

CURRENT AFFAIRS

WEEKLY



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- ❑ SWELL WAVES

GS-II

- ❑ DETERIORATION OF INDIA-CANADA RELATIONS
- ❑ SHANGHAI COOPERATION ORGANISATION (SCO) MEETING
- ❑ INDIA'S 10-POINT PLAN TO STRENGTHEN INDIA-ASEAN RELATIONS
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- ❑ Battle of Walong

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- ❑ PM Gati Shakti Initiative
- ❑ Section 6A of the Citizenship Act, 1955

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- ❑ MSP approved for Rabi Crops
- ❑ Fixed Deposits

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- ❑ Terminal High Altitude Area Defense (THAAD)
- ❑ Dragon Drones in the Russia-Ukraine War
- ❑ Innovations for Defence Excellence (iDEX) scheme
- ❑ Space Based Surveillance (SBS) Mission
- ❑ AI Centres of Excellence

ENVIRONMENT

- ❑ Coastal Tree Resilience to Climate Change
- ❑ Impact of Climate Change on the Antarctic Peninsula

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DISCLAIMER

The current affairs articles are segregated from prelims and mains perspective, such separation is maintained in terms of structure of articles. Mains articles have more focus on analysis and prelims articles have more focus on facts.

However, this doesn't mean that Mains articles don't cover facts and PT articles can't have analysis. You are suggested to read all of them for all stages of examination.

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SECTION -A

MAINS ISSUES

SWELL WAVES

CONTEXT

The **Indian National Centre for Ocean Information Services (INCOIS)** in Hyderabad has issued advisories regarding **swell waves** affecting the Andaman and Nicobar Islands, Lakshadweep, and various coastal regions in India, including Andhra Pradesh, Goa, Gujarat, Kerala, Maharashtra, Odisha, Tamil Nadu, West Bengal, Daman and Diu, and Puducherry.

What are Swell Waves?

- Swell waves are **long-wavelength ocean waves** that travel away from their points of origin, typically created by windstorms or other weather systems.
- Unlike local sea waves, which are generated by nearby winds, swell waves carry energy across vast distances.
- This energy transfer occurs when windstorms and powerful air currents impact the water surface, resulting in waves that are more potent than their locally generated counterparts.

Characteristics of Swell Waves

- ▶ **Energy and Distance:** Swell waves have **higher energy levels**, enabling them to travel long distances with minimal energy loss. This characteristic allows them to strike coastal areas with considerable power.
- ▶ **Wave Organization:** Swell waves tend to organize into groups with similar heights and periods. The **"wave period"** refers to the time taken for one wavelength to pass a specific point. **Longer wavelengths** correlate with longer wave periods, signifying faster and more powerful waves.

- ▶ **Power and Persistence:** A wave represents a transfer of energy; thus, longer waves, which dissipate energy more slowly than shorter waves, can persist for days after their formation. This persistence is critical for coastal communities as it affects safety and preparedness.

Forecasting Swell Waves in India

- INCOIS launched a **swell surge forecast system** in February 2020 to provide timely warnings to coastal populations about impending swell waves.
- The significance of this system is underscored by the colloquial term **"Kallakkadal waves,"** used by Kerala fishermen to describe sudden and hazardous wave surges that can lead to flash floods.
- This term has gained scientific acceptance through recognition by UNESCO.

Differences Between Swell Waves and Tsunami Waves

- Tsunamis are massive ocean waves primarily caused by underwater earthquakes or volcanic eruptions. As they approach shorelines, their height significantly increases due to shallower waters.

Key Characteristics

- ▶ **Speed:** Tsunami waves can travel at speeds up to 500 miles (805 kilometers) per hour in deep water, slowing down but gaining height as they near the coast.
- ▶ **Misconception:** Often called "tidal waves," tsunamis are not related to tides and are distinct phenomena.

Causes

- ▶ **Earthquakes:** Most tsunamis are triggered by significant underwater earthquakes, particularly at tectonic plate boundaries.
- ▶ **Geological Activity:** About **80% occur in the "Ring of Fire" in the Pacific**, known for intense geological activity.
- ▶ **Other Triggers:** Underwater landslides, volcanic eruptions, and historical meteorite impacts can also cause tsunamis.

(Figure No. 01 at bottom)

Key-Difference		
	Swell Waves	Tsunami Waves
Causes	Kallakkadal waves arise from meteorological conditions and are influenced by atmospheric phenomena	Tsunamis primarily result from geological activities, such as underwater earthquakes or tectonic movements.
Nature of Surges	Kallakkadal waves tend to inundate coastal areas rapidly, often leading to sudden flash floods	Tsunamis can cause extensive destruction and travel at much higher speeds across the ocean.

DETERIORATION OF INDIA-CANADA RELATIONS

CONTEXT

The diplomatic relations between India and Canada have significantly deteriorated since 2018, marked by a series of incidents and statements that highlight growing tensions. Now, India "strongly" rejected Canada's latest "diplomatic communication" against the Indian envoy and other diplomats "in a matter related to an investigation in that country". India's Ministry of External Affairs slammed the Canadian government and accused Prime Minister Justin Trudeau of indulging in "vote bank politics".

Key events that have shaped this strained relationship.

- ◉ **2018: Trudeau's Controversial Visit:** Canadian Prime Minister Justin Trudeau visited India, which was intended to strengthen ties but ended up being criticized as a diplomatic disaster. The visit was marred by controversy when a convicted Sikh separatist was invited to a formal event by the Canadian High Commissioner, only rescinded after media inquiries.
- ◉ **2020: Farmers' Protests and Diplomatic Tensions:** Trudeau became the first world leader to express concerns about India's farmers' protests, stating he was worried for those affected. This marked the beginning of heightened sensitivities regarding Canada's stance on issues affecting India, leading to mutual distrust.
- ◉ **2022: Anti-India Activities and Hate Crimes:** India condemned the defacing of the BAPS Swaminarayan

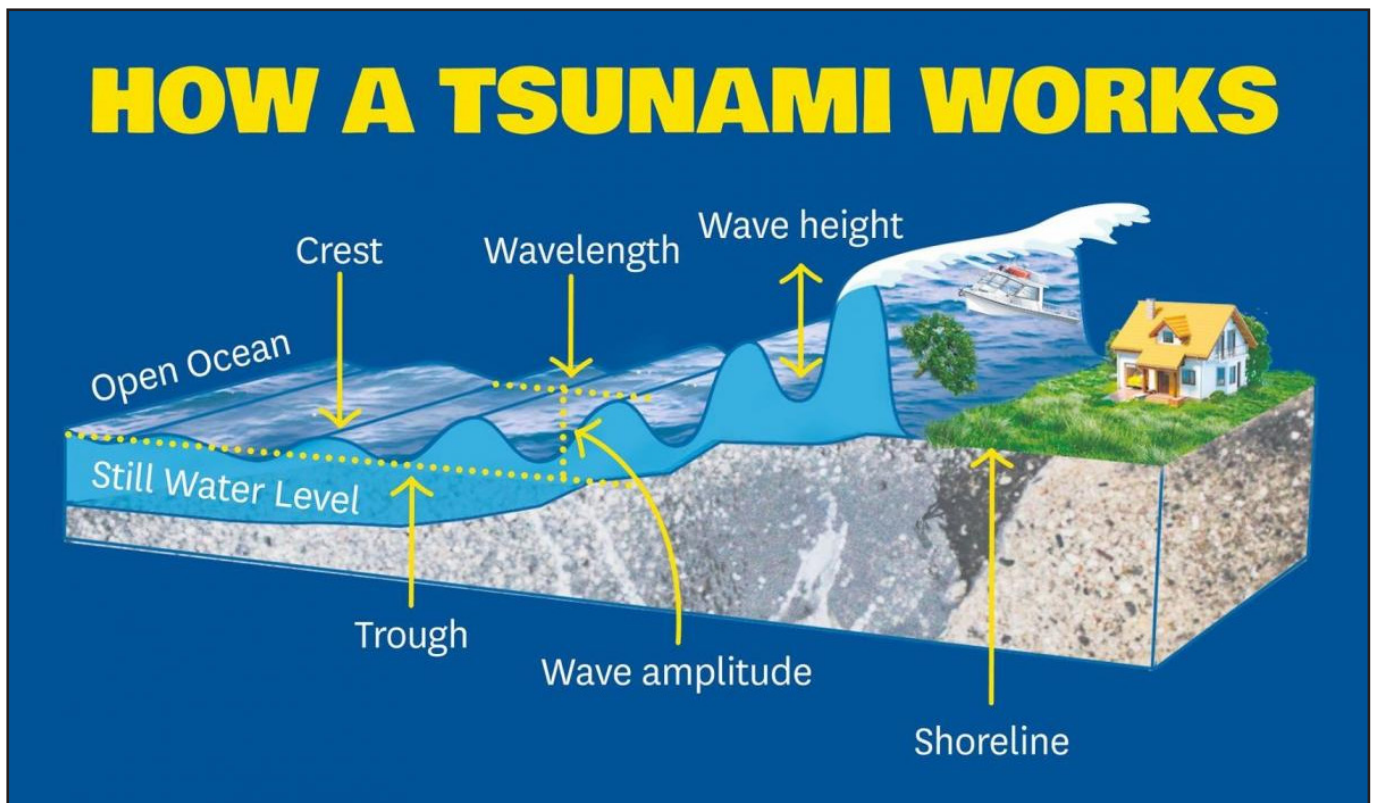


Figure No. 01

Mandir in Toronto with anti-India graffiti and warned Indian nationals in Canada about a rise in hate crimes and sectarian violence.

- 2023: Protests and Security Concerns:** A protest outside the Indian Consulate in Vancouver coincided with a manhunt for Sikh separatist Amritpal Singh. Trudeau's national security adviser accused India of foreign interference, while an event glorifying the assassination of former Prime Minister Indira Gandhi further strained relations.
- Nijjar's Assassination and Diplomatic Fallout:** Hardeep Singh Nijjar, designated a terrorist by India, was shot dead in Vancouver. His death incited protests and escalated tensions, leading to accusations from Trudeau that Indian agents may be involved. Canada halted negotiations on a proposed trade treaty with India as diplomatic ties continued to fray over Nijjar's killing.
 - Nijjar was a Khalistani separatist who was gunned down on Canadian soil in June 2023. He was a Canadian citizen but a designated terrorist in India. Nijjar supported the **Khalistan movement**, which is banned in India. Khalistani separatists talk about an **unofficial Khalistan referendum vote seeking a separate Sikh state**.

What is the root cause of deteriorating relations?

- There are some 770,000 Sikhs living in Canada, home to the largest Sikh diaspora outside the Indian state of

Punjab.

- Sikh separatism** - rooted in a bloody insurgency in India during the 1980s and early '90s - continues to strain relations between the two countries.
- Canada has faced sharp criticism from Delhi for failing to oppose the pro-Khalistan movement within its borders.
- Canada, says India, is aware of local Khalistani groups and has been monitoring them for years.
- Negotiations towards the **Early Progress Trade Agreement (EPTA)**, which was to serve as an early transitional step towards the larger **Comprehensive Economic Partnership Agreement (CEPA)** now stand "paused."

(Figure No. 02 at bottom)

Impact

- Bilateral merchandise trade** between India and Canada grew slightly during this period, to \$8.4 billion in FY24 from \$8.3 billion in FY23. India's imports from Canada increased to \$4.6 billion, while exports saw a marginal dip, falling to \$3.8 billion.
- Canadian Investments:** Canadian investments in India extend well beyond popular brands like **Tim Hortons and McCain Foods**. A variety of sectors are seeing significant financial input from Canada, particularly through pension funds, asset management firms, and financial services companies.

