Today's Prelims Topics

India's first quasi-ballistic missile – Pralay

Context

The DRDO will showcase "Pralay," India's first short-range quasi-ballistic missile for conventional strikes, at the Republic Day parade.

About Pralay

- **Type**: Indigenous, short-range, quasi-ballistic missile.
- **Range**: Up to **400 kilometers**, making it suitable for deployment along both the **Line of Control (LoC)** and the **Line of Actual Control (LAC)**.
- It is powered by a solid-propellant rocket motor & is capable of carrying conventional warheads.
- Pralay complements **BrahMos** and **Prahar missiles** which are already in the Indian missile inventory.
- **Global Examples:** Russia's Iskander-M & China's Dong Feng 12 a

Quasi - Ballistic Missiles

- It combines features of traditional ballistic missiles and cruise missiles.
- Unlike pure ballistic missiles that follow a high-arcing trajectory, quasi-ballistic missiles:
  - **Maneuver mid-flight** to adjust their path.
  - Generally fly at a **lower altitude**, making them harder to detect and intercept.
- **Key Characteristics**
  - **Speed**: Travel at high speeds, often in the hypersonic range (Mach 5 or above).
  - **Stealth capacity:** Can evade missile defense systems more effectively than standard ballistic missiles.
  - **Precision**: Designed for greater accuracy, making them ideal for targeted strikes.

Source:

- The Hindu - Pralay

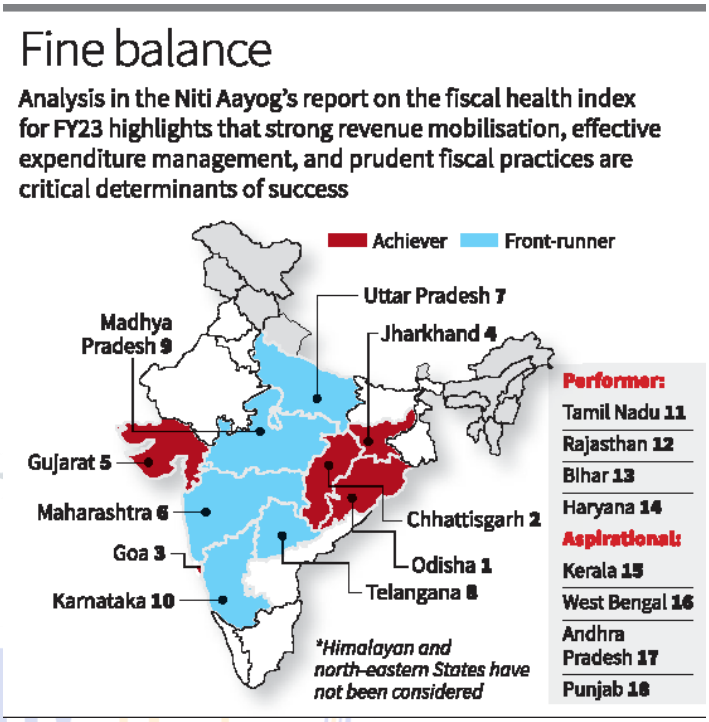
NITI Aayog's first Fiscal Health Index (FHI)

Context

NITI Aayog's inaugural Fiscal Health Index report was released by Chairman of the 16th Finance Commission, **Dr. Arvind Panagariya**.

About Fiscal Health Index (FHI)

- **FHI** aims to evaluate the fiscal health of Indian States based on key financial parameters, providing insights into their fiscal stability, revenue generation and expenditure quality.
- **FHI assesses states using five sub-indices** - Quality of Expenditure, Revenue Mobilization, Fiscal Prudence, Debt Index and Debt Sustainability.
- **Scope**: Covers **18 major States** contributing significantly to India's GDP, demography, and public expenditure.



