

explore

MONTHLY CURRENT AFFAIRS

JULY
2026



POLITY &
GOVERNANCE



ECONOMY &
DEVELOPMENT



ENVIRONMENT &
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INTERNATIONAL
RELATIONS



SOCIETY &
SOCIAL ISSUES



SCIENCE &
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MUST READ!

- Right to Walk on Footpaths as a Fundamental Right
- Ashtalakshmi Growth Model
- India-Myanmar Relations
- Graduate Unemployment in India
- 8th Central Pay Commission
- The Power of Mangroves Over Seawalls
- India Calls for Dialogue on Climate Finance
- Nipah Virus in Kerala
- India's Evolving Space Architecture
- Rise of Non-Communicable Diseases (NCDs) in India

SPECIAL COLUMNS



TELANGANA

Telangana's Rural Women
Entrepreneurship Incubation
Programme



ANDHRA PRADESH

Andhra Pradesh Leads India
in Oil Palm Cultivation
Expansion

PREFACE

Welcome to our monthly current affairs magazine! We are thrilled to provide you with the latest information and updates on the most important events that happened in our country and around the world in the month of January 2026. Our magazine is designed to help you prepare for competitive examinations like UPSC and other State PSC Exams, and we hope that you will find it informative, engaging, and useful.

In this magazine, you will find a wide range of topics covering current affairs, including politics, economics, sports, science and technology, and many more. Our team of writers and editors work hard to bring you the most accurate and up-to-date information, so you can stay informed and prepared for any competitive exam. We understand that preparing for competitive exams can be a daunting task, but we are here to make it easier for you. Our magazine is designed to be easy to read and understand, with clear and concise articles that will help you stay on top of the latest news and events.

We believe that knowledge is power, and we are committed to helping you achieve your goals. Whether you are preparing for a government job, entrance exam, or any other competitive exam, our magazine will provide you with the information and insights you need to succeed.

Thank you for choosing our magazine, and we hope that you find it helpful and informative.

ACKNOWLEDGMENTS

We extend our heartfelt gratitude and appreciation to the exceptional team of content developers who have played a pivotal role in shaping our UPSC Current Affairs Magazine. Your unwavering dedication, extensive research, and commitment to delivering high-quality content have been instrumental in making this publication a trusted resource for our readers.

Your relentless pursuit of current affairs, profound understanding of complex issues, and the ability to distil them into informative, concise, and engaging articles have set a benchmark in the field of competitive examination preparation.

We are proud to have a team that goes above and beyond, ensuring that our readers are well-informed and well-prepared for the UPSC examinations. Your exceptional contributions are the driving force behind our magazine's success.

Thank you for your hard work, expertise, and passion for delivering top-notch content. Your efforts have not only enriched our magazine but have also played a significant role in the educational journey of countless aspiring civil servants.

We look forward to continuing this remarkable journey of knowledge dissemination with your continued support and excellence.

With deep appreciation,

EKAM IAS ACADEMY

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POLITY AND GOVERNANCE

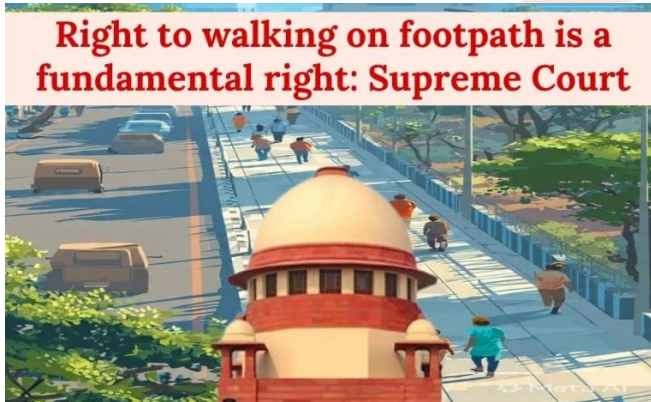
RIGHTS ISSUES

RIGHT TO WALK ON FOOTPATHS AS A FUNDAMENTAL RIGHT

SOURCE: THE HINDU

Why in News?

The Supreme Court, in **Maniyar Iliyas @ Shaik Riyaz vs. P. Ayyappan (2026)**, held that the **Right to Walk on Safe and Demarcated Footpaths** is an essential part of the **Fundamental Right to Life under Article 21**.



Need for Recognising this Right

- Rapid **urbanisation and increasing motorisation** have reduced the space available for pedestrians, making walking unsafe in many cities.
- Encroachments by **parked vehicles, street vendors, construction materials and garbage** force pedestrians onto roads, increasing the risk of accidents.
- Children, **senior citizens, women and Persons with Disabilities (PwDs)** are the worst affected due to the absence of safe pedestrian infrastructure.
- Recognising this right promotes **inclusive, safe and sustainable urban development**.

Supreme Court's Key Observations

Walking is a Fundamental Right

- The Court held that the **Right to Walk Safely** forms part of the **Right to Life and Personal Liberty under Article 21**, as safe mobility is essential for a dignified life.

Pedestrians Deserve Priority

- The Court observed that roads are meant for both **pedestrians and vehicles**, and therefore urban planning should prioritise the safety of the most vulnerable road users.

Footpaths are Public Assets

- Footpaths are meant exclusively for pedestrian movement, and illegal encroachments on them violate the constitutional rights of citizens.

Human-Centric Urban Planning

- The Court emphasised that city planning should encourage **walking, cycling and public transport** instead of focusing only on private vehicles.

Constitutional Provisions

Article 21 – Right to Life

- The Court held that the **Right to Life** includes the right to move safely and with dignity in public spaces, making safe footpaths a constitutional necessity.

Article 14 – Right to Equality

- Public infrastructure must provide **equal access** to all citizens and should not disproportionately favour motor vehicle users.

Article 19(1)(d) – Freedom of Movement

- Safe pedestrian infrastructure enables citizens to exercise their **constitutional freedom of movement** effectively.

Article 39(b) – Directive Principles

- Public roads and footpaths are **community resources** that should be managed for the benefit of all citizens rather than a particular group.

Major Issues

- Most Indian cities suffer from **poorly designed or discontinuous footpaths**, making pedestrian movement unsafe.
- Illegal encroachments and **unauthorised parking** have significantly reduced the usability of existing footpaths.
- Weak coordination among **municipal authorities, urban planners and traffic police** delays effective implementation.
- Existing laws primarily focus on **motor vehicles** and do not adequately recognise pedestrian rights.

Supreme Court's Directions

- The Court recommended that **Parliament and State Legislatures enact a dedicated law** to protect pedestrian rights.
- It suggested establishing a **special regulatory authority** to oversee pedestrian infrastructure and ensure accountability.
- Municipal authorities were directed to **remove encroachments** and maintain safe, accessible footpaths.
- The Court recognised that violation of the **Right to Walk** can entitle citizens to seek constitutional and legal remedies.

Significance of the Judgment

- The judgment expands the scope of **Article 21** by recognising safe walking as a **Fundamental Right**.
- It promotes **inclusive urban planning** by giving equal importance to pedestrians, cyclists and public transport users.
- Improved pedestrian infrastructure can reduce **road accidents** and enhance public safety.
- The judgment supports **sustainable mobility**, helping reduce pollution and dependence on private vehicles.
- It strengthens the accountability of **municipal bodies and urban development authorities** in protecting public infrastructure.

Way Forward

- Enact a **National Pedestrian Rights Law** to provide statutory protection for safe pedestrian movement.
- Adopt the **Complete Streets** approach to ensure equal priority for pedestrians, cyclists and public transport.
- Conduct regular **pedestrian safety audits** and remove illegal encroachments through strict enforcement.
- Develop **barrier-free footpaths** to improve accessibility for **Persons with Disabilities (PwDs)** and senior citizens.
- Strengthen public awareness and improve coordination among **municipal bodies, traffic police and urban planning agencies**.

Conclusion

The Supreme Court's judgment recognises that **safe walking is a constitutional right rather than a civic privilege**, making pedestrian-friendly infrastructure an essential requirement for **inclusive, safe and sustainable urban development**

ECONOMICALLY WEAKER SECTIONS (EWS) QUOTA – UPSC INVESTIGATION

SOURCE: THE INDIAN EXPRESS

Why in News?

An investigation by **The Indian Express** into the **UPSC Civil Services Examination (CSE) 2025** raised concerns that some candidates selected under the **Economically Weaker Sections (EWS)** quota appeared to have socio-economic backgrounds inconsistent with the scheme's intended beneficiaries.

What is the EWS Quota?

The **Economically Weaker Sections (EWS)** reservation was introduced through the **103rd Constitutional Amendment Act, 2019** to provide **10% reservation in education and public employment** for economically disadvantaged persons belonging to the **unreserved (General) category**.

ARE YOU ELIGIBLE FOR EWS RESERVATION?

	01 FAMILY INCOME Less than Rs.8 lakh per annum	
	02 AGRICULTURAL LAND Less than 5 acres	
	03 RESIDENTIAL FLAT Less than 1000 sq.ft	
	04 RESIDENTIAL PLOT Less than 100/200 sq.yards	

 EWS (Economically Weaker Sections) reservation aims to **promote equality and provide opportunities** for those in need.

Need for the EWS Quota

- It provides reservation benefits to **economically weaker persons** belonging to the General category who were previously outside the reservation framework.
- It promotes **equal access** to higher education and public employment irrespective of economic hardship.
- It supports **social mobility** by creating opportunities for deserving candidates from low-income families.
- It strengthens the principle of **inclusive development** by recognising economic disadvantage as an important factor in access to opportunities.

Issues Highlighted by the Investigation

- The investigation suggested that **some EWS candidates belonged to financially well-supported families**, raising concerns about the effectiveness of existing eligibility norms.
- The **₹8 lakh annual income ceiling** is considered by many experts to be relatively high, allowing economically better-off families to qualify.
- Heavy dependence on **self-declarations and limited verification** may lead to inaccurate issuance of EWS certificates.
- Candidates with access to **expensive coaching, quality private education and substantial financial support** may enjoy a competitive advantage over genuinely poor applicants.
- Weak integration of **income, property and asset databases** makes comprehensive verification difficult.

Significance of the Debate

- The issue highlights the need to ensure that **reservation benefits reach genuinely deserving beneficiaries**.
- It strengthens the demand for **greater transparency and accountability** in issuing EWS certificates.
- The debate encourages periodic review of **income and asset criteria** in line with changing economic conditions.
- It reinforces the importance of balancing **social justice with merit and fairness** in public recruitment.

Challenges

1. Verifying the **actual income and assets** of applicants remains difficult due to fragmented government databases.
2. Differences in **cost of living and income levels** across States make a uniform eligibility criterion challenging.
3. Excessively broad eligibility criteria may reduce the effectiveness of the policy in targeting the poorest sections.
4. Strengthening verification mechanisms without creating unnecessary delays remains an administrative challenge.

Way Forward

- The Government should **periodically review the income and asset limits** to ensure that EWS benefits reach the most economically disadvantaged families.

- Revenue authorities should strengthen **field verification and digital verification systems** before issuing EWS certificates.
- Integration of **Income Tax, property, land and other government databases** can improve transparency and reduce misuse.
- Regular audits of EWS certificates should be conducted to identify irregularities and strengthen public confidence.
- Awareness programmes should educate citizens about the **eligibility conditions and legal consequences of false declarations**.

Important Constitutional Provisions

- **Article 14** – Equality before Law
- **Article 15(6)** – Reservation in educational institutions for EWS
- **Article 16(6)** – Reservation in public employment for EWS
- **103rd Constitutional Amendment Act, 2019** – Introduced EWS reservation

Important Supreme Court Judgment

1. **Janhit Abhiyan v. Union of India (2022)**: The Supreme Court, by a **3:2 majority**, upheld the constitutional validity of the **103rd Constitutional Amendment**, affirming that **10% EWS reservation** does not violate the **Basic Structure** of the Constitution.

Conclusion

The EWS reservation is an important step towards achieving economic justice, but its long-term credibility depends on transparent eligibility criteria, robust verification mechanisms and ensuring that the benefits reach the truly economically disadvantaged sections of society.

JUDICIARY

THE JUDICIARY'S ROLE IN COMPLETE JUSTICE

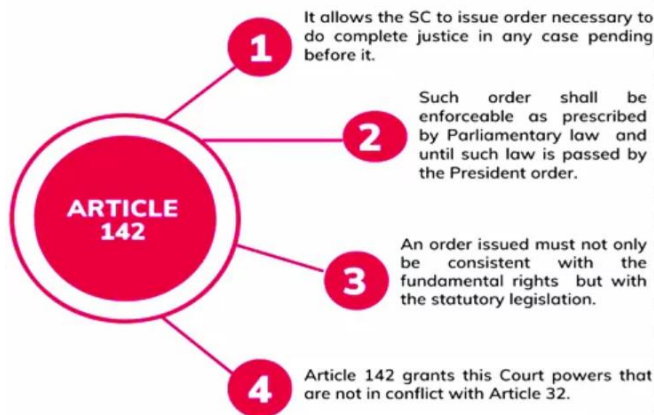
SOURCE: THE HINDU

Why in News?

The **Supreme Court**, while taking **suo motu cognisance** of two fatal road accidents, held that the **Right to Safe Travel on National Highways** forms part of the **Fundamental Right to Life under Article 21**.

What is Complete Justice?

1. **Complete Justice** refers to the extraordinary constitutional power of the **Supreme Court** to pass any order necessary to ensure justice in matters before it.
2. It enables the Court to provide effective remedies when **existing laws, procedures or statutory provisions fail to protect constitutional rights**.
3. This power is unique to the **Supreme Court** and acts as a safeguard against injustice arising from legal or procedural gaps.



Constitutional Provisions

Article 142 – Power to Do Complete Justice

- **Article 142** empowers the Supreme Court to pass any decree or order necessary for doing **complete justice** in any case pending before it.
- This power is exercised only in **exceptional situations** where ordinary legal remedies are insufficient.

Article 21 – Right to Life and Personal Liberty

- The Court has expanded **Article 21** to include several rights necessary for living with dignity, including the **Right to Safe Travel on National Highways**.

Article 141 – Law Declared by the Supreme Court

- Any law declared by the **Supreme Court** becomes binding on all courts in India, ensuring uniform application of legal principles.

Article 226 – Powers of High Courts

- High Courts can enforce legal and fundamental rights through writs, but **they cannot exercise powers equivalent to Article 142**.

Role of the Judiciary in Delivering Complete Justice

Protecting Constitutional Rights

- The Supreme Court protects **Fundamental Rights** by granting appropriate relief when existing laws are inadequate or silent.

Filling Legislative Gaps

- The Court issues necessary directions in areas where legislation is absent, ensuring that justice is not delayed until new laws are enacted.

Providing Effective Remedies

- The Court may relax procedural limitations and issue innovative directions to secure **substantive justice** in exceptional cases.

Importance of Complete Justice

- It ensures that **justice is based on fairness rather than procedural technicalities**.
- It strengthens the protection of **Fundamental Rights**, particularly those guaranteed under **Article 21**.
- It enhances public confidence by ensuring timely and meaningful judicial remedies.
- It enables the judiciary to respond effectively to emerging social, environmental and governance challenges.

Challenges

- Frequent use of **Article 142** may invite criticism of **judicial overreach**, as it can overlap with the functions of the Legislature or Executive.
- The Constitution does not prescribe detailed guidelines for exercising this extraordinary power, leaving considerable scope for judicial discretion.
- Many judicial directions require administrative capacity and financial resources, making effective implementation difficult in some cases.

Important Supreme Court Judgments

1. Delhi Judicial Service Association v. State of Gujarat (1991)

- The Court held that the powers under **Article 142** cannot be restricted by ordinary legislation.

2. Supreme Court Bar Association v. Union of India (1998)

- The Court clarified that **Article 142** cannot be used to ignore substantive statutory provisions while delivering justice.

3. Hitesh Bhatnagar v. Deepa Bhatnagar (2011)

- The Court observed that **Article 142** should be exercised **sparingly and with great caution**.

Way Forward

- The Supreme Court should continue exercising **Article 142** only in exceptional circumstances while respecting the **Separation of Powers**.

- Parliament should promptly enact laws to address legal gaps identified through important judicial decisions.
- Greater coordination among the **Judiciary, Legislature and Executive** is essential for effective implementation of judicial directions.
- Expert committees should assist the judiciary in technically complex matters such as infrastructure, environment and public safety.

Conclusion

The Supreme Court's power under Article 142 serves as a constitutional safeguard that ensures justice prevails where ordinary laws are inadequate, **while its balanced use strengthens both constitutional governance and the rule of law.**

FAST-TRACKING JUDICIAL JUDGMENTS AND BAIL DELIVERY

SOURCE: THE HINDU

Why in News?

The **Supreme Court**, exercising its powers under **Article 142**, recently issued guidelines directing **High Courts** to pronounce reserved judgments within a fixed time and ensure the speedy disposal of **bail applications**.

What is Fast-Tracking Judicial Judgments and Bail Delivery?

- It refers to measures adopted by the judiciary to ensure the **timely pronouncement of judgments** and **speedy disposal of bail applications**.
- The objective is to prevent unnecessary delays that affect **personal liberty, access to justice and judicial efficiency**.
- The initiative also promotes greater use of **digital technology, case monitoring and electronic communication** within the justice delivery system.

Supreme Court's Key Directions

Time Limit for Reserved Judgments

- High Courts should **endeavour to pronounce reserved judgments within three months** from the date on which the judgment is reserved.
- In urgent matters, where only the operative portion is pronounced initially, the detailed judgment should ordinarily be uploaded **within 15 days**.

Speedy Disposal of Bail Applications

- Bail applications should be heard and decided **as early as possible**, preferably on the same day or within **24 hours**, wherever circumstances permit.

- This ensures that an individual's liberty is not curtailed due to avoidable judicial delays.

Digital Communication of Orders

- Bail, acquittal and sentence suspension orders should be **immediately transmitted through electronic means** to prisons and trial courts.
- Digital communication reduces administrative delays and facilitates the prompt release of eligible persons.

Monitoring Mechanism

- High Court Registries should maintain records showing the dates of **reservation, pronouncement and uploading of judgments**.
- If judgments remain pending beyond the prescribed period, the matter should be placed before the **Chief Justice of the High Court** for appropriate action.

Important Constitutional Provisions

- **Article 21** – Right to Life and Personal Liberty
- **Article 39A** – Equal Justice and Free Legal Aid
- **Article 141** – Law Declared by the Supreme Court
- **Article 142** – Power of the Supreme Court to Do Complete Justice
- **Article 224A** – Appointment of Retired High Court Judges

Important Supreme Court Judgments

- **Hussainara Khatoon v. State of Bihar (1979):** Recognised the **Right to Speedy Trial** as part of **Article 21**.
- **Kadra Pahadiya v. State of Bihar (1981):** Reaffirmed that prolonged delay in trial violates **Fundamental Rights**.
- **Satender Kumar Antil v. CBI (2022):** Emphasised that **bail is the rule and jail is the exception**, while directing speedy disposal of bail matters.

Importance

- Timely judgments strengthen the **Rule of Law** and improve public confidence in the judiciary.
- Faster disposal of bail applications protects the **Fundamental Right to Personal Liberty** and prevents unnecessary detention.
- Digital transmission of judicial orders reduces procedural delays and improves coordination between **courts, prisons and police authorities**.
- Speedy justice reduces **case backlog**, improves judicial efficiency and enhances access to justice.

Challenges

- High Courts continue to face **significant vacancies of judges**, affecting the timely disposal of cases.
- A large and growing **pendency of cases** increases the workload on judges and delays judgment writing.
- Digital infrastructure remains inadequate in several **district courts and prisons**, limiting effective implementation.
- Timelines alone cannot resolve delays without adequate **judicial manpower and administrative reforms**.

Way Forward

- Fill judicial vacancies expeditiously through better coordination between the **Judiciary and the Executive**.
- Strengthen the **e-Courts Project** and the **Interoperable Criminal Justice System (ICJS)** to enable seamless digital communication among courts, police and prisons.
- Increase the appointment of **retired judges under Article 224A** and strengthen subordinate courts to reduce case pendency.
- Adopt **technology-driven case management systems** and encourage concise pleadings for quicker disposal of cases.
- Extend similar time-bound practices to **District and Subordinate Courts**, where the majority of litigation is pending.

Conclusion

Timely delivery of judgments and prompt disposal of bail applications are essential for protecting personal liberty and strengthening the Rule of Law, making judicial efficiency a cornerstone of a fair and accessible justice delivery system.

SUO MOTU COGNISANCE AND THE LIMITS OF JUDICIAL INTERVENTION

SOURCE: THE HINDU

Why in News?

The increasing use of **suo motu cognisance** by the **Supreme Court** in matters involving public importance has renewed the debate on **judicial activism, judicial overreach and the need to strengthen lower courts**.



What is Suo Motu Cognisance?

- **Suo motu** (Latin for "on its own motion") refers to the power of a court to initiate legal proceedings **without receiving a formal petition or complaint**.
- The **Supreme Court** and **High Courts** exercise this power in exceptional cases involving **public interest, violation of Fundamental Rights, constitutional issues or failure of public authorities**.

Constitutional Basis

- **Article 32 - Article 32** empowers the **Supreme Court** to protect and enforce **Fundamental Rights**, enabling it to intervene in cases involving serious constitutional violations.
- **Article 226 - High Courts** can issue writs for the enforcement of **Fundamental Rights and other legal rights**, allowing them to take suo motu action in appropriate cases.
- **Article 142 - Article 142** empowers the Supreme Court to pass any order necessary to ensure **complete justice**, including in matters taken up suo motu.
- **Article 141** - The law declared by the **Supreme Court** is binding on all courts in India, ensuring uniform application of legal principles.

Important Supreme Court Judgments

- **Vineet Narain v. Union of India (1998)**: Strengthened judicial supervision in cases involving public interest and institutional accountability.
- **Bandhua Mukti Morcha v. Union of India (1984)**: Expanded the scope of **Public Interest Litigation (PIL)** and judicial intervention for protecting the rights of disadvantaged groups.
- **In Re: Destruction of Public and Private Properties (2009)**: Demonstrated the Supreme Court's use of **suo motu powers** to safeguard public interest.

Need for Suo Motu Cognisance

- It enables the judiciary to act swiftly when **Fundamental Rights are violated** and affected persons cannot approach the courts.
- It provides relief in cases involving **human rights violations, environmental degradation, custodial violence, disasters and administrative failure**.
- It strengthens **constitutional governance** by ensuring that public authorities remain accountable.
- It helps protect the interests of **vulnerable and marginalised sections** who may lack access to legal remedies.

Importance of Suo Motu Powers

- Suo motu jurisdiction serves as an important safeguard against **executive inaction and abuse of power**.
- It strengthens **judicial review** and upholds the **Rule of Law** by ensuring constitutional compliance.
- The power has contributed significantly to the growth of **Public Interest Litigation (PIL)** and the protection of public interest.
- It allows the judiciary to respond quickly to issues having a **wide public impact**.