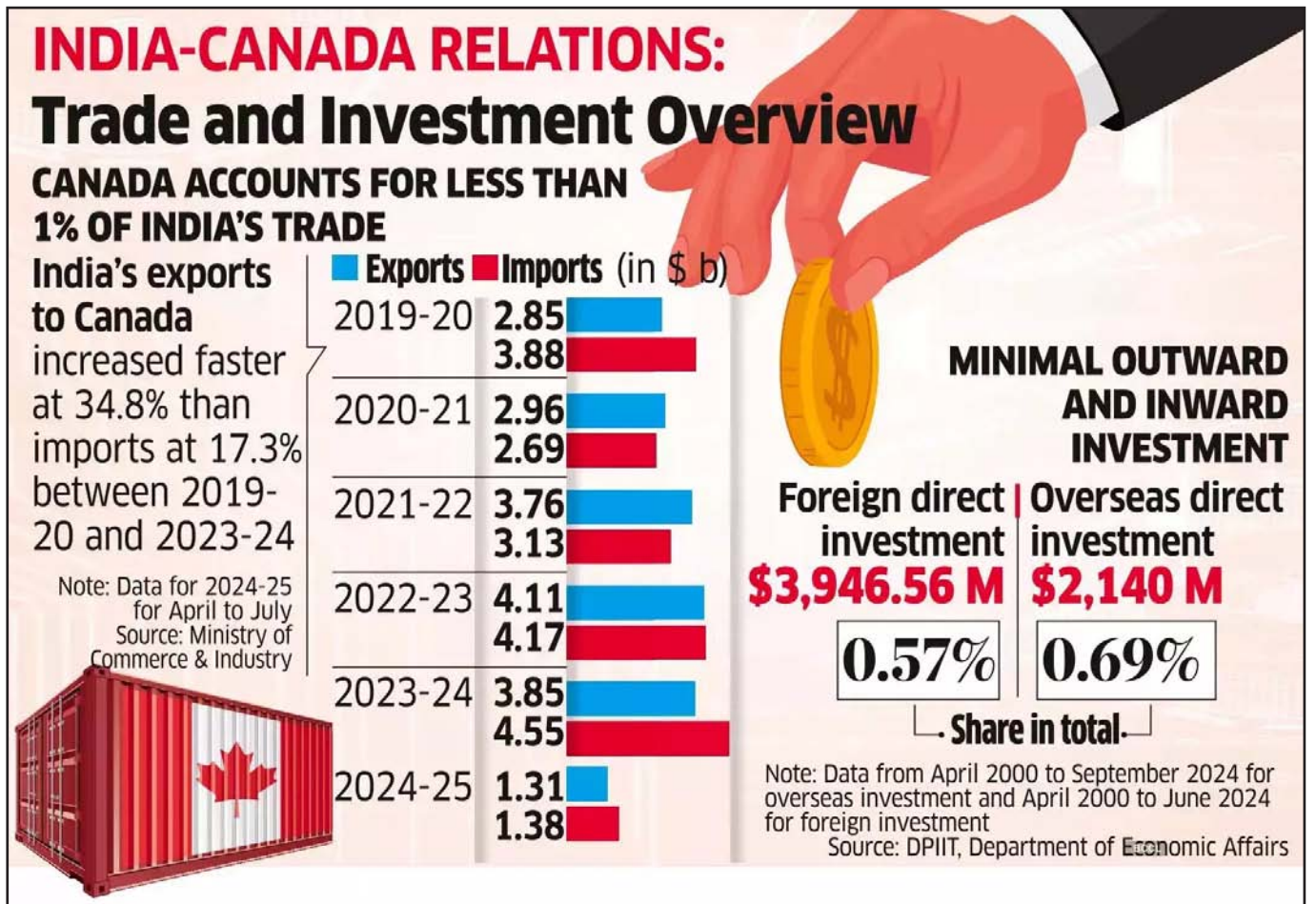


Figure No. 02

- ▶ Canada is the 18th-largest foreign investor in India.
- ▶ From 2020-21 to 2022-23, Canadian investments totaled approximately **\$3.31 billion**, representing **0.5%** of India's total foreign direct investment (FDI) inflows.
- **Sector Focus:** Major sectors for Canadian investment include: **Financial Services, Financial Technology (FinTech), Infrastructure, Real Estate, Information Technology (IT) and Energy**
- Services and infrastructure alone account for nearly **41%** of Canadian FDI in India.
- **Pension Fund Investments:** Canadian pension funds have invested over **\$75 billion** in India, reflecting a growing interest in the country as a promising investment destination.
- **Remittances:** India is the largest recipient of remittances from abroad, due to the sizeable presence of the Indian migrant workforce globally. In 2023, India received an estimated USD 125 billion in remittances, with Canada ranking among the top 10 sources (World Bank).

Trade Items:

- ▶ **Items of India's exports to Canada:** Gems, jewellery and precious stones, pharmaceutical products, ready-made garments, mechanical appliances, organic chemicals, light engineering goods, iron and steel articles, etc.
- ▶ **India's imports from Canada:** pulses, newsprint, wood pulp, asbestos, potash, iron scrap, copper, minerals, and industrial chemicals, etc.

SHANGHAI COOPERATION ORGANISATION (SCO) MEETING

CONTEXT

India's Foreign Minister, S. Jaishankar, is visiting Islamabad for the **23rd Meeting of the Shanghai Cooperation Organisation (SCO) Council of Heads of Government (CHG)**. This visit by India's foreign minister is a notable event in regional diplomacy.

What is Shanghai Cooperation Organisation (SCO)?

- The Shanghai Cooperation Organisation (SCO) is a **multilateral platform** founded in 2001, comprising eight member states: **China, Russia, India, Pakistan, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan**.
- The organization primarily focuses on **regional security, economic cooperation, and political collaboration**, particularly in addressing challenges like terrorism and extremism.
- With a unique blend of both **Asian and Eurasian countries**, the SCO aims to foster stability and development across the region, making it one of the largest transregional organizations globally.
- India became an observer in the SCO in 2005 and became a member state in 2017.

Importance of SCO for India

- For India, the SCO is strategically significant as it enhances its engagement with major regional powers, particularly **China and Russia**, in a **multipolar world**.
- The organization provides a platform for India to collaborate on security issues, especially in **combating terrorism and addressing threats** emanating from its **immediate neighbors**, Pakistan and China.
- Additionally, the SCO facilitates India's **access to Central Asian resources**, thereby bolstering its energy security and economic interests in the region.

Reasons for India Joining SCO

- ▶ India's decision to join the SCO stemmed from its desire for a greater presence in Central Asia and to counterbalance the influence of Western powers. By becoming a member, India aims to leverage the platform to push for collective action against terrorism, particularly regarding groups operating from Pakistan.
- ▶ The move also aligns with India's long-term objective of **establishing a multipolar global order** and enhancing its strategic partnerships in a region critical to its national interests.

INDIA'S 10-POINT PLAN TO STRENGTHEN INDIA-ASEAN RELATIONS

CONTEXT

Prime Minister Narendra Modi has announced a **10-point plan** at the **21st India-ASEAN Summit** to strengthen **India-ASEAN comprehensive partnership**.

What Is PM Modi's 10-Point Plan To Strengthen ASEAN-India Comprehensive Partnership?

- The 10-point plan is focused on strengthening the **India-ASEAN partnership** and proposes to celebrate the year 2025 as the **ASEAN-India Year of Tourism**, for which India will make available USD 5 million towards joint activities.
- It also includes doubling the number of scholarships at **Nalanda University** and providing **new grants for ASEAN students at Agricultural Universities in India**.
- The plan proposed a celebration of the **decade of Act East Policy** through several people-centric activities including a youth summit, start-up festival, hackathon, music festival, ASEAN-India Network of Think-Tanks and Delhi Dialogue.
- It also proposed to organise an **ASEAN-India women scientists conclave** under the **ASEAN-India Science and Technology Development Fund**.
- Under the plan, India would make available **USD 5 million for enhancing disaster resilience**.

- The plan proposes to initiate a **new Health Ministers’** track towards building **Health Resilience**.
- It also proposes the review of the **ASEAN-India Trade and Goods Agreement by 2025**.
- Under the plan, a regular mechanism of the **ASEAN-India Cyber Policy Dialogue** will be initiated to strengthen digital and cyber resilience
- It also proposes to organise a workshop on **Green Hydrogen**.
- PM Modi also invited all ASEAN leaders to join the **‘Plant a Tree for Mother’** campaign towards building climate resilience.

Significance of ASEAN Countries

- PM Modi stressed that he believes that the **21st century is the ‘Asian Century’**-- a century for India and ASEAN countries, and noted that India-ASEAN trade had doubled to over USD 130 billion in the past decade.
- India is celebrating a decade of its Act East Policy and ASEAN is its central pillar of the policy.
 - ▶ **India-ASEAN cooperation** began in the 1990s, driven by shared economic and strategic interests, particularly in response to China’s growing influence.
- India reiterated its full **support for ASEAN Centrality**, ASEAN Outlook on the Indo-Pacific (AOIP), and Lao PDR’s ASEAN Chairmanship’s priorities and deliverables under their theme **“ASEAN: Enhancing Connectivity and Resilience”**.
- **Trade and investment:** India and ASEAN have signed a **Free Trade Agreement (FTA)**, significantly boosting trade and investment.
 - ▶ ASEAN is India’s 4th largest trading partner.
- **India-Myanmar-Thailand Trilateral Highway:** Towards its east, India is part of a push to develop a highway connecting the country to Myanmar and Thailand.
 - ▶ The 1,400-km highway, first proposed in 2002, is expected to link India to the two SEA nations by land.
- **Potential market:** ASEAN constitutes the 3rd largest market in the world. This can help India utilize its export potential.
- **Convergence with Indo-Pacific strategy:** ASEAN is a crucial component of India’s “Act East” policy and its “Indo-Pacific” strategy, reflecting the convergence of interests in the region.
- **Countering China’s influence:** Strengthening relations with ASEAN countries can serve as a counterbalance to China’s influence in the region.
- **Connectivity with North East:** Connectivity initiatives with ASEAN can boost economic development in India’s northeastern states by positioning them as a hub for regional trade and commerce.
- **Important for rule-based order:** ASEAN plays a central role in promoting a rules-based security architecture in the Indo-Pacific region, which is essential for the region’s stability and prosperity.



FACT BOX

About Association of Southeast Asian Nations (ASEAN)

- ASEAN is a **regional intergovernmental organization**.
- **Establishment:** 08 August 1967 in Bangkok, Thailand, with the signing of the **ASEAN Declaration (Bangkok Declaration)**
- **Founding Fathers of ASEAN:** Indonesia, Malaysia, Philippines, Singapore and Thailand.
- Today, ASEAN nations include **Malaysia, Thailand, Brunei, Cambodia, Indonesia, Myanmar, Philippines, Vietnam, Laos and Singapore**.
- Its primary aim is to promote **political, economic, and social cooperation and stability** among its member countries.
- The **East Asia Summit** comprises the **10 ASEAN countries**, and eight partners – **Australia, China, India, Japan, South Korea, New Zealand, Russia and the United States**. **Timor-Leste** has the observer status at the EAS.