Categories of States in the Report

- **Achievers (Top-performing States):** Odisha, Chhattisgarh, Goa and Jharkhand.
  - **Capital Outlay**: Up to **4% of Gross State Domestic Product (GSDP)**.
  - **Revenue Surplus**: Effective non-tax revenue mobilization.
  - **Low Interest Payments**: Only up to **7% of revenue receipts**.
  - **Top State**: Odisha with the **highest overall index score of 67.8**.
  - **Debt Rankings**: Odisha topped both **Debt Index (99.0)** and **Debt Sustainability (64.0)** rankings.
- **Front-runners:** Maharashtra, Uttar Pradesh, Telangana, Madhya Pradesh, Karnataka.
  - **Developmental Expenditure**: High at **73%** of total expenditure.
  - **Tax Revenue Growth**: Consistent growth in **own tax revenue**.
  - **Fiscal Management**: Balanced fiscal management with improved **debt-to-GSDP ratio** of **24%**.
- **Performers:** Tamil Nadu, Bihar, Rajasthan, and Haryana.
  - Moderate performance with some fiscal management challenges.
- **Aspirational States (Worst-performing States):** Punjab, Andhra Pradesh, West Bengal, and Kerala.
  - **Low Revenue Mobilization**: Struggling to meet fiscal and revenue deficit targets.
  - **Debt Issues**: Witnessing a growing debt burden, with **debt sustainability** a significant concern.
  - **State-specific Issues**:
    - **Kerala and Punjab**: Poor quality of expenditure and weak debt sustainability.
    - **West Bengal**: Low revenue mobilization and issues with debt index scores.
    - **Andhra Pradesh**: High fiscal deficits.

Source: [The Hindu - Odisha tops NITI fiscal health index]

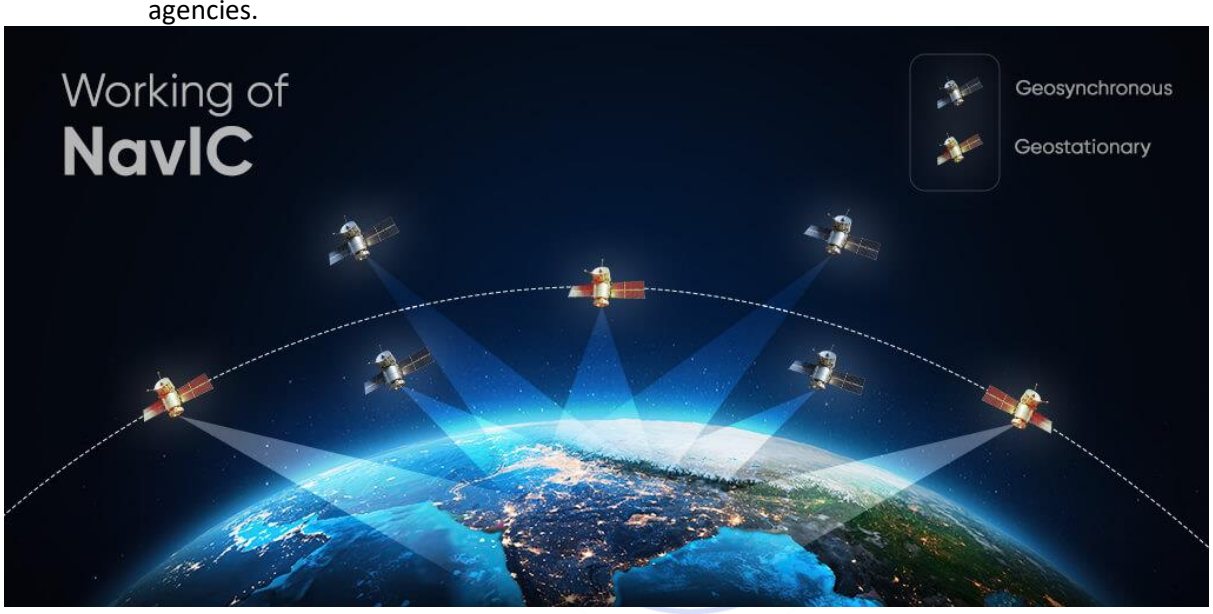
ISRO's 100th Launch: GSLV-F15 and NVS-02

Context

The GSLV-F15 NVS-02 mission marks **ISRO's 100th launch from Sriharikota,** deploying a **2nd-generation NavIC satellite** equipped with advanced atomic clocks and L1 frequency for enhanced regional navigation.