Concerns and Limitations

- Frequent suo motu intervention may create concerns regarding **judicial overreach**, particularly when courts enter areas primarily assigned to the **Legislature or Executive**.
- Excessive intervention in individual criminal cases may reduce the autonomy and confidence of **High Courts and subordinate courts**.
- Selection of cases based largely on **media attention** may create perceptions of unequal judicial priorities.
- Continuous monitoring by the Supreme Court cannot substitute long-term reforms such as **filling judicial vacancies, improving infrastructure and strengthening trial courts**.

Way Forward

- Suo motu powers should be exercised **only in exceptional situations** involving constitutional importance or clear failure of public authorities.
- The Supreme Court should strengthen **institutional capacity** by supporting reforms in **High Courts and subordinate courts** rather than routinely monitoring individual cases.

- Transparent and objective guidelines should be evolved for initiating **suo motu proceedings** to ensure consistency and judicial restraint.
- The Government should improve **judicial infrastructure, digital courts and judicial appointments** to reduce delays and improve access to justice.
- Greater coordination between the **Judiciary, Executive and Legislature** is essential to strengthen constitutional governance without disturbing the **Separation of Powers**.

Conclusion

Suo motu cognisance remains an important constitutional tool for protecting public interest and Fundamental Rights, but its exercise should be guided by judicial restraint, institutional balance and respect for the constitutional principle of Separation of Powers.

GOVERNANCE

ASHTALAKSHMI GROWTH MODEL

SOURCE: THE PIB

report "Ashtalakshmi – The North-East at the Heart of India's Growth Story", highlighting the socio-economic transformation of the **North-Eastern Region (NER)** over the last decade.



What is the Ashtalakshmi Growth Model?

- The **Ashtalakshmi Growth Model** is a comprehensive development strategy that seeks to unlock the potential of the **eight North-Eastern States—Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura**.
- Inspired by the **eight forms of Goddess Lakshmi**, the model promotes **inclusive development**,

improved connectivity, sustainable livelihoods, ecological conservation and strategic integration.

- It focuses on transforming the North-East into a **gateway for trade, tourism, investment and regional cooperation** with South-East Asia.

Major Pillars of the Growth Model

1. Infrastructure and Connectivity

- The Government has significantly expanded **road, railway, air and inland waterway connectivity** to reduce geographical isolation.
- Landmark projects such as the **Bogibeel Bridge, Dhola-Sadiya Bridge, Sela Tunnel** and new railway lines have improved connectivity and strengthened national integration.
- Under the **UDAN Scheme**, regional air connectivity has expanded, while the **Brahmaputra (NW-2)** and **Barak (NW-16)** waterways have enhanced inland transport.

2. Social Development

- Schemes such as **Jal Jeevan Mission, PMAY-G, Ayushman Bharat and BharatNet** have improved access to drinking water, housing, healthcare and digital services.
- Expansion of mobile networks and internet connectivity has strengthened **education, financial inclusion and e-governance**.

3. Agriculture and Rural Economy

- The region is being promoted as a hub for **organic farming** under **Mission Organic Value Chain Development for North Eastern Region (MOVCD-NER)**.
- Government support through **PM-KISAN**, fisheries development, bamboo cultivation, agarwood production and **Farmer Producer Organisations (FPOs)** has improved rural livelihoods.

4. Renewable Energy and Sustainable Growth

- Major **hydropower and renewable energy projects** are enhancing energy security while supporting sustainable development.
- Skill development programmes in **green energy and solar technologies** are creating new employment opportunities.

Significance of the Ashtalakshmi Growth Model

- It promotes **balanced regional development** by reducing economic disparities between the North-East and the rest of India.
- Improved connectivity strengthens **national security, border management and regional integration**.

- Promotion of **organic agriculture, eco-tourism and biodiversity conservation** supports environmentally sustainable development.
- Better infrastructure and digital connectivity attract **investment, industries and employment opportunities**.
- The model strengthens India's **Act East Policy** by improving connectivity and trade with **Myanmar and other South-East Asian countries**.

Challenges

- The **mountainous terrain, fragile ecology and frequent natural disasters** increase the cost and complexity of infrastructure development.
- Limited industrialisation and inadequate **value addition facilities** reduce the commercial potential of agricultural and forest products.
- High transportation costs and logistical constraints continue to affect investment and market access.
- Balancing rapid development with **environmental conservation and protection of indigenous communities** remains a major challenge.

Way Forward

- Complete strategic connectivity projects such as the **India-Myanmar-Thailand Trilateral Highway, Kaladan Multi-Modal Transit Transport Project** and **Jiribam-Imphal Railway Line**.
- Promote **food processing, bamboo industries, organic farming, eco-tourism and GI-based products** to increase farmers' incomes and local employment.
- Strengthen **digital infrastructure, renewable energy, skill development and entrepreneurship** to improve economic opportunities.
- Enhance coordination among the **Central Government, North Eastern Council (NEC)** and State Governments for faster project implementation.
- Ensure that future development follows the principles of **sustainability, disaster resilience and community participation**.

Important Government Initiatives

- PM-DevINE
- North Eastern Council (NEC)
- North East Special Infrastructure Development Scheme (NESIDS)
- Mission Organic Value Chain Development for North Eastern Region (MOVCD-NER)
- Act East Policy
- UDAN Scheme
- BharatNet
- PM-KUSUM

Important Strategic Projects

- Bogibeel Bridge
- Dhola-Sadiya Bridge (Bhupen Hazarika Setu)
- Sela Tunnel
- Dibang Multipurpose Hydropower Project
- Subansiri Lower Hydroelectric Project
- Kaladan Multi-Modal Transit Transport Project
- India-Myanmar-Thailand Trilateral Highway

Conclusion

The Ashtalakshmi Growth Model aims to transform the North-East into a hub of connectivity, sustainable development and strategic growth, making the region a vital pillar of India's economic progress, national integration and Act East vision.

PRELIMS POINTERS IN NEWS

PM-AJAY SCHEME

SOURCE: INDIAN EXPRESS

Why in News?

The **Ministry of Social Justice and Empowerment** recently launched the **PM-AJAY Portal** and **AJAY Mobile App** to digitise the implementation and monitoring of the scheme.

About PM-AJAY Scheme

- **PM-AJAY (Pradhan Mantri Anusuchit Jaati Abhyuday Yojana)** is a **Centrally Sponsored Scheme** launched in **2021-22** to promote the **economic and social development of Scheduled Castes (SCs)**.
- The scheme is implemented by the **Ministry of Social Justice and Empowerment**.



Key Features

Objectives

- Improve the socio-economic status of SCs.
- Generate sustainable livelihoods.
- Develop infrastructure in SC-majority villages.
- Enhance educational opportunities.
- Promote skill development and entrepreneurship.

Merged Schemes

PM-AJAY combines three earlier schemes:

- **Pradhan Mantri Adarsh Gram Yojana (PMAGY)**
- **Special Central Assistance to Scheduled Castes Sub Plan (SCA to SCSP)**
- **Babu Jagjivan Ram Chhatrawas Yojana (BJRCY)**

Eligibility

- **Scheduled Caste** individuals living below the poverty line are eligible for livelihood and skill development benefits.
- Villages with **50% or more SC population** are eligible for infrastructure assistance.

Major Components

- **Adarsh Gram Development** for model SC villages.
- **Grants-in-aid** for socio-economic development projects.
- Financial support for **income-generating assets** and self-employment.
- **Skill development** and entrepreneurship programmes.
- Construction of **hostels** in government institutions and educational establishments, including eligible institutions under **NIRF**.

Significance

- Promotes **social justice** and inclusive development.
- Reduces poverty among vulnerable SC households.
- Improves access to education and employment.
- Encourages entrepreneurship and self-reliance.
- Supports the vision of **Sabka Saath, Sabka Vikas**.

eSARAS PLATFORM

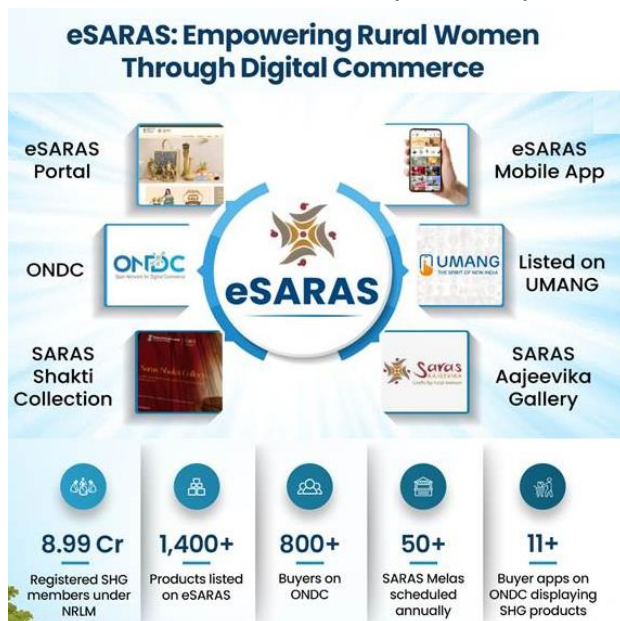
SOURCE: PIB

Why in News?

The **eSARAS Platform** has expanded significantly, enabling **over 8.62 crore women Self-Help Group (SHG) members** to access a digital marketplace for their products.

About eSARAS Platform

- eSARAS is the official **e-commerce platform** developed by the **Ministry of Rural Development** under the **Deendayal Antyodaya Yojana – National Rural Livelihoods Mission (DAY-NRLM)**.



Key Features

- Developed under **DAY-NRLM** by the **Ministry of Rural Development**.
- Functions as an exclusive digital marketplace for **Women SHGs** and producer collectives.
- Enables **direct producer-to-consumer (D2C)** sales, ensuring better income for rural artisans.
- Offers products across multiple categories such as:
 - Home & Living
 - Handicrafts
 - Handloom
 - Women's and Men's Apparel
 - Food Products
 - Personal Care
 - Toys and Accessories
- Integrated with the **Open Network for Digital Commerce (ONDC)** to expand market reach.
- Accessible through the **UMANG Platform**, making services available through a single digital interface.

- Introduced the premium "**SARAS Shakti Collection**" to cater to institutional buyers, corporate gifting, and government procurement.
- Provides secure payment systems, product cataloguing, branding support, and order tracking facilities.
- Encourages local artisans to adopt digital marketing and online business practices.

Significance

- Creates sustainable livelihood opportunities for **rural women entrepreneurs**.
- Reduces dependence on intermediaries, ensuring higher returns to producers.
- Promotes **financial inclusion** and digital literacy among SHG members.
- Encourages preservation of **traditional handicrafts**, handloom products, and indigenous skills.
- Supports the objectives of **Atmanirbhar Bharat**, **Make in India**, and **Vocal for Local**.
- Expands the national and international market for rural products through digital commerce.

PM-RAHAT SCHEME

SOURCE: PIB

Why in News?

The **facial identification requirement** for accident victims under the **PM-RAHAT Scheme** has been removed to ensure quicker access to emergency medical treatment.



About PM-RAHAT Scheme

- **PM-RAHAT (Road Accident Victim Hospitalization and Assured Treatment)** is a **Central Sector Scheme** implemented by the **Ministry of Road Transport and Highways (MoRTH)**.

Key Features

- Applicable to eligible road accident victims on **all categories of roads** across India.
- Provides **cashless treatment up to ₹1.5 lakh** for a maximum period of **7 days** from the date of the accident.
- Every eligible victim receives:
 - **Stabilization treatment up to 24 hours** in non-life-threatening cases.
 - **Up to 48 hours** in life-threatening situations.
- Integrated with:
 - **eDAR (Electronic Detailed Accident Report)** used by police.
 - **TMS 2.0 (Transaction Management System)** of the **National Health Authority (NHA)** for treatment and claim processing.
- Linked with **Emergency Response Support System (ERSS-112)** for ambulance services and identification of the nearest designated hospital.
- Maintains a complete **digital trail** from accident reporting to reimbursement.
- Reimbursement is made through the **Motor Vehicle Accident Fund (MVAf)**.
- In insured cases, payments are supported by contributions from insurance companies.
- In **uninsured** and **hit-and-run** cases, expenditure is borne by the **Government of India**.
- Grievances are addressed by a **District Grievance Redressal Officer** under the supervision of the **District Road Safety Committee**.

Significance

- Saves lives by ensuring **golden hour** medical treatment.
- Reduces financial burden on accident victims and families.
- Promotes universal access to emergency trauma care.
- Encourages **Good Samaritans** to assist accident victims without hesitation.
- Strengthens coordination among police, hospitals, and emergency services through digital integration.
- Supports India's goal of reducing road accident deaths.

ABHIGYAN APP

SOURCE: PIB

Why in News?

The **Union Home Minister** recently launched the **Abhigyan App** to strengthen technology-driven policing and improve access to criminal records for field police personnel.



About Abhigyan App

- **Abhigyan App** is a **centralized mobile application** developed by the **National Crime Records Bureau (NCRB)** under the **Ministry of Home Affairs (MHA)**.
- It enables police personnel to access **crime-related information** and conduct **real-time fingerprint identification** directly through smartphones.

Key Features

- Developed by the **National Crime Records Bureau (NCRB)**.
- Provides **field police officers** with instant access to a centralized repository of criminal records.
- Integrated with the **National Automated Fingerprint Identification System (NAFIS)**.
- Enables **real-time fingerprint authentication**, with fingerprint matching completed in nearly **35 seconds**.
- Equipped with **two-factor authentication**, ensuring secure access to sensitive criminal information.
- Supports **portable policing**, allowing officers to verify suspects directly at the crime scene.
- Facilitates quick identification of:
 - **Accused persons**
 - **Convicted offenders**
 - **Prison inmates**
- Reduces dependence on manual record verification, thereby improving investigation speed.
- Strengthens coordination among police agencies through a unified digital platform.

Significance

- Promotes **technology-driven policing** and evidence-based investigations.

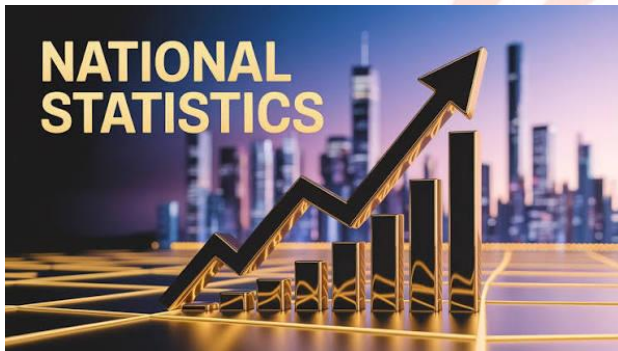
- Enables **faster identification** of repeat offenders and absconding criminals.
- Improves operational efficiency and reduces investigation time.
- Enhances **inter-state coordination** by providing access to a common criminal database.
- Supports the Government's vision of **Smart Policing** and **Digital India**.
- Increases transparency, accountability, and accuracy in criminal investigations.

NATIONAL STATISTICAL COMMISSION (NSC)

SOURCE: INDIAN EXPRESS

Why in News?

The **Government of India** recently appointed a new **Chairperson** and **three Members** to the **National Statistical Commission (NSC)**.



About National Statistical Commission

- The **National Statistical Commission (NSC)** is the apex advisory body responsible for strengthening India's **official statistical system**.
- It was established in **2005** based on the recommendations of the **Rangarajan Commission (2000)**.

The Commission promotes **uniform statistical standards**, improves coordination among statistical

- agencies, and enhances the credibility of official data used for policymaking.
- It plays a crucial role in ensuring that statistical information remains **accurate, transparent, reliable, and internationally comparable**.

Composition

- **Part-time Chairperson**
- **Four Part-time Members** with expertise in statistics, economics, social sciences, or related disciplines.
- **Chief Executive Officer (CEO), NITI Aayog** serves as an **ex-officio Member**.
- The **Chief Statistician of India (CSI)** acts as the **Secretary** of the Commission and is also the **Secretary of the Ministry of Statistics and Programme Implementation (MoSPI)**.

Key Functions

- Serves as the **nodal advisory body** for core statistical activities in the country.
- Identifies **Core Statistics** that are essential for economic planning and governance.
- Recommends **national statistical policies, priorities, and long-term strategies**.
- Develops **standard definitions, classifications, concepts, and methodologies** to ensure consistency across datasets.
- Prescribes **quality standards** for official statistics.
- Promotes coordination among the **Central Government, State Governments**, and various statistical agencies.
- Constitutes **expert committees** and technical working groups to address specialized statistical issues.
- Recommends mechanisms for **collection, processing, analysis, and dissemination** of statistical data.
- Encourages adoption of **international best practices** in official statistics.
- Supports evidence-based policymaking by improving data reliability.

PREVENTIVE DETENTION

SOURCE: THE HINDU

Why in News?

The **Allahabad High Court** recently issued important guidelines after finding that **preventive detention provisions under the Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023** had been misused, leading to the illegal detention of several individuals.

STATE POWER VS. LIBERTY: PREVENTIVE DETENTION IN INDIA

Tension between national security and individual rights in detention without trial



What is Preventive Detention?

- **Preventive detention** refers to the detention of a person **without trial** to prevent the commission of a future offence or maintain **public order and security**.
- Unlike **punitive detention**, it is **preventive in nature** and is not based on proving guilt for an offence already committed.

Constitutional and Legal Provisions

Article 21 – Right to Life and Personal Liberty

- **Article 21** guarantees that no person shall be deprived of personal liberty except according to the **procedure established by law**.
- The Court reiterated that **liberty is the rule, while detention must remain the exception**.

Article 22 – Protection against Arrest and Detention

- **Article 22** provides safeguards against arbitrary arrest and also lays down specific provisions relating to **preventive detention**.
- It requires communication of detention grounds and provides for review by an **Advisory Board**, subject to constitutional exceptions.

Articles 14 and 15

- **Article 14** guarantees equality before law, while **Article 15** prohibits discrimination on specified grounds.
- Arbitrary detention disproportionately affects **economically and socially vulnerable sections**, thereby undermining constitutional equality.

BNSS, 2023

- The **Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023** replaced the **Code of Criminal Procedure (CrPC), 1973**.
- Preventive action is now governed under the **BNSS**, with the objective of preventing an imminent breach of peace rather than imposing punishment.

Allahabad High Court's Key Observations

- Preventive detention **cannot be used as a routine policing tool** or as a means of harassment.

- Authorities should ordinarily release individuals on a **personal bond** instead of insisting on expensive sureties.
- A person cannot be detained beyond **24 hours** without being produced before a competent Magistrate, except as permitted by law.
- Any refusal to execute a bond should be **properly documented**, ensuring transparency and accountability.
- Public authorities must exercise preventive powers **fairly, reasonably and strictly within constitutional limits**.

Significance of the Judgment

Strengthens Personal Liberty

- The judgment reinforces that **individual liberty is a Fundamental Right** and cannot be curtailed through arbitrary executive action.

Ensures Administrative Accountability

- It places greater responsibility on **police officers and Executive Magistrates** for unlawful detention and misuse of legal powers.

Protects Vulnerable Sections

- The decision safeguards the rights of **Dalits, Persons with Disabilities (PwDs), economically weaker sections and other vulnerable groups**, who are often more susceptible to arbitrary detention.

Promotes Rule of Law

- It ensures that preventive detention remains a **constitutional safeguard** rather than becoming an instrument of administrative oppression.

Challenges

- Preventive detention laws are sometimes misused due to **wide discretionary powers** available to executive authorities.
- Lack of awareness among detainees regarding their legal rights often results in prolonged illegal detention.
- Weak institutional accountability and delayed departmental action reduce the effectiveness of constitutional safeguards.
- Balancing **individual liberty** with the need to maintain **public order and national security** remains a continuing challenge.

Way Forward

- Police officers and Executive Magistrates should receive **regular training** on constitutional safeguards and the proper use of preventive detention provisions.

- Governments should strengthen **judicial oversight** to prevent arbitrary detention and ensure timely legal review.
- Technology such as **digital records and audio-visual documentation** should be used to improve transparency during preventive proceedings.
- Strict disciplinary action should be taken against officials found guilty of abusing preventive detention powers.
- Public awareness regarding **constitutional rights and legal remedies** should be enhanced to prevent misuse of executive authority.

Difference between Preventive and Punitive Detention

Preventive Detention	Punitive Detention
Detention to prevent a future offence.	Detention after conviction or for an offence already committed.
Based on reasonable apprehension of threat.	Based on proof of guilt through judicial process.
Does not require prior conviction.	Requires trial and conviction under law.
Objective is prevention of harm.	Objective is punishment for an offence.

Conclusion

Preventive detention is an exceptional constitutional power intended to protect public order, but its exercise must always remain consistent with the principles of **liberty, fairness and the Rule of Law to preserve citizens' fundamental rights.**

INTERNATIONAL RELATIONS

INDIA ITS NEIGHBOURHOOD

INDIA-MYANMAR RELATIONS

SOURCE: THE HINDU

Why in News?

India recently hosted **Senior General Min Aung Hlaing**, Chairman of Myanmar's State Administration Council, highlighting New Delhi's continued engagement with Myanmar despite the ongoing political situation.



Evolution of India-Myanmar Relations

Historical Background

- India and Myanmar established diplomatic relations in **1948**, soon after Myanmar gained independence.
- The two countries share **deep civilizational, cultural and Buddhist linkages**, along with strong people-to-people contacts.
- Myanmar occupies a central place in India's **Neighbourhood First Policy**, **Act East Policy** and **Indo-Pacific Vision**.

Strategic Importance

- Myanmar is the **only ASEAN country** sharing both **land and maritime boundaries** with India.
- It shares a **1,643 km-long international border** with **Arunachal Pradesh, Nagaland, Manipur and Mizoram**, making it vital for India's security and regional connectivity.

Major Pillars of India-Myanmar Relations

1. Strategic and Geopolitical Cooperation

- Myanmar acts as **India's gateway to Southeast Asia**, strengthening India's engagement with **ASEAN**.
- A stable Myanmar is essential for the success of India's **Act East Policy** and **Indo-Pacific strategy**.
- Strong bilateral relations help India balance **China's growing strategic presence** in Myanmar and the Bay of Bengal.

2. Security and Border Management

- Both countries cooperate to tackle **cross-border insurgency, terrorism, arms smuggling and narcotics trafficking**.
- Joint military operations and intelligence sharing have helped curb the activities of insurgent groups operating along the border.
- India has also strengthened border management by reviewing the **Free Movement Regime (FMR)** and enhancing border infrastructure.

3. Connectivity and Infrastructure

- The **Kaladan Multi-Modal Transit Transport Project** provides an alternative route connecting **Kolkata Port** to **Mizoram** through Myanmar, reducing dependence on the **Siliguri Corridor**.
- The **India-Myanmar-Thailand Trilateral Highway** aims to improve road connectivity between India and Southeast Asia, boosting trade and tourism.
- India is also supporting the development of **Sittwe Port**, which enhances maritime connectivity in the Bay of Bengal.

