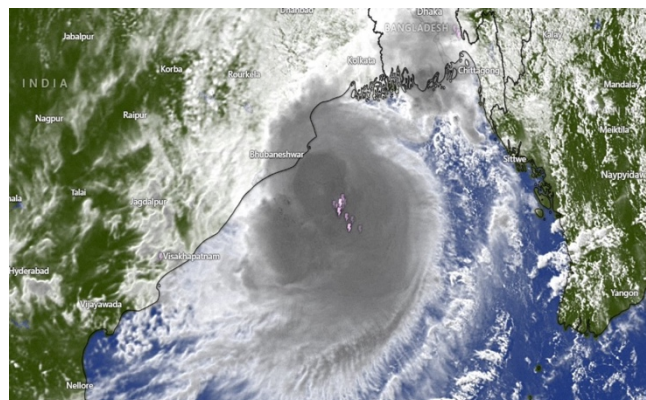
- Strengthen the **strategic partnership** between India and Singapore.
- Enhance **interoperability** between the two navies.
- Improve **maritime domain awareness**.
- Foster **cooperation to address shared maritime challenges**.

Submarines: An Overview

- **Definition:** Submarines are **specialized watercraft** capable of independent underwater operations, using onboard power and systems to remain submerged for extended periods.
- **Role in Naval Warfare:** They are critical for their **stealth** and **agility**, providing advantages in intelligence gathering, surveillance, and anti-submarine operations.
- **Functions:** Submarines contribute to **maritime defence, intelligence gathering, anti-submarine warfare**, and **patrol** missions, significantly bolstering a nation's naval capabilities.

Severe Cyclonic Storm Dana Makes Landfall on Odisha Coast

Context: On the night of **October 24**, **Cyclone Dana** made landfall along the Odisha coast with wind speeds reaching between **100 to 120 km/h**. This severe cyclonic storm was marked by intense rainfall, high winds, and storm surges affecting coastal areas, marking a significant weather event in the region.



About Tropical Cyclones:

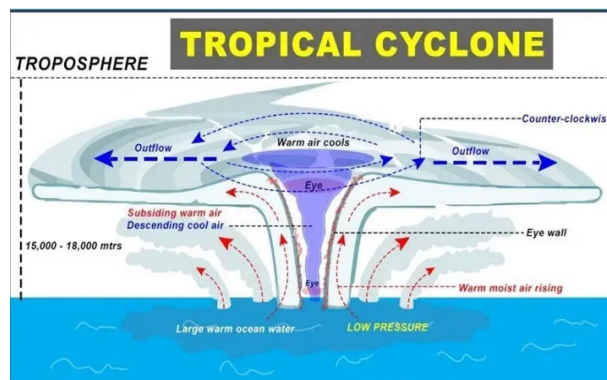
- **Definition:** Tropical cyclones are intense weather systems that form over **warm ocean waters** between the **Tropics of Capricorn and Cancer**. According to the **World Meteorological Organization (WMO)**, they are classified as tropical cyclones when wind speeds exceed **Gale Force (minimum 63 km/h)**.
- **Formation:** These storms form from the combined heat from the sea and atmospheric conditions near the equator.

Characteristics of Tropical Cyclones:

- **Calm Eye:** The center of a tropical cyclone, known as the "eye," is relatively calm and characterized by very low pressure.
- **High Wind Speeds:** The average wind speeds can exceed **120 km/h**.
- **Closed Isobars:** Cyclones feature closely spaced isobars, which increase wind speeds.
- **Seasonality:** Tropical cyclones tend to occur during specific seasons and follow trade wind paths from **east to west**.

Classification by Wind Speed (Indian Meteorological Department)

1. **Depression:** 31-49 km/h
2. **Deep Depression:** 50-61 km/h
3. **Cyclonic Storm:** 62-88 km/h
4. **Severe Cyclonic Storm:** 89-117 km/h
5. **Very Severe Cyclonic Storm:** 118-166 km/h



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6. **Extremely Severe Cyclonic Storm:** 166-221 km/h

7. **Super Cyclonic Storm:** Above 222 km/h

Saffir-Simpson Hurricane Wind Scale:

- Cyclones are also categorized based on wind speed into **Category 1 to 5**, with **Category 5** being the most intense, having winds of **252 km/h or higher**.