About NavIC (Navigation with Indian Constellation)

- India's **regional navigation satellite system**, offering **accurate Position Velocity, and Timing (PVT) services**.
- Coverage: **Indian mainland** and up to **1,500 km beyond** the Indian landmass.
- Provides two types of services:
    - **Standard Positioning Service (SPS)**: For general public use.
    - **Restricted Service (RS)**: For authorized users, including defense and government agencies.



Features of NavIC:

- **Positioning Accuracy:** Better than 20 meters.
- **Timing Accuracy**: Better than **40 nanoseconds**.
- **Constellation**:
    - **7 satellites** initially launched between 2013-2018.
    - Designed for a **10-year mission life**, but some satellites needed early replacement due to issues with **onboard atomic clocks.**

Atomic clock

- Atomic clock measures time by monitoring the resonant frequency of atoms (usually cesium or rubidium) to keep time with extreme accuracy.
- A satellite-based positioning system determines the **object location** by accurately measuring the time required for a **signal to travel to and back from it using the atomic clocks** on board.
- Satellites will no longer be able to provide accurate locations in case of **failure of atomic clocks**.

- **Second-Generation Satellites:**
    - A total of **5 satellites (NVS-01 to NVS-05)** planned to augment the base layer.
    - **NVS-01** was launched in May 2023.
    - **NVS-02** is now being launched to improve accuracy and reliability.

    - New satellites are equipped with **L1 frequency**, widening usability to smaller devices like smartphones and fitness trackers.
- **NavIC vs GPS**:
    - **NavIC**: Regional coverage (India + 1,500 km).
    - **GPS**: Global coverage.
    - NavIC provides **better accuracy** within India and is independent of foreign systems, ensuring **strategic autonomy**.

Challenges Faced by NavIC

- **Malfunctions in Atomic Clocks:** Replacement of satellites became necessary before the end of their mission life.
- **Failure of IRNSS-1H Launch**: Heat shield malfunction during launch prevented deployment.
- **Underutilization**:
    - A 2018 **CAG Report** highlighted delays in the development of user receivers.
    - Work on receivers began only in 2017, despite funding approval in 2006.
    - Wasted years of satellite mission life due to delays.

UPSC PYQ

Q. Which one of the following countries has its own Satellite Navigation System? **(2023)**

(a) Australia
(b) Canada
(c) Israel
(d) Japan

Answer: D

Source:

- The Hindu - ISRO gearing up for its 100th launch from Sriharikota

Algorithmic Pricing

Context

Central Consumer Protection Authority (CCPA), has issued notices to Ola and Uber regarding alleged discrepancies in fares shown on Android and iOS devices.

About Algorithmic Pricing

- It is a method of automatically setting prices for items for sale.
- It uses algorithms to analyze data and make predictions about how much to charge for a product. The **goal is to maximize profits.**
- Fares are influenced by real-time conditions like traffic, demand and time of booking.

Potential Factors in Pricing Algorithms

- **User Characteristics:**
    - Device type (iPhone vs. Android).
    - Age, location, browsing history and payment methods (e.g., credit card usage).
- **Consumer Behavior Tracking**:
    - Tracking mouse movements, unpurchased items in shopping carts and precise location data.
- **Neighborhood Data**:
    - **A 2020 study by George Washington University** found that ride-hailing companies charged higher fares per mile for trips starting or ending in neighborhoods with higher ethnic minority populations, though companies like Uber and Lyft denied this.

