



Daily Current Affairs



To The Point by Dhananjay Gautam

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1 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.

2 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.

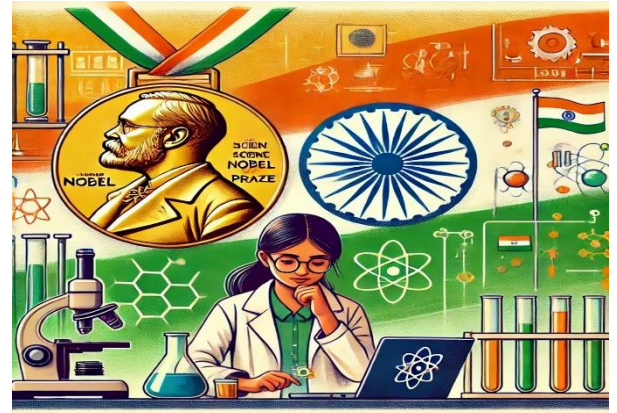
Conclusion: The current mass bleaching event highlights the urgent need for concerted global action to mitigate climate change impacts and protect coral ecosystems. Enhanced research, strict regulatory measures, and community engagement are essential for preserving these vital marine habitats.

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3 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.



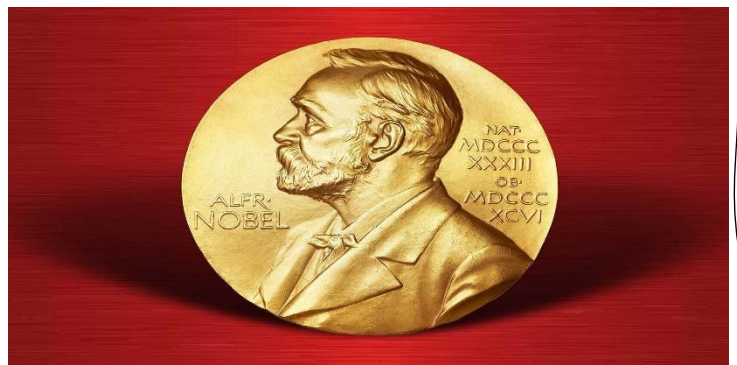
India's Nobel Prize Journey

- **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



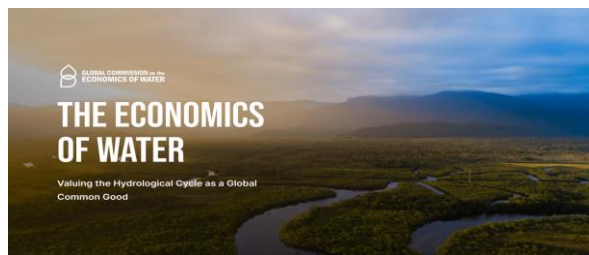
2. **Highly Selective Nobel Selection Process:** Several Indian scientists have been nominated but overlooked for the Nobel Prize, including **Meghnad Saha, Homi Bhabha, S.N. Bose, G.N. Ramachandran, and K.S. Krishnan**. Their contributions were significant, yet none secured the award.
3. **Western Dominance 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.

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.

5 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

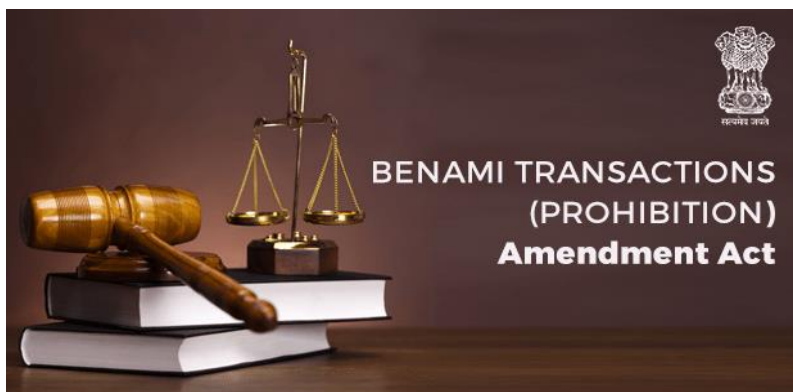
- According to the **National Family Health Survey (NFHS-5):**
 - **23% of women** and **17.7% of boys** aged 20-24 were married before the age of 18.
- UNICEF reports indicate that over half of the girls and women who marry in childhood reside in five states:
 - **Uttar Pradesh** (largest contributor)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



6 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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7 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.

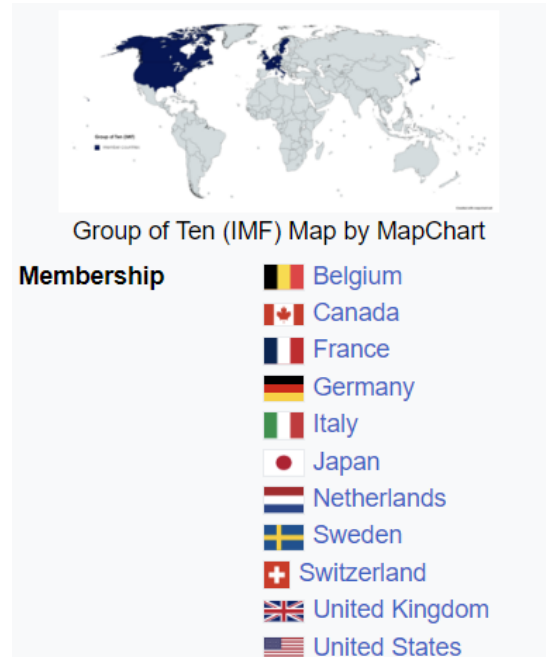
Characteristics of SWIFT

- **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.

8 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.

9 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.

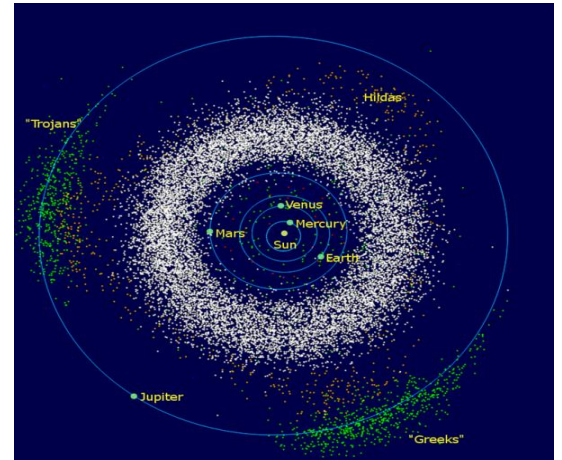
Conclusion: The Next Generation Missile Vessels (NGMV) symbolize a leap forward in India's naval capabilities, focusing on advanced technologies and strategic deterrence. With their sophisticated design and potent armament, these vessels are expected to play a crucial role in ensuring maritime security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

10 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.