UKRAINE’S VICTORY PLAN

CONTEXT:

Ukrainian President Volodymyr Zelensky recently unveiled his **“victory plan”** in a significant address to parliament, marking a pivotal moment in the ongoing conflict with Russia as it enters its third year.

What is the Victory Plan?

- Zelensky’s victory plan is centered around **five primary goals** designed to strengthen Ukraine’s position in the war against Russia:
 - ▶ **Immediate NATO Membership Invitation:** Zelensky is calling for NATO to extend an unconditional invitation for Ukraine to join the alliance, emphasizing that this is crucial for Ukraine’s defense and future security.
 - ▶ **Strengthening Defense Capabilities:** The plan advocates for increased military support from allies, including permission to use foreign-supplied weapons for strikes deep within Russian territory, which some nations are hesitant to allow due to fears of escalating conflict.
 - ▶ **Comprehensive Non-Nuclear Deterrence:** Establishing a deterrence strategy to protect Ukraine from Russian threats is a key focus, aiming to ensure long-term security.
 - ▶ **Joint Investment Agreements:** The plan includes proposals for agreements with foreign partners to invest in Ukraine’s natural resources, enhancing economic resilience.

- ▶ **Enhancing NATO Security:** Zelensky aims to have Ukrainian troops contribute to NATO's collective security and potentially replace some U.S. forces stationed in Europe.
- Additionally, Zelensky mentioned three "secret annexes" to the plan, including aspects related to the deterrence strategy.
- His plan is aimed at strengthening Ukraine's military position and encouraging NATO membership, amidst ongoing discussions about negotiations and peace.

Impact

Zelensky's victory plan aims to unify support within Ukraine and bolster international backing against Russia. If successful, it could:

- **Strengthen Ukraine's Military Position:** Increased military support and the prospect of NATO membership may enhance Ukraine's defense capabilities.
- **Influence International Dynamics:** The plan seeks to galvanize NATO allies and European partners, potentially leading to a reevaluation of their support strategies.
- **Impact on Public Morale:** By articulating a clear strategy, Zelensky hopes to rally public support amidst challenges and setbacks in the war.

However, the plan has drawn criticism domestically, with some lawmakers expressing concerns over Ukraine's reliance on foreign support, suggesting that it may undermine national sovereignty.

RISING TENSIONS BETWEEN NORTH AND SOUTH KOREA

CONTEXT:

Tensions between North and South Korea are escalating significantly. Recently, North Korea announced that over 1.4 million citizens applied to join the military, coinciding with the destruction of roads and railway lines along its southern border. This act was in retaliation for South Korea allegedly sending drones carrying anti-Pyongyang propaganda leaflets. The situation is becoming increasingly volatile, raising concerns about the potential for conflict.

Historical Background

The Korean peninsula has a complex history:

- **Colonial Rule and Division:** After being under Japanese control from 1910, Korea was divided into two separate states following Japan's surrender in 1945. The Soviet Union supported the establishment of a communist regime in the North (Democratic People's Republic of Korea), while the United States backed a democratic government in the South (Republic of Korea).
- **Korean War (1950-1953):** Tensions escalated into war in 1950 when North Korea invaded the South. The conflict saw major initial gains for the North but eventually led to a stalemate, resulting in an armistice in 1953. This established the Korean Demilitarized Zone (DMZ), but no formal peace treaty was ever signed, leaving the Koreas technically still at war.

- **Attempts at Reunification:** Both Koreas have long sought reunification, with several diplomatic efforts made since the 1970s, including agreements in 2000, 2007, and 2018. However, these efforts have yielded little progress, particularly as North Korea has pursued nuclear weapons development, leading to international sanctions.

Genesis of Current Tensions

The roots of the current tensions can be traced back to several key events:

- **Failed Diplomacy:** In 2019, a summit between then-U.S. President Donald Trump and North Korean leader Kim Jong Un failed to produce a meaningful agreement on denuclearization. This setback reportedly led to a breakdown in relations between North Korea and the U.S., prompting North Korea to restart its nuclear program.
- **Shift in Attitude:** In early 2024, Kim Jong Un publicly renounced any hopes for reunification with the South, declaring it the "primary foe." This marked a significant change in rhetoric and policy towards South Korea.
- **Escalating Hostilities:** North Korea has engaged in various provocations, including sending balloons carrying propaganda and trash across the border and fortifying its defenses. The recent destruction of infrastructure connecting the two Koreas signals a formal end to diplomatic ties.

GLOBAL HUNGER INDEX 2024

CONTEXT

The 19th edition of **Global Hunger Index (GHI)** has ranked India **105th**, which places it under the "serious" category of the analysis.

Key-Findings of the Index

- India is among 42 countries that fall within the "serious" category, alongside Pakistan and Afghanistan, with other South Asian neighbours such as Bangladesh, Nepal and Sri Lanka showing better GHI scores to be listed under the "moderate" category.
- With a score of 27.3 in the **2024 Global Hunger Index**, India has a level of hunger that is serious.
- India's GHI Score is based on the values of four component indicators:
 - ▶ 13.7 per cent of the population is **undernourished** (share of the population with insufficient caloric intake)
 - ▶ 35.5 per cent of children under five are **stunted** (share of children under age five who have low height for their age to reflect "chronic" undernutrition)
 - ▶ 18.7 per cent of children are **wasted** (share of children under five who have low weight for their height due to "acute" undernutrition)
 - ▶ 2.9 per cent of children die before their fifth birthday (**mortality** refers to the fatal mix of inadequate nutrition and unhealthy environments)

- Globally, around 733 million people face hunger each day due to a lack of access to a sufficient amount of food, while about 2.8 billion people cannot afford a healthy diet.

Why in India starving?

Rice, wheat, milk and sugarcane — India is among the largest producers of these agricultural commodities, yet millions are still starving in the world’s most populous country.

- **Economic issue:** Hunger is the result of **widespread poverty, rapid population growth, pockets of weak governance, poor health systems, and unreliable national indicators.**
- **Logistical setbacks:** There is lack of supply chain. India’s “poor infrastructure” has led to almost 40% of postharvest losses for some products.
- **Postharvest losses** refer to food lost in the supply chain from the harvesting of crops to the consumption process. Vegetables and fruits expire more quickly when there’s a lack of cold storage, and hundreds of tonnes of food grains risk rotting in warehouses.
- **Increasing demand:** India’s food problem is also compounded by the fact that the rising middle class is on course to demand for more food — and better quality food as well.
- **Other reasons for India’s low productivity:** “inefficient” food distribution systems, erratic and unusual weather, heavy regulations as well as lack of education and training for farmers.



FACT BOX

About Global Hunger Index (GHI)

- The Global Hunger Index (GHI) is a tool used by international humanitarian agencies to measure and track hunger levels with GHI scores based on undernourishment and child mortality indicators across 127 countries.
- It is published jointly by **Concern Worldwide (Irish humanitarian organisation)** and **Welthungerhilfe (German aid agency).**
- It is published keeping in mind **United Nations’ Sustainable Development Goal 2 (SDG 2)** to achieve “Zero Hunger” by 2030.
- It uses four parameters to calculate its scores.
 - ▶ level of undernourishment in a country
 - ▶ child mortality rate
 - ▶ child wasting
 - ▶ child stunting
- It is published keeping in mind **United Nations’ Sustainable Development Goal 2 (SDG 2)** to achieve “Zero Hunger” by 2030.

Government Initiatives

- The Government of India has undertaken several policy changes and initiatives to attain a hunger-free society. These include:
 - ▶ Providing subsidised food through the Public Distribution System (PDS)
 - ▶ Targeted PDS
 - ▶ Targeted supplementation (Integrated Child Development Services Scheme)
 - ▶ Mid-Day Meal Scheme for school children
 - ▶ MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act 2005)
 - ▶ AAY (Antyodana Aana Yojana)
 - ▶ NFSA (National Food Security Act) of 2013
 - ▶ POSHAN Abhiyan (National Nutrition Mission)

SAMSUNG WORKERS’ STRIKE IN TAMIL NADU

CONTEXT

The ongoing protests by Samsung India workers in Tamil Nadu, have drawn significant attention as they highlight the **fundamental right of workers to form trade unions** for collective bargaining. The workers have sought to negotiate on equal terms with the management to establish better employment conditions. The situation escalated when the State government formed a ‘**workmen committee**’ to address the issues while resorting to police action against the striking workers.

What Has Happened?

- The workers at Samsung India are demanding the registration of their **trade union, the Samsung India Workers Union (SIWU),** under the **Trade Unions Act of 1926.**
- However, the government’s formation of a **workmen committee,** without prior registration of the union, has raised concerns about the legitimacy of the process.
- Samsung has also expressed objections to the inclusion of its name in the union, alleging backing from the **Centre of Trade Unions (CITU).**

Labour Rights and Constitutional Provisions

- **Right to Form a Union:** The Supreme Court (**B.R. Singh versus Union of India in 1989**) recognized the right to form associations and unions as a fundamental right under **Article 19(1)(c) of the Indian Constitution.**
 - ▶ This right can only be restricted under **Article 19(4)** in cases where public order, morality, or national integrity is at risk.
 - ▶ It is the obligation of the State, acting through the **Registrar of Trade Unions,** as the regulatory authority under the **1926 Act,** to register trade unions and give individual workers their voice.

- ▶ The benefits of registration under the 1926 Act include **immunity from both civil and criminal action**.
 - ◆ **Section 4 of the Act** notes that even seven members could apply for registration of their union.
 - ◆ Under **Section 6**, the Registrar has to merely examine whether a trade union's rules conform with the rules of the Act.
- **Right to Strike:** Strikes are **legally recognized** (legal right) as a form of demonstration for workers' rights under the **Industrial Disputes Act of 1947**, but they come with certain restrictions. **Section 22 of the Act** specifies conditions under which strikes may be deemed illegal, such as lack of proper notice or continuation during ongoing conciliation proceedings.
 - ▶ The Supreme Court has acknowledged that while the right to strike is essential for worker advocacy, it must be exercised in accordance with existing industrial laws.



FACT BOX

Collective Bargaining

- The Madras High Court, in **Rangaswami versus Registrar of Trade Unions**, succinctly defined the history and object of the **Trade Unions Act** as "the organisation of labour to enable collective bargaining".
- 'Collective bargaining' is defined in **Article 2** of the **International Labour Organization (ILO) Collective Bargaining Convention of 1981** as negotiations between employees and employers or their organisations to determine working conditions and terms of employment.
- **Collective agreement** is the product of successful collective bargaining. Collective bargaining is **statutorily recognised in the Industrial Disputes Act**.
 - ▶ The Act provides that in case of failure of collective bargaining, the State steps in to refer the matter to a conciliation officer.
 - ▶ The case is further referred to a **labour court** or an industrial tribunal if the conciliation officer does not succeed.
- The celebrated U.S. Supreme Court case, **National Labor Relations Board versus Jones & Laughlin Steel Corp** held that employees have a fundamental right to organise and select representatives of their own choosing for collective bargaining.

IMPROVING ACCESS TO ORPHAN DRUGS FOR RARE DISEASES

CONTEXT

In a significant move, the **Delhi High Court** recently directed measures to enhance the availability of **orphan drugs—medications** specifically designed to treat **rare diseases**.

Current Landscape of Rare Diseases in India

- Despite the existence of therapies for some rare diseases, less than 5% of these conditions have effective treatments available. Consequently, fewer than 1 in 10 patients receive disease-specific care.
- The high cost of existing treatments exacerbates the problem, prompting stakeholders to approach the court to address funding access challenges for patients.