Source:

- Indian Express - Ola Uber

India joins Eurodrone programme

Context

India has officially joined the **MALE RPAS (Medium-Altitude Long-Endurance Remotely Piloted Aircraft System) programme,** also known as Eurodrone programme**, as an Observer State.**

About Eurodrone

- It is a joint European initiative to meet future Uncrewed Aircraft System (UAS) requirements.
- It is part of Europe's collective defence strategy, reducing reliance on US and Israeli platforms such as the **Reaper and Heron drones**.
- **Participating Nations**:
    - **Core members:** Germany, France, Italy, and Spain.
    - **Lead Nation**: Germany.
    - Observer States: Japan (joined in November 2023) and India (joined in January 2025).
- India will be represented by the **Aeronautical Development Establishment (ADE)** of DRDO.
- **Features:**
    - It is equipped with a **twin-engine configuration.**
    - It is designed for operations in diverse environments, including severe weather conditions.
    - The drones are expected to enter service by 2030
- **Mission Capabilities**:
    - Designed to support ISTAR (Intelligence, Surveillance, Target Acquisition, and Reconnaissance) missions globally.
    - Suitable for operations in both civil and military airspace.

Source:

- The Print - India joins €7.1 bn Eurodrone as observer

Global Plastic Action Partnership

Context

Seven new members including Angola, Bangladesh, Gabon, Guatemala, Kenya, Senegal & Tanzania have joined GPAP.

About Global Plastic Action Partnership (GPAP)

- It was launched during the **World Economic Forum's (WEF) Sustainable Development Impact Summit in 2018 to** combat plastic pollution worldwide.
- It focuses on promoting a circular economy for plastics, emphasizing reuse, recycling, and sustainable management to mitigate the environmental impacts of plastic waste.
- It helps countries in developing National Action Roadmaps & Investment Mobilization for waste management.
- **Members:** 25 (including Maharashtra State from India)
- **In 2024, India became the world's largest plastic emitter country.**

Source:

- WEF - 25 Countries Unite in the Fight Against Plastic Pollution

Tamil Nadu's Iron Age Origins Push Global Timelines Back by 2,000 Years

Context

A recent study has revealed that the use of iron in Tamil Nadu dates back to **3345 BCE**, making it the **earliest known evidence of iron technology** globally

About Key Findings and Claims

The findings provide evidence that iron technology in Tamil Nadu dates as far back as 3345 BCE

- The study, titled *'Antiquity of Iron: Recent Radiometric Dates from Tamil Nadu'*, was based on advanced dating techniques like **Accelerator Mass Spectrometry (AMS)** and **Optically Stimulated Luminescence (OSL)**.
- These methods were used to date samples from key archaeological sites in Tamil Nadu.
- **Advanced Metallurgical Techniques**:
    - The study found **three types of iron-smelting furnaces** at sites like **Kodumanal**.
    - These furnaces could reach **temperatures of 1300°C**, sufficient to produce **sponge iron** - an advanced method for early iron production.
- **Iron Age vs Copper Age**:
    - The study proposes that while regions north of the **Vindhyas** were still in the **Copper Age**, southern India, particularly Tamil Nadu, had already entered the **Iron Age**.
- **Cultural Connections with Indus Valley:**
    - Over **90% of the graffiti marks** found across 140 sites in Tamil Nadu resemble those from the **Indus Valley Civilization**, suggesting possible cultural connections between the two regions.
- **Global Impact**:
    - The discovery challenges the previous belief that the **Hittite Empire** in Anatolia (modern-day Turkey) was the first to use iron around **1300 BCE**.
    - The findings from Tamil Nadu suggest that iron technology in the region is about **2,000 years older** than previously thought.

Key Sites and Findings:

- **Sivagalai:** Excavations here revealed 85 iron objects such as knives, axes and swords. Radiocarbon dating showed iron usage as early as **3345 BCE.**
- **Mayiladumparai**: Samples from this site were dated to **2172 BCE**, providing additional evidence of early iron use.
- **Kilnamandi**: A **sarcophagus burial** found here was dated to **1692 BCE**.
- **Adichanallur**: Iron objects were found with charcoal dated to **2517 BCE**, indicating a longstanding tradition of metallurgy.