Regional Names of Tropical Cyclones:

- **Hurricanes:** Caribbean Sea and Atlantic Ocean
- **Typhoons:** Northwest Pacific, especially East and Southeast Asia
- **Cyclones:** Indian Ocean and Southwest Pacific
- **Willy-Willies:** Australian region

Naming of Cyclones:

- **Cyclone Dana:** The name "Dana" was proposed by **Qatar** and selected by the WMO/ESCAP for this cyclone.
- **Process:** Tropical cyclone names are contributed by 13 member countries under the WMO/ESCAP, with each country suggesting a list of 13 names. The **India Meteorological Department (IMD)**, as one of the **six Regional Specialized Meteorological Centres (RSMCs)**, assigns these names sequentially.

Cyclone Landfall:

- **Definition:** Landfall occurs when the cyclone's **eye** reaches the coastline.
- **Eye Characteristics:** This is a calm area in the storm's center, often with clear skies.
- **Impact:** Before landfall, the cyclone's outer bands bring strong winds, heavy rain, and storm surges to the coast.

This recent **landfall of Cyclone Dana** on the Odisha coast underscores the importance of continuous monitoring and preparedness in the face of tropical storms, which can significantly impact coastal communities and infrastructure.

Minimum Dietary Diversity among Children in India

Context: A recent study highlights that **77% of children in India aged 6-23 months** lack **Minimum Dietary Diversity (MDD)**, as per WHO standards.

Minimum Dietary Diversity (MDD) Defined:

According to the **World Health Organization (WHO)**, **Minimum Dietary Diversity** is met when a child's diet includes **five or more** of the following eight food groups:

- Breast milk
- Grains
- Legumes
- Dairy products
- Flesh foods (e.g., meat, fish)
- Eggs
- Fruits and vegetables



When a child consumes foods from **fewer than five of these groups**, it is considered **Minimum Dietary Diversity Failure (MDDF)**.

Key Findings of the Study (2019-2021):

- **Regional Disparities:** The **central region** (Uttar Pradesh, Rajasthan, Gujarat, Maharashtra, Madhya Pradesh) shows over **80% MDDF** among children.
- **Age Impact:** **Younger children** (6-11 months) experience **highest MDDF (87%)**.
- **Vulnerable Groups:** MDDF rates are highest among **Other Backward Classes (OBC) (79%)**, followed by **Scheduled Castes (77.2%)** and **Scheduled Tribes (76%)**.
- **Mother's Education and Exposure:** Children of **illiterate, young, rural-residing mothers** with limited exposure to mass media are more likely to have diet deficiencies.

Issues in Ensuring Dietary Diversity:

- **Nutritional Composition:** Minimal consumption of fruits, vegetables, and animal products.
- **Education Levels:** Illiterate mothers show an **MDDF rate of 81%**, compared to **75% for educated mothers**.

Recommendations:

1. **Targeted Outreach:** Prioritize outreach to **pregnant women**, especially those with **high-risk pregnancies**.
2. **Community Engagement:** Use **local governance** structures to promote nutrition activities.

Initiatives in India to Combat Malnutrition:

- **POSHAN Abhiyan:** Increases nutrition awareness through **Jan Andolans** focusing on pregnant women, lactating mothers, and young children.
- **Rashtriya Poshan Mah:** Encourages **inter-ministerial collaboration** to engage communities in nutrition awareness.
- **Integrated Child Development Services (ICDS) Scheme:** Provides support to **children aged 0-6 years**, as well as pregnant and lactating women, promoting child health and nutrition.

The study emphasizes the need for **enhanced dietary diversity** to support the growth and development of India's children, especially in **vulnerable communities** and **low-education environments**.

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Venture Capital Fund for Space Sector under IN-SPACE

Context: Recently, Union Cabinet Approves ₹1,000 Crore Venture Capital Fund for Space Sector under IN-SPACE. A Venture Capital (VC) Fund provides private equity financing for early-stage startups with high growth potential, specifically supporting innovative, high-risk sectors such as space technology.



About the VC Fund for the Space Sector:

- **Funding Scope:** Targets startups across the entire **space supply chain**—upstream, midstream, and downstream.
- **Financial Structure:** Operates over **five years** with an annual fund deployment of ₹150-250 crore.
- **Investment per Startup:** Between ₹10-60 crore, supporting around **40 startups** in total.