Government Initiatives and Funding Policies

- **National Policy for Rare Diseases (NPRD):** In response to the challenges faced by patients with rare diseases, the Indian government launched the **National Policy for Rare Diseases (NPRD)** in 2021. This policy provides financial assistance of up to Rs 50 lakh for treatments at **designated Centres of Excellence (CoEs)**, including prestigious institutions such as AIIMS and PGIMER.
- **Digital Portal for Crowdfunding & Voluntary Donations:** To facilitate crowdfunding, the **Health Ministry** launched a digital portal where patients can present their treatment needs, costs, and banking details to potential donors.
 - ▶ As of August 2024, Rs 24 crore had been allocated to CoEs for treating rare disease patients, with significant disbursements in previous years (Rs 3.15 crore in 2021-22, ₹34.99 crore in 2022-23, and Rs 74 crore in 2023-24).
- **Legal Provisions:** Under the **Patents Act of 1970**, the government can allow third parties to manufacture orphan drugs if they are not made available by the patent holder. This approach includes negotiating with pharmaceutical companies to ensure drug availability and potentially acquiring patents to facilitate local production.

Challenges in the Availability of Orphan Drugs

- **High Cost of Orphan Drugs:** Many orphan drugs are patented, making them prohibitively expensive. The small market size and high development costs deter pharmaceutical companies from producing these medications profitably.
- **Regulatory and Customs Hurdles:** While patients importing orphan drugs are exempt from customs duty, pharmaceutical companies still face an 11% customs duty and a 12% GST when bringing these medications to

India. The Delhi High Court has mandated that necessary exemptions for these drugs be processed within 30 days.

- **Lack of Price Control:** In January 2019, the **Department of Pharmaceuticals** exempted orphan drugs from price controls. The Delhi High Court criticized this exemption, emphasizing that it creates barriers to access for patients.
- **Delayed Approvals:** The approval process for orphan drugs by the **Drug Controller General of India (DCGI)** often faces delays, affecting timely access to treatments.



FACT BOX

Rare Disease

- Rare diseases are defined by the World Health Organization (WHO) as debilitating conditions affecting fewer than 1 in 1,000 individuals.
- In India, around 55 medical conditions, including **Gaucher's disease** and various forms of **muscular dystrophy**, fall under this classification.
- The **National Registry for Rare and Other Inherited Disorders (NRROID)** has documented **14,472 rare disease patients in the country**, revealing the urgent need for effective treatments.
- **Classification of Rare Diseases:** Rare diseases in India are categorized into three groups based on treatment options:
 - ▶ **Group 1:** Diseases that can be treated with a one-time curative procedure.
 - ▶ **Group 2:** Conditions requiring long-term or lifelong treatment, which are less costly but necessitate regular check-ups.
 - ▶ **Group 3:** Diseases for which effective but expensive treatments are available and often require lifelong administration.

- By leveraging genomic data and emerging technologies such as gene editing, mRNA therapeutics, and organ-on-a-chip models, precision medicine aims to deliver more effective and personalized treatment plans for diseases, particularly in oncology, chronic diseases, and genetic disorders.
- **Technological Contributions:** Key technologies driving precision medicine include:
 - ▶ **Gene Editing:** Techniques like **CRISPR** enable targeted modifications to DNA, which can correct genetic mutations.
 - ▶ **mRNA Therapeutics:** This technology gained prominence during the COVID-19 pandemic, exemplified by rapid vaccine development.
 - ▶ **Organ-on-a-Chip:** These microfluidic devices allow researchers to model human organ systems for drug testing, mimicking the microenvironment of diseases.
- The Indian precision medicine market is anticipated to surpass \$5 billion by 2030, contributing 36% to the national bioeconomy. Initiatives like the **Genome India programme** and the **Phenome India project** are crucial for identifying treatments for rare diseases and enhancing predictive models for common ailments.

Challenges in India

India faces significant hurdles in establishing a robust framework for precision medicine:

- **Inconsistent Biobanking Regulations:** Unlike countries like the U.S. and U.K., India lacks comprehensive laws governing biobanks, leading to gaps in consent processes and data protection. Current guidelines do not adequately inform participants about how their samples and data will be used, raising ethical concerns.
- **Absence of a Central Authority:** The lack of a singular regulatory body overseeing biobanks leads to inconsistencies and ethical violations, jeopardizing public trust and participation in research initiatives.
- **Public Awareness and Participation:** There is a need for improved public engagement to encourage participation in biobanking and research. Concerns about data privacy and potential misuse of genetic information deter individuals from sharing their samples.
- **Infrastructure and Investment:** While the precision medicine market in India is projected to grow at a CAGR of 16%, significant investments are required in biobanks, genomics research, and healthcare infrastructure to keep pace with advancements globally.

PRECISION MEDICINE

CONTEXT

Precision medicine is gaining traction as advancements in genomics and biotechnology pave the way for personalized healthcare solutions. Recent breakthroughs, such as India's approval of **NexCAR19**, a **CAR-T cell therapy**, and the establishment of AI-focused facilities in collaboration with institutions like the Indian Institute of Science, highlight the growing significance of this field.

What is Precision Medicine?

- Precision medicine refers to a tailored approach to healthcare that considers individual differences in genetics, environment, and lifestyle.

2024 ECONOMICS NOBEL PRIZE

CONTEXT

The **2024 Nobel Prize in Economics** was awarded to **U.S. economists Daron Acemoglu, Simon Johnson, and James A. Robinson** for their groundbreaking studies on how institutions are formed and their impact on prosperity. The Nobel committee recognized the winners for **enhancing our understanding of the root causes behind the "success or failure of nations"**.

Significance of Their Work

- The noble prize winners studied the “**global inequality in wealth**”.
- The disparity between rich and poor nations has long puzzled economists.
- Currently, the richest 20% of countries have an average income 30 times greater than that of the poorest 20%.
- Various theories have attempted to explain this divergence, ranging from historical colonialism to differences in natural resources and even intelligence.
- However, Acemoglu, Johnson, and Robinson argue that the primary explanation lies in the quality of economic and political institutions.
- Their influential 2012 book, *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*, along with their collaborative paper from 2004, emphasizes that:
 - ▶ **inclusive institutions**—characterized by secure property rights and democracy—promote economic growth
 - ▶ **whereas extractive institutions**—marked by insecurity and lack of political freedom—lead to stagnation and poverty

Why is there a “Wealth Gap” between nations?

- The wealth gap between nations refers to the significant differences in income and prosperity that exist across countries. Some nations that were once rich have become poor, particularly after experiencing **colonization**.
- Economists Daron Acemoglu, Simon Johnson, and James A. Robinson have explored this issue, focusing on the **role of societal institutions** established during colonization.
- **The Role of Institutions:** Institutions are the rules and systems that govern how a society operates. They include laws, political structures, and economic policies. The quality of these institutions can greatly influence a country’s economic success or failure.
- **Inclusive vs. Extractive Institutions**
 - ▶ **Inclusive Institutions:** These institutions provide secure property rights, promote political participation, and encourage investment. They allow individuals to work hard and benefit from their efforts. Countries that adopted inclusive institutions tend to become more prosperous over time.
 - ▶ **Extractive Institutions:** In contrast, extractive institutions concentrate power and wealth in the hands of a few. They often lack protection for property rights and discourage investment. Countries with extractive institutions struggle to achieve economic growth and often remain poor.

Impact of Colonization

Institutions are described as the “**rules of the game**” that shape individual incentives in economic interactions. During colonization, different types of institutions were established in various regions:

- **Inclusive institutions:** In areas where colonizers intended to settle and build a future, inclusive institutions were often created. For example, in North America, these institutions supported long-term economic development.
- **Extractive institutions:** In regions where colonizers did not settle, they established extractive institutions aimed at exploiting resources quickly. This approach can be seen in parts of Africa and Asia, including India, where the focus was on extraction rather than growth.

Challenges to Establishing Inclusive Institutions

- Despite the evident benefits of inclusive institutions for economic growth, their adoption has been limited.
- The laureates attribute this to the choices faced by rulers, who may prefer extractive institutions that allow them to secure resources for personal gain.
- When rulers can exploit resources without facing substantial opposition, there is little incentive for reform.
- However, when popular uprisings threaten the status quo, some leaders may opt to implement more inclusive institutions to appease the masses and stabilize their rule.

MIDDLE-INCOME TRAP

CONTEXT

The **World Development Report 2024** (WDR), published by the **World Bank**, explores the phenomenon of the **middle-income trap**. This term refers to the stagnation of growth rates that occurs when economies reach a certain level of income but struggle to transition to high-income status. The report highlights that only **34 middle-income economies** have successfully made this transition in the past 34 years.

What is the Middle-Income Trap?

- The middle-income trap is characterized by stagnation in income per capita when economies reach about **11% of U.S. per capita income**.
- **Current Status:** Middle-income countries, defined as those with per capita incomes between **\$1,136 and \$13,845**, often face challenges in sustaining growth.
- **Strategies to Escape the Trap:** The WDR emphasizes a “**3i**” approach for countries aiming to overcome the middle-income trap:
 - ▶ **Investment:** Capital must be allocated efficiently to foster growth.
 - ▶ **Infusion:** Introduction of new global technologies is crucial.
 - ▶ **Innovation:** Encouraging domestic innovation can drive progress.

Role of the State (Case Study)

Successful Models: Countries that have successfully escaped the middle-income trap, such as **South Korea** and **Chile**, demonstrate the importance of state intervention:

South Korea:

- ▶ Utilized a heavily interventionist state to direct private sector activities.
- ▶ Supported successful companies with access to technologies and allowed underperformers to fail.

Chile:

- ▶ The government actively supported natural resource sectors, such as the salmon industry, through targeted interventions.

Lessons for India

For India to break the middle-income trap, the government must:

- Act as a neutral facilitator among private enterprises.
- Base support on performance rather than political connections.
- Encourage powerful business entities to innovate and invest in new technologies.

Challenges Facing India

- **Increased Power of Billionaires:** The concentration of wealth can create barriers to equitable growth and investment.
- **Stagnation in Manufacturing:** The manufacturing sector has been underperforming, and many jobs are returning to low-productive agriculture post-pandemic.
- **Wage Growth Issues:** Despite an estimated GDP growth of **7%**, real wages for workers have not kept pace, with nominal wage growth around **5-7%** compared to an inflation rate of about **5%**.
- **Premature Deindustrialization:** Many economies are experiencing a decline in manufacturing share of income at much lower GDP levels than before, raising questions about the potential of the service sector to lead growth.
- **Democratic Concerns:** Historical examples from South Korea and Chile show that growth can come at the expense of democracy. It is essential to ensure that India maintains its democratic ethos while pursuing state-led growth initiatives.

INDIA'S CONTAINER SHORTAGE

CONTEXT

India's rapid economic growth has sparked discussions about the **country's logistics capabilities**, particularly regarding **containerized transport**. Recent reports highlight a significant challenge: **India's insufficient production of shipping containers**, which could hinder the country's trade ambitions.

What is the Importance of Containerization?

- Containerization has **transformed global trade** by allowing goods to be transported efficiently across various modes—rail, ship, and road.

- Standardized containers make it easy to move cargo long distances without disruption once sealed. This method significantly reduces transportation time and port delays, facilitating globalization.