4. Economic and Development Cooperation

- India and Myanmar cooperate in **trade, energy, agriculture, healthcare, pharmaceuticals and capacity building**.
- Myanmar possesses significant reserves of **natural gas, rare earth minerals and other critical minerals**, creating opportunities for long-term economic cooperation.
- India has also extended **development assistance, humanitarian aid and capacity-building programmes** in Myanmar.

5. Cultural and People-to-People Relations

- **Buddhism** forms an important cultural link between the two countries.

- India regularly supports **heritage conservation, educational exchanges, scholarships and cultural cooperation**.
- Pilgrimage tourism to **Bodh Gaya** and other Buddhist sites strengthens bilateral cultural relations.

Challenges in Bilateral Relations

- The **political instability** in Myanmar following the **2021 military takeover** has affected connectivity projects and economic cooperation.
- The presence of **insurgent groups** and transnational criminal networks along the border continues to pose security challenges.
- **Drug trafficking** from the **Golden Triangle** and illegal arms smuggling remain major concerns.
- Suspension of the **Free Movement Regime (FMR)** has generated concerns among border communities with long-standing ethnic and cultural ties.
- Increasing **Chinese investments** under the **China-Myanmar Economic Corridor (CMEC)** have intensified strategic competition in the region.

Significance for India

- Myanmar is crucial for ensuring **peace and stability in India's North-Eastern Region**.
- It strengthens India's **connectivity with ASEAN**, promoting trade, investment and regional integration.
- Cooperation with Myanmar enhances **maritime security** in the **Bay of Bengal** and supports a **free, open and inclusive Indo-Pacific**.
- Strong relations also improve India's access to **critical minerals, energy resources and emerging markets**.

Way Forward

- India should continue a **balanced and pragmatic engagement** with Myanmar while supporting peace, stability and inclusive political dialogue.
- The Government should expedite the completion of the **Kaladan Project** and the **India-Myanmar-Thailand Trilateral Highway**.
- Both countries should strengthen cooperation in **border security, intelligence sharing and counter-insurgency operations**.
- Greater investment should be made in **healthcare, education, digital connectivity, skill development and humanitarian assistance** to strengthen people-centric cooperation.

- Border management measures should balance **national security** with the cultural and livelihood interests of **border communities**.

Conclusion

India-Myanmar relations are central to India's security, connectivity and Act East Policy, and sustained pragmatic engagement will be essential to promote regional stability, economic integration and strategic balance in the Indo-Pacific.

INDIA-NEPAL BOUNDARY DISPUTES

SOURCE: THE HINDU

Why in News?

Nepal's newly elected **Prime Minister Balendra Shah (Balen)** has called for an **objective and dialogue-based approach** to resolve the long-pending **Kalapani, Lipulekh and Limpiyadhura** boundary dispute with India.



Background of the Boundary Dispute

Treaty of Sugauli (1816)

- The **Treaty of Sugauli**, signed between the **East India Company** and the **Kingdom of Nepal**, defined the **Kali (Mahakali) River** as the western boundary of Nepal.
- However, the treaty did not clearly identify the **exact source of the Kali River**, giving rise to different territorial interpretations.

Conflicting Territorial Claims

- **Nepal** claims that the **Kali River originates at Limpiyadhura**, placing **Kalapani, Lipulekh and Limpiyadhura** within Nepalese territory.
- **India** maintains that the river originates near **Kalapani**, and therefore the disputed areas fall within **Uttarakhand**.

- India has exercised **administrative control** over the area since **1947**, considering it strategically important.

Strategic Importance of the Disputed Area

Security Significance

- The disputed region lies near the **India–Nepal–China tri-junction**, making it strategically important for India's border security.
- The area provides surveillance over the **India–China frontier**, particularly after the 1962 India–China War.

Lipulekh Pass

- Lipulekh Pass** is an important trade route connecting India with **Tibet (China)**.
- It also serves as one of the main routes for the **Kailash Mansarovar Yatra**, giving it both strategic and religious significance.

Regional Connectivity

- The region is important for improving border infrastructure, disaster response and connectivity in the Himalayan region.

Major Issues in India–Nepal Relations

Different Interpretation of Historical Records

- Both countries rely on different historical maps and documents to support their territorial claims.
- Variations in colonial-era surveys have complicated the boundary settlement process.

Strategic Concerns

- India considers the disputed region critical for safeguarding its northern borders and maintaining strategic stability.
- Any alteration in the existing status has significant national security implications.

Political Sensitivities

- Border disputes often become subjects of **domestic political debate** in Nepal, affecting bilateral relations.
- Nationalist sentiments sometimes delay constructive diplomatic engagement.

Delay in Boundary Resolution

- Although the **India–Nepal Joint Technical Level Boundary Committee** resolved most boundary issues, the **Kalapani and Susta sectors** remain unresolved.

Importance of India–Nepal Relations

Neighbourhood First Policy

- Nepal is a key partner under India's **Neighbourhood First Policy** and plays an important role in regional stability.

Economic Cooperation

- India is Nepal's **largest trading partner** and a major source of investment, development assistance and petroleum supplies.
- Both countries cooperate in **hydropower, connectivity, digital payments and cross-border infrastructure**.

People-to-People Relations

- The **India–Nepal Friendship Treaty, 1950** allows free movement of people, residence, employment and business activities.
- Deep cultural, religious and family ties strengthen bilateral relations.

Regional Security

- Close cooperation helps combat **cross-border crime, illegal migration, smuggling and disaster management challenges**.

Way Forward

- Both countries should resolve the dispute through **peaceful bilateral dialogue** while respecting each other's sovereignty and security concerns.
- Historical records, modern surveys and technical expertise should be jointly examined to arrive at a mutually acceptable solution.
- Existing institutional mechanisms such as the **Joint Boundary Working Group** should be strengthened to expedite negotiations.
- Greater cooperation in **connectivity, hydropower, trade, tourism and digital infrastructure** should continue irrespective of the boundary dispute.

Conclusion

India and Nepal share a unique civilizational partnership, and resolving the boundary dispute through sustained dialogue, mutual trust and respect for each other's legitimate interests will strengthen regional stability and deepen bilateral cooperation

INDIA RELATIONS WITH OTHER NATIONS

INDIA–OMAN COMPREHENSIVE ECONOMIC PARTNERSHIP AGREEMENT (CEPA)

SOURCE: NDTV

Why in News?

The **India–Oman Comprehensive Economic Partnership Agreement (CEPA)** has officially entered into force, marking a new phase in bilateral economic cooperation.



What is the India–Oman CEPA?

- The **India–Oman CEPA** is a **comprehensive bilateral trade agreement** that seeks to deepen cooperation in **trade in goods, trade in services, investment, digital trade and economic partnerships**.
- Unlike a traditional **Free Trade Agreement (FTA)**, the CEPA also covers **professional mobility, regulatory cooperation, investment facilitation and trade-related standards**.
- Oman becomes the **second Gulf Cooperation Council (GCC) country**, after the **United Arab Emirates (UAE)**, to conclude a comprehensive trade agreement with India.

Major Features of the CEPA

1. Trade in Goods

- Oman has provided **duty-free market access** to a large share of Indian exports, significantly improving the competitiveness of Indian products.
- Sensitive sectors such as **dairy, edible oils, cereals and certain agricultural products** have been protected through exclusion lists and safeguard measures.

2. Trade in Services

- The agreement provides improved market access in **over 120 service sectors**, including **Information Technology (IT), healthcare, education, engineering and financial services**.
- It facilitates greater participation of Indian service providers in the Omani market.

3. Professional Mobility

- The CEPA simplifies visa procedures and improves mobility for **professionals, business visitors and intra-company transferees**.
- It creates new opportunities for **Indian doctors, engineers, teachers, architects and IT professionals**.

4. Regulatory Cooperation

- The agreement promotes **mutual recognition of quality standards and certification systems**, reducing technical barriers to trade.
- Faster approval mechanisms for **pharmaceutical products** are expected to improve market access for Indian medicines.

Significance for India

Boost to Bilateral Trade

- The agreement is expected to increase bilateral trade by reducing tariffs and improving market access for Indian exports.
- Key beneficiary sectors include **textiles, gems and jewellery, engineering goods, pharmaceuticals, food products and chemicals**.

Energy Security

- Oman remains an important supplier of **crude oil, Liquefied Natural Gas (LNG), fertilizers and petrochemical products**.
- Stronger economic ties contribute to India's long-term **energy security**.

Gateway to the Gulf and Africa

- Oman's strategic ports such as **Duqm, Sohar and Salalah** provide Indian companies with better access to **Gulf Cooperation Council (GCC) markets and the East African region**.
- The agreement supports India's efforts to diversify export destinations.

Strengthening Strategic Partnership

- The CEPA deepens India's engagement with an important maritime partner in the **Western Indian Ocean Region**.
- It complements India's **Link West Policy, Vision MAHASAGAR and Indo-Pacific strategy**.

Challenges

- Oman's relatively **small domestic market** limits the overall expansion of merchandise exports.
- Indian exporters will face strong competition from established suppliers in **Europe, China and other Gulf countries**.
- Differences in regulatory standards and certification procedures may continue to affect market access in certain sectors.

- The absence of a comprehensive **Social Security Agreement (SSA)** may increase compliance costs for Indian professionals working in Oman.

Way Forward

- Ensure the timely implementation of CEPA provisions through regular **Joint Committee meetings** and institutional cooperation.
- Encourage Indian industries, especially **MSMEs**, to utilise the duty-free opportunities created under the agreement.
- Expedite negotiations on a **Social Security Agreement** to benefit Indian workers and professionals.
- Promote investment in **logistics, renewable energy, digital economy, food processing and manufacturing** through Oman's Special Economic Zones.
- Use Oman as a strategic hub to expand India's trade with the **GCC, West Asia and Africa**.

Difference between FTA and CEPA

Free Trade Agreement (FTA)	Comprehensive Economic Partnership Agreement (CEPA)
Primarily focuses on trade in goods.	Covers goods, services, investment, digital trade and regulatory cooperation.
Limited scope of economic integration.	Provides deeper and broader economic partnership.
Mainly reduces tariffs.	Includes tariff reduction, services, professional mobility and investment facilitation.

Conclusion

The India–Oman CEPA marks a major milestone in India's economic diplomacy by strengthening trade, investment and strategic cooperation, while enhancing India's connectivity with the Gulf region and supporting its vision of becoming a global manufacturing and export hub.

GLOBAL ISSUES

AN OCEAN OF OPPORTUNITY IN THE INDIAN OCEAN REGION (IOR)

SOURCE: DD NEWS

Why in News?

During his **State Visit to Seychelles**, the **Prime Minister of India** and the President of Seychelles jointly unveiled a roadmap to transform the **Indian Ocean Region (IOR)** into an **"Ocean of Opportunity"** through deeper cooperation in security, connectivity, trade and the **Blue Economy**.

What is the Ocean of Opportunity?

- The **Ocean of Opportunity** is India's vision for promoting **inclusive, secure and sustainable development** in the **Indian Ocean Region (IOR)**.
- It seeks to strengthen cooperation in **maritime security, the Blue Economy, digital connectivity, climate resilience and capacity building** through partnerships based on **mutual respect and sovereign equality**.
- The initiative gives special importance to **Small Island Developing States (SIDS)** such as **Seychelles, Mauritius, Maldives and Sri Lanka**, recognising their strategic and economic significance.



Major Areas of Cooperation

1. Maritime Security

- India is enhancing **defence cooperation, joint naval exercises, coastal surveillance and maritime domain awareness** with partner countries.
- Assistance in the form of **patrol vessels, defence equipment and capacity building** strengthens the ability of island nations to protect their maritime interests.

2. Blue Economy

- The initiative promotes the sustainable use of **marine resources** for economic growth while ensuring environmental conservation.
- Cooperation includes **sustainable fisheries, marine tourism, ocean research, renewable ocean energy and coastal resource management**.

3. Digital and Development Partnership

- India is expanding its **Digital Public Infrastructure (DPI)** by promoting technologies such as the **Unified Payments Interface (UPI)** and digital governance solutions.

- Financial assistance, infrastructure projects, healthcare support and skill development further strengthen bilateral partnerships.

4. Climate Resilience

- India supports island nations in addressing **climate change, rising sea levels and natural disasters** through technology transfer, disaster-resilient infrastructure and renewable energy initiatives.
- Cooperation through the **Coalition for Disaster Resilient Infrastructure (CDRI)** enhances regional resilience.

Significance of the Indian Ocean Region

- The **Indian Ocean Region** is one of the world's most important maritime regions, carrying a major share of **global trade, energy supplies and container traffic**.
- The region connects **Asia, Africa and Europe**, making it vital for international commerce and strategic stability.
- It contains important **Sea Lines of Communication (SLOCs)** and strategic chokepoints such as the **Strait of Malacca, Strait of Hormuz and Bab-el-Mandeb**.
- A peaceful and secure Indian Ocean is essential for **India's trade, energy security and national security**.

Importance for India

- It strengthens India's role as a **net security provider** in the Indian Ocean Region.
- It supports the objectives of **MAHASAGAR (Mutual and Holistic Advancement for Security and Growth Across Regions)** and complements the **Act East Policy** and **Neighbourhood First Policy**.
- Stronger ties with island nations enhance India's strategic presence and promote **rules-based maritime governance**.
- The initiative also expands economic cooperation through **trade, tourism, digital payments, healthcare and capacity building**.

Challenges

- Piracy, maritime terrorism, illegal trafficking and Illegal, Unreported and Unregulated (IUU) fishing** continue to threaten regional security.
- Climate change, rising sea levels and extreme weather events** pose serious challenges to Small Island Developing States.
- Growing geopolitical competition among major powers has increased strategic tensions in the Indian Ocean.

- Weak maritime infrastructure and limited financial resources affect the ability of many island nations to safeguard their maritime interests.

Way Forward

- Strengthen **Maritime Domain Awareness (MDA)** through greater information sharing, satellite surveillance and joint naval patrols.
- Expand cooperation in the **Blue Economy**, including sustainable fisheries, marine biotechnology and coastal tourism.
- Accelerate the implementation of **Digital Public Infrastructure**, including **UPI**, digital governance and financial inclusion initiatives.
- Enhance climate resilience through **CDRI**, renewable energy projects and disaster management cooperation.
- Deepen partnerships with **Indian Ocean Rim Association (IORA)** members and other regional institutions to promote a **free, open, secure and inclusive Indian Ocean**.

Major Indian Ocean Initiatives

- MAHASAGAR** (Mutual and Holistic Advancement for Security and Growth Across Regions)
- SAGAR** (Security and Growth for All in the Region)
- Act East Policy**
- Neighbourhood First Policy**
- Indo-Pacific Oceans Initiative (IPOI)**
- Project Mausam**

Important Regional Organisations

- Indian Ocean Rim Association (IORA)**
- Indian Ocean Naval Symposium (IONS)**
- Coalition for Disaster Resilient Infrastructure (CDRI)**
- Indian Ocean Commission (IOC)**

Conclusion

India's vision of an "Ocean of Opportunity" seeks to transform the Indian Ocean Region into a secure, prosperous and sustainable maritime space, strengthening regional cooperation while advancing India's role as a responsible maritime partner in the Global South.

PRELIMS POINTERS IN NEWS

BRICS INDORE DECLARATION

SOURCE: THE HINDU

Why in News?

The **BRICS Agriculture Ministers' Meeting** held in **Indore, Madhya Pradesh**, concluded with the unanimous adoption of the **BRICS Indore Declaration**.



About BRICS Indore Declaration

- The **BRICS Indore Declaration** is a **farmer-centric multilateral charter** adopted by the **BRICS member countries** during the **2026 Agriculture Ministers' Meeting** held in **Indore**.
- It provides a common framework to strengthen cooperation in **agriculture, food systems, innovation, and sustainable rural development**.

Aim

- To strengthen **food and nutritional security**.
- To improve **farmer welfare and livelihoods**.
- To promote **climate-resilient and sustainable agriculture**.
- To enhance **agricultural trade** among BRICS countries.
- To encourage **digital transformation** in agriculture.

Key Priorities

1. Food and Nutritional Security

- Ensure adequate availability of safe and nutritious food.
- Improve resilience of food supply chains.
- Promote sustainable food production systems.

2. Agricultural Trade and Cooperation

- Facilitate greater trade in agricultural commodities.
- Remove barriers affecting agricultural cooperation.
- Encourage investment in agri-value chains.

3. Climate-Resilient Agriculture

- Promote **regenerative, natural, and organic farming**.
- Encourage efficient use of water and natural resources.

- Develop adaptation strategies against climate change.

4. Innovation and Technology

- Strengthen digital agriculture through **Artificial Intelligence (AI), Geospatial Technologies, and Digital Public Infrastructure (DPI)**.
- Promote research, knowledge exchange, and capacity building.

Significance

- Strengthens cooperation among **Global South** countries.
- Enhances **food security** amid climate uncertainties.
- Promotes **sustainable agriculture** and natural farming.
- Encourages innovation-driven agricultural growth.
- Supports achievement of **Sustainable Development Goal (SDG) 2 – Zero Hunger**.
- Improves farmers' income through technology and international cooperation.

BHARAT INNOVATES 2026

SOURCE: PIB

Why in News?

Prime Minister Narendra Modi and French President Emmanuel Macron jointly inaugurated **Bharat Innovates 2026** in Nice, France.



About Bharat Innovates 2026

- **Bharat Innovates 2026** is a global innovation platform designed to showcase India's rapidly growing **deep-tech ecosystem** before international

investors, industries, research organizations, universities, and policymakers.

- The initiative promotes **technology-driven entrepreneurship**, international partnerships, and commercialization of research-based innovations.

Organizing Agency

- **Ministry of Education**
- Strategic guidance from the **Office of the Principal Scientific Adviser (PSA)**.

Objectives

- Showcase India's **deep-tech startups** globally.
- Promote international research collaboration.
- Connect innovators with global investors.
- Encourage commercialization of indigenous technologies.
- Strengthen India-France scientific cooperation.

Eligibility

Student-Faculty Teams

- Teams from **Higher Education Institutions (HEIs)** and **Centrally Funded Technical Institutions (CFTIs)**.

Innovator Teams

- Researchers and innovators associated with recognized innovation ecosystems.

Startups

- Legally registered in India.
- **More than 51% Indian ownership**.

Key Features

Global Innovation Platform

- Brings together **120 Deep-Tech Startups**, **15+ Institutes of Excellence**, **350+ Global Investors** and **Venture Capitalists**

Incubator & Innovation Bridge

- Supports Incubation, Mentorship, Research commercialization and Cross-border startup immersion

Industry Innovation Bridge

- Facilitates Proof of Concept (PoC), Technology Transfer, Intellectual Property (IP) licensing and Global market access

MUSCAT PLAN OF ACTION

SOURCE: UNAOC

Why in News?

The **UN Secretary-General** recently highlighted the **Muscat Plan of Action**, stating that **hate speech** often acts as an early warning sign of violence and can accelerate the commission of atrocity crimes.



About Muscat Plan of Action

- The **Muscat Plan of Action** is a **global policy framework** that seeks to prevent **hate speech**, **genocide**, and other **atrocity crimes** by actively involving **traditional, Indigenous, and religious leaders** in peacebuilding.

Background

- Developed through a **multi-stakeholder consultation process** involving governments, international organizations, civil society, and peacebuilding networks.
- Led by:
 - **Sultanate of Oman**
 - **United Nations Office on Genocide Prevention and the Responsibility to Protect (UNOSAPG)**
 - **Network for Religious and Traditional Peacemakers**
- Co-hosted by the **United Nations Alliance of Civilizations (UNAOC)**.

Objectives

- Prevent **hate speech** before it escalates into violence.
- Strengthen the role of **traditional and Indigenous leaders** in peacebuilding.
- Promote **social cohesion**, **religious tolerance**, and **intercultural dialogue**.
- Prevent **genocide**, **ethnic violence**, and other atrocity crimes.
- Encourage community-led conflict prevention and reconciliation.

Key Features

- Places **traditional, Indigenous, and religious leaders** at the centre of conflict prevention.

- Encourages **early identification** of hate speech and inflammatory narratives.
- Promotes **interfaith** and **intercultural dialogue**.
- Supports **community-based mediation** and peaceful dispute resolution.
- Strengthens cooperation between governments, civil society, and local communities.
- Protects **human dignity, minority rights, and cultural diversity**.
- Encourages education and awareness to counter misinformation and extremism.
- Recommends stronger institutional mechanisms for preventing identity-based violence.

BLUE VALLEY CLUSTER INITIATIVE

SOURCE: INDIAN EXPRESS

Why in News?

The **Government of Assam** and the **European Union (EU)** recently launched the **Blue Valley Cluster Initiative** to strengthen cooperation in bioeconomy and sustainable industrial development.



About Blue Valley Cluster Initiative

- The **Blue Valley Cluster Initiative** is a collaborative programme launched jointly by the **Government of Assam** and the **European Union (EU)**.

Aim

- Promote cooperation in **bioeconomy** sectors.

- Attract international investment into Northeast India.
- Strengthen research, innovation, and industrial partnerships.
- Develop sustainable and biodiversity-based value chains.
- Increase employment and entrepreneurship opportunities.

Key Features

- Joint initiative of the **Government of Assam** and the **European Union**.
- Focuses on sectors such as **Natural Flavours, Fragrances, AYUSH** and Bio-based products
- Aligns with the **EU-India Comprehensive Strategic Agenda (2026)**.
- Supports the broader **EU Blue Valleys Initiative**.
- Connects Industries, Universities, Research institutions, Startups, Entrepreneurs and Local communities
- Encourages technology transfer, innovation, and sustainable manufacturing.
- Promotes biodiversity conservation alongside economic development.
- Facilitates international market access for products developed in Northeast India.

Significance

- Positions **Assam** as a major hub for the **bioeconomy**.
- Promotes sustainable utilization of biodiversity resources.
- Generates employment through value-added industries.
- Encourages innovation in traditional medicinal plants and natural products.
- Strengthens **India-EU economic cooperation**.
- Supports regional development in the **North Eastern Region (NER)**.

What is Bioeconomy?

- A **bioeconomy** refers to an economic system that utilizes **renewable biological resources** such as plants, animals, microorganisms, and biomass to produce food, medicines, chemicals, energy, and industrial products sustainably.