Strategic Goals:

1. **Capital Infusion:** Designed to **attract additional investment** for later-stage growth.
2. **Growth Acceleration:** Aims to stimulate a **five-fold expansion** in India's space economy over the next decade.
3. **Technological Advancements:** Promotes private sector-driven **innovation in space technology** to solidify India's global leadership.

Benefits of the Fund:

- **Retention of Space Companies:** Keeps space-related enterprises based in India.
- **Job Creation:** Expected growth in fields like **engineering, software development, data analysis, and manufacturing**.
- **Innovation Ecosystem:** Drives global competitiveness by fostering a **dynamic startup environment**.

India's Space Sector Goals:

India currently ranks **5th globally** in the space economy, with a 2-3% share, valued at **\$8.4 billion**. The fund aims to help India reach **\$44 billion by 2033**.

About IN-SPACE:

- **Established:** 2020, as a **single-window, autonomous agency** under the Department of Space (DOS).
- **Role:** Acts as a bridge between **ISRO and Non-Governmental Entities (NGEs)**, facilitating private sector involvement.
- **Functions:** Authorizes and oversees various space-related activities like **launch vehicle and satellite development, and sharing of space infrastructure**.

Private Sector Milestone:

India's first **private launch vehicle, Vikram-1**, developed by **Skyroot Aerospace**, highlights the increasing role of private sector initiatives in advancing India's space capabilities.

The VC fund, under IN-SPACE, is a key step toward nurturing a **sustainable and competitive space ecosystem** in India, positioning it as a global space leader.

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UN COP16 Nature Summit to Debate Digital Sequence Information (DSI) Rules

Context: COP16 aims to develop a **unified, multilateral framework** to regulate **Digital Sequence Information (DSI)** and to generate conservation revenue through its utilization.

About Digital Sequence Information (DSI):

- **Definition:** A policy term for **genomic and related digital data**, including DNA, RNA, and protein sequences.
- **Scope:** Broadly represents **genetic resources** in digital form; however, its exact interpretation is yet to be standardized.

**Significance of DSI:**

1. **Biological Research:** Supports **evolutionary studies** and **bioprospecting** (e.g., SARS-CoV-2 DSI used for COVID-19 diagnostic kits).
2. **Agriculture and Food Security:** Aids in developing **climate-resilient, pest-resistant crops** for food security.
3. **Species Conservation:** Assists in identifying **threatened species** and **tracking illegal wildlife trade**.

Challenges with DSI:

- **Lack of Accountability:** Public DSI databases, established before the **CBD (1992)**, are not regulated under its provisions.
- **Equitable Benefit Sharing:** Sectors using DSI generate **\$1.6 trillion** annually, yet benefits are rarely shared with countries or communities of origin.
- **Other Issues:** Include **privacy, data security, ownership, and technological constraints**.

Initiatives on DSI:

- **Kunming-Montreal Global Biodiversity Framework: Target 13** promotes equitable benefit sharing from DSI on genetic resources.
- **India's Digital Sequencing Initiatives:** Includes projects like the **Genome India Project**, which aims to map India's genetic diversity.

COP16's work to establish DSI rules could significantly impact **global conservation efforts** by ensuring **fair access** and **benefit sharing** from biological data.

Supreme Court Directions to Ensure Free and Timely Legal Aid for Prisoners

Context: In the **Suhas Chakma vs. Union of India** case, the Supreme Court issued crucial directions to strengthen **legal aid access** for prisoners, emphasizing timely, free, and effective support through structured initiatives by legal authorities.



Key Highlights of Court Directions:

- 1. Role of NALSA and State/District Legal Services Authorities:** The **National Legal Services Authority (NALSA)**, in coordination with State and District Legal Services Authorities, is responsible for implementing **Standard Operating Procedures (SOPs)** to provide prisoners access to legal aid.
- 2. Awareness Initiatives:** The Court urged for literature in **local languages** and **awareness campaigns** to inform eligible prisoners of their right to legal aid.
- 3. Display of Legal Aid Information:** The Court directed the installation of **display boards** with contact details of the nearest legal aid offices at accessible locations such as **police stations, post offices, and transit hubs** (bus stands, railway stations).