India's Trade Growth and Container Needs

- India's trade growth relies heavily on increasing its container handling capacity.
- Major projects, like the **Vadhavan and Galathea Bay ports**, and the **India-Middle East-Europe Economic Corridor**, are centered around containerized transport. However, India faces a major hurdle: it does not produce enough containers.
 - ▶ Currently, India manufactures only 10,000 to 30,000 containers annually, while China produces between 2.5 to 3 million.
 - ▶ As a result, India must lease containers from abroad, primarily China, leading to higher costs.
 - ▶ The price of making one container in India ranges from USD 3,500 to USD 4,800, compared to USD 2,500 to USD 3,500 in China.

Impacts of the Container Shortage

- The shortage of containers drives up freight rates and contributes to congestion at Indian ports. Despite their strategic location on East-West trade routes, Indian ports struggle to become hub ports due to this lack of containers. Consequently, major shipping traffic is diverted to ports in Colombo, Dubai, and Hong Kong.
- Events like the **Russia-Ukraine war** and crises in West Asia have further complicated shipping logistics, increasing freight costs and reducing container availability. These challenges highlight the urgent need for a robust domestic supply of containers.

Government Initiatives and Recommendations

- The Indian government has launched initiatives like **Make In India** to promote local container production. Strategies include public-private partnerships and direct incentives for manufacturers. Additional measures could include:
 - **Reducing Costs:** Lowering charges for repositioning and storing empty containers can help alleviate shortages.
 - **Enhancing Port Capacities:** Increasing container yard capacities at ports would support business growth.
 - **Production Incentives:** Implementing Production Linked Incentives (PLI) and relaxing GST for manufacturers can lower production costs.
 - **Encouraging Local Usage:** Mandating the use of Indian-made containers would increase domestic demand and benefit local manufacturers.
 - **Streamlining Logistics:** Developing tracking systems through platforms like the Unified Logistics Interface Platform (ULIP) can improve efficiency and reduce turnaround times for export containers.

GLOBAL PUBLIC DEBT

CONTEXT

Global public debt is set to surpass USD 100 trillion this year, signalling urgent calls for stronger fiscal measures from major economies, according to a recent report from the **International Monetary Fund (IMF)**.

What Is Global Public Debt?

- Global public debt refers to the **total amount of money that governments around the world owe to creditors**.
- This debt can include domestic and foreign loans, bonds, and other forms of borrowing. Public debt is usually expressed as a percentage of a country's **Gross Domestic Product (GDP)**, which measures the economic output of a nation.
- A **rising public debt ratio** can indicate that a country is borrowing more than it is producing, raising concerns about its long-term financial health.

Causes of Rising Global Public Debt

- COVID-19 Pandemic:** The pandemic forced governments to implement expansive spending strategies to support their economies. This included financial aid for businesses, unemployment benefits, and healthcare spending, leading to increased borrowing.
- Economic Stimulus:** Major economies, particularly the U.S. and China, have engaged in substantial fiscal stimulus plans to boost growth. This has contributed significantly to the rise in global debt levels.
- Inflation and Interest Rates:** As inflationary pressures ease and central banks lower borrowing costs, governments have more incentive to borrow. However, the need for long-term fiscal sustainability remains pressing.
- Aging Populations and Security Issues:** Challenges like an aging population and increasing security concerns further strain public finances, requiring governments to borrow more to meet these needs.

Impact of Rising Global Public Debt

- Economic Stability:** High levels of public debt can jeopardize economic stability, making it more challenging for governments to respond to future crises. The IMF warns that without decisive action, future debt levels may exceed current projections, requiring significant fiscal adjustments.
- Government Bond Markets:** Escalating borrowing levels have already led to sell-offs in government bond markets, raising borrowing costs for countries. This can create a cycle of increasing debt as governments struggle to finance their obligations.
- Fiscal Policies:** The IMF has recommended that governments prioritize their spending, reform entitlements, and find new revenue sources to stabilize their finances. Delaying these necessary adjustments could lead to more severe economic challenges in the future.

- Vulnerable Households:** As governments make fiscal adjustments, it is crucial to protect vulnerable households from the impacts of austerity measures. Well-designed fiscal policies can support economic growth while ensuring that the most affected populations receive assistance.

NATIONAL AGRICULTURE CODE (NAC) IN INDIA

CONTEXT

The **Bureau of Indian Standards (BIS)** is taking a significant step toward improving agricultural practices in India by formulating a **National Agriculture Code (NAC)**. This initiative aims to establish a comprehensive framework for agricultural standards, similar to existing codes for buildings and electrical systems.

Why is the NAC Needed?

Current Gaps in Agricultural Standards

- While the BIS has set standards for agricultural machinery and inputs like fertilizers and pesticides, many essential practices remain unregulated.
- Areas such as field preparation, irrigation methods, and overall agricultural practices lack standardized guidelines, which can lead to inefficiencies and inconsistencies in farming.

Need for a Comprehensive Framework

- Policymakers have long recognized the necessity of a unified standards framework to enhance productivity and sustainability in agriculture.
- The NAC will provide guidelines covering the entire agricultural cycle, aiding farmers, agricultural universities, and officials.

Key Features of the NAC

- Structure of the Code:** The NAC will consist of two main parts:
 - General Principles:** Applicable to all crops.
 - Crop-Specific Standards:** Targeting specific crops like paddy, wheat, oilseeds, and pulses.
- Areas Covered:** The NAC will encompass a wide range of agricultural practices, including:
 - Crop selection
 - Land preparation
 - Sowing and transplanting
 - Irrigation and drainage
 - Soil health management
 - Plant health management
 - Harvesting and post-harvest operations
 - Input management (fertilizers, pesticides, etc.)
 - Storage and traceability

- **Inclusion of Emerging Practices:** The code will address modern agricultural practices such as:
 - ▶ Natural and organic farming
 - ▶ Utilization of Internet-of-Things (IoT) in agriculture

Objectives of the NAC

The NAC aims to:

- Create a **national code** that considers agro-climatic zones and socio-economic diversity.
- Promote a **quality culture** in Indian agriculture by providing a reference for policymakers and regulators.
- Serve as a **guide** for the farming community to make informed decisions.
- Integrate Indian Standards with recommended agricultural practices.
- Address critical areas such as **sustainability, traceability, and documentation**.
- Support capacity-building programs through agricultural extension services and civil society organizations.

Proposed Timeline and Implementation

- The BIS has outlined a plan with **working panels** to draft the NAC, targeting completion by **October 2025**.
- Post-completion, training programs for farmers will be conducted to ensure effective implementation of the standards.

Standardized Agriculture Demonstration Farms (SADF)

▢ Purpose and Importance

- ▶ In parallel to the NAC, the BIS plans to establish **Standardized Agriculture Demonstration Farms (SADF)** in selected agricultural institutes.
- ▶ These farms will serve as experimental sites for testing and implementing agricultural practices based on Indian Standards.

▢ Collaboration with Agricultural Institutes

- ▶ The BIS will collaborate with premier agricultural institutes, signing **Memoranda of Understanding (MoUs)** to develop these farms.
- ▶ The initiative will provide financial support for the setup of SADFs, offering hands-on learning opportunities for farmers and industry professionals.

NATURAL FARMING PRACTICES

CONTEXT

The NITI Aayog team commended the **natural farming practices** of **Andhra Pradesh Community Managed Natural Farming (APCNF)** and its potential in transforming the lives of small and marginal farmers.

What is Andhra Pradesh Community Managed Natural Farming (APCNF) Programme?

- The **Andhra Pradesh Community Managed Natural Farming (APCNF)** programme is a pioneering initiative aimed at promoting natural farming practices among farmers in Andhra Pradesh.
- Launched in **2016**, the program seeks to alleviate the debt cycle faced by farmers due to high input costs associated with conventional agriculture.

▢ Objectives of the APCNF

- ▶ **Reduce Debt:** Help farmers escape the financial burden caused by expensive chemical inputs.
- ▶ **Promote Sustainable Practices:** Encourage the adoption of natural farming techniques that enhance soil health and biodiversity.

Key Features

- The APCNF supports farmers in shifting from chemically intensive practices to natural farming through various techniques:
 - ▶ **Organic Residues and Minimal Tillage:** Improving soil health by using organic matter and reducing soil disturbance.
 - ▶ **Indigenous Seeds:** Reintroducing local seed varieties to enhance resilience and yield.
 - ▶ **Crop Diversification:** Encouraging the cultivation of a variety of crops, including trees, to enhance productivity and sustainability.
- **Pre-Monsoon Dry Sowing (PMDS) Model:** The APCNF promotes the **PMDS model**, which allows farmers to cultivate three crops per year even in rainfed conditions, a significant improvement over traditional practices that typically yield only one crop annually.

Funding and Support

The programme receives financial backing from various central schemes, including:

- **Rashtriya Krishi Vikas Yojana**
- **Paramparagat Krishi Vikas Yojana**
- **Bharatiya Prakriti Krishi Padhati**
- The recently announced **National Mission of Natural Farming** is also expected to provide additional funding.



FACT BOX

Understanding Natural Farming

- Natural farming is an **agro-ecological practice** that emphasizes the use of bio inputs derived from local ecosystems rather than relying on purchased chemical inputs.

- It differs from organic farming, which is primarily focused on product certification.
- Key Components of Natural Farming
 - ▶ **Beejamrit:** Seed treatment using cow dung, urine, and lime.
 - ▶ **Jivamrit:** A concoction for enhancing soil fertility using cow products and pulses.
 - ▶ **Whapasa:** Activating earthworms in soil to promote moisture retention.
 - ▶ **Mulching:** Creating microclimates with organic materials to conserve soil moisture.
 - ▶ **Plant Protection:** Applying biological mixtures to protect crops from pests and diseases.

Government Initiatives Supporting Natural Farming

- National Mission on Natural Farming (NMNF)
- Pradhan Mantri Krishi Sinchai Yojana
- Paramparagat Krishi Vikas Yojana (PKVY)
- Rashtriya Krishi Vikas Yojana (RKVY)

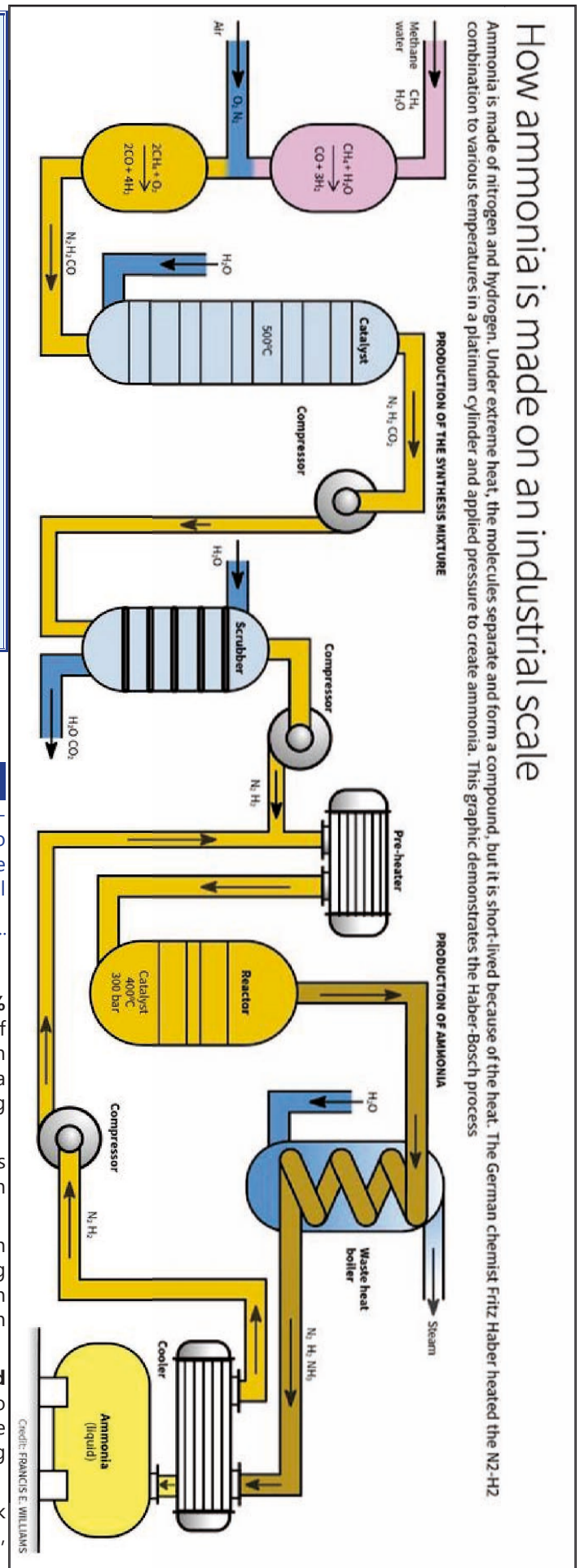
HABER-BOSCH PROCESS

CONTEXT

Recent reports emphasize the significance of the Haber-Bosch process in converting atmospheric nitrogen into fertilizer, addressing the growing global food demand while highlighting the disparity between industrial and natural nitrogen replenishment methods.