Related Indian Initiatives

- **National Bio-Energy Programme**
- **National Biotechnology Development Strategy**
- **BioE3 Policy (Biotechnology for Economy, Environment and Employment)**
- **National AYUSH Mission**

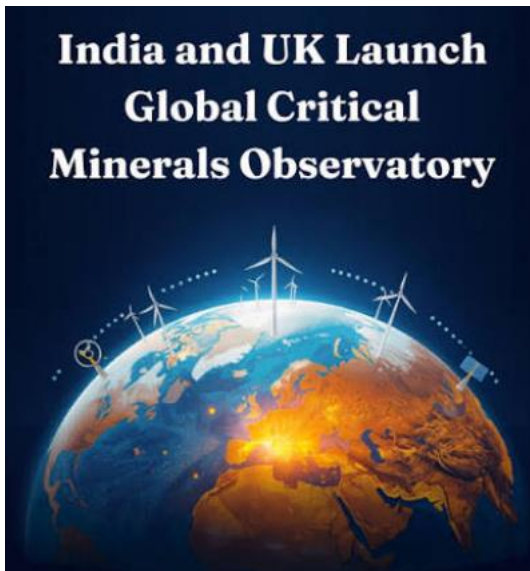
- National Medicinal Plants Board (NMPB)

CRITICAL MINERALS GLOBAL SUPPLY CHAIN OBSERVATORY (GSCO)

SOURCE: THE HINDU

Why in News?

India and the **United Kingdom (UK)** recently launched the **Critical Minerals Global Supply Chain Observatory (GSCO)** to strengthen cooperation in securing critical mineral supply chains.



About Critical Minerals Global Supply Chain Observatory (GSCO)

- The **Critical Minerals Global Supply Chain Observatory (GSCO)** is a **joint India–UK initiative** established to monitor, analyse, and assess **global critical mineral supply chains** using advanced data analytics.

Key Features

- **Joint Initiative of:**
 - **TEXMiN Foundation**
 - **Indian Institute of Technology (ISM), Dhanbad**
 - **University of Cambridge (United Kingdom)**

- Announced during the **India–UK Prime Ministers' bilateral meeting (October 2025)**.
- Formalized through a **Research Collaboration Agreement** signed in **March 2026**.
- Establishes a **data-driven platform** for monitoring global critical mineral supply chains.
- Tracks:
 - **Supply disruptions**
 - **Market trends**
 - **Price fluctuations**
 - **Geopolitical risks**
 - **Trade patterns**
- Provides **market intelligence** to governments, industries, investors, and researchers.
- Supports **early warning systems** for supply-chain vulnerabilities.
- Facilitates evidence-based policy formulation and strategic planning.
- Complements the **India–UK Technology Security Initiative**, which promotes cooperation in:
 - **Critical Minerals**
 - **Semiconductors**
 - **Artificial Intelligence (AI)**
 - **Telecommunications**
 - **Other emerging technologies.**

Significance

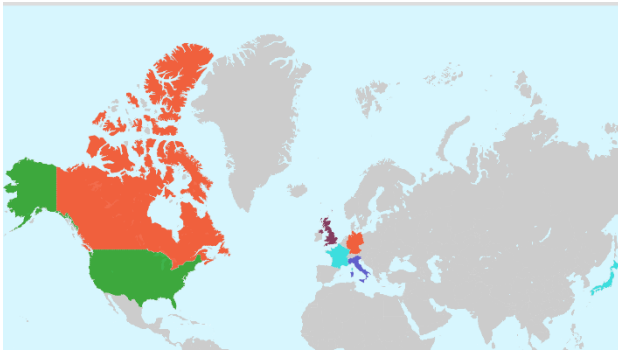
- Enhances **India's strategic mineral security**.
- Reduces dependence on a limited number of global suppliers.
- Strengthens supply-chain resilience for clean energy technologies.
- Supports India's transition towards **Net Zero emissions**.
- Promotes international cooperation in emerging technologies.
- Improves investment planning and industrial competitiveness.
- Assists policymakers with reliable and real-time data for informed decision-making.

52nd G7 SUMMIT (2026)

SOURCE: INDIAN EXPRESS

Why in News?

The **Prime Minister of India** participated in the **52nd G7 Summit** held in **Évian, France**, at the invitation of **French President Emmanuel Macron**.



About the G7 Summit

What is the G7?

- The **Group of Seven (G7)** is an **informal forum** comprising the world's leading **advanced industrialized democracies** that discusses major global economic, political and security issues.
- The Summit is held **annually** under the presidency of a rotating member country to strengthen international cooperation on common global challenges.

Members of G7

- **Canada**
- **France**
- **Germany**
- **Italy**
- **Japan**
- **United Kingdom**
- **United States**
- **European Union (EU)** participates as a non-enumerated member.

Evolution of the G7

Historical Background

- The group was established in **1975** as the **G6** following the global oil crisis to improve coordination among major industrial economies.
- **Canada** joined in **1976**, transforming it into the **G7**.
- **Russia** became a member in **1998**, creating the **G8**, but its membership was suspended in **2014** following the **Crimea crisis**, after which the forum reverted to the **G7**.
- Today, the G7 continues as an important platform for coordinating responses to global economic and geopolitical issues.

Major Objectives of the G7

1. Global Economic Cooperation

The G7 promotes **economic stability, sustainable growth, financial cooperation and resilient global supply chains**

- It discusses issues relating to inflation, energy security, trade and international financial governance.

2. International Peace and Security

- The forum coordinates responses to **global conflicts, terrorism, maritime security and emerging geopolitical challenges**.
- It supports a **rules-based international order** founded on international law.

3. Technology and Innovation

- The G7 promotes cooperation in **Artificial Intelligence (AI), digital governance, cybersecurity, quantum technologies and critical technologies**.
- It encourages the responsible and ethical use of emerging technologies.

4. Climate Change and Sustainable Development

- The forum supports **clean energy transition, climate finance, biodiversity conservation and sustainable development**.
- It also promotes global efforts to achieve the **Sustainable Development Goals (SDGs)**.

India's Participation and Significance

- India has emerged as a **regular invitee**, reflecting its growing importance in the global economy and international affairs.
- Participation enables India to present the concerns of the **Global South** on issues such as climate finance, food security, energy security and development.
- It strengthens India's cooperation with advanced economies in **technology, trade, clean energy, digital public infrastructure and innovation**.
- The Summit also provides an opportunity to deepen bilateral relations with G7 member countries through high-level meetings.

Challenges Facing the G7

- The G7 represents only a **small share of the world's population**, leading to concerns regarding its representativeness.
- Differences among member countries on trade, climate policies and geopolitical issues sometimes affect consensus-building.
- Emerging economies increasingly expect **greater inclusiveness and reform of global governance institutions**.
- Rising geopolitical tensions and global economic uncertainties continue to test the effectiveness of coordinated decision-making.

Way Forward

- The G7 should strengthen cooperation with **emerging economies** such as India to make global governance more inclusive.

- Greater collaboration is required on **Artificial Intelligence, digital governance, clean energy, health security and resilient supply chains.**
- The forum should support reforms in **multilateral institutions**, including the **United Nations Security Council (UNSC)** and international financial institutions.
- Partnerships with the **Global South** should focus on sustainable development, climate finance and technology transfer.
- India should continue using the G7 platform to advance its vision of **inclusive, rules-based and multipolar global governance.**

Difference Between G7 and G20

G7	G20
Informal group of advanced economies.	Includes developed and developing economies.
Focuses mainly on strategic and economic coordination.	Focuses on global economic governance and sustainable development.
7 member countries and the EU.	19 countries, the EU and the African Union.

Conclusion

The G7 Summit remains an important platform for addressing global economic and strategic challenges, and India's continued participation reflects its growing influence as a **leading voice of the Global South and an indispensable partner in shaping an inclusive and resilient international order.**

ECONOMY

GROWTH AND DEVELOPMENT, INCLUSION

GRADUATE UNEMPLOYMENT IN INDIA

SOURCE: THE HINDU

Why in News?

Despite the rapid expansion of **higher education**, India continues to witness **high graduate unemployment**, raising concerns about the mismatch between education and employment.

The debate has gained importance as **Artificial Intelligence (AI)**, **automation** and **capital-intensive industries** are transforming the nature of jobs and skill requirements.

Expansion of Higher Education Institutions in India (2014–2025)

Institution	2014	2025	Growth
IITs	16	23	+44%
IIMs	13	22	+69%
AIIMS	7	20	+186%
IIITs	9	25	+178%
IISERs	5	7	+40%
Universities	~ 760	~1,330	+ 75%
Colleges	~38,500	~52,000	+35%

Source: Ministry of Education

Why is Graduate Unemployment Increasing?

Rapid Expansion of Higher Education

- Universities, engineering colleges and private institutions have expanded significantly over the past two decades.
- The number of graduates has increased faster than the creation of quality formal-sector jobs.

Changing Employment Pattern

- Earlier, sectors such as **Information Technology (IT)** absorbed a large number of engineering graduates.
- Today, employment opportunities are shifting towards **Artificial Intelligence (AI)**, **semiconductors**, **aerospace**, **defence**, **fintech**,

electronics and advanced manufacturing, which require specialised skills.

Skill Mismatch

- Many graduates possess theoretical knowledge but lack **practical, technical and industry-oriented skills**.
- Employers increasingly seek candidates with **problem-solving ability, communication skills, digital literacy and interdisciplinary knowledge**.

Limited Industry Exposure

- Many students complete their education without adequate **internships, laboratory training, apprenticeships or industrial exposure**.
- Consequently, companies spend considerable resources on retraining newly recruited graduates.

Impact of AI and Technological Changes

Changing Nature of Jobs

- Artificial Intelligence, automation and digital technologies** are transforming job profiles across sectors.
- Routine and repetitive tasks are increasingly being automated.

Curriculum Lag

- University curricula often fail to keep pace with rapidly changing technological developments.
- Many graduates enter the job market with outdated knowledge and limited exposure to emerging technologies.

Demand for New Skills

- Employers increasingly value **AI literacy, data analytics, coding, systems thinking, innovation and critical thinking** over traditional academic qualifications.

Why is Economic Growth Not Creating Enough Jobs?

Capital-Intensive Growth

- Emerging sectors such as **semiconductors, electronics and advanced manufacturing** generate high output using fewer workers.
- Increased automation reduces demand for middle-level technical jobs.

Jobless Growth

- Economic output continues to rise, but employment growth remains comparatively slow.
- This phenomenon is often described as "**Jobless Growth**."

Output-Employment Gap

- Technological advancements enable industries to increase productivity without proportionately increasing employment.

Graduate Surplus or Skill Deficit?

Not Simply a Graduate Surplus

- Several sectors continue to face shortages of **highly skilled professionals**.
- The real challenge lies in the **quality of skills rather than the number of graduates**.

Employability Gap

- Many graduates remain unemployed because they lack the competencies required by industry.
- At the same time, employers struggle to find candidates with specialised technical expertise.

Underemployment

- A significant number of graduates accept jobs below their qualifications or enter the **informal and gig economy** due to limited suitable employment opportunities.

Role of Innovation and Entrepreneurship

Innovation-led Growth

- Investment in **Research & Development (R&D), startups and emerging technologies** creates high-quality employment opportunities.

Entrepreneurship

- Startups have the potential to generate employment rather than merely seeking jobs.
- However, access to **finance, mentoring and market linkages** remains a challenge.

Way Forward

- Strengthen **industry-academia collaboration** through joint curriculum development and regular interaction.
- Promote **internships, apprenticeships, laboratory training and project-based learning** to improve employability.
- Regularly update university curricula to incorporate **AI, Industry 4.0, data science, robotics and digital technologies**.
- Expand **skill development programmes** under initiatives like **Skill India Mission** and **PM Kaushal Vikas Yojana (PMKVY)**.
- Encourage **innovation, entrepreneurship and startup ecosystems** through greater financial and institutional support.
- Promote labour-intensive sectors such as **MSMEs, textiles, tourism, logistics and food processing** alongside high-technology industries.

Conclusion

India's employment challenge is not merely the growing number of graduates but the widening gap between education and industry requirements, making **continuous skill development, innovation and stronger industry-academia partnerships** essential for transforming the country's demographic advantage into sustainable economic growth.

8th CENTRAL PAY COMMISSION: NEED FOR A NEW PUBLIC COMPENSATION FRAMEWORK

SOURCE: THE HINDU

Why in News?

The Union Government has initiated the process for constituting the **8th Central Pay Commission (CPC)**, which is expected to recommend revisions in the salaries, pensions and allowances of Central Government employees and pensioners.

What is the Central Pay Commission (CPC)?

- The **Central Pay Commission** is constituted by the **Government of India** under the **Department of Expenditure, Ministry of Finance**, generally once every **10 years**.
- It recommends revisions in:
 - **Basic Pay**
 - **Dearness Allowance (DA)**
 - **Dearness Relief (DR)**
 - **Allowances**
 - **Pension and retirement benefits**
- Although its recommendations are **advisory**, they are generally accepted by the Union Government and influence the pay structures of many **State Governments and Public Sector Undertakings (PSUs)**.

Evolution of the Pay Commission

- Since **Independence**, India has constituted **seven Central Pay Commissions**.
- The **7th Central Pay Commission**, chaired by **Justice A.K. Mathur**, came into effect from **1 January 2016**.
- The **8th Central Pay Commission** is expected to revise salaries and pensions for the next decade while addressing emerging administrative and fiscal challenges.

Need for Reforms in the Existing Pay Commission Framework

1. Decadal Revision Model

- Pay revisions take place only once every **ten years**, resulting in sudden and substantial increases in government expenditure.
- A more regular review mechanism could reduce financial shocks and improve predictability.

2. Absence of Uniform Evaluation Criteria

- There is no common framework to objectively compare **responsibility, risk, qualifications, hardship and accountability** across different government services.
- This often leads to demands for **inter-service parity**, particularly between **civil services and the armed forces**.

3. Issues in Career Progression

- Existing mechanisms such as **Non-Functional Upgradation (NFU)** sometimes weaken the relationship between **performance, responsibility and compensation**.
- Differences in promotion policies create disparities among various services.

Challenges in the Pension System

Multiple Pension Frameworks

- India currently operates different pension systems:
 - **Old Pension Scheme (OPS)**
 - **National Pension System (NPS)** for most employees recruited after **1 January 2004**
 - Separate pension arrangements for certain constitutional functionaries.

Fiscal Sustainability

- According to the **RBI State Finances Report**, expenditure on **salaries, pensions and interest payments** constitutes a major share of State Government expenditure.
- Rising pension liabilities reduce the fiscal space available for **capital expenditure and developmental programmes**.

Inter-Generational Equity

- A rapidly increasing pension burden may transfer financial obligations to future generations, affecting long-term fiscal stability.

Need for a New Compensation Architecture

Institutionalised Review Mechanism

- Instead of a one-time revision every decade, India can consider a **permanent independent compensation authority** to periodically review public sector salaries.

Transparent Compensation Principles

- A common framework should evaluate:
 - **Nature of work**

- **Level of responsibility**
- **Risk and hardship**
- **Skills and qualifications**
- **Performance and productivity**

Strengthening Fiscal Discipline

- Future salary revisions should balance **employee welfare** with **government finances**, ensuring long-term sustainability.

Respecting Federalism

- While the Union may establish broad principles, **State Governments** should retain flexibility in implementation according to their fiscal capacity.

Significance of Pay Commission Reforms

- Ensures **fair and equitable compensation** for public servants.
- Improves **motivation, efficiency and service delivery** in government institutions.
- Enhances **transparency and public confidence** in public expenditure.
- Promotes **fiscal responsibility** while maintaining administrative effectiveness.
- Supports the goal of **good governance** by linking compensation with accountability and performance.

Way Forward

- Establish a **National Public Compensation Authority** for continuous and evidence-based review of salaries and pensions.
- Introduce **performance-oriented compensation** while protecting employee welfare.
- Rationalise allowances and pension structures to improve transparency and efficiency.
- Develop a **uniform framework** for assessing responsibility, hardship and career progression across services.
- Ensure that reforms are implemented through consultation with **employees, State Governments and financial experts** to achieve consensus and sustainability.

Conclusion

The 8th Central Pay Commission offers an opportunity to **move beyond periodic salary revisions** and create a transparent, performance-oriented and fiscally sustainable compensation system that strengthens **both public administration and citizens' trust in governance**.

BANKING AND FINANCIAL INTERMEDIARIES

THE CENTRAL BANK'S SURPLUS TRANSFER FRAME WORK

SOURCE: THE HINDU

Why in News?

The Reserve Bank of India (RBI) approved a record surplus transfer of ₹2.87 lakh crore to the Union Government for FY 2025–26, the highest dividend ever transferred by the central bank.

What is the RBI's Surplus Transfer Framework?

- The **Surplus Transfer Framework** governs how the RBI transfers its excess income to the Central Government.
- It is based on the **Economic Capital Framework (ECF)** adopted in **2019** following the recommendations of the **Bimal Jalan Committee**.
- Under this framework:
 - The RBI first maintains prescribed **risk buffers** and contingency reserves.
 - The remaining **realised surplus** is transferred to the Government as **non-tax revenue**.
- The objective is to ensure that the RBI remains financially strong while supporting the government's fiscal requirements.

How Does RBI Earn Income?

The RBI generates income through:

- **Interest earned on Government Securities (G-Secs).**
- **Returns from Foreign Exchange (Forex) Reserves.**
- **Open Market Operations (OMOs).**
- **Liquidity management operations** under the Monetary Policy Framework.
- **Foreign currency investments** and valuation gains.
- **Fees from banking and currency management services.**

Economic Capital Framework (ECF), 2019

What is Economic Capital?

- It refers to the financial resources maintained by the RBI to absorb **market risks, credit risks, operational risks and financial stability risks**.

Major Features

- Specifies the level of **Contingent Risk Buffer (CRB)** that the RBI should maintain.
- Provides a transparent method for determining the annual surplus transfer.
- Ensures that dividend transfers do not weaken the RBI's balance sheet or financial stability.

Significance of the Surplus Transfer

Supports Government Finances

- The surplus provides substantial **non-tax revenue**, reducing the need for additional borrowing.
- It helps contain the **fiscal deficit** without imposing new taxes.

Promotes Macroeconomic Stability

- Additional fiscal resources enable greater investment in **infrastructure, welfare schemes and capital expenditure**.

Strengthens Fiscal Management

- Higher non-tax revenue improves fiscal flexibility during periods of global uncertainty.

Reflects RBI's Strong Financial Position

- A large surplus generally indicates healthy earnings from reserve management and monetary operations.

Major Concerns

Central Bank Independence

- Excessive dependence on RBI dividends may create perceptions of fiscal pressure on the central bank.
- Monetary policy decisions should remain independent of government financing needs.

Fiscal Federalism

- RBI surplus is classified as **non-tax revenue** and therefore **does not form part of the divisible pool** shared with States under **Article 270**.
- Consequently, States do not receive a direct share of these transfers.

Long-Term Financial Stability

- Frequent large transfers could reduce the RBI's financial buffers if adequate reserves are not maintained.

Transparency

- Greater disclosure regarding reserve management and surplus calculations can improve public confidence.

Challenges

- Balancing **government revenue requirements** with the RBI's long-term financial resilience.
- Maintaining adequate **risk provisions** against global financial shocks.
- Preserving the RBI's **institutional autonomy** while supporting economic growth.
- Addressing concerns of **States** regarding limited fiscal devolution from non-tax revenues.

Way Forward

- Strictly adhere to the **Economic Capital Framework** while determining annual surplus transfers.
- Ensure that adequate **risk buffers and contingency reserves** are maintained before distributing dividends.
- Enhance transparency by publishing detailed reports on **reserve management and surplus calculations**.
- Strengthen Centre–State fiscal cooperation through broader reforms in **fiscal federalism** and Finance Commission recommendations.
- Preserve the **operational independence** of the RBI to ensure credibility in monetary policy and financial regulation.

Conclusion

The RBI's surplus transfer framework plays an important role in **strengthening public finances**, but its long-term success depends on maintaining adequate financial buffers, safeguarding central bank independence and ensuring that fiscal support does not compromise monetary stability or cooperative federalism.

AGRICULTURE AND ALLIED

ROADMAP TO MAKE GREEN UREA PRODUCTION A REALITY

SOURCE: PIB

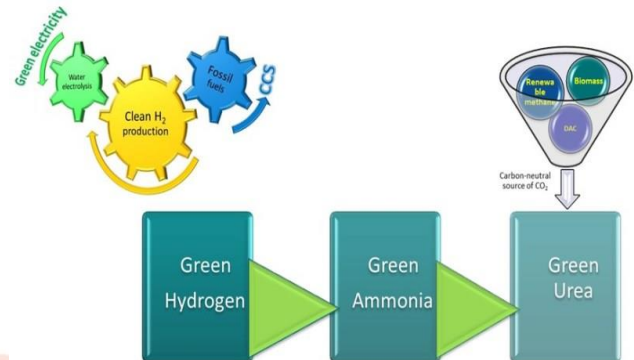
Why in News?

The **Department of Fertilizers (DoF)** recently held a **Pre-Expression of Interest (EOI)** meeting to prepare the roadmap for establishing **India's first commercial Green Urea manufacturing plants**.

What is Green Urea?

- **Green Urea** is manufactured using **Green Hydrogen**, which is produced by splitting water
- through **electrolysis powered by renewable energy** such as solar and wind.

- The hydrogen is combined with **nitrogen from the atmosphere** to produce **Green Ammonia**, which is further reacted with **captured CO₂** to manufacture urea.
- Unlike conventional urea, Green Urea significantly reduces **greenhouse gas emissions** during production.



Need for Green Urea in India

Reducing Import Dependence

- India imports nearly **10 million tonnes of urea annually**, resulting in a high import bill and dependence on global fertilizer markets.
- Domestic Green Urea production can improve **fertilizer self-sufficiency** and reduce import dependence.

Supporting Climate Goals

- Conventional urea production relies heavily on **natural gas**, leading to significant carbon emissions.
- Green Urea contributes to India's commitment of achieving **Net Zero emissions by 2070**.

Energy Security

- Using **renewable energy** instead of imported fossil fuels reduces vulnerability to international energy price fluctuations.

Promoting Sustainable Agriculture

- Green Urea supports environmentally sustainable farming while ensuring a stable supply of fertilizers for Indian agriculture.

Government Initiatives

1. National Green Hydrogen Mission (NGHM)

- Launched in **2023** with an outlay of **₹19,744 crore**, the mission promotes the production and use of **Green Hydrogen and Green Ammonia** across various sectors.

2. Green Ammonia Procurement

- The **Solar Energy Corporation of India (SECI)** has been entrusted with procuring **Green Ammonia** to promote demand and encourage private investment.

3. Pilot Projects

- Demonstration projects are being developed to test the commercial viability of **Green Hydrogen and Green Ammonia-based fertilizer production**.

4. Digital Platforms

- Platforms such as **Srijan** and **Srijan DEEP** facilitate collaboration among technology providers, manufacturers and investors in the green hydrogen ecosystem.

Benefits of Green Urea

Environmental Benefits

- Reduces **carbon emissions** associated with fertilizer production.
- Promotes the use of **renewable energy** and supports cleaner industrial processes.

Economic Benefits

- Reduces expenditure on **fertilizer imports**.
- Creates new investment opportunities in **green technologies, hydrogen production and renewable energy**.

Agricultural Benefits

- Ensures long-term availability of fertilizers for farmers.
- Strengthens **food security** through sustainable fertilizer production.