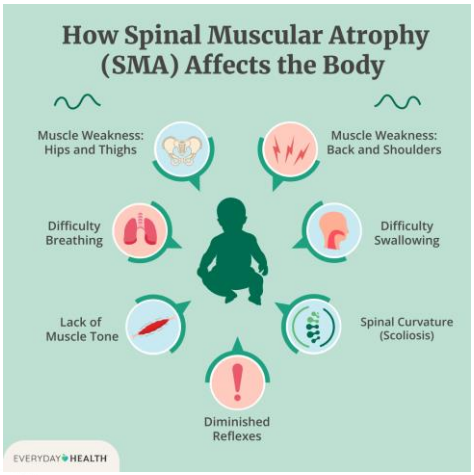
Source:

- Indian Express - Iron age began in TN

News in Shorts

Spinal Muscular Atrophy (SMA)

- It is a **genetic disorder** that causes **weak muscles** because the nerves that control them stop working properly.
- These nerves, called **motor neurons**, are found in the spinal cord and help send signals from the brain to the muscles for movement.



What Causes SMA?

- SMA happens because of a problem (mutation) in a gene called **SMN1**, which produces an important protein for keeping motor neurons healthy.
- When the body doesn't make enough of this protein, motor neurons die, and muscles become weaker over time.
- It's **inherited** from both parents. If both parents are carriers of the faulty gene, there's a 25% chance their child will have SMA.

Source:

- The Hindu - 'People with spinal muscular atrophy need Centre's help'

Dhanuri Wetland

- NGT has directed the Uttar Pradesh government to provide a detailed status report within 4 weeks regarding the notification of the Dhanauri Wetland, near the Jewar airport, as a wetland.
- It is located in **Greater Noida**, Gautam Buddha Nagar district, **Uttar Pradesh.**
- It is home to 217 bird species, including **150 Sarus Cranes** (state bird of Uttar Pradesh).
- It is recognized as an **Important Bird Area (IBA) by BirdLife International.**
- During peak migratory seasons (November to March), the wetland hosts over 50,000 waterfowls.
- It lies within the **floodplains of the Yamuna Basin.**

Facts

- **Ramsar Sites in Uttar Pradesh (10):** Bakhira Sanctuary, Haiderpur Wetland, Nawabganj Bird Sanctuary, Parvati Arga Bird Sanctuary, Saman Bird Sanctuary, Samaspur Bird Sanctuary, Sandi Bird Sanctuary, Sarsai Nawar Jheel, Sur Sarovar & Upper Ganga River.
- **Tamil Nadu has the highest number of Ramsar sites in India** - **18**.

Source:

- The Hindu - NGT

Halwa Ceremony

- Recently, the Union Finance Minister participated in a traditional 'halwa' ceremony, marking the **final stage for preparation of Union Budget 2025-26.**
- The ceremony is an annual ritual in which the traditional dessert halwa is prepared and served to officials and staff members of the finance ministry who are involved in the preparation of the Budget.
- It is a kind of a send-off for the officials involved with the preparation of the Union government's

Budget documents.

- After this they enter in a **"lock-in period",** during which they stay in the basement of North Block, cut off from the world outside with a view to maintaining the secrecy around the Budget documents.
- **Budget 2025 will be presented in a paperless format,** just like a few of the earlier full Union Budgets.

Source:

- Indian Express - Halwa ceremony commences

Editorial Summary

Trump 2.0 and Iran

Context

The situation in the Middle East has changed significantly since Donald Trump last held office. The dynamics of the Arab-Iranian relationship have shifted, creating opportunities for engagement between Tehran and Washington.