What Is Nitrogen?

- Nitrogen is a key element that makes up about **78% of the Earth's atmosphere**, primarily in the form of **molecular nitrogen (N₂)**. Although abundant, this form of nitrogen is not usable by plants because it exists as a stable triple bond between two nitrogen atoms, making it inert and difficult to break apart.
- The Nitrogen Cycle:** Nitrogen enters the soil in forms that plants can use, known as reactive nitrogen, through several natural processes:
 - ▶ **Lightning:** When lightning strikes, it provides enough energy to break the nitrogen triple bond, creating **nitrogen oxides (NO and NO₂)**. These oxides can mix with water to form nitric acid, which falls as rain and enriches the soil.
 - ▶ **Bacteria:** Certain bacteria, like **Azotobacter and Rhizobia**, can convert atmospheric nitrogen into reactive forms. Rhizobia live in the roots of legume plants, helping them absorb nitrogen while receiving nutrients in return.
 - ▶ **Aquatic Plants:** Some aquatic ferns, like **Azolla**, work with bacteria to convert nitrogen into a usable form, acting as a natural fertilizer when they decay.



The Role of Ammonia

- Ammonia (NH₃) is a key reactive form of nitrogen that plants need for growth. It can be produced through natural processes or industrial methods.
- The **Haber-Bosch process** is a significant industrial method that synthesizes ammonia from nitrogen and hydrogen gases under high pressure and temperature.

The Haber-Bosch Process

- **Development:** It is developed by Fritz Haber and later improved by Carl Bosch, the Haber-Bosch process revolutionized ammonia production. It requires:
 - ▶ High temperatures (around 200°C)
 - ▶ High pressures (up to 200 atm)
 - ▶ A catalyst (initially osmium, later iron oxides)
- **Impact:** This process enables the mass production of synthetic fertilizers, which have dramatically increased

global food production, allowing us to meet the demands of a growing population.

Environmental Concerns

While the Haber-Bosch process has been crucial for food security, it also has significant downsides:

- **Excess Nitrogen:** The widespread use of nitrogen fertilizers leads to soil saturation, where plants absorb more nitrogen than they need. This excess can:
 - ▶ Acidify rain, harming ecosystems.
 - ▶ Cause runoff into water bodies, leading to algal blooms that deplete oxygen and harm aquatic life.
- **Food Security Issues:** Despite increased food production, issues like hunger and malnutrition persist due to economic and political factors, illustrating that technology alone cannot solve these problems.



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SECTION - B

QUICK BYTES

BONEDI BARI PUJAS (DURGA PUJAS)

CONTEXT

The **Bonedi Bari Pujas**, or **Durga Pujas**, conducted in Kolkata's aristocratic households, have gained renewed attention as cultural heritage and tradition face the challenges of modernization and economic pressures.

About the Puja

- **Bonedi Bari Pujas** are among the **oldest Durga Puja** celebrations in Kolkata, with origins dating back over 415 years.
 - ▶ Bonedi Bari is a Bengali term for the traditional homes of the **upper class, aristocrats, and zamindars of Kolkata**.
- These pujas are held in the **grand houses of Kolkata's elite families (traditional Bengali houses)**
- These rituals are deeply entwined with the history of the **Sabarna Roy Choudhury family** (*zamindars* of vast swathes of land in Mughal Bengal including the villages **Sutanuti, Gobindapur, and Kalikata** which would later become Kolkata), among others.
 - ▶ In 1698, the Sabarna Roy Choudhury family was forced to sell these settlements to the British East India Company; and by 1805, the Company had converted these three settlements into a modern city of the 19th century — Calcutta.
 - ▶ The same Sabarna Roy Choudhury family is also credited with hosting the first public Durga Pujo in Kolkata in the 1600s. Supposedly over 400-years-old now, the Aat-chala Durga Puja of the Sabarna Roy Choudhury family is said to be older than Kolkata itself.

- These celebrations are not only religious festivals but also a reflection of **Kolkata's rich cultural tapestry**.
 - ▶ Traditions such as using old molds for idol-making and maintaining relationships with long-serving artisans highlight the continuity of cultural practices through generations. The involvement of families in these rituals fosters unity and pride, even as many members reside outside the region.

UNITED NATIONS INTERIM FORCE IN LEBANON (UNIFIL)

CONTEXT

In a latest development, an Israeli military tank fired at a UN observation post in southern Lebanon.

What is United Nations Interim Force in Lebanon (UNIFIL)?

- The United Nations Interim Force in Lebanon (UNIFIL) was established in 1978 in response to Israel's invasion of Lebanon, with the mandate to oversee the withdrawal of Israeli forces and restore peace in the region.
- Its creation was formalized through **United Nations Security Council Resolutions 425 and 426**.
- Over the years, UNIFIL's mission has evolved, focusing on three primary objectives:
 - ▶ **Confirming Israel's Withdrawal:** Ensuring that Israeli military forces vacate Lebanese territory, as stipulated in UN resolutions.
 - ▶ **Restoring Peace and Security:** Monitoring the situation in southern Lebanon, preventing escalations, and facilitating a stable environment for the local population.

- ▶ **Assisting the Lebanese Government:** Supporting the Lebanese authorities in reestablishing their control and governance in southern Lebanon.
- UNIFIL operates predominantly along the **Blue Line**, a demarcation established in 2000 to confirm Israel's withdrawal.
 - ▶ The area is sensitive due to the presence of Hezbollah and ongoing tensions between Israel and Lebanon.
- Despite the military backgrounds of many peacekeepers, their role is **strictly non-combatant**, focusing on monitoring ceasefires, mediating between conflicting parties, and protecting civilians.
- UNIFIL is **one of the largest UN peacekeeping missions**, with personnel from over 50 countries. It plays a crucial role in maintaining stability in a region marked by historical conflicts and political complexities.

FIVE EYES ALLIANCE

CONTEXT

Canadian Prime Minister Justin Trudeau has recently engaged the **Five Eyes alliance**—comprising the **United States, the United Kingdom, Canada, Australia, and New Zealand**—in response to allegations regarding the involvement of Indian government agents in the assassination of Khalistani activist Hardeep Singh Nijjar in June 2023.

What is Five Eyes Alliance?

- **Formation and Historical Background:** The Five Eyes alliance traces its origins back to the aftermath of **World War II**.
- Initially established through the **UKUSA Agreement of 1946**, the alliance was created to enhance cooperation in **signals intelligence (SIGINT)** among its members.
- The United Kingdom and the United States were the founding nations, with Canada, Australia, and New Zealand joining the network in the 1950s.
- This coalition was initially focused on monitoring the Soviet Union during the Cold War.
- **Membership and Structure:** The alliance consists of five core member countries: the **United States, the United Kingdom, Canada, Australia, and New Zealand**.
 - ▶ While Norway, Denmark, and West Germany were temporarily included during the 1950s, the current membership solidified by 1955 remains unchanged.
 - ▶ Each member country contributes its intelligence capabilities, including human intelligence (HUMINT) and geospatial intelligence (GEOINT), facilitating a comprehensive intelligence-sharing framework.
- **Operational Mechanisms:** The Five Eyes alliance operates through both formal and informal agreements among its intelligence agencies, such as the Federal Bureau of Investigation (FBI) in the U.S. and the Royal Canadian Mounted Police (RCMP) in Canada.
 - ▶ The alliance is designed to provide a strategic advantage to its members by sharing a wide array of intelligence, including SIGINT, security assessments, and defense-related information.

- ▶ Intelligence-sharing occurs through various channels, enabling the monitoring of electronic communications like phone calls, emails, and text messages.
- The **Five Eyes Intelligence Oversight and Review Council**, also known as FVEY, comprises oversight bodies from each member nation, ensuring accountability and governance within the alliance.

BATTLE OF WALONG

CONTEXT

The Indian Army is set to commence a month-long series of commemorative events from October 17 to November 14 to mark the **62nd Walong Day**. This initiative honors the valiant soldiers who fought in the **Battle of Walong** during the **1962 Sino-Indian War**, highlighting their sacrifices and courage in defending India's eastern front.

About the Battle of Walong

- The Battle of Walong was a significant conflict fought between October 20 and November 14, 1962, during the Sino-Indian War.
- Located in the eastern part of Arunachal Pradesh, near the Indo-China border, Walong held strategic importance due to its proximity to the **McMahon Line** (de facto border between India and China)

Forces Involved:

- ▶ Indian forces, primarily comprising the Assam Rifles and the Indian Army.
- ▶ Opposing forces from the People's Liberation Army (PLA) of China.
- ▶ Indian troops utilized the rugged terrain to their advantage, conducting counterattacks and inflicting significant casualties on Chinese forces.
- ▶ Despite their determined defense, Indian forces were ultimately overwhelmed by the superior numbers and firepower of the Chinese army.
- ▶ **Outcome:** The battle concluded with a retreat of Indian troops, marking a challenging moment in India's military history. Both sides suffered considerable casualties, with the Indian Army experiencing significant losses, including killed, wounded, and captured personnel.
- ▶ **Legacy:** The battle symbolizes bravery and resilience, becoming a poignant chapter in India's military history.

Walong War Memorial

- ▶ In honor of the soldiers who fought and lost their lives in this battle, the Walong War Memorial was established. It serves as a site of remembrance and tribute to the bravery of those who defended the nation.

PM GATI SHAKTI INITIATIVE

CONTEXT

The 'PM Gati Shakti' initiative has completed three years.

About

- **Launched in:** 2021
- The **PM GatiShakti initiative** was launched to transform India's infrastructure landscape by enhancing multi-modal connectivity and promoting integrated infrastructure development.
- It aims to streamline logistics costs and boost investments across various sectors, which is vital for the country's economic growth and efficiency.
- The initiative leverages advanced geospatial data to create a **National Master Plan (NMP)**, enabling efficient project planning and execution.