Industrial Benefits

- Encourages the growth of India's **Green Hydrogen ecosystem** and supports domestic manufacturing under **Atmanirbhar Bharat**.

Challenges

- The production cost of **Green Hydrogen and Green Ammonia** remains significantly higher than conventional alternatives.
- Large quantities of **renewable electricity, ultra-pure water and captured CO₂** are required for commercial-scale production.
- Existing fertilizer plants require substantial **technological upgrades** to handle Green Hydrogen.

- Limited domestic manufacturing capacity for **electrolysers and hydrogen infrastructure** increases project costs.

Way Forward

- Expand investments under the **National Green Hydrogen Mission** to accelerate commercial-scale Green Urea production.
- Develop integrated **Green Hydrogen, Green Ammonia and Carbon Capture (CCUS)** clusters near fertilizer and industrial hubs.
- Promote indigenous manufacturing of **electrolysers** and renewable energy equipment through targeted incentives.
- Strengthen research and development to reduce production costs and improve technological efficiency.
- Encourage public-private partnerships and long-term financing to support large-scale Green Urea projects.

Conclusion

Green Urea can transform India's fertilizer sector by **reducing import dependence, lowering carbon emissions and promoting sustainable agriculture**, making it a crucial step towards achieving **self-reliance and the country's long-term climate goals**.

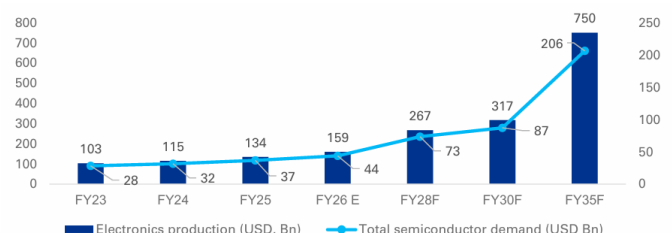
INFRASTRUCTURE

NITI AAYOG'S FUTURE OF INDIA'S SEMICONDUCTOR INDUSTRY ROADMAP

SOURCE: PIB

Why in News?

NITI Aayog's Frontier Tech Hub has released the "**Future of India's Semiconductor Industry**" roadmap, outlining a long-term strategy to build a globally competitive semiconductor ecosystem by **2035**.



Key Highlights of the Roadmap

1. Building a Domestic Semiconductor Ecosystem

- The roadmap aims to develop a **comprehensive semiconductor value chain** covering **chip design**,

fabrication (fabs), assembly, testing, packaging and research & development (R&D).

- It encourages India to focus on **mature technology nodes, advanced packaging technologies and specialised semiconductor materials**, where the country has greater competitive potential.

2. Reducing Import Dependence

- India currently imports the majority of its semiconductor requirements, making supply chains vulnerable to global disruptions.
- The roadmap seeks to reduce import dependence by promoting **domestic manufacturing and indigenous technological capabilities**.

3. Expanding India's Global Role

- India aims to become a major global centre for **semiconductor design, manufacturing and innovation**.
- The roadmap envisions greater participation in **global semiconductor supply chains** through partnerships with trusted countries.

Opportunities for India

1. Strong Design Talent

- India possesses nearly **20% of the world's semiconductor design engineers**, providing a strong foundation for innovation and chip development.
- The existing talent base can be leveraged to develop **indigenous intellectual property (IP)** and advanced chip designs.

2. Growing Domestic Demand

- Rapid growth in **electronics manufacturing, electric vehicles (EVs), Artificial Intelligence, 5G, data centres and consumer electronics** is expected to significantly increase semiconductor demand.
- A large domestic market improves the viability of local manufacturing.

3. Global Supply Chain Diversification

- Many countries are adopting a **China+1 strategy**, creating opportunities for India to emerge as an alternative semiconductor manufacturing destination.
- Strategic partnerships with countries such as the **United States, Japan, the European Union and Taiwan** can accelerate technology transfer and investments.

4. Advanced Packaging

- India has significant potential to become a global leader in **Outsourced Semiconductor Assembly and Test (OSAT)** and advanced packaging technologies.

- These segments require relatively lower investment than leading-edge fabrication plants while generating high-value employment.

Challenges

High Capital Requirement

- Establishing semiconductor fabrication units requires **very high investments**, advanced technology and long gestation periods.

Infrastructure Constraints

- Semiconductor manufacturing depends on uninterrupted **electricity, ultra-pure water, clean-room facilities and high-quality logistics infrastructure**.

Technology Gap

- India still relies on foreign companies for **advanced semiconductor equipment, manufacturing technologies and specialised materials**.

Skill Shortage

- Although India has strong software expertise, there is a shortage of professionals with experience in **chip fabrication, semiconductor manufacturing and process engineering**.

Global Competition

- Established semiconductor hubs such as **Taiwan, South Korea, the United States and Japan** continue to dominate the global market through advanced technologies and integrated supply chains.

Government Initiatives

India Semiconductor Mission (ISM)

- Launched in **2021** with a financial outlay of **₹76,000 crore** to promote semiconductor and display manufacturing in India.

Design Linked Incentive (DLI) Scheme

- Provides financial support to domestic companies engaged in semiconductor design and innovation.

Production Linked Incentive (PLI) Scheme

- Encourages large-scale manufacturing of electronics and semiconductor-related products.

Semicon India Programme

- Supports investments in semiconductor fabrication, packaging, compound semiconductors and research.

Way Forward

- Strengthen the **India Semiconductor Mission** through sustained financial support and policy stability.

- Develop dedicated **Semiconductor Manufacturing Clusters** with world-class infrastructure, reliable power supply and logistics facilities.
- Promote investment in **research, innovation, advanced packaging, compound semiconductors and indigenous semiconductor design**.
- Expand partnerships with **global technology leaders** for technology transfer, skill development and joint manufacturing.
- Create specialised training institutions and strengthen industry-academia collaboration to build a highly skilled semiconductor workforce.

Conclusion

The NITI Aayog roadmap provides a strategic blueprint for building a resilient semiconductor ecosystem in India, and sustained investments in manufacturing, innovation, skilled manpower and global partnerships will be essential to achieve technological self-reliance and strengthen India's position in the global electronics value chain.

INDIA'S SHIPBUILDING AND SHIP RECYCLING SECTOR

SOURCE: PIB

Why in News?

UNCTAD reported that India became the world's largest ship recycling nation in 2025, achieving a major target under Maritime India Vision (MIV) 2030 ahead of schedule.

Current Status of India's Ship Recycling Sector

Global Leadership

- India emerged as the **largest ship recycling country** in 2025, accounting for **35.4% of global ship recycling**, compared to **30.1% in 2024**.
- India recycled nearly **2.99 million Gross Tonnage (GT)** of ships during 2025, recording significant growth.

Modernisation of Ship Recycling

- The **Recycling of Ships Act, 2019** aligned India's ship recycling industry with the **Hong Kong International Convention (HKC)** for safe and environmentally sound recycling.
- More than **100 ship recycling yards**, especially at **Alang (Gujarat)**, have been upgraded to international standards.

Circular Economy

- Ship recycling supplies **steel, machinery and reusable materials** for domestic industries, reducing dependence on imported raw materials.

Major Government Initiatives

Shipbuilding Financial Assistance Scheme (SBFAS)

- Provides **financial assistance of 15%–25%** of the contract value to Indian shipyards.
- Improves the competitiveness of Indian shipbuilders against foreign competitors.

Shipbuilding Development Scheme (SbDS)

- Supports the establishment of **greenfield shipbuilding clusters** and modernization of existing shipyards.
- Promotes indigenous technology, infrastructure and employment generation.

Maritime Development Fund (MDF)

- A dedicated **₹25,000 crore** financing mechanism to provide long-term capital for maritime infrastructure and shipbuilding projects.

Ship Recycling Credit Note Scheme

- Ship owners receive a **credit note equal to 40% of the scrap value**, which can be used while ordering new ships from Indian shipyards.

Green Tug Transition Programme (GTTP)

- Promotes construction of **LNG, battery-electric, hydrogen and methanol-powered vessels**, supporting green shipping.

Role of South Korea in India's Shipbuilding Ambitions Technology Transfer

- South Korean companies are expected to support India in **ship design, automation, green propulsion systems and advanced ship construction**.

Mega Shipbuilding Infrastructure

- Cooperation includes development of **large integrated shipbuilding facilities** with modern manufacturing capabilities.

Skill Development

- Partnerships between Indian and Korean institutions will strengthen **marine engineering, ship design and naval architecture**.

Defence Manufacturing

- Collaboration will promote **joint construction of naval vessels** under **Make in India** and **Aatmanirbhar Bharat**.

DEVELOPMENT OF SHIPPING AND MARITIME SECTOR IN 11 YEARS			
PARAMETER	2014	2025	% GROWTH
Cruise Passengers	84,000	4.92 lakhs	485%
Inland water cargo	18 MMT	146 MMT	700%
Operational waterways	3	29	870%
Investment in National waterways	Rs. 183 Cr	1,700 Cr	800%
Number of Seafarers	1.08 lakhs	3.2 lakhs	200%
Annual financial performance of ports	Rs. 11,172 Cr	Rs. 24,202 Cr	120%
No of new legislations	1 in 10 years	11 in 11 Years	

Source: Ministry of Ports, Shipping and Waterways

Significance for India

Economic Growth

- Shipbuilding has strong **multiplier effects** on industries such as **steel, electronics, heavy engineering, logistics and ports**.

Employment Generation

- The sector has the potential to generate **millions of direct and indirect employment opportunities**.

Maritime Security

- Indigenous shipbuilding enhances **naval capability, coastal security and strategic autonomy**.

Export Promotion

- Competitive shipbuilding can increase India's exports and strengthen its participation in global maritime value chains.

Blue Economy

- A strong shipbuilding industry supports the development of India's **Blue Economy** and sustainable maritime growth.

Challenges

- India's contribution to global shipbuilding remains **below 1%**, despite handling nearly **95% of India's trade volume through maritime transport**.
- Indian shipyards face **high financing costs** compared to global competitors.
- Dependence on imported **marine equipment, propulsion systems and shipbuilding-grade steel** increases production costs.
- Limited availability of **large dry docks, repair facilities and advanced manufacturing infrastructure** restricts capacity.
- Shortage of skilled manpower in **marine engineering, green ship technologies and advanced ship design** remains a challenge.

Way Forward

- Develop **integrated shipbuilding clusters** by adopting South Korea's **Ulsan Model**, combining shipyards, suppliers and training centres.
- Promote **indigenous manufacturing** of marine equipment under **Aatmanirbhar Bharat**.
- Strengthen **green shipbuilding** by promoting hydrogen, LNG and methanol-powered vessels.
- Expand **Maintenance, Repair and Overhaul (MRO)** facilities to reduce dependence on foreign ports.
- Ensure effective implementation of **Maritime India Vision 2030, Sagarmala Programme and Maritime Amrit Kaal Vision 2047**.

Conclusion

A globally competitive shipbuilding and ship recycling ecosystem will **strengthen India's maritime economy, enhance strategic security, generate large-scale employment and support the vision of making India a leading maritime power under Maritime Amrit Kaal Vision 2047**.

PRELIMS POINTERS IN NEWS

ICMR-MINDS PROJECT

SOURCE: PIB

Why in News?

The **ICMR-MINDS Project** received the **Gold Award** under the **National Awards for e-Governance (NAeG) 2026** for its AI-enabled citizen-centric mental healthcare platform.



About ICMR-MINDS Project

- ICMR-MINDS** stands for **ICMR's Multistate Implementation Research Study on Integration of**

Screening and Management of Mental and Substance Use Disorders with other Non-Communicable Diseases.

- It is a **flagship digital mental health initiative** of the **Indian Council of Medical Research (ICMR)**.

Key Features

- Developed by the **Indian Council of Medical Research (ICMR)**.
- Implemented across **seven States** through institutions including:
 - **AIIMS New Delhi**
 - **AIIMS Guwahati**
 - **AIIMS Bhopal**
 - **AIIMS Bhubaneswar**
 - **PGIMER Chandigarh**
 - **St. John's Medical College**
 - **Gujarat Institute of Mental Health**
- Uses an **AI-enabled Clinical Decision Support System (CDSS)** to assist frontline healthcare workers.
- Provides **standardised digital screening** for mental and substance use disorders.
- Offers **evidence-based clinical guidance** for assessment, treatment, and follow-up.
- Includes **multilingual interfaces**, ensuring accessibility across different regions.
- Supports **offline functionality**, enabling healthcare delivery in areas with poor internet connectivity.
- Features **real-time dashboards** for programme monitoring and performance evaluation.
- Uses **structured referral and back-referral mechanisms** to ensure continuity of care between primary and tertiary healthcare centres.
- Incorporates **gamification features** to improve patient engagement and treatment adherence.

LOKOS PLATFORM

SOURCE: PIB

Why in News?

The **LokOS Platform** has significantly expanded its coverage across India, accelerating the digital transformation of **Self-Help Groups (SHGs)** and community institutions.



About LokOS Platform

- **LokOS** is a digital platform developed under the **Deendayal Antyodaya Yojana – National Rural Livelihoods Mission (DAY-NRLM)** for the complete digitisation of **Self-Help Groups (SHGs)** and their federations.
- The term "**Lok**" means **People**, while "**OS**" stands for **Operating System**, reflecting its role as a comprehensive digital operating platform for community institutions.

Key Features

- Provides **end-to-end digital management** of:
 - **Self-Help Groups (SHGs)**
 - **Village Organisations (VOs)**
 - **Cluster Level Federations (CLFs)**
 - **Community-Based Organisations (CBOs)**
- Generates **Aadhaar-linked** and **bank-linked digital identities** for members and institutions.
- Digitally records:
 - Savings
 - Internal lending
 - Loan repayments
 - Financial transactions
- Captures **livelihood information** to facilitate convergence with government welfare schemes.
- Offers **role-based access** for administrators, bookkeepers, and field functionaries.
- Provides **real-time dashboards**, analytics, and automated reports for better decision-making.
- Available through both **web** and **mobile applications**.
- Mobile application enables field-level data entry and real-time updates.
- Supports the **Lakshpati Didi Initiative** by tracking beneficiaries and livelihood progress.

- Covers **34 States and Union Territories**, thousands of districts, blocks, Gram Panchayats, and villages.

LAVENDER CULTIVATION

SOURCE: BUSINESS LINE

Why in News?

The **Union Government** and the **Nagaland Government** recently discussed expanding **lavender cultivation** and agri-entrepreneurship under the **CSIR Aroma Mission**.



About Lavender Cultivation

- **Lavender** is a **perennial aromatic shrub** belonging to the **mint family (Lamiaceae)** and is widely cultivated for its **flowers** and **essential oil**.
- It is valued for its high commercial demand in the **perfume, cosmetic, pharmaceutical, food processing, and aromatherapy** industries.
- In India, commercial cultivation was first promoted in the temperate regions of **Jammu & Kashmir** under the **CSIR Aroma Mission**, where it emerged as a profitable alternative to traditional crops.

Key Features

Botanical Characteristics

- Scientific Name: **Lavandula angustifolia** (commonly cultivated species).
- Member of the **Lamiaceae** family.
- A **drought-resistant** and low-maintenance crop.

Climatic Requirements

- Thrives in **temperate climates**.
- Requires **well-drained sandy or loamy soil**.
- Performs well in regions with moderate rainfall and abundant sunlight.

Life Cycle

- A single plant remains productive for **10–15 years**.
- Commercial harvesting generally begins from the **second year** after planting.
- Requires relatively low irrigation and maintenance.

Propagation Methods

- **Seeds**
- **Rooted cuttings**

- **Tissue culture**
- **Layering**

About CSIR Aroma Mission

- **Launched:** 2016
- **Implemented by:** Council of Scientific and Industrial Research (CSIR)
- **Nodal Institute:** CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow
- Also known as the **Purple Revolution**.

Objectives

- Promote cultivation of **aromatic crops**.
- Increase farmers' income through **high-value agriculture**.
- Reduce imports of essential oils.
- Generate rural employment through value addition and processing.
- Encourage entrepreneurship in the aroma industry.

Key Features of Aroma Mission

- Provides **quality planting material** to farmers.
- Offers **technical training** and scientific guidance.
- Supports cultivation, processing, and marketing.
- Develops **value chains** for aromatic products.
- Encourages **skill development** and rural enterprises.
- Implemented in **two phases**, with **Phase-II** launched in February 2021.

NEW GI TAG CROPS OF MADHYA PRADESH

SOURCE: THE HINDU

Why in News?

Four traditional agricultural crops of **Madhya Pradesh** have recently been granted the **Geographical Indication (GI) Tag**, recognising their unique identity and traditional heritage.



PROTECTING HERITAGE, EMPOWERING FARMERS

About New GI Tag Crops

- The **Geographical Indication (GI) Tag** has been awarded to four indigenous crops of Madhya Pradesh for their unique geographical origin, nutritional qualities, and traditional cultivation practices.
- The newly recognised crops are:
 - **Sitahi Kutki (Sitahi Minor Millet)**
 - **Nagdaman Kutki (Nagdaman Minor Millet)**
 - **Baigani Arhar (Dindori Pigeon Pea)**
 - **Mahakoshal Chhatriya Chawal (Chhatriya Paddy)**
- These crops are closely associated with the farming traditions of tribal communities and represent the rich agricultural biodiversity of central India.
- The GI tag provides legal protection against misuse while improving branding and market value.

Key Features

1. Sitahi Kutki & Nagdaman Kutki (Minor Millets)

- Cultivated mainly in the **Dindori district** of Madhya Pradesh.
- Traditionally preserved by the **Baiga** and **Gond** tribal communities.
- Naturally grown using **organic farming practices**.
- Highly **climate-resilient** and suitable for rainfed agriculture.
- Rich source of **Dietary fibre**, **Complex carbohydrates**, **Iron**, **Potassium**, **Magnesium** and **Antioxidants**
- Possess a **Low Glycaemic Index (GI)**, making them beneficial for diabetic and health-conscious consumers.

2. Baigani Arhar (Dindori Pigeon Pea)

- Native to the **Dindori region**.
- Closely linked with the traditional farming practices of the **Baiga Tribe**.
- Cultivated without intensive chemical inputs.
- Contains High **protein content**, Rich dietary fibre, Iron, Calcium and **B-Complex Vitamins**
- Has a naturally **sweet taste**, shorter crop duration (**5–6 months**), and requires less cooking time.

3. Mahakoshal Chhatriya Chawal

- Indigenous rice variety cultivated in **Jabalpur** and **Katni** districts.
- Known for its Distinct aroma, Superior taste and Adaptability to local agro-climatic conditions.
- Retains its **bran layer**, making it rich in:
 - **Vitamin B1 (Thiamine)**
 - **Minerals**

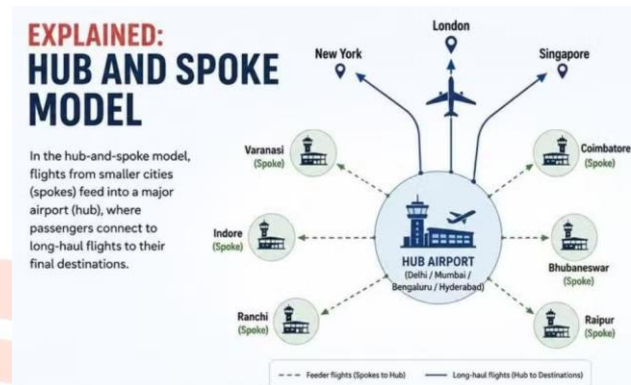
- Healthy fats

HUB-AND-SPOKE AVIATION MODEL

SOURCE: THE HINDU

Why in News?

India recently launched its first 'Easy Connect' Flight under the **Hub-and-Spoke Aviation Model**, connecting **Varanasi** with **New Delhi**.



About Hub-and-Spoke Aviation Model

- The **Hub-and-Spoke Aviation Model** is a transport network in which **smaller airports (spokes)** are connected to **major airports (hubs)** to facilitate efficient domestic and international travel.

Key Features

Spoke Airports

- Smaller regional airports serve as the starting point of the journey.
- Passengers complete:
 - **Check-in**
 - **Immigration**
 - **Customs formalities**
- Receive both:
 - **Domestic (D) Boarding Pass**
 - **International (I) Boarding Pass**

Hub Airports

- Major airports act as central transit points.
- Passengers directly board their international flight without repeating immigration or security procedures.
- Checked baggage is automatically transferred to the final destination.

Easy Connect Facility

- First launched from **Lal Bahadur Shastri International Airport, Varanasi**, to **New Delhi**.
- Operated by **Air India**.
- Provides seamless transfer for international passengers.

Objectives

- Improve international connectivity from **Tier-II and Tier-III cities**.
- Reduce congestion at major airports.
- Enhance passenger convenience.
- Promote India as a preferred **international aviation hub** by **2030** and a global aviation leader by **2047**.
- Improve operational efficiency for airlines.

DRUNIX PLATFORM

SOURCE: INDIAN EXPRESS

Why in News?

The **National Payments Corporation of India (NPCI)** recently launched the **Drunix Platform** to promote enterprise-grade blockchain adoption in India.



About Drunix Platform

- **Drunix** is an **open-source blockchain platform** developed by the **National Payments Corporation of India (NPCI)**.
- It is designed to enable organisations to build secure, scalable, and interoperable **distributed ledger solutions** for enterprise and public-sector applications.

Key Features

- **Developed by:** **National Payments Corporation of India (NPCI)**.
- Built as an enhanced version of **Hyperledger Fabric**, an enterprise blockchain framework.
- Provides a **high-performance distributed ledger** capable of handling enterprise-scale applications.
- Supports the creation of:
 - **Tokenisation platforms**
 - **Digital asset ecosystems**
 - **Multi-organisation blockchain networks**
- Enables secure and transparent sharing of information among multiple stakeholders.
- Designed for **high scalability**, making it suitable for government and enterprise infrastructure.

- Encourages **interoperability**, allowing integration with different digital systems.
- Open-source architecture enables innovation, customization, and collaborative development.
- Supports experimentation and rapid deployment of blockchain-based applications.

Applications

- Digital identity management.
- Supply chain and logistics tracking.
- Tokenisation of physical and financial assets.
- Banking and financial services.
- Trade documentation.
- Healthcare records management.
- Government digital services.

BHARATI INITIATIVE

SOURCE: INDIAN EXPRESS

Why in News?

The **Agricultural and Processed Food Products Export Development Authority (APEDA)** recently completed the **first cohort** of the **BHARATI Initiative**.



About BHARATI Initiative

- **BHARATI** stands for **Bharat's Hub for Agritech, Resilience, Advancement and Incubation for Export Enablement**.
- It is an incubation and acceleration programme launched by **APEDA** under the **Ministry of Commerce & Industry**.

Objectives

- Promote innovation in the agri-food sector.
- Improve export competitiveness of Indian agricultural products.
- Encourage technology-driven agricultural solutions.

- Support startups in accessing international markets.
- Strengthen India's agri-export ecosystem.