Key Changes in US-Iran Relations

- **Iran's Evolving Political Landscape:**
  - Iran has gone through significant leadership changes. The hardline leadership under President **Ebrahim Raisi** faced internal economic struggles and social unrest.
  - **Transition to Masoud Pezeshkian**: With Raisi's death in May 2024,His successor, **Masoud Pezeshkian** emphasized on engaging with the West to lift sanctions, while maintaining a strong stance on military capabilities, particularly nuclear enrichment.
- **Diplomatic Shifts**:
  - Iran's leadership expressed hope for a more "rational" approach from the new US administration, as they seek regional stability and a return to the nuclear deal. However, they emphasized that Iran would not appear weak.
  - The absence of key hawkish figures from the first Trump administration (such as former national security advisers) is seen as a positive sign for potential diplomatic engagement.

Regional Changes Since Trump's First Term

- **Improved Arab-Iran Relations**:
  - Since 2023, **Saudi Arabia** and **Iran** have worked on improving their relationship, with mediation by China. Saudi Arabia's crown prince has acknowledged a historic turning point in their ties, signaling a shift in regional dynamics.
  - Arab states, including Saudi Arabia, are prioritizing **regional stability** and **economic diversification**. There is growing comfort among Arab states in engaging with Iran, as reflected in joint diplomatic actions like **condemning Israeli actions in Gaza.**
- **Shifting Middle East Conflicts**:
  - **Syria, Lebanon, and Iraq**: The situation in these countries has softened the Arab states' stance toward Iran. For instance, the collapse of the Syrian regime and the weakening of groups like **Hezbollah** have created new opportunities for Arab-Iran cooperation.
- **Israel's Influence:**
  - Israel's influence continues to shape US policy towards Iran. However, Arab countries are increasingly vocal in opposing Israeli aggression, particularly in Gaza.
  - **At the 2024 Arab-Islamic summit, MBS** cautioned Israel against attacking Iran, showcasing Arab support for Iran's regional security.

Factors Affecting US-Iran Engagement

- **Maximum Pressure vs. Diplomacy:**
  - The Trump administration faces a dilemma between its hawkish figures who favor sanctions and military pressure and other appointees advocating for a diplomatic approach to Iran. This contrast will influence the approach the US takes in the second term.
- **Sanctions and Oil Markets**:

- US sanctions on Iran, particularly related to oil exports, have significant implications for global energy markets. These sanctions may be moderated, as seen under the Biden administration, and this dynamic will continue to influence US decisions on Iran.

- **US Military Presence in the Region**:
  - One potential area of cooperation between the US and Iran could be the full withdrawal of US troops from **Iraq**, which aligns with both Iran's desire to expel foreign forces and **Trump's anti-interventionist stance.** This could be an area where both sides find common ground.
- **Arab States as Key Actors**:
  - Arab countries, particularly Saudi Arabia, view their rapprochement with Iran as crucial for regional stability. These countries expect the US to support their engagement with Iran while also recognizing the new realities in the Middle East.

Source:

- Indian Express - Trump 2.0 & Iran

Detailed Coverage

India - Indonesia Ties

Context

Indonesian President Prabowo Subianto arrived in India ahead of New Delhi's 76th Republic Day celebrations, where he will serve as the chief guest.

Historical Context

- **Deep-rooted Connections:** India and Indonesia share commonalities in history, religion (Hinduism and Buddhism) and cultural exchange.
- **Foundation of Diplomatic Relations:** Formal diplomatic ties were established in 1950, followed by the **Treaty of Friendship in 1951.**
    - Also Both countries were founding members of the **Non-Aligned Movement (NAM).**
- **Elevation to Strategic Partnership:** The relationship was elevated to a Strategic Partnership in 2005, further to a **Comprehensive Strategic Partnership in 2018 with** focus on economic and security collaboration.
- **Act East Policy:** Indonesia was part of Act east policy since its inception in 2014.