Current Status of Progress

- ▶ **Large-Scale Projects Identified:** The initiative has identified 208 infrastructure projects valued at Rs 15.39 lakh crore, focusing on critical sectors such as roads, railways, urban development, and oil and gas. This includes 101 projects for road development and 73 for railway infrastructure.
- ▶ **Network Planning Group (NPG) Oversight:** The NPG, an **inter-ministerial body**, evaluates these projects every two weeks to ensure transparency and rigorous scrutiny. Projects exceeding Rs 500 crore undergo a thorough review before reaching the Public Investment Board for final approval.
- ▶ **International Interest and Expansion Plans:** The initiative has attracted international attention, with countries like Nepal and Sri Lanka expressing interest in adopting the **GatiShakti model**. Plans to expand the initiative to the district level within the next two months aim to ensure local economies benefit from integrated infrastructure development.
- **Key Challenges:** Complex integration of land records, bureaucratic hurdles.

SECTION 6A OF THE CITIZENSHIP ACT, 1955

CONTEXT

In a landmark ruling, the Supreme Court **upheld the constitutional validity of Section 6A of the Citizenship Act, 1955**, which granted citizenship to immigrants who entered Assam before January 1, 1966. This verdict is part of an ongoing legal and social debate over the status of immigrants, the rights of indigenous communities, and the demographic changes in the state.

What is Section 6A?

- Section 6A was introduced to **the Citizenship Act, 1955**, as part of **the Assam Accord signed in 1985**. This accord aimed to address the concerns of local Assamese regarding the influx of migrants from Bangladesh.

- **Provisions:** The section specifically grants citizenship to individuals who migrated to Assam from Bangladesh before January 1, 1966, thus providing a different cut-off date for Assam compared to the rest of India.
- **Purpose:** It was designed to protect the rights of indigenous Assamese people while acknowledging the historical context of migration in the region. The provision was part of a broader effort to manage demographic changes resulting from the influx of migrants.

About Citizenship

- **Articles 5-11 of the Constitution** describe the various categories of persons who are entitled to citizenship. These were enforced on November 26, 1949, ahead of the commencement of the Constitution on January 26, 1950. Article 11 empowers Parliament to regulate citizenship by law; the Citizenship Act was, therefore, passed in 1955. It has since been amended 1986, 2003, 2005, and 2015.
 - ▶ **Article 5** provided for citizenship on the commencement of the Constitution: all those domiciled and born in India, either of whose parents was born in India, or anyone who had been ordinarily resident in India for at least five years preceding the commencement of the Constitution.
 - ▶ Under **Article 6**, anyone who migrated to India before July 19, 1948, from territory that had become part Pakistan, automatically became a citizen if either of their parents or grandparents was born in India. But those who entered India after this date needed to register themselves.
 - ▶ Those who had migrated to Pakistan after March 1, 1947, but had subsequently returned on resettlement permits, too, were included within the citizenship net (**Article 7**).
 - ▶ Under **Article 8**, a person of Indian origin residing outside India who, or any of whose parents or grandparents, was born in India can register as an Indian citizen with the relevant Indian diplomatic mission.
- **Rights of Citizen:** The Constitution gives some fundamental rights to non-citizens —
 - ▶ the right to equality before the law (Article 14)
 - ▶ protection of life and personal liberty (Article 21)
 - ▶ freedom to manage religious affairs (Article 25)
- However, some other fundamental rights, such as prohibition of discrimination on grounds of religion, race, caste, sex or place of birth (**Article 15**); equality of opportunity in matters of public employment (**Article 16**); and the six basic freedoms of speech and expression, peaceful assembly, forming associations or unions, movement, residence, and profession (subject to reasonable restrictions, **Article 19**), are available only to citizens.
- Also, only a citizen has the right to vote in elections to Lok Sabha and state Assemblies (**Article 326**), become a member of these Houses (**Articles 84, 191d**), and assume certain high offices such as those of President, Vice-President, Governor, and a judge of the higher judiciary.

MSP APPROVED FOR RABI CROPS

CONTEXT

The Union Cabinet has recently approved new **Minimum Support Prices (MSP) for Rabi crops for the 2025-26 marketing season**. This decision comes amid ongoing discussions about agricultural support and food security in India, especially as the country prepares for the upcoming crop cycle. The increase in MSP is aimed at providing better financial support to farmers, ensuring they receive fair prices for their produce, and encouraging the cultivation of essential crops.

Key Highlights

- **Wheat MSP Increase:** The MSP for wheat has been raised by Rs 150 per quintal, from Rs 2,275 to Rs 2,425.
 - ▶ This increase is expected to benefit farmers, particularly in northern India, where wheat is a staple crop.
- **Mustard MSP Increase:** The MSP for mustard has been increased by Rs 300, bringing it from Rs 5,650 to Rs 5,950 per quintal.
 - ▶ Mustard is a significant oilseed crop, and the higher MSP aims to boost cultivation and ensure better returns for farmers, especially in states like Rajasthan, Haryana, and Madhya Pradesh.
- **Chana MSP Increase:** The MSP for chana (a key pulse crop) has been raised by Rs 210, setting the new rate at Rs 5,650 per quintal.
 - ▶ This increase aims to promote chana production, which is vital for protein intake in the Indian diet, benefiting farmers in states like Madhya Pradesh and Maharashtra.

About Minimum Support Prices (MSP)

- MSP is a government-set price at which it purchases certain crops from farmers, ensuring them a minimum profit for their harvest.
- The MSP aims to safeguard farmers against price fluctuations in the market and encourage them to cultivate certain crops deemed essential for food security.
- **Crops under MSP:** CACP recommends MSPs of 23 commodities, which comprise
 - ▶ **7 cereals** (paddy, wheat, maize, sorghum, pearl millet, barley and ragi)
 - ▶ **5 pulses** (gram, tur, moong, urad, lentil)
 - ▶ **7 oilseeds** (groundnut, rapeseed-mustard, soyabean, seasmum, sunflower, safflower, nigerseed)
 - ▶ **4 commercial crops** (copra, sugarcane, cotton and raw jute)
- **Types of Crops:** India's agriculture is broadly divided into two seasons: Kharif and Rabi.
 - ▶ **Kharif Crops:** These are sown in the monsoon season (June to September) and harvested in autumn. Examples include paddy, ragi, bajra, jowar, maize, and cotton.

- ▶ **Rabi Crops:** These are sown in winter (October to March) and harvested in spring. Examples include wheat, barley, gram, and mustard.

FIXED DEPOSITS

CONTEXT

The Reserve Bank of India (RBI) recently announced that it will keep the repo rate unchanged for the tenth consecutive time, which is a significant indicator in the **CONTEXT** of India's monetary policy. This decision is interpreted as a sign that the RBI may be nearing the peak of its interest rate cycle, which directly affects the returns on various financial instruments, including fixed deposits (FDs).

What Are Fixed Deposits?

- Fixed deposits are a type of investment offered by banks and financial institutions where an individual deposits a lump sum amount for a fixed tenure at a predetermined interest rate.
- They are considered one of the **safest investment options** due to their fixed returns and are popular among conservative investors.

Key Features of Fixed Deposits:

- ▶ **Safety:** FDs are low-risk investments, often insured up to a certain limit by the Deposit Insurance and Credit Guarantee Corporation (DICGC).
- ▶ **Fixed Returns:** The interest rate is agreed upon at the time of deposit and remains constant throughout the tenure.
- ▶ **Tenure Flexibility:** Investors can choose tenures ranging from a few months to several years.
- ▶ **Liquidity:** While FDs are generally less liquid than savings accounts, premature withdrawal is possible, though it may incur penalties.
- ▶ **Taxation:** Interest earned on FDs is subject to tax as per the investor's income tax slab.



FACT BOX

Important Financial Instruments

- **Equities (Stocks)** are shares of publicly listed companies that represent ownership in the company. Investors can buy and sell these shares on stock exchanges like the **Bombay Stock Exchange (BSE) and National Stock Exchange (NSE)**.
 - ▶ **Risk Level:** High risk, as stock prices can be highly volatile.
 - ▶ **Investment Horizon:** Long-term, as equities generally yield higher returns over extended periods.
- **Mutual Funds** are investment vehicles that pool money from multiple investors to invest in a diversified portfolio of stocks, bonds, or other securities. Managed by professional fund managers.

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- ▶ **Risk Level:** Varies by type (equity, debt, hybrid), but typically moderate.
- ▶ **Investment Horizon:** Short to long-term, depending on the fund's objective.
- **Public Provident Fund (PPF)** is a government-backed savings scheme offering tax benefits and a fixed interest rate. The investment is locked in for 15 years, with partial withdrawals allowed after a certain period.
 - ▶ **Risk Level:** Low risk, as it is backed by the government.
 - ▶ **Investment Horizon:** 15 years, with the possibility of extension.
- **National Pension System (NPS)** is a retirement savings scheme that allows individuals to invest in a pension fund managed by professional fund managers. It includes various investment options, including equity and fixed income.
 - ▶ **Risk Level:** Varies based on the chosen asset allocation.
 - ▶ **Investment Horizon:** Long-term, until retirement.
- **Fixed Deposit (FD)** is savings account offered by banks where money is deposited for a fixed tenure at a predetermined interest rate. FDs provide guaranteed returns.
 - ▶ **Risk Level:** Low risk, as they are insured up to a certain limit by the Deposit Insurance and Credit Guarantee Corporation (DICGC).
 - ▶ **Investment Horizon:** Short to long-term, typically from 7 days to 10 years.
- **Recurring Deposit (RD)** is savings scheme where individuals deposit a fixed amount monthly for a specified tenure. It encourages regular saving habits.
 - ▶ **Risk Level:** Low risk, similar to fixed deposits.
 - ▶ **Investment Horizon:** Varies based on the chosen tenure, typically from 6 months to 10 years.
- **Bonds:** Debt securities issued by corporations, municipalities, or the government to raise funds. Investors receive periodic interest payments and the principal amount at maturity.
 - ▶ **Risk Level:** Generally lower than stocks, but depends on the issuer's creditworthiness.
 - ▶ **Investment Horizon:** Medium to long-term, depending on the bond's maturity.
- **Exchange-Traded Funds (ETFs):** Investment funds that track a specific index and trade on stock exchanges like individual stocks. They offer diversification and lower expense ratios compared to mutual funds.
 - ▶ **Risk Level:** Varies based on underlying assets; generally moderate.
 - ▶ **Investment Horizon:** Short to long-term.

WAYANAD'S NEW X-BAND RADAR

CONTEXT

Following severe floods and landslides in Kerala's Wayanad district, the **Union Ministry of Earth Sciences** has approved the installation of an **X-band radar** in the region. This **advanced radar technology** aims to enhance monitoring and forecasting capabilities, thereby improving disaster preparedness.

What is a Radar?

- Radar stands for "**Radio Detection and Ranging.**" It is a technology that utilizes radio waves to detect the distance, speed, and physical characteristics of objects in its vicinity.
- **How It Works:**
 - ▶ A **transmitter** emits radio signals towards an object (e.g., clouds in meteorology).
 - ▶ The signal reflects off the object and returns to the radar device.
 - ▶ A **receiver** then analyzes the echoed signal to extract information about the object's properties.
- **Applications:** Weather radar, also known as a **Doppler radar**, is a common application of this device. The Doppler effect is the change in frequency of sound waves as their source moves towards and away from a listener. In meteorology, Doppler radars can reveal how fast a cloud is moving and in which direction based on how the cloud's relative motion changes the frequency of the radiation striking it.
- **Pulse-Doppler Radar** A pulse-Doppler radar can measure the intensity of, say, rainfall by emitting radiation in pulses and tracking how often they're reflected to the receiver.