Key Features

Programme Structure

- Three-month acceleration programme.
- Complements existing government and private incubators.
- Provides mentoring, capacity building, and business support.

Startup Support

- Focuses on **100 agri-food and agritech startups**.
- Supports:
 - Product development
 - Export readiness
 - Regulatory compliance
 - Market access

Priority Sectors

- **GI-tagged products**
- Organic foods
- Superfoods
- Processed food products
- Livestock products
- **AYUSH products**

Technology Focus

Encourages adoption of:

- **Artificial Intelligence (AI)**
- **Blockchain-enabled traceability**
- **Internet of Things (IoT)** for cold chain management
- Agri-fintech solutions
- Sustainable packaging technologies

Challenges Addressed

- Quality certification.
- Food wastage.
- Perishability.
- Logistics bottlenecks.
- SPS (Sanitary and Phytosanitary) compliance.
- TBT (Technical Barriers to Trade) requirements.

Ecosystem Development

- Connects startups with exporters, research institutions, technology providers, and global buyers.
- Encourages collaboration between innovators and industry stakeholders.

MEMFLATION

SOURCE: THE HINDU

Why in News?

Memflation has recently emerged as a major concern due to the sharp increase in **memory chip prices**, leading to higher costs of smartphones, laptops, and other electronic devices.



About Memflation

- **Memflation** is a term formed by combining the words "Memory" and "Inflation." It refers to the sustained rise in the prices of **semiconductor memory chips**, particularly **DRAM (Dynamic Random Access Memory)** and **NAND Flash Memory**.
- The term was coined by the global research and advisory firm **Gartner**.

Major Causes of Memflation

AI-Driven Demand

- Rapid expansion of **Artificial Intelligence (AI)**, cloud computing, and data centres has significantly increased demand for advanced memory chips.
- AI servers require much larger memory capacity than conventional computing systems.

Shift in Manufacturing Capacity

- Semiconductor manufacturers are allocating more production towards **High-Bandwidth Memory (HBM)** and other AI-specific memory products.
- Production of conventional **DRAM** and **NAND** chips has consequently declined.

Supply Constraints

- Lower production has resulted in shortages of memory chips used in consumer electronics.
- Limited availability has pushed up global prices.

Slow Expansion of Manufacturing

- Establishing semiconductor fabrication plants requires:
 - High capital investment
 - Advanced technology
 - Skilled manpower
 - Long construction timelines

- Therefore, supply cannot be increased immediately.

Global Impact

1. Increase in prices of:

1. Smartphones
2. Laptops
3. Personal Computers
4. Servers
5. Gaming devices

2. Higher production costs for electronics manufacturers.
3. Delays in product deliveries due to supply shortages.
4. **Increased operational costs for cloud service providers and AI companies.**
5. Weak demand in non-AI semiconductor segments because of rising prices.

RBI'S STRATEGIC WAIT-AND-WATCH POLICY

SOURCE: THE HINDU

Why in News?

The **Reserve Bank of India (RBI)** recently kept the **Repo Rate unchanged at 5.25%** while maintaining a **neutral monetary policy stance**, citing inflationary risks and global uncertainties.

What is RBI's Strategic Wait-and-Watch Policy?

- It refers to the RBI's decision to **maintain the policy interest rate without immediate changes** while closely monitoring economic indicators before taking further action.
- By adopting a **neutral stance**, the RBI retains the flexibility to either **increase or reduce interest rates** depending on future inflation and growth trends.

Macroeconomic Background

Inflation Concerns

- Inflation continues to remain an important concern due to:
 - **Volatility in global crude oil prices.**
 - **Food inflation** arising from weather-related uncertainties.
 - Rising logistics and transportation costs.
- The RBI aims to keep inflation within the target of **4% (±2%)** under the flexible inflation targeting framework.

Moderating Economic Growth

- Domestic growth has shown signs of moderation due to:
 - Weak global demand.
 - Slower private investment.
 - Uncertainty in external markets.
- At the same time, India continues to remain among the **fastest-growing major economies**.

External Sector Challenges

Capital Outflows

- Higher interest rates in advanced economies have encouraged some foreign investors to shift capital from emerging markets.
- This affects portfolio investment flows into India.

Pressure on the Indian Rupee

- Global financial uncertainty and higher imports, especially crude oil, place downward pressure on the **Indian Rupee**.
- A weaker rupee increases the cost of imports and contributes to **imported inflation**.

Global Geopolitical Risks

- Ongoing geopolitical tensions and disruptions in global shipping routes continue to affect:
 - International trade.
 - Energy prices.
 - Supply chains.

Why has RBI Maintained a Neutral Stance?

Control Inflation

- Keeping interest rates unchanged helps contain inflation expectations without disrupting economic recovery.

Support Economic Growth

- Premature monetary tightening may reduce investment and consumption, while an early rate cut may fuel inflation.

Maintain Financial Stability

- A neutral stance allows the RBI to respond quickly if economic conditions change unexpectedly.

Policy Flexibility

- The RBI can either tighten or ease monetary policy depending on future inflation, growth and external developments.

Government and RBI Measures

Strengthening Foreign Investment

- Policy measures have been introduced to improve the attractiveness of Indian financial markets for foreign investors.

Foreign Exchange Management

- RBI actively manages liquidity and intervenes in the foreign exchange market whenever necessary to reduce excessive volatility.

Deepening Bond Markets

- Expansion of investment avenues for foreign investors helps strengthen India's debt market and improve capital inflows.

Significance of the Policy

Ensures Price Stability

- Reinforces RBI's commitment to controlling inflation over the medium term.

Improves Investor Confidence

- Predictable monetary policy enhances confidence among domestic and foreign investors.

Supports Sustainable Growth

- Balanced policy decisions help maintain macroeconomic stability without compromising long-term growth.

Strengthens Monetary Policy Credibility

- Demonstrates that RBI's decisions are based on economic data rather than short-term pressures.

Challenges

- Persistent **food and fuel inflation**.
- Global geopolitical conflicts affecting commodity prices.
- Volatile foreign capital flows.
- Exchange rate fluctuations.
- Balancing inflation control with economic growth.

Way Forward

- Continue adopting a **data-driven monetary policy** based on evolving inflation and growth trends.
- Strengthen domestic demand through higher investment and infrastructure development.
- Reduce dependence on imported energy by expanding **renewable energy and domestic energy production**.
- Deepen domestic financial markets to reduce dependence on volatile portfolio investments.
- Maintain close coordination between **monetary policy and fiscal policy** for sustained macroeconomic stability.

Monetary Policy Committee (MPC)

- Constituted under the **Reserve Bank of India Act, 1934** (amended in 2016).
- Consists of **6 members**:
 - **3 RBI officials** (including the Governor).

- **3 members nominated by the Central Government.**

- Meets at least **four times every year**.
- Decisions are taken by **majority vote**, with the RBI Governor having the **casting vote** in case of a tie.

Major Monetary Policy Instruments

- Repo Rate
- Reverse Repo Rate
- Standing Deposit Facility (SDF)
- Cash Reserve Ratio (CRR)
- Statutory Liquidity Ratio (SLR)
- Open Market Operations (OMO)
- Marginal Standing Facility (MSF)

Inflation Target

- **Target:** 4%
- **Tolerance Band:** 2% – 6%
- Mandated under the **Flexible Inflation Targeting (FIT) Framework**.

Related Reports

- Monetary Policy Report (RBI)
- Financial Stability Report (RBI)
- World Economic Outlook (IMF)
- Economic Survey

Conclusion

The RBI's strategic wait-and-watch approach reflects a **balanced monetary policy that prioritizes price stability while safeguarding economic growth, and continued data-driven decisions**, supported by sound fiscal policies and structural reforms, will be essential for maintaining India's macroeconomic resilience in an uncertain global environment.

HISTORY

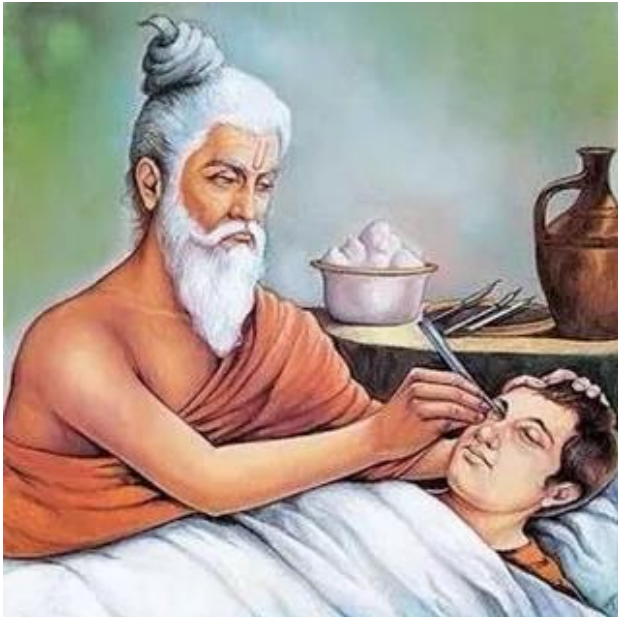
PRELIMS POINTERS IN NEWS

MAHARISHI SUSHRUTA

SOURCE: THE HINDU

Why in News?

A **bronze statue of Maharishi Sushruta** was recently unveiled at the **Royal College of Surgeons of Edinburgh, United Kingdom**, recognising his extraordinary contribution to the field of surgery.



About Maharishi Sushruta

- **Maharishi Sushruta** is regarded as the "**Father of Surgery**" and one of the greatest physicians in the history of **Ayurveda**.
- He is believed to have lived around **6th century BCE** (though scholars differ on the exact period) and practised medicine in **Varanasi (Kashi)**.
- According to Ayurvedic tradition, he was a disciple of **Lord Dhanvantari**, the divine teacher of medicine.

Sushruta Samhita

- The **Sushruta Samhita** is one of the oldest and most comprehensive medical texts in the world.
- It consists of **184 chapters** covering various branches of medicine and surgery.
- The text describes:
 - **300+ surgical procedures**

- **120+ surgical instruments**
- Various diseases, fractures, wounds, burns, and their treatment.

Major Contributions

Pioneer of Surgery

- Developed advanced techniques for **Shalya Tantra (Surgery)**.
- Standardised surgical procedures and clinical practices.

Plastic and Reconstructive Surgery

- Successfully performed **Rhinoplasty (nose reconstruction)** using skin graft techniques.
- His methods are considered the foundation of modern **plastic surgery**.

Other Surgical Procedures

- Removal of **urinary bladder stones (Lithotomy)**.
- Surgical management of fractures and dislocations.
- Removal of dead foetus in complicated childbirth.
- Treatment of wounds, abscesses, cataracts, and injuries.

Human Anatomy

- Strongly advocated **cadaver dissection** for understanding human anatomy.
- Encouraged practical observation rather than relying solely on theoretical knowledge.

Surgical Instruments

- Designed and classified over **120 surgical instruments** made from metal, wood, and other materials.
- Many instruments resembled modern surgical tools such as scalpels, forceps, probes, needles, and scissors.

Medical Education

- Stressed **hands-on training** before operating on patients.
- Recommended practising surgical techniques on fruits, vegetables, leather bags, and dead animals before performing actual surgeries.

DANCING GIRL OF MOHENJO-DARO

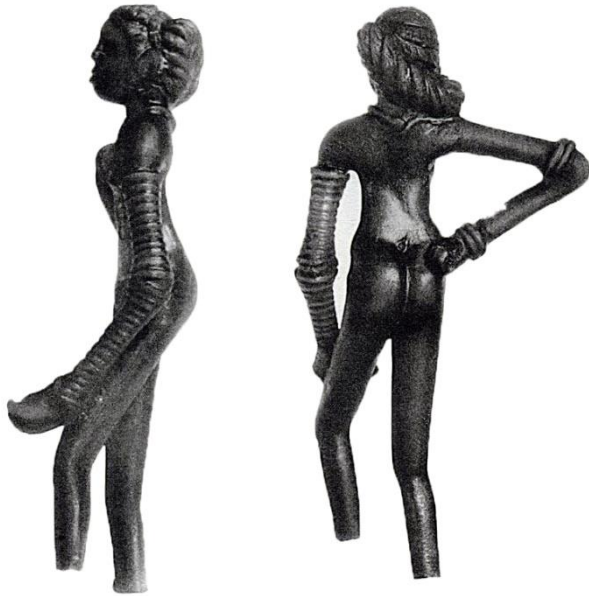
SOURCE: INDIAN EXPRESS

Why in News?

The **NCERT Class 9 Art textbook** recently published a **retouched image** of the famous **Dancing Girl of Mohenjo-daro**, covering the figurine's bare torso, leading to debate over the portrayal of historical artefacts.

About Dancing Girl of Mohenjo-daro

- The **Dancing Girl** is one of the most celebrated artistic creations of the **Indus Valley Civilization (Harappan Civilization)**.
- It is a small **bronze statuette**, measuring about **10.5 cm (4 inches)** in height, discovered at **Mohenjo-daro** in present-day **Sindh, Pakistan**.



Discovery

- **Discovered by:** Ernest Mackay
- **Year:** 1926
- **Site:** Mohenjo-daro
- The name "**Dancing Girl**" was popularised by **Sir John Marshall**, who felt the posture resembled that of traditional dancers.

Key Features

Material and Technique

- Made of **bronze** (an alloy of **copper** and **tin**).
- Created using the **Lost-Wax Casting Technique (Cire Perdue)**, demonstrating advanced metallurgical knowledge.

Physical Features

- Depicts a young female figure standing confidently.
- One hand rests on the hip while the other hangs freely.
- The head is slightly tilted, conveying confidence and movement.
- Hair is arranged in a **long coiled hairstyle**.
- Adorned with numerous **bangles**, a small necklace, and minimal clothing.

- Features include large eyes, a broad nose, and stylised facial expression.

Artistic Significance

- Reflects a natural sense of balance and body posture.
- Indicates a sophisticated understanding of human anatomy and metal craftsmanship.
- Demonstrates the artistic excellence of the Harappan Civilization.

BUNDEL KESARI MAHARAJA CHHATRASAL

SOURCE: THE HINDU

Why in News?

A special **dance-drama** based on the life of **Bundel Kesari Maharaja Chhatrasal** was recently presented during the **Mahua Festival** at the **Madhya Pradesh Tribal Museum**.



About Maharaja Chhatrasal

- **Maharaja Chhatrasal (1649–1731)** was a renowned **Bundela Rajput ruler**, military leader, and founder of the independent **Bundelkhand Kingdom**.
- He is remembered for his prolonged resistance against the **Mughal Empire**, particularly during the reign of **Aurangzeb**, and for establishing self-rule in Bundelkhand.
- Owing to his courage and leadership, he earned the title "**Bundel Kesari**" (**Lion of Bundelkhand**).

Early Life

- **Born:** 4 May 1649
- **Parents:** Champat Rai and Lal Kunwar
- Belonged to the **Bundela Rajput Clan**.
- Descended from **Rudra Pratap Singh**, founder of the **Orchha Kingdom**.

Struggle Against the Mughals

- His father sacrificed his life resisting Mughal expansion.

- Inspired by this legacy, Chhatrasal launched his rebellion against the Mughals in **1671**.
- Continued the struggle for nearly **five decades**.
- Began his campaign with only **5 horsemen** and **25 soldiers**.
- Successfully established an independent kingdom in **Bundelkhand**.

Influence of Chhatrapati Shivaji Maharaj

- Met **Chhatrapati Shivaji Maharaj** at **Deogarh** in **1671**.
- Shivaji inspired him to fight for **Swarajya (self-rule)**.
- Adopted **guerrilla warfare tactics**, which proved highly effective against Mughal forces.

Relations with Baji Rao I

- **Peshwa Baji Rao I** helped Chhatrasal defeat **Muhammad Khan Bangash**, a Mughal commander.
- In gratitude, Chhatrasal strengthened ties with the Marathas.
- His daughter **Mastani** later married **Baji Rao I**, symbolising the alliance.

Administration and Legacy

- Expanded his kingdom from **Chitrakoot** and **Panna** to **Gwalior**.
- Guided spiritually by **Mahamati Prannath**, who also encouraged development of the **Panna Diamond Mines**.
- Patronised renowned scholars and poets including:
 - **Kavi Bhushan**
 - **Lal Kavi**
 - **Bakhshi Hansaraj**
- The **Chhatarpur district** of Madhya Pradesh is named in his honour.
- His legacy is preserved through the **Maharaja Chhatrasal Museum** and **Chhatrasal Stadium** in Delhi.

MASROOR ROCK-CUT TEMPLES

SOURCE: THE HINDU

Why in News?

The **Masroor Rock-Cut Temples** in **Himachal Pradesh** have recently gained attention as a unique heritage monument popularly known as the "**Ellora of the Himalayas**."



About Masroor Rock-Cut Temples

- The **Masroor Rock-Cut Temples** are a remarkable group of **15 monolithic Hindu temples** carved out of a single sandstone rock during the **early 8th century CE**.
- The complex represents one of the very few examples of **monolithic rock-cut architecture in North India** and reflects the artistic excellence of early medieval temple builders.

Location

- Situated in **Masroor village, Kangra District, Himachal Pradesh**.
- Located in the **Kangra Valley** near the **Beas River**.
- Faces the **Dhauladhar Mountain Range**, adding to its scenic and religious significance.

Architecture and Layout

Architectural Style

- Built in the **North Indian Nagara Style**.
- One of the rare **monolithic rock-cut temple complexes** featuring **Shikharas (spires)** in northern India.

Temple Layout

- Comprises **15 temples** arranged in a **symmetrical square plan**.
- The shrines are organised in a **Mandala pattern**, with the central shrine surrounded by smaller temples.

Central Shrine

- Known as the **Thakurdwara Temple**.
- Contains a fully excavated **Garbhagriha (sanctum sanctorum)**.

Entrances

- Three completed entrances face:
 - **North-East**
 - **South-East**
 - **North-West**
- The western entrance remained unfinished.

Sacred Water Tank

- A large **quadrangular water reservoir** lies in front of the temple complex.
- Used for ritual purification and religious ceremonies.

Iconography

- Presently houses idols of:
 - **Lord Rama**
 - **Lakshmana**
 - **Sita**
- Sculptural remains of **Lord Shiva** indicate the site's earlier Shaivite association.

FAMOUS MEGALITHIC SITE OF

SOURCE: DTE

Why in News?

Researchers and local communities have renewed efforts to secure **UNESCO World Heritage Site** status for the **Megalithic Site of Chokahatu in Jharkhand**.



About Chokahatu Megalithic Site

- **Chokahatu** is one of the **largest megalithic burial sites in India**, closely associated with the **Munda Tribe** of Jharkhand.
- The site is known for its thousands of **memorial and burial stones**, erected over centuries to honour ancestors according to tribal customs.

Location

- Situated in the **Bundu–Sonahatu region** of **Ranchi District, Jharkhand**.

Origin of the Name

- Derived from the **Austrie Mundari language**.
- "**Chokahatu**" means "**Place of Mourning**."

Historical Background

According to **Munda oral traditions**, the community settled in the region over **2,800 years ago**.

- The megalithic tradition has been continuously practised since then.
- The site was documented by **Colonel E.T. Dalton** in **1872**, based on information provided by **T.F. Peppe**.

Key Features

Living Megalithic Tradition

- Memorial stones are still erected in memory of deceased ancestors.
- Represents an uninterrupted cultural practice.

Large Megalithic Landscape

- Contains thousands of structures such as **Dolmens, Cromlechs, Menhirs (Standing Stones), Burial Slabs, Cairns** and **Stone Circles**

Tribal Heritage

- Closely linked to the traditions of the **Munda** and other **Adivasi communities**.
- Reflects indigenous beliefs, social customs, and cultural identity.

Significance

- One of India's most important **megalithic heritage sites**.
- Demonstrates remarkable cultural continuity over several centuries.
- Preserves the traditional practices of tribal communities.
- Strengthens India's case for recognition under **UNESCO World Heritage**.
- Provides valuable evidence for the study of prehistoric and tribal societies.
- Promotes awareness of India's rich indigenous cultural heritage.

GEOGRAPHY

PRELIMS POINTERS IN NEWS

HIMAYAT SAGAR LAKE

SOURCE: THE HINDU

Why in News?

The **Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB)** recently opened the floodgates of **Himayat Sagar Lake** following heavy rainfall and increased inflows.



About Himayat Sagar Lake

- **Himayat Sagar Lake** is a **man-made reservoir** situated about **20 km southwest of Hyderabad** in **Telangana**.
- It was constructed across the **Esi River**, a tributary of the **Musi River**, during the rule of the **last Nizam of Hyderabad**.

Location

- Located near **Hyderabad**, **Telangana**.
- Constructed on the **Esi River**.
- Lies parallel to **Osman Sagar Lake**.
- Forms part of the **Musi River basin**.

History

- Constructed during the reign of **Mir Osman Ali Khan**, the last Nizam of Hyderabad.
- Completed in **1927**.
- Named after **Prince Himayat Ali Khan**, the youngest son of the Nizam.
- Built under the supervision of engineer **Khaja Mohinuddin**.

Key Features

- **Type:** Artificial freshwater reservoir.

- **Storage Capacity:** Approximately **3 TMC (Thousand Million Cubic Feet)**.
- **Area:** Around **1,700 acres**.
- Serves as an important **drinking water source** for **Hyderabad** and **Secunderabad**.
- Functions as a major **flood moderation reservoir** for the **Musi River** system.
- Supports groundwater recharge and local biodiversity.
- Surrounded by forested landscapes that provide habitat for birds and wildlife.

DAL LAKE

SOURCE: INDIAN EXPRESS

Why in News?

The **Jammu and Kashmir Lakes and Waterways Development Authority (LAWDA)** recently intensified weed removal operations in **Dal Lake** to improve its ecological health.



About Dal Lake

- **Dal Lake** is a famous **urban freshwater lake** situated in **Srinagar, Jammu & Kashmir**.
- Often referred to as the **"Jewel of Srinagar"** or the **"Jewel in the Crown of Kashmir,"** it is one of India's most celebrated natural attractions.

Location

- Situated in **Srinagar, Jammu & Kashmir**.

- Surrounded by the **Zabarwan Hills**, with the **Pir Panjal Range** in the background.
- Receives its major inflow from the **Telbal Nallah (Stream)**.

Key Features

- **Type:** Urban freshwater lake.
- **Area:** Approximately **18 sq. km**.
- Second-largest lake in Jammu & Kashmir after **Wular Lake**.
- Divided into four major basins:
 - **Gagribal**
 - **Lokut Dal**
 - **Bod Dal**
 - **Nagin** (sometimes treated as a separate lake)
- Contains famous islands:
 - **Char Chinar (Rupa Lank)**
 - **Sona Lank**
- Home to unique **floating gardens (Rad)** where vegetables and flowers are cultivated.
- Famous for **Shikara** rides and the traditional **floating market**.
- Lotus flowers bloom extensively during **July and August**.
- Freezes partially during severe winter conditions.