Partnership Areas

- **Trade and Economic Relations:**
    - **Trade Volume**: India and Indonesia have a trade volume of $30 billion, with significant untapped potential.
    - **Economic Strength of Indonesia**: It has a GDP of $1.4 trillion. It is rich in natural resources, including palm oil, coal, and rubber which are vital for India.
    - Indonesia is **India's second-largest trading partner in ASEAN.**
    - Indian businesses have invested over **$1.56 billion** in Indonesia in sectors like mining, textiles and infrastructure.
- **Maritime Security and Indo-Pacific Cooperation:**
    - **Strategic Significance**: Indonesia, as a large archipelagic state with thousands of islands, serves as a bridge between the Indian and Pacific Oceans.
    - **Sea Lines of Communication (SLOCs)**: Indonesian waters are crucial for global trade between East Asia, India, Africa, and Europe.

- **Indo-Pacific Collaboration**:
  - Indonesia has aligned its *ASEAN Outlook on the Indo-Pacific (AOIP)* with India's *Indo-Pacific Oceans Initiative (IPOI)*.
  - Both nations are working together on maritime resources under the IPOI framework.
- **Defence and Strategic Cooperation:**
  - **Joint Military Exercises:** Exercises like Garuda Shakti (Army), Samudra Shakti(Navy) and coordinated patrols (IND-INDO CORPAT).
  - **Defense Industry Collaboration:** The inaugural India-Indonesia Defense Industry Exhibition in 2024.
- **Multilateral Engagement:**
  - **BRICS Membership**: Indonesia joined BRICS in 2023. It provides a platform for India and Indonesia to collaborate on global issues.
  - **Regional Architecture**: Both countries engage in ASEAN-related forums, such as the East Asia Summit (EAS) and ASEAN Regional Forum (ARF).
- **Cultural & Educational Engagement:**
  - India operates two cultural centers in **Jakarta and Bali,** promoting yoga, classical dance and music.
  - India offers a significant number of scholarships to Indonesian students through the Indian Technical and Economic Cooperation (ITEC) program and the Indian Council for Cultural Relations (ICCR).
  - Universities in India and Indonesia are collaborating on joint research projects, technology transfer and student exchange programs.

Challenges in Bilateral Relations

- **Divergent Perspectives on China:**
  - **Indonesia's Balanced Policy**: Indonesia maintains strong economic ties with China and has a tradition of balanced relations with major powers.
  - **Alignment Challenges**: While India remains cautious of China's strategic intentions, Indonesia's approach to China is less adversarial.
- **Limited Trade and Investment:**
  - **Low Bilateral Trade:** Trade volume of **$30 billion** is low considering the size and economic potential of both countries. Indonesia's trade volume with **China ($139 billion in 2023)**
  - Efforts to boost trade in sectors like technology, infrastructure and energy are limited.
- **Connectivity Issues:**
  - Despite geographical proximity, physical and digital connectivity between India and Indonesia is underdeveloped, affecting trade and tourism.
- **Differing view on Myanmar Issue:**
  - India and Indonesia have different views on Myanmar, particularly regarding the political crisis and human rights issues.

Future Course of Action

- **Strengthening Economic Ties:**
  - More focus on diversifying trade beyond commodities like palm oil and coal to include technology, infrastructure and renewable energy.
  - Enhance connectivity between the two nations to facilitate trade and tourism.
- **Deepening Maritime and Defence Cooperation:**
  - Expand cooperation in maritime security to secure sea lanes and **combat piracy in the Indo-Pacific region.**
- **Enhancing Regional Collaboration:**

    - Strengthen trilateral partnerships with Australia and Japan under frameworks like **IPOI and the Indian Ocean Rim Association (IORA).**
- **Promoting Multilateral Engagement:**
    - Use BRICS as a platform to address shared concerns, such as economic reform and climate change.
    - Advocate for Indonesia's inclusion in BIMSTEC to strengthen regional cooperation.
- **Building Stronger Political Ties:**
    - Develop strong relationships based on the goodwill generated by past visits and multilateral engagements.
    - Promote stronger foreign ministerial consultations to ensure alignment on key regional and global issues.
- **Strengthen People-to-People Ties:**
    - Increase educational exchanges through scholarships like ITEC and promote Indian diaspora contributions to bilateral cooperation.

Source:

- Indian Express - Delhi & Jakarta
- Indian Express- Beyond China Factor