What is an X-Band Radar?

- Doppler radar relies on **Rayleigh scattering**, when the scatterer is much smaller than the wavelength of the radiation.
- A radar trying to 'see' smaller particles like rain droplets or fog will need to use radiation of lower wavelengths, like in the X-band.
- An X-band radar is radar that emits radiation in the X-band of the electromagnetic spectrum: **8-12 GHz**, corresponding to wavelengths of around 2-4 cm (this is in the microwave part of the spectrum.)
- The smaller wavelengths allow the radar to produce images of higher resolution. However, the greater the frequency of some radiation, the faster it will be attenuated. So X-band radars have a relatively shorter range.
- **Functionality in Wayanad:** In Wayanad, the X-band radar is expected to monitor particle movements, particularly soil, to provide early warnings for landslides. Its ability for high temporal sampling allows for rapid monitoring, crucial in detecting changes over short time frames.

Current Radar Infrastructure in India

- **Historical Context:** The India Meteorological Department (IMD) began utilizing radar technology in the 1950s, with the first indigenous X-band radar installed in 1970.
- **Current Capabilities:** India operates a network of X-band radars for storm detection and wind-finding, complemented by S-band radars for long-range observations.
- **Future Expansion:** As of September 2024, plans are in place to add 56 additional Doppler radars under the 'Mission Mausam' initiative, which aims to enhance meteorological infrastructure with an investment of ₹2,000 crore.
- **NISAR:** NISAR (NASA-ISRO Synthetic Aperture Radar) is a joint project between NASA and ISRO, set to produce high-resolution Earth maps using radar imaging. The satellite is slated for launch in 2025, with total costs estimated at \$1.5 billion, largely funded by NASA.
 - ▶ **Technical Composition:**
 - ◆ **L-band Radar:** Built by NASA (1.25 GHz, 24 cm).
 - ◆ **S-band Radar:** Developed by ISRO (3.2 GHz, 9.3 cm).

TERMINAL HIGH ALTITUDE AREA DEFENSE (THAAD)

CONTEXT

The United States is reportedly sending its advanced anti-missile system, the **Terminal High Altitude Area Defense (THAAD)**, to Israel, along with US troops to operate it. **What is THAAD?**

- THAAD is a **US-developed missile defense system** designed to intercept incoming ballistic missiles at high altitudes.
- It can neutralize **short-, medium-, and limited intermediate-range missile threats**, making it a versatile part of missile defense.
- THAAD can cover a wide area, engaging targets at distances between 150-200 kilometers (93-124 miles).
- It complements other defense systems, like the **Patriot system**, which Israel recently retired.
- Each THAAD battery typically includes six truck-mounted launchers, interceptors, radar, and requires 95 soldiers to operate.
- The THAAD system adds another layer of protection, reinforcing Israel's air defense capabilities.
- The U.S. Army currently operates seven THAAD batteries.
- Each battery comprises six truck-mounted launchers, 48 interceptors, radar equipment, and requires 95 personnel to operate.
- This system is a critical part of the U.S. military's missile defense strategy, especially in volatile regions where the threat of ballistic missile attacks is high.

DRAGON DRONES IN THE RUSSIA-UKRAINE WAR

CONTEXT

In the ongoing conflict between Russia and Ukraine, a new and deadly weapon has emerged: the "dragon drone." This innovative use of drone technology has captured global attention due to its capability to deploy thermite, a highly incendiary substance, causing significant destruction on the battlefield.

What Are Dragon Drones?

- Dragon drones are **unmanned aerial vehicles (UAVs)** specifically modified to carry and release **thermite**.
 - ▶ Thermite is a mixture of aluminum and iron oxide known for its extreme heat.
 - ▶ When ignited, thermite burns at a temperature of approximately 2,427 degrees Celsius, capable of melting through various materials, including military-grade vehicles and other structures.
- These drones have been employed by both Ukrainian and Russian forces.

The Mechanics of Thermite

- ▶ **Chemical Properties:** Thermite is notable for its self-sustaining reaction once ignited, making it incredibly difficult to extinguish.
 - ◆ Its burning properties allow it to cause severe damage to not just equipment, but also human targets, resulting in potentially fatal burns and injuries.
- ▶ **Historical Use:** Thermite has a long history of military application, dating back to **World War I**, where German zeppelins used thermite bombs. By **World War II**, both the Allies and Axis powers extensively employed thermite in their bombing campaigns, dropping millions of thermite bombs to incinerate enemy targets.
 - ◆ In modern warfare, its ability to burn intensely without an explosive blast has made it a tool for covert operations.
- **International Law:** While the use of thermite in warfare is **not outright banned by international law**, its application raises significant ethical concerns.
 - ▶ The **Convention on Certain Conventional Weapons (CCW)** prohibits the use of incendiary weapons against civilian targets, reflecting the dangers these weapons pose.
 - ◆ **Protocol III of the CCW** limits the use of thermite to strictly military targets due to its indiscriminate nature and potential for causing severe burns and respiratory injuries.

INNOVATIONS FOR DEFENCE EXCELLENCE (IDEX) SCHEME

CONTEXT

The **Ministry of Defence** is seeking to expand the scope of its flagship Innovations for Defence Excellence (iDEX) scheme and has sought additional funds from the Finance Ministry to keep it going.

About iDEX

- The **iDEX (Innovations For Defence Excellence)** is a well-conceived scheme of the **Ministry's Department of Defence**.
- The iDEX initiative was launched in April 2018.
- It aims to achieve **self-reliance and foster innovation and technology development** in defence and aerospace by engaging industries including **MSMEs, start-ups, individual innovators, R&D institutes and academia**.
- **ADITI Scheme:** Earlier this year, the Defence Minister launched another initiative — the Acing Development of Innovative Technologies with iDEX (ADITI) scheme — to promote innovations in critical and strategic defence technologies under which start-ups are eligible to receive grant-in-aid of up to Rs 25 crore for their research, development and innovation endeavours in defence technology.
 - ▶ The ADITI scheme worth Rs 750 crore for the period 2023-24 to 2025-26 falls under the iDEX framework and aims to develop about 30 deep-tech critical and strategic technologies in a proposed timeframe.

SPACE BASED SURVEILLANCE (SBS) MISSION

CONTEXT

The Cabinet Committee on Security (CCS) has approved phase III of its Space Based Surveillance (SBS) mission for better land and maritime domain awareness for civilian and military applications. The project is being handled by the National Security Council Secretariat along with the Defence Space Agency under the integrated headquarters in the Defence Ministry.

About the Mission

- **SBS 1** was initiated by the Vajpayee government in 2001, and involved the launch of four satellites for surveillance, **Cartosat 2A, Cartosat 2B, Eros B and Risat 2**.
- **SBS 2** came in 2013 with the launch of six satellites, **Cartosat 2C, Cartosat 2D, Cartosat 3A, Cartosat 3B, Microsat 1 and Risat 2A**.
- **SBS 3:** The newly cleared SBS 3 shows that India will be launching 52 satellites in low earth orbit and geostationary orbit for surveillance within the next decade.
 - ▶ Costing Rs 26,968 crore, the proposal involves the construction and launch of 21 satellites by ISRO and the remaining 31 by private companies.

- ▶ The three services will have dedicated satellites for their land, sea or air-based missions.

AI CENTRES OF EXCELLENCE

CONTEXT

The Indian government has announced the establishment of three Centres of Excellence (CoE) in artificial intelligence (AI) focused on healthcare, agriculture, and sustainable cities, aimed at enhancing India's position in the global AI landscape.

What Are the Centres of Excellence?

- These CoEs will develop AI solutions to improve various sectors, create jobs, and stimulate economic growth.

Leadership:

- ▶ **Healthcare:** Led by the All India Institute of Medical Sciences (AIIMS) and IIT Delhi.
- ▶ **Agriculture:** Led by IIT Ropar in Punjab.
- ▶ **Sustainable Cities:** Led by IIT Kanpur.

Goals:

- ▶ **Innovation:** The CoEs aim to foster multidisciplinary research and collaboration among industries, start-ups, and educational institutions.
- ▶ **Economic Impact:** They are expected to boost the start-up ecosystem, generate new jobs, and create wealth.
- ▶ **Global Contribution:** The government hopes these centres will play a significant role in global public policy and provide solutions to worldwide challenges.

COASTAL TREE RESILIENCE TO CLIMATE CHANGE

CONTEXT

Recent research has challenged the assumption that rising sea levels and increased flooding negatively impact coastal tree species, revealing that some trees may actually thrive under these conditions.

Impact of coastal flooding

- Coastal flooding is a **sudden and abrupt inundation of a coastal environment** caused by a **short-term increase in water level** due to a storm surge and extreme tides.
- Coastal flooding is generally a natural process and constitutes an important part of the natural coastal dynamics, especially for salt marshes and mangrove forests.
- **Resilience Variation:** The study indicates that the impact of climate change on coastal trees varies by species.

- ▶ For example, **American holly** grows better with more water, while loblolly and pitch pines struggle with rising water levels.
- **Research Method:** Researchers used dendrochronology, a technique that analyzes tree rings to assess growth patterns in relation to environmental changes. They combined this with a machine-learning method called gradient-boosted linear regression to understand complex interactions among climate factors.

IMPACT OF CLIMATE CHANGE ON THE ANTARCTIC PENINSULA

CONTEXT

Recent research has revealed a significant increase in plant cover across the **Antarctic Peninsula**, indicating a dramatic transformation driven by rising temperatures. This study, published in the journal **Nature Geoscience**, highlights how climate change is affecting even the most remote regions of our planet.

Key Findings of the Study

- **Vegetation Growth:** The study found that the extent of vegetation, primarily consisting of mosses and lichens, has increased **14 times** over the past 35 years.
 - ▶ In **1986**, vegetation covered less than **1 square kilometer** of the Antarctic Peninsula, while by **2021**, it had expanded to nearly **12 square kilometers**.
- **Rate of Greening:** The rate of greening has accelerated, with an increase of over **30%** between **2016 and 2021**.
- **Warming Trends:** The Antarctic Peninsula is warming **five times** faster than the global average, with temperatures nearly **3 degrees Celsius** higher than in **1950**.
 - ▶ A **2023** study indicated that Antarctica is warming at a rate of **0.22 to 0.32 degrees Celsius** per decade.

Implications of Increased Vegetation

- **Positive Effects:** The colonization of bare rock by mosses may enhance soil formation by adding organic matter, potentially improving soil quality.
- **Concerns**
 - ▶ **Invasive Species:** Increased plant life could attract non-native species, posing a threat to indigenous flora and fauna. These species might be introduced by eco-tourists or researchers.
 - ▶ **Albedo Effect:** A darker surface due to vegetation absorbs more solar radiation, reducing the Antarctic Peninsula's ability to reflect sunlight. This could further increase ground temperatures, contributing to a feedback loop of warming.
- Environmental Changes in Antarctica
 - ▶ **Ice Loss:** Antarctica has lost **280% more ice mass** in the **2000s and 2010s** compared to the **1980s and 1990s**. This loss contributes to rising global sea levels.
 - ▶ **Record Heatwaves:** The continent has experienced unprecedented heatwaves, with temperatures in some areas reaching **39 degrees Celsius** above normal.





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