Ecological and Economic Importance

- Supports rich aquatic biodiversity.
- Sustains fisheries and aquatic vegetation.
- Provides livelihood to thousands of people through tourism, agriculture, and handicrafts.
- Acts as an important freshwater ecosystem in the Kashmir Valley.
- Supports floating agriculture, a unique traditional farming practice.

LONAR LAKE (LONAR CRATER)

SOURCE: THE HINDU

Why in News?

Lonar Lake in **Maharashtra** has recently attracted scientific attention as its **water level is rising**, even while reservoirs and groundwater levels in the state are declining.



About Lonar Lake

- **Lonar Lake**, also known as the **Lonar Crater**, is a unique **meteorite impact crater lake** located in **Buldhana District, Maharashtra**.
- It is one of the world's most remarkable geological formations because it was created by a **meteorite impact** on the **basaltic rocks of the Deccan Plateau**.
- The lake is internationally recognised for its unusual **saline and alkaline water**, rich biodiversity, and exceptional geological importance.
- Owing to its scientific and ecological value, it has been designated as a **Ramsar Site (Wetland of International Importance)**.

Location

- Situated in **Buldhana District, Maharashtra**.
- Formed within the **Deccan Traps**, one of the world's largest volcanic basalt provinces.
- Located approximately **500 km east of Mumbai**.

Formation

- Formed by the impact of a **meteorite** around **50,000 years ago** (estimated).
- Diameter is about **1.8 km**, with a nearly circular crater.
- Earlier believed to be a volcanic crater, but scientific studies confirmed its **meteoritic origin**.

Key Features

- **World's only known meteorite impact crater formed entirely in basaltic rock.**
- One of the few **saline and alkaline crater lakes** in the world.
- Water contains high concentrations of salts and minerals due to chemical weathering of basalt.
- Receives freshwater through natural springs around the crater.
- Emits gases such as:
 - **Methane**
 - **Carbon dioxide**
 - **Hydrogen sulphide**
- Lake water occasionally changes colour from **green to pink**, mainly due to the growth of **halophilic**

microorganisms and algae under changing environmental conditions.

- Surrounded by several **ancient temples** dating back to the medieval period.

Mentioned in ancient texts including the **Puranas** and the **Ain-i-Akbari**.

CASPIAN SEA

SOURCE: DTE

Why in News?

Recent studies indicate that the **Caspian Sea** has lost nearly **24,000 sq. km** of surface area since the mid-1990s due to declining water levels.



About Caspian Sea

- The **Caspian Sea** is the **largest enclosed inland water body** on Earth, often described as the world's largest lake.
- It lies between **Europe and Asia** and is surrounded by **five countries**.
- Despite being called a "sea," it has **no natural outlet to the oceans**, making it an **endorheic basin**.

Location

- Situated between **Europe and Asia**.

- Bordered by:
 - Russia
 - Kazakhstan
 - Turkmenistan
 - Iran
 - Azerbaijan

Key Features

Endorheic Basin

- Water does not flow into any ocean.
- Water loss occurs mainly through **evaporation**.

Water Sources

Major rivers flowing into the Caspian Sea include:

- Volga River** (largest contributor)
- Ural River**
- Terek River**

Water Characteristics

- Northern region contains relatively **freshwater**.
- Southern region is comparatively **more saline**.

Major Islands

- Chechen**
- Tyuleny**
- Kulaly**
- Ogurchinsky**
- Zhiloy**

Important Cities

- Baku** (Azerbaijan)
- Aktau** (Kazakhstan)
- Nowshahr** (Iran)

Natural Resources

- Contains one of the world's largest reserves of:
 - Petroleum**
 - Natural Gas**
- Supports an important **fishing industry**, particularly for **sturgeon**, the primary source of **caviar**.
- Rich in marine biodiversity, including the endangered **Caspian Seal**, the only marine mammal found in the sea.

LAKE BAIKAL

SOURCE: THE HINDU

Why in News?

Researchers recently identified the **oldest known strains of Yersinia pestis** (the plague-causing bacterium) from ancient human remains discovered near **Lake Baikal**.



Lake Baikal the blue gem of the Siberia

About Lake Baikal

- **Lake Baikal** is the **oldest, deepest**, and one of the **largest freshwater lakes** in the world.
- It is located in **southern Siberia, Russia**, close to the **Mongolian border**.
- Formed in an active **continental rift zone**, the lake is estimated to be **20–25 million years old**, making it the world's oldest existing freshwater lake.
- Due to its exceptional biodiversity, geological importance, and vast freshwater reserves, it has been designated a **UNESCO World Heritage Site**.

Location

- Situated in **southern Eastern Siberia, Russia**.
- Lies near the **Russia–Mongolia border**.
- Formed within the **Baikal Rift Zone**, one of the world's oldest active continental rift systems.

Key Features

Physical Characteristics

- **Age:** Approximately **20–25 million years**.
- **Maximum Depth:** **1,642 metres**, making it the **deepest freshwater lake** in the world.
- Contains nearly **20% of the world's unfrozen surface freshwater**, the highest for any single lake.
- Beneath the lake lies nearly **7 km of sediment**, recording millions of years of Earth's geological history.

Hydrology

- Receives water from more than **330 rivers and streams**.
- Major inflowing rivers include **Selenga, Upper Angara, Barguzin, Turka and Sarma**.
- Has only **one outlet**—the **Angara River**.

Islands

- Contains around **45 islands and islets**.
- **Olkhon Island** is the largest and holds cultural and ecological importance.

Biodiversity

- Home to thousands of plant and animal species, many of which are **endemic**.
- Famous for the **Baikal Seal (Nerpa)**, the world's only exclusively freshwater seal.

Local Communities

The eastern shores are inhabited by the **Buryat people**, who traditionally practise **Tibetan Buddhism** and animal husbandry.

VAIGAI RIVER

SOURCE: THE HINDU

Why in News?

Residents of **Madurai** recently raised concerns over the dumping of municipal waste along the **Vaigai River**, highlighting the need for better river conservation.



About Vaigai River

- The **Vaigai River** is one of the major east-flowing rivers of **Tamil Nadu** and has played a significant role in the state's history, agriculture, and culture.
- It is often referred to as the "**Lifeline of Madurai**", as it provides water for irrigation and drinking purposes to several districts.

Origin and Course

- **Origin:** **Varusanadu Hills** of the **Western Ghats**.
- Flows eastwards through **Theni, Dindigul, Madurai, Sivagangai** and **Ramanathapuram**.
- Finally empties into the **Palk Strait** near **Ramanathapuram**.

Key Features

Length

- Approximately **256 km** long.

Major Tributaries

- **Suruli River**
- **Mullaiyar River**
- **Varaha River**
- **Manjalar River**

Periyar Diversion

- Receives significant water through the **Periyar Project**.

- Water from the **Periyar River (Kerala)** is diverted to the Vaigai Basin via a tunnel through the Western Ghats.

Major Dam

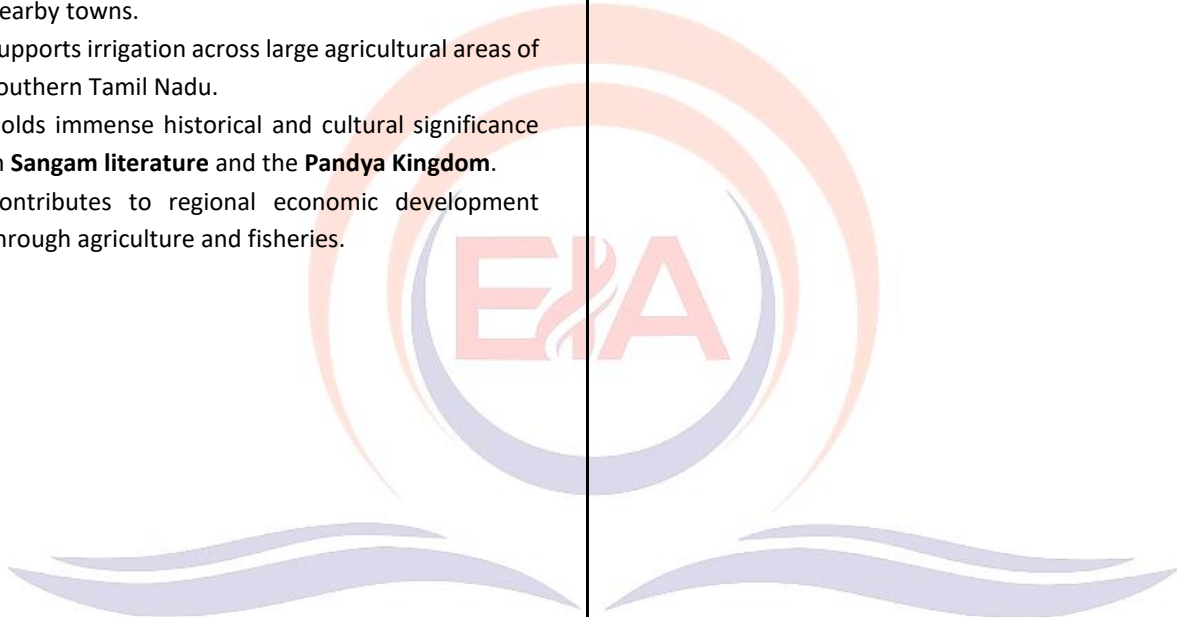
- **Vaigai Dam** is located near **Andipatti** in **Theni District**.
- Provides:
 - Irrigation water
 - Drinking water
 - Flood regulation

Other Features

- Forms the scenic **Vattaparai Falls**.
- Supports agriculture, especially paddy, sugarcane, pulses, and horticultural crops.

Significance

- Major source of **drinking water** for **Madurai** and nearby towns.
- Supports irrigation across large agricultural areas of southern Tamil Nadu.
- Holds immense historical and cultural significance in **Sangam literature** and the **Pandya Kingdom**.
- Contributes to regional economic development through agriculture and fisheries.



ENVIRONMENT

BIODIVERSITY AND CONSERVATION

THE POWER OF MANGROVES OVER SEAWALLS

SOURCE: THE HINDU

Why in News?

The impact of **Cyclone Dana** along the Odisha coast highlighted how **mangrove forests significantly reduced storm damage**, reinforcing their role as natural coastal protectors.

What is Ecosystem-based Adaptation (EbA)?

- **Ecosystem-based Adaptation (EbA)** is an approach that uses **healthy ecosystems and biodiversity** to help communities adapt to the adverse effects of climate change.
- Instead of depending only on **grey infrastructure** such as seawalls and embankments, EbA strengthens natural ecosystems like **mangroves, coral reefs, wetlands, dunes, and seagrass beds** to reduce disaster risks.
- EbA combines **climate adaptation, biodiversity conservation, and sustainable livelihoods**, making it an important component of climate-resilient development.



Why are Mangroves Important?

Natural Protection Against Cyclones

- Dense mangrove forests absorb the energy of **storm surges and high waves**, reducing their impact on coastal settlements.
- Their complex root systems act as natural barriers against strong winds and tidal waves.

Control Coastal Erosion

- Mangrove roots stabilize coastal soils by trapping sediments.
- They reduce shoreline erosion and help coastlines naturally adjust to rising sea levels.

Excellent Carbon Sinks

- Mangroves store significant amounts of **Blue Carbon**, capturing much more carbon per unit area than many terrestrial forests.
- This contributes to **climate change mitigation** while protecting coastal ecosystems.

Rich Biodiversity

- Mangroves provide breeding and nursery grounds for **fish, crabs, prawns, molluscs, reptiles, birds, and mammals**.
- They support fisheries and strengthen food security for coastal communities.

Support Livelihoods

- Local communities depend on mangroves for **fisheries, honey collection, eco-tourism, and sustainable forest products**, improving livelihood security.

Mangroves vs Seawalls

Mangroves	Seawalls
Absorb wave energy naturally	Reflect wave energy, often increasing erosion nearby
Self-regenerating ecosystem	Require frequent maintenance and repairs
Store carbon and improve biodiversity	Provide no ecological benefits
Support fisheries and livelihoods	Limited social and environmental benefits
Cost-effective in the long run	High construction and maintenance costs

Major Mangrove Areas in India

- **Sundarbans (West Bengal)** – World's largest mangrove ecosystem and UNESCO World Heritage Site.
- **Bhitarkanika (Odisha)** – India's second-largest mangrove forest.

- Godavari-Krishna Delta (Andhra Pradesh).
- Pichavaram and Muthupet (Tamil Nadu).
- Gulf of Kachchh (Gujarat).
- Andaman & Nicobar Islands.

Government Initiatives

- **MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes)** launched in **2023** promotes mangrove restoration through convergence of **MGNREGS, CAMPA Fund, and other schemes**.
- **National Coastal Mission** under the **National Action Plan on Climate Change (NAPCC)** supports sustainable coastal management.
- **Integrated Coastal Zone Management (ICZM)** promotes ecosystem conservation and climate-resilient coastal development.
- **Green India Mission, CAMPA, and National Biodiversity Action Plan** also support mangrove conservation.
- India is a Party to the **Ramsar Convention, Convention on Biological Diversity (CBD)** and the **Paris Agreement**, all of which encourage ecosystem-based climate adaptation.

Challenges

- Large-scale destruction of mangroves due to **urbanization, aquaculture, ports, industries, and tourism**.
- Preference for visible **grey infrastructure** over nature-based solutions.
- Fragmented institutional coordination among coastal management agencies.
- Limited funding for ecosystem restoration compared to engineered coastal protection.
- Pollution, sea-level rise and climate change continue to degrade mangrove ecosystems.

Way Forward

- Integrate **Ecosystem-based Adaptation (EbA)** into all coastal development and disaster management plans.
- Expand **MISHTI** and undertake large-scale mangrove restoration in vulnerable coastal districts.
- Increase funding for **nature-based coastal protection** alongside engineered infrastructure.
- Promote **community-led mangrove conservation**, especially involving women Self-Help Groups (SHGs), fisher communities and local institutions.
- Strengthen scientific monitoring using **remote sensing, GIS and Blue Carbon assessment** to evaluate ecosystem health and climate benefits.

- Encourage hybrid approaches combining **natural ecosystems with engineered structures** wherever necessary.

Conclusion

Mangroves are not merely coastal forests but natural climate shields that simultaneously protect lives, conserve biodiversity and support livelihoods, making ecosystem-based adaptation an essential pillar of India's long-term coastal resilience and sustainable development strategy.

CLIMATE CHANGE AND POLLUTION

THE TWIN CLIMATE AND ENERGY CRISES

SOURCE: DTE

Why in News?

During **London Climate Action Week 2026**, **UN Secretary-General António Guterres** warned that the world is facing both a **climate crisis** and an **energy crisis**, mainly due to excessive dependence on **fossil fuels**.



What are the Twin Climate and Energy Crises?

- The **Climate Crisis** refers to rising global temperatures caused by excessive emissions of **greenhouse gases (GHGs)** such as **Carbon Dioxide (CO₂), Methane (CH₄) and Nitrous Oxide (N₂O)**.
- The **Energy Crisis** refers to disruptions in energy supplies, rising fuel prices and increasing dependence on imported fossil fuels due to geopolitical tensions and supply-chain disruptions.
- Since both crises originate from excessive reliance on fossil fuels, expanding **renewable energy** offers a common long-term solution.

Major Concerns Highlighted by the United Nations

Accelerating Climate Change

- The world has recorded several of its **warmest years** in recent history, indicating that global temperatures are moving closer to the **1.5°C limit** under the **Paris Agreement (2015)**.
- Rising temperatures are increasing the frequency of **heat waves, floods, droughts, wildfires and cyclones**, threatening ecosystems, agriculture and livelihoods.

Growing Energy Insecurity

- Conflicts in **West Asia** and disruptions in important maritime routes have increased crude oil and natural gas prices.
- Countries dependent on fossil fuel imports face higher inflation and greater economic uncertainty.

Methane Emissions

- **Methane (CH₄)** is one of the most powerful greenhouse gases and contributes significantly to global warming.
- Major sources include:
 - Oil and gas operations.
 - Livestock and agriculture.
 - Landfills and waste management.
- The **Global Methane Pledge**, launched at **COP26**, aims to reduce global methane emissions by **30% by 2030**.

Rising Energy Demand from AI

- Expansion of **Artificial Intelligence (AI)** and large **data centres** is expected to sharply increase electricity demand.
- This makes it essential to power digital infrastructure using **solar, wind, hydropower and other renewable sources**.

Barriers to Clean Energy Transition

Weak Power Infrastructure

- Existing electricity grids are not adequately equipped to integrate large-scale renewable energy generation.

Limited Energy Storage

- Lack of advanced battery storage affects the reliability of solar and wind power.

Climate Finance Gap

- Developing countries face higher borrowing costs for renewable energy projects, slowing the transition.

Regulatory Delays

- Lengthy approval procedures and land acquisition issues delay clean energy investments.

Global Initiatives Supporting Climate Action

- The **United Nations Framework Convention on Climate Change (UNFCCC)** provides the global framework for climate negotiations.
- The **Paris Agreement (2015)** aims to limit global warming to **well below 2°C**, while pursuing efforts to restrict it to **1.5°C**.
- The **International Solar Alliance (ISA)**, jointly launched by **India and France**, promotes solar energy deployment among sunshine-rich countries.
- The **Coalition for Disaster Resilient Infrastructure (CDRI)** focuses on building climate-resilient infrastructure.
- Every year, the **Conference of Parties (COP)** reviews global climate commitments and strengthens international cooperation.

Significance for India

Energy Security

- Increasing renewable energy reduces dependence on imported crude oil and natural gas.

Climate Commitments

- Supports India's **Panchamrit** commitments announced at **COP26**, including:
 - **500 GW non-fossil fuel electricity capacity by 2030.**
 - **50% of installed electricity capacity from non-fossil sources by 2030.**
 - **Reduction of emission intensity of GDP by 45% by 2030 (from 2005 levels).**
 - **Net Zero emissions by 2070.**

Green Economic Growth

- Renewable energy promotes employment, attracts investment and supports sustainable industrial development.

Environmental Protection

- Lower fossil fuel consumption improves air quality, reduces carbon emissions and protects biodiversity.

Challenges

- Continued dependence on fossil fuels for meeting energy demand.
- High capital investment required for renewable energy infrastructure.
- Inadequate transmission networks and storage facilities.
- Limited climate finance for developing countries.
- Balancing economic development with environmental sustainability.

Way Forward

- Accelerate investment in **solar energy, wind energy, green hydrogen and battery storage technologies**.
- Modernise electricity grids to integrate higher shares of renewable energy.
- Implement stricter policies for reducing **methane emissions** from agriculture, waste and fossil fuel industries.
- Increase international climate finance and technology transfer to developing countries.
- Promote **energy efficiency**, electric mobility and circular economy practices.
- Strengthen global cooperation through initiatives such as the **UNFCCC, Paris Agreement, International Solar Alliance (ISA) and CDRI** to ensure a just and sustainable energy transition.

Conclusion

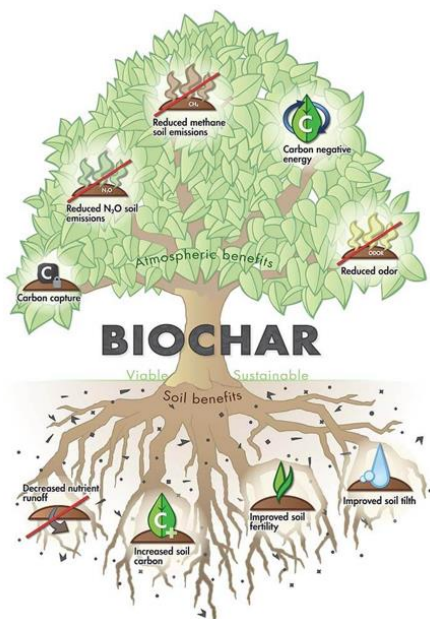
The climate and energy crises are deeply interconnected, and accelerating the transition towards **clean energy, strengthening climate finance and promoting international cooperation** are essential for achieving energy security, sustainable development and global climate resilience.

BIOCHAR: TURNING AGRICULTURAL WASTE INTO CLIMATE WEALTH

SOURCE: THE HINDU

Why in News?

Rising **stubble burning** in **Punjab and Haryana** has once again highlighted the twin challenges of **air pollution** and **declining soil fertility**, bringing **biochar** into focus as a sustainable solution.



What is Biochar?

- **Biochar** is a **carbon-rich solid** obtained by heating **biomass** (crop residues, agricultural waste, forestry waste, coconut shells, rice husk, etc.) at **high temperatures in the absence or limited presence of oxygen**, a process known as **Pyrolysis**.
- Unlike compost, biochar decomposes very slowly and can remain in soil for **hundreds of years**, making it an effective tool for **long-term carbon sequestration**.
- It acts as a **soil conditioner**, improving soil fertility, water retention and microbial activity.

Need for Biochar in India

Addressing Crop Residue Burning

- Every year, **Punjab and Haryana** burn millions of tonnes of paddy straw because farmers have very little time between harvesting and sowing the next crop.
- Burning releases **greenhouse gases (GHGs)** and **Particulate Matter (PM_{2.5})**, worsening air pollution across northern India.

Improving Soil Health

- Many Indian agricultural soils suffer from **low Soil Organic Carbon (SOC)**, resulting in poor fertility and reduced water-holding capacity.
- Biochar restores soil carbon and enhances long-term productivity.

Climate Change Mitigation

- Biochar locks carbon into the soil for long periods, reducing atmospheric **Carbon Dioxide (CO₂)**.
- It contributes to India's commitment of achieving **Net Zero emissions by 2070**.

Promoting Circular Economy

- Agricultural biomass, instead of becoming waste, is converted into a productive resource, supporting **resource efficiency** and reducing environmental pollution.

Benefits of Biochar

Environmental Benefits

- Reduces **stubble burning** and associated air pollution.
- Enhances **carbon sequestration**, helping mitigate climate change.
- Improves biodiversity by promoting beneficial soil microorganisms.

Agricultural Benefits

- Increases **soil organic carbon**.
- Improves **water retention**, especially in drought-prone areas.

- Enhances nutrient availability and reduces fertilizer losses.
- Improves crop productivity, particularly in degraded soils.

Economic Benefits

- Converts agricultural waste into a value-added product.
- Provides opportunities for farmers to earn additional income through **carbon credits**.
- Reduces dependence on chemical fertilizers over time.

Role of Carbon Markets

- Biochar stores carbon in a stable form, making it eligible for **carbon credit generation** under recognised carbon accounting standards.
- Through **Measurement, Reporting and Verification (MRV)** systems, carbon stored in biochar can be certified and traded in **voluntary carbon markets**.
- Farmer Producer Organisations (FPOs), cooperatives and village-level enterprises can aggregate biomass and participate in carbon markets, creating new income opportunities for small farmers.