Statutory Framework for Legal Aid:

- 1. Constitutional Provision:**
 - **Article 39A:** Mandates the **State** to provide **free legal aid** to ensure that justice is accessible, regardless of a person's financial capacity or other limitations.
- 2. Legal Services Authorities Act, 1987:**
 - **Framework for Legal Aid:** Establishes **Legal Services Authorities** at **National, State, District, and Taluka** levels and **Legal Services Committees** in the Supreme Court, High Courts, District Courts, and Taluka Courts.

Eligibility for Legal Aid under the Act:

Free legal aid is available to:

- **Women or children**
- **Scheduled Castes and Scheduled Tribes members**
- **Industrial workmen**
- **Persons with disabilities**
- **Victims of trafficking, forced labor, or beggary**
- **Victims of disasters or violent events**
- **Persons in custody**, including those in protective homes, juvenile homes, or psychiatric facilities

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India's First Great Indian Bustard Hatched via Artificial Insemination

Context: In a historic development, **India's first Great Indian Bustard (GIB)** has been successfully hatched through artificial insemination at the **National Breeding Centre in Jaisalmer, Rajasthan**, as part of the **Bustard Recovery Program**.



Bustard Recovery Project:

- **Launch and Duration:** Initiated in **2016** for five years, extended from **2021 to 2024**.
- **Objectives:**
 - **Conservation Breeding:** To increase GIB populations through controlled breeding.
 - **Capacity Building and Advocacy:** To raise awareness among stakeholders on bustard conservation.
 - **Promote Bustard-Friendly Land Use:** Encourage conservation practices in land management.

About the Great Indian Bustard (GIB):

- **Also Known As:** Locally called **Godawan** in Rajasthan.
- **Habitat:** Primarily found in **Rajasthan and Gujarat**; smaller populations are present in **Maharashtra, Karnataka, and Andhra Pradesh**.
- **Conservation Status:**
 - **IUCN Red List:** Critically Endangered.
 - **Wildlife Protection Act, 1972:** Listed in **Schedule I** and **CITES Appendix I**.
 - **Population:** Fewer than **150 individuals** remain, mostly restricted to India.

Characteristics and behaviour:

- **Species Type:** Grassland bird, endemic to the Indian subcontinent.
- **Distinctive Traits:**
 - Has a **black crown** on its forehead; males have larger black crowns.
 - Males use a **gular pouch** to produce a low humming sound to attract females.
- **Diet:** Omnivorous; feeds on grass seeds, insects like grasshoppers, beetles, and occasionally small rodents and reptiles.

Major Threats:

- **Hunting:** Once widely hunted, now illegal but remains a historic cause of decline.
- **Habitat Loss:** Grasslands are increasingly converted for agriculture and development.
- **Collision with Power Lines:** Power infrastructure in bustard habitats has led to frequent collisions.
- **Agricultural Expansion:** Fragmentation of habitats due to large-scale agriculture.

This successful artificial insemination milestone offers a critical boost to conservation efforts, helping protect this **Critically Endangered** species from extinction.

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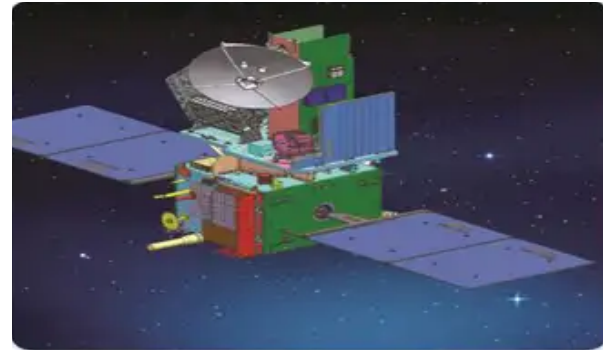
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EOS-06 and INSAT-3DR Satellites

Context: The Indian Space Research Organisation (ISRO) is actively tracking **Cyclonic Storm 'Dana'**, which is advancing toward the coastal regions of **Odisha** and **West Bengal**. Utilizing its advanced satellites, **EOS-06** and **INSAT-3DR**, ISRO has been monitoring the storm's development. The data provided by these satellites supports disaster management operations and enhances India's weather monitoring capabilities.



About EOS-06 (Oceansat-3):

- **Developer:** Indian Space Research Organisation (ISRO)
- **Launch Date:** November 26, 2022
- **Launch Vehicle:** Polar Satellite Launch Vehicle (PSLV-C54)
- **Purpose:** EOS-06 is designed to monitor and study various aspects of the Earth's oceans and coastal zones.
- **Key Objectives:**
 - Provide continuity of services from its predecessors, **Oceansat-1** and **Oceansat-2**.
 - Enhance payload capabilities for oceanographic and atmospheric studies.
 - Applications include ocean surface studies, coastal zone management, and marine weather forecasting.

About INSAT-3DR:

- **Developer:** Indian Space Research Organisation (ISRO)
- **Launch Date:** September 2016
- **Type:** Advanced meteorological satellite
- **Significant Features:**
 - Imaging in the middle infrared band for night-time visibility of low clouds and fog.
 - Dual thermal infrared bands for accurate Sea Surface Temperature (SST) estimation.
 - Higher spatial resolution in both visible and thermal infrared bands.
- **Purpose:** INSAT-3DR continues the service of previous meteorological missions and enhances capabilities for weather forecasting, environmental monitoring, and search and rescue operations.

What is a Meteorological Satellite?

A **meteorological satellite** is a specialized satellite used to observe and gather data about Earth's atmospheric conditions. Key functions include:

- **Weather Forecasting:** Providing real-time data to improve the accuracy of weather predictions.
- **Climate Change Studies:** Monitoring long-term atmospheric changes related to climate patterns.
- **Environmental Monitoring:** Tracking natural disasters, pollution levels, and land use changes.

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PM Young Achievers Scholarship Award Scheme (PM-YASASVI)

Context: Under the vision of "Sabka Saath, Sabka Vikas," the Ministry of Social Justice and Empowerment has implemented the **PM Young Achievers Scholarship Award Scheme (PM-YASASVI)** for a Vibrant India. This comprehensive scheme aims to empower students from Other Backward Classes (OBC), Economically Backward Classes (EBC), and Denotified Tribes (DNT) by providing quality education during their early years.

Key Features of the PM-YASASVI Scheme:

Organized Initiative: This scheme integrates several previous schemes, such as:

- **Dr. Ambedkar Post-Matric Scholarship Scheme for EBC**
- **Dr. Ambedkar Pre-Matric and Post-Matric Scholarship Scheme for DNT**

By combining these schemes, an effective approach has been created to meet the educational needs of socially and economically disadvantaged students.

Objectives: The primary goal of the scheme is to promote educational empowerment, enabling these students to face financial challenges and complete their education. This initiative also contributes to individual development as well as the creation of an inclusive and equitable society.

Benefits of the Scheme: Students benefit from the following schemes:

1. **Pre-Matric Scholarship:** For classes 9 and 10.
2. **Post-Matric Scholarship:** For post-matriculation and post-secondary higher studies.
3. **Top Class Education:** Scholarships are provided for students excelling in their studies to gain admission to top-class schools and colleges.
4. **Hostel Facilities:** Hostel facilities are provided under the "Construction Scheme for Hostels for OBC Boys and Girls."

Five Sub-Schemes of PM-YASASVI:

1. Pre-Matric Scholarship for OBC, EBC, and DNT students.
2. Post-Matric Scholarship for OBC, EBC, and DNT students.
3. Top Class School Education for OBC, EBC, and DNT students.
4. Top Class College Education for OBC, EBC, and DNT students.
5. Construction of Hostels for OBC boys and girls.





Scope and Financial Provisions of the Scheme:

- **Pre-Matric Scholarship:** For students in classes 9 and 10, with a family annual income of less than ₹2.5 lakh. Each student receives an annual academic allowance of ₹4,000.
 - **Financial Year 2023-24:** ₹193.83 crores allocated to benefit 19.86 lakh students.
- **Post-Matric Scholarship:** Provides academic allowances ranging from ₹5,000 to ₹20,000 for higher education.
 - **In 2023-24:** ₹988.05 crores allocated to benefit 27.97 lakh students.
- **Top Class Education:** Covers tuition, hostel expenses, and other academic costs for meritorious students.
 - For school students: Up to ₹1.25 lakh per year in financial support.
 - College education: Allocation of ₹111.18 crores for 4,762 students.
- **Hostel Construction Scheme:** To provide residential facilities for OBC students.
 - **In 2023-24:** ₹14.30 crores allocated for the construction of hostels for 1,146 students.

Key Benefits and Impact of the Scheme:

- Through educational empowerment, this scheme leads disadvantaged students toward self-reliance.
- Financial assistance allows them to continue their studies, enhancing their personal and professional potential.
- By expanding education among disadvantaged groups, this initiative also promotes equality in society.
- Moving beyond a narrow perspective, this scheme has integrated all previous scholarship initiatives to ensure a streamlined and inclusive education system.
- As a result, the educational landscape for marginalized communities has improved significantly.

Conclusion: The PM YASASVI Scheme opens educational opportunities for marginalized students lacking financial resources. This scheme not only assists students in achieving academic success but also enables them to play a meaningful role in the vision of a developed India by 2047.

What is E. coli?

Context: A recent report from the Centers for Disease Control and Prevention (CDC) indicated that one person died, and 49 others fell ill due to an E. coli outbreak linked to McDonald's Quarter Pounder hamburgers.



About E. coli:

- **Escherichia coli (E. coli)** is a type of bacteria found in the intestines of humans and animals.
- It is a rod-shaped bacterium belonging to the **Enterobacteriaceae** family.
- While most strains are harmless and beneficial, some can cause serious illness and infections.

Types of Illness:

- Some strains of E. coli can lead to:
 - Diarrhea
 - Urinary tract infections
 - Respiratory illnesses and pneumonia
 - Other infections

Transmission: E. coli can be transmitted to humans through:

- Contaminated food and water
- Contact with fecal matter from infected individuals or animals

Mechanism of Illness: The strains that cause illness produce a toxin called **Shiga**, which damages the lining of the small intestine and leads to diarrhea. These are known as **Shiga toxin-producing E. coli (STEC)**.

Symptoms of E. coli Infection:

- Common symptoms include:
 - Fever over 102°F
 - Persistent diarrhea (often bloody)
 - Vomiting
- A significant concern is dehydration due to the inability to retain fluids, and in rare cases, it can lead to acute kidney injury.

Treatment: Most E. coli infections are self-limiting and resolve without treatment. However, staying hydrated is crucial during the illness.

What is Bacteria?

- Bacteria are microscopic, single-celled prokaryotic organisms that play vital roles in ecosystems and significantly impact human health. They are ubiquitous, found in diverse environments from mountaintops to ocean trenches.

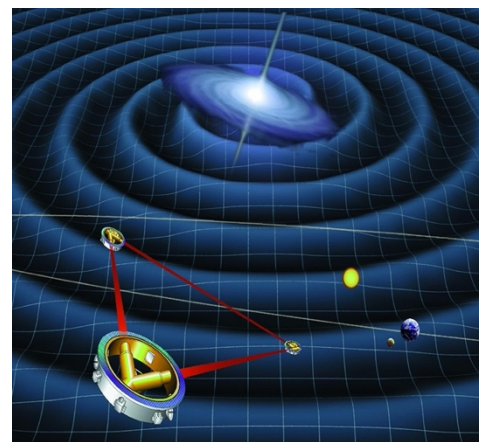
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LISA Mission

Context: NASA recently unveiled the prototype for six telescopes that will assist LISA's three spacecraft in detecting gravitational waves in space.

About the LISA Mission:

- The **Laser Interferometer Space Antenna (LISA)** mission is a joint initiative by NASA and the European Space Agency (ESA), scheduled for launch in the mid-2030s.
- **Objective:** The mission aims to detect and study gravitational waves by deploying three spacecraft in Earth's orbit, arranged in a triangular formation with sides measuring 1.6 million miles (approximately 2.5 million kilometres).
- It will be the **first gravitational wave detector in space**, exploring the fundamental nature of gravity and black holes, as well as the rate of expansion of the Universe.



Spacecraft Configuration:

- Each of the three spacecraft will be equipped with two telescopes.
- The spacecraft will operate in a **heliocentric orbit**, about 50 million kilometres from Earth, maintaining a distance of around 2.5 million kilometres between them.
- The mission will utilize lasers to detect gravitational waves by monitoring subtle changes in distances between free-floating cubes housed within each spacecraft.
- These distances will be measured with extreme precision through **laser interferometry**.

What are Gravitational Waves?

- **Gravitational waves** are distortions in spacetime caused by energetic events involving dense objects with strong gravitational fields.
- Predicted by **Albert Einstein's theory of general relativity**, they are weak and interact minimally with matter, enabling them to travel vast cosmic distances without distortion.
- Gravitational waves leave clear signatures on the dynamics of their sources and on the local structure of spacetime.