Government Initiatives and Policy Support

- **National Mission for Sustainable Agriculture (NMSA)** promotes sustainable soil management and climate-resilient agriculture.
- The **Soil Health Card Scheme** encourages balanced nutrient management and improvement of soil fertility.
- The **National Policy on Biofuels** and **GOBARdhan Scheme** promote scientific utilisation of agricultural and organic waste.
- Programmes such as **Natural Farming** and **Paramparagat Krishi Vikas Yojana (PKVY)** can integrate biochar as a sustainable soil amendment.
- Biochar also supports India's commitments under the **Paris Agreement**, **Nationally Determined Contributions (NDCs)** and the **Long-Term Low Emission Development Strategy (LT-LEDS)**.

Challenges

- Limited awareness among farmers regarding biochar production and benefits.
- High initial investment required for **pyrolysis units** and processing facilities.

- Absence of a robust **MRV framework** for smallholder participation in carbon markets.
- Weak market linkages for biochar and carbon credits.
- Lack of institutional mechanisms to aggregate biomass at the village level.

Way Forward

- Promote decentralized **pyrolysis units** through financial assistance and public-private partnerships.
- Develop a national **MRV framework** to facilitate participation of farmers in carbon credit markets.
- Strengthen **Farmer Producer Organisations (FPOs)** and cooperatives to aggregate crop residues and market biochar.
- Integrate biochar into **Natural Farming, Soil Health Mission** and climate adaptation programmes.
- Encourage research, innovation and demonstration projects through agricultural universities and **ICAR** to improve adoption.
- Establish dedicated supply chains linking biomass collection, biochar production and carbon markets to create a viable rural green economy.

Conclusion

Biochar offers a **sustainable solution to India's interconnected challenges of stubble burning, declining soil fertility and climate change, and creating an integrated ecosystem of technology, carbon markets** and institutional support will be essential to transform agricultural waste into a valuable resource for farmers and the environment.

INDIAN INITIATIVES, EFFORTS AND COMMITMENTS

INDIA CALLS FOR DIALOGUE ON CLIMATE FINANCE

SOURCE: THE HINDU

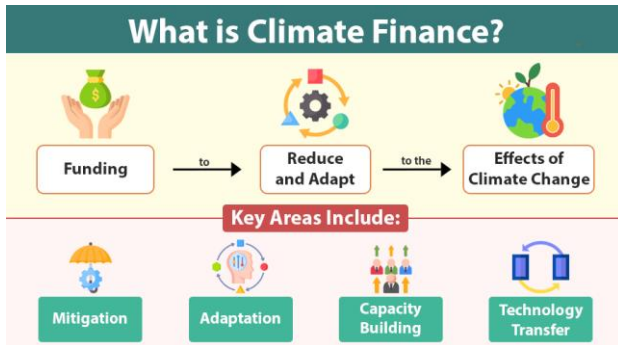
Why in News?

At the **UN Climate Change Conference (SB62)** held in **Bonn, Germany**, India urged developed countries to address the **declining flow of international climate finance** and the widening **adaptation funding gap**.

What is Climate Finance?

- **Climate Finance** refers to **financial resources provided from public, private, domestic and international sources** to support activities related to **climate change mitigation and adaptation**.

- It aims to:
 - Reduce **Greenhouse Gas (GHG) emissions (Mitigation)**.
 - Build resilience against climate impacts (**Adaptation**).
 - Support **capacity building, technology transfer, and climate-resilient development**.



Need for Climate Finance

Supporting Climate Mitigation

- Developing countries require financial assistance to expand **renewable energy**, improve **energy efficiency**, and reduce dependence on fossil fuels.

Strengthening Climate Adaptation

- Climate finance helps countries invest in:
 - Climate-resilient agriculture.
 - Water resource management.
 - Disaster-resilient infrastructure.
 - Coastal protection and ecosystem restoration.

Promoting Climate Justice

- Developed countries have contributed the largest share of **historical greenhouse gas emissions**.
- Therefore, they have a greater responsibility to assist developing nations in combating climate change.

Achieving Sustainable Development

- Climate finance supports both **economic development** and **environmental sustainability**, particularly in vulnerable developing economies.

International Framework on Climate Finance

1. United Nations Framework Convention on Climate Change (UNFCCC), 1992

- Recognizes the principle of **Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC)**.
- Places greater financial responsibility on developed countries.

2. Paris Agreement (2015)

- **Article 9** requires developed countries to provide financial resources to assist developing nations in climate action.
- Encourages developed countries to continue taking the lead in mobilizing climate finance.

3. New Collective Quantified Goal (NCQG)

- The NCQG will replace the earlier **USD 100 billion annual climate finance goal** after 2025.
- It aims to establish a **new global climate finance target** based on the evolving needs of developing countries.

4. Green Climate Fund (GCF)

- Established under the **UNFCCC** to finance mitigation and adaptation projects in developing countries.
- It is currently the world's largest multilateral climate finance mechanism.

India's Concerns

Large Adaptation Finance Gap

- Developing countries require significantly higher financial support for climate adaptation than what is currently available.
- Adaptation projects often receive much lower funding compared to mitigation projects.

Declining Financial Flows

- Despite increasing climate challenges, actual concessional finance from developed countries remains inadequate.

Shift from Grants to Loans

- A large portion of climate finance is being provided as **loans instead of grants**, increasing the debt burden of developing nations.

Unilateral Climate Measures

- Trade measures such as the **European Union's Carbon Border Adjustment Mechanism (CBAM)** may adversely affect exports from developing countries without providing adequate financial support for green transitions.

Need for Transparency

- India has called for transparent accounting and monitoring of climate finance commitments to ensure accountability.

Challenges in Global Climate Finance

- Failure of developed countries to fully meet climate finance commitments.
- Slow disbursement of funds through international financial institutions.
- Complex approval procedures under the **Green Climate Fund (GCF)**.
- Unequal distribution of climate finance between mitigation and adaptation.
- High borrowing costs faced by developing countries for green investments.

India's Stand

- India supports the principle of **Climate Justice**, emphasizing that countries with higher historical emissions should bear greater responsibility.
- India has aligned with developing country groups such as:
 - G77 + China**
 - BASIC (Brazil, South Africa, India and China)**
 - Like-Minded Developing Countries (LMDCs)**
- India advocates that climate finance should be:
 - Adequate**
 - Predictable**
 - Grant-based wherever possible**
 - Accessible without cumbersome procedures**

Way Forward

- Developed countries should fully implement their obligations under **Article 9 of the Paris Agreement** by providing adequate financial resources.
- Finalize an ambitious and transparent **New Collective Quantified Goal (NCQG)** that reflects the actual needs of developing countries.
- Simplify access to climate funds by reforming the **Green Climate Fund (GCF)** approval process.
- Increase financial support for **adaptation**, especially for vulnerable countries facing severe climate impacts.
- Strengthen technology transfer, capacity building and partnerships between developed and developing countries to accelerate low-carbon development.

- Ensure that climate-related trade measures remain consistent with the principles of **equity, CBDR-RC, and sustainable development**.

Conclusion

Climate finance remains the foundation of **global climate cooperation, and ensuring timely, adequate and equitable financial support to developing countries** will be essential for achieving the goals of the Paris Agreement while promoting climate justice and sustainable development.

DISASTER MANAGEMENT

INDIA AND URBAN FIRE ACCIDENTS

SOURCE: THE HINDU

Why in News?

A devastating fire at an unauthorized **bed-and-breakfast (B&B)** facility in **Malviya Nagar, New Delhi**, claimed **21 lives**, including several foreign nationals, raising serious concerns about urban fire safety.

What are Urban Fire Accidents?

- Urban fire accidents** are fires occurring in **residential buildings, commercial establishments, industries, hospitals, hotels, educational institutions, markets, and public places** within urban areas.
- They are generally caused by **electrical failures, gas leaks, inflammable materials, human negligence, and violations of fire safety regulations**.
- Due to dense construction and congestion, urban fires spread rapidly and complicate rescue operations.

Why Are Fire Accidents Increasing in Indian Cities?

Fire accidents are escalating in urban centers due to rapid, unregulated vertical urbanization, high density of commercial establishments, rampant violations of local building bylaws, and a severe lack of modernization in aging municipal fire departments.

Major Causes of Urban Fire Accidents

Electrical Short Circuits

- Faulty wiring, overloaded electrical systems, illegal power connections, and poor maintenance are among the leading causes of urban fires.



Violation of Building Safety Norms

- Unauthorized construction, illegal floor additions, blocked staircases, and absence of emergency exits significantly increase fire risks.

Lack of Fire Safety Equipment

- Many buildings operate without **fire extinguishers, smoke detectors, sprinkler systems, fire alarms, or emergency lighting.**

Storage of Inflammable Materials

- Improper storage of LPG cylinders, chemicals, plastics, fuels, and combustible goods accelerates fire spread.

Poor Maintenance and Human Negligence

- Failure to conduct periodic electrical inspections, fire drills, and equipment maintenance often results in avoidable disasters.

Major Fire Safety Framework in India

National Building Code (NBC) 2016

- Prescribes comprehensive standards for **fire prevention, structural safety, emergency exits, firefighting systems, and evacuation procedures.**

State Fire Services Acts

- Fire prevention and firefighting are primarily State subjects, and States enact their own fire safety laws and regulations.

Disaster Management Act, 2005

- Provides the institutional framework for disaster prevention, preparedness, response, and mitigation, including urban fire disasters.

National Disaster Management Authority (NDMA)

- NDMA has issued detailed **Guidelines on the Management of Urban Fires**, emphasizing prevention, preparedness, emergency response, and capacity building.

Fire No Objection Certificate (Fire NOC)

- Commercial buildings, hospitals, hotels, schools, malls, and high-rise buildings are required to obtain a **Fire NOC** before commencing operations.

Major Fire Disasters in India

- Dabwali School Fire (1995)** – Over **500 people** lost their lives during a school function.
- Uphaar Cinema Fire, Delhi (1997)** – **59 people** died due to smoke inhalation and blocked exits.
- Kumbakonam School Fire (2004)** – **94 schoolchildren** died after a fire engulfed a thatched classroom.
- AMRI Hospital Fire, Kolkata (2011)** – Around **90 people** died due to toxic smoke.
- Rajkot TRP Game Zone Fire (2024)** – Multiple deaths exposed serious violations of fire safety regulations.

These incidents reveal recurring failures in **building compliance, emergency preparedness, and regulatory enforcement.**

Challenges in Urban Fire Safety

Weak Enforcement

- Many commercial establishments continue operating without valid **Fire NOCs** or periodic safety inspections.

Rapid Urbanization

- Congested urban settlements, narrow roads, and unauthorized constructions obstruct firefighting and evacuation.

Inadequate Fire Infrastructure

- Many urban local bodies face shortages of **modern firefighting equipment, trained personnel, and fire stations.**

Poor Public Awareness

- Lack of knowledge regarding evacuation procedures and emergency response often results in panic and higher casualties.

Institutional Coordination Issues

- Weak coordination among **municipal authorities, fire departments, electricity agencies, and building regulators** delays preventive action.

Way Forward

- Strictly enforce **National Building Code (NBC) 2016** provisions and make periodic fire safety audits mandatory for all high-risk buildings.
- Digitally integrate **Fire NOC** systems with municipal licensing to prevent unauthorized commercial operations.
- Upgrade urban firefighting infrastructure with **modern fire stations, hydraulic platforms, drones, thermal imaging cameras, and compact fire engines.**
- Conduct regular **fire safety drills**, evacuation exercises, and awareness campaigns in schools,

hospitals, hotels, industries, and residential complexes.

- Promote **smart fire detection systems**, automatic sprinklers, smoke sensors, and IoT-based early warning technologies.

Conclusion

The Malviya Nagar tragedy demonstrates that urban fire disasters are **largely preventable through strict enforcement, resilient infrastructure, and greater public awareness, and building a culture of fire safety** must become an integral part of India's urban governance and disaster management strategy.

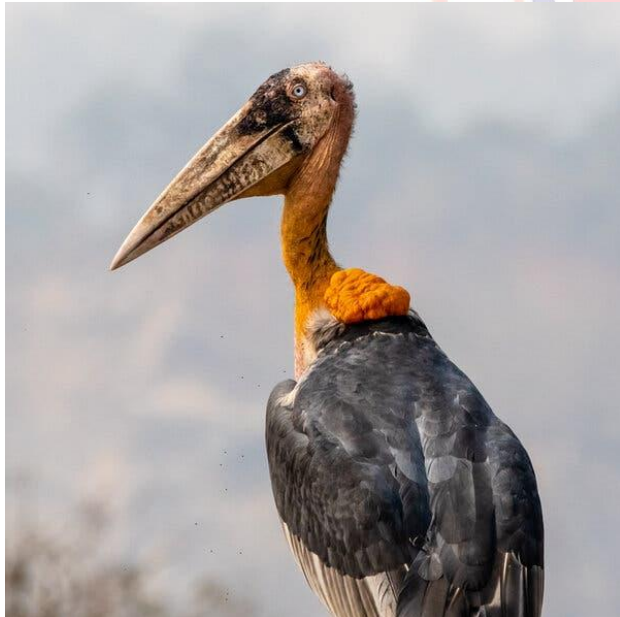
PRELIMS POINTERS IN NEWS

HARGILA BIRD

SOURCE: THE HINDU

Why in News?

The **Prime Minister** recently appreciated the efforts of the '**Hargila Army**', a women-led conservation movement in **Assam**, for protecting the **Hargila Bird** and its nesting habitats.



About Hargila Bird

- The **Hargila Bird**, scientifically known as **Leptoptilos dubius**, is commonly called the **Greater Adjutant Stork**.
- It is one of the **largest stork species** in the world and belongs to the **family Ciconiidae**.

Habitat and Distribution

Habitat

- Prefers:
 - **Wetlands**
 - **Floodplains**
 - **Freshwater marshes**
 - **Shallow lakes**
 - **Riverbanks**
 - **Seasonally flooded forests**
- Often nests on tall trees located near human settlements.

Distribution

- Found mainly in **Assam** and **Bihar**
- Outside India, it is also found in **Cambodia**, which hosts another important breeding population.

Key Features

- One of the **largest flying birds** in Asia.
- Characterised by:
 - Long legs
 - Massive bill
 - Bare neck
 - Hanging throat pouch
- Usually seen alone or in small groups while foraging.
- Breeding season generally occurs during the **winter months**.
- Builds large nests on tall trees in colonies.

Conservation Status

- **IUCN Red List: Endangered** (latest status; earlier classifications in some older sources may differ).
- **Wild Life (Protection) Act, 1972: Schedule IV**.

TETRASTICHUS NARAYANDEBNATHI

SOURCE: TIMES OF INDIA

Why in News?

Scientists recently discovered a new species of **parasitoid wasp** in **West Bengal** and named it **Tetrastichus narayandebnathi** in honour of renowned cartoonist **Narayan Debnath**.



About Tetrastichus narayandebnathi

- **Tetrastichus narayandebnathi** is a newly identified species of **parasitoid wasp** belonging to the family **Eulophidae**.

Discovery

- **Location:** Rajarhat, West Bengal.
- Named in honour of **Narayan Debnath**, one of India's most celebrated cartoonists.

Key Features

- Belongs to the genus **Tetrastichus**.
- Classified as a **parasitoid wasp**.

What is a Parasitoid?

- A parasitoid spends most of its life cycle on or inside a single host organism.
- Unlike ordinary parasites, it eventually **kills its host** after completing development.
- This species parasitises the **pupa of tortoise beetles (Cassidinae)**.
- It is a **gregarious parasitoid**, meaning multiple larvae develop within a single host.

Scientific Importance

- Represents only the **second recorded species in India** from this genus associated with **Cassidinae** beetles.
- Among the **86 valid Indian species** of the genus **Tetrastichus**, this discovery provides valuable taxonomic information.
- Improves understanding of insect diversity and ecological interactions.

Ecological Importance

- Acts as a **natural biological control agent** by regulating beetle populations.
- Reduces dependence on chemical pesticides.
- Helps maintain ecological balance in agricultural ecosystems.
- Supports sustainable and environmentally friendly pest management.

HEMISCYLLIUM DUDGEONAE (WALKING SHARK)

SOURCE: THE HINDU

Why in News?

Scientists have recently identified a **new species of walking shark**, named **Hemiscyllium dudgeonae**, in the waters of **Papua New Guinea**.



About Hemiscyllium dudgeonae

- **Hemiscyllium dudgeonae** is a newly identified species belonging to the **walking sharks**, a unique group of small benthic sharks under the genus **Hemiscyllium**.
- Unlike most sharks that rely mainly on swimming, walking sharks use their **muscular pectoral and pelvic fins** to move across the sea floor, giving them a distinctive "walking" behaviour.
- Locally, it is known as "**Kadedekedewa**", meaning "**Lazy Shark**."

Distribution

- Found in **Milne Bay, Papua New Guinea**.
- Walking sharks of the genus **Hemiscyllium** are generally distributed in the tropical waters of:
 - **Australia**
 - **Indonesia**
 - **Papua New Guinea**

Key Features

Walking Behaviour

- Uses **pectoral and pelvic fins** to "walk" across the seabed.
- Can crawl between **shallow tidal pools** when water levels recede.

Size

- Generally grows to **70–80 cm** in length.

Habitat

- Lives in **shallow coastal waters**, coral reefs, lagoons, and tidal pools.
- Usually found at depths of **less than 10 metres**.

Limited Movement

- Has a **small home range** and may spend its entire life within a few hundred square metres.

Reproduction

- **Oviparous** (egg-laying).

Females lay **egg cases** on the sea floor, where young hatch close to their parents' habitat.

BLUE SWIMMER CRAB

SOURCE: INDIAN EXPRESS

Why in News?

The ICAR–Central Institute of Brackishwater Aquaculture (ICAR-CIBA), Chennai, has successfully demonstrated **Blue Swimmer Crab farming technology** for the first time in India.



About Blue Swimmer Crab

- The **Blue Swimmer Crab** (*Portunus reticulatus*) is a marine crab belonging to the **Portunidae** family, commonly known as **swimming crabs**.
- It is valued for its high-quality meat and has significant commercial importance in fisheries and aquaculture.

Distribution in India

- Occurs along both the **east and west coasts**.
- Major fishing grounds include:
 - **Palk Bay**
 - **Gulf of Mannar**

Key Features

Appearance

- Recognised by:
 - **Bluish body colour**
 - **Flat paddle-shaped hind legs** adapted for swimming.
 - **Nine sharp spines** on each side of the carapace.

Habitat

- Inhabits:
 - Estuaries
 - Coastal waters
 - Mangroves
 - Brackishwater ecosystems
 - Sandy and muddy seabeds

Behaviour

- Remains buried beneath sand or mud during daytime and colder months.
- Emerges mainly during **high tide** for feeding.

Diet

- Carnivorous and opportunistic feeder.

TAPANULI ORANGUTAN

SOURCE: DOWN TO EARTH

Why in News?

A recent report revealed that severe **floods and landslides** in **Sumatra, Indonesia**, wiped out nearly **7% of the global population** of the **Tapanuli Orangutan**.



About Tapanuli Orangutan

- The **Tapanuli Orangutan** (*Pongo tapanuliensis*) is the **rarest and most recently identified species of orangutan**, officially recognised as a separate species in **2017**.
- It is one of the **three living orangutan species**, the other two being the **Bornean Orangutan** (*Pongo pygmaeus*) and the **Sumatran Orangutan** (*Pongo abelii*).

Habitat and Distribution

Habitat

- Inhabits **tropical and subtropical moist broadleaf forests**.
- Prefers dense forest canopies with abundant fruit-bearing trees.

Distribution

- **Endemic to the Batang Toru Ecosystem in North Sumatra, Indonesia**.
- Found nowhere else in the world.

Key Features

Physical Characteristics

- Similar in appearance to the **Sumatran Orangutan**.
- Possesses:
 - Frizzy hair
 - Smaller head
 - Broader and flatter face
- Adult males develop:
 - Prominent **moustaches**
 - Large cheek pads (**flanges**)
- Both males and females have **beards**.
- Males are generally larger than females.

Behaviour

- Entirely **arboreal**, spending almost its entire life in trees.
- Mostly **solitary**, except mothers caring for offspring.
- **Diurnal**, remaining active during the daytime.
- Builds nests from branches high in the canopy for sleeping.
- Communicates using vocal calls and body movements.

Conservation Status

- **Scientific Name:** Pongo tapanuliensis
- **IUCN Red List:** Critically Endangered

VENUS FLYTRAP

SOURCE: INDIAN EXPRESS

Why in News?

Scientists have recently identified the **physical mechanism** responsible for the rapid snapping action of the **Venus Flytrap**.



About Venus Flytrap

- The **Venus Flytrap** (*Dionaea muscipula*) is a small **carnivorous flowering plant** belonging to the **Droseraceae (Sundew) family**.
- It is famous for its unique ability to **capture and digest insects** using specialised leaf traps.

Distribution

- **Native** to a limited region of:
 - **North Carolina**
 - **South Carolina**

Key Features

Carnivorous Nature

- Captures insects to obtain essential nutrients such as **nitrogen** and **phosphorus**.
- Performs normal **photosynthesis** like other green plants.

Trap Structure

- Leaves are modified into **snap traps**.
- Inner surface contains Sensitive **trigger hairs** and Digestive glands

Snapping Mechanism

- The trap closes only when an insect touches the trigger hairs **twice within a short interval**, preventing accidental closure.
- Trap shuts in approximately **0.1 second**, making it one of the fastest plant movements.

Recent Scientific Findings

- Researchers found that:
 - The **outer cell walls** of the trap become **30–40% softer** after repeated stimulation.
 - The trap remains under **mechanical tension**, similar to a compressed spring.
 - Softening of the cell walls releases this stored tension, causing the trap to snap shut rapidly.
- This explains the physical basis behind the plant's remarkable movement.

Feeding Process

- Insect becomes trapped inside the closed leaves.
- Digestive enzymes break down soft tissues.
- Nutrients are absorbed by the plant.
- The trap reopens after digestion, leaving behind the insect's exoskeleton.

SOLANUM PANDEYI

SOURCE: THE HINDU

Why in News?

Scientists from the **Botanical Survey of India (BSI)** have discovered a **new species of wild brinjal, Solanum pandeyi**, in the **Middle Andaman** of the Andaman and Nicobar Islands.



About Solanum pandeyi

- **Solanum pandeyi** is a newly identified **wild brinjal (eggplant)** species belonging to the **genus Solanum**, one of the largest genera of flowering plants.
- It was discovered in the **evergreen forests of Middle Andaman** by scientists of the **Botanical Survey of India (BSI)**.

Habitat and Distribution

Habitat

- Found in **evergreen tropical forests**.
- Commonly grows along:
 - Forest margins
 - Open clearings
 - Naturally disturbed habitats

Distribution

- Currently recorded only from **Middle Andaman** in the **Andaman and Nicobar Islands**.
- Considered a **region-specific wild plant species**.

Taxonomy

- **Scientific Name:** Solanum pandeyi

- **Genus:** Solanum
- Belongs to the **Leptostemonum Clade**, commonly known as the **spiny solanums**.
- Closely related to **Solanum lasiocarpum**.

Traditional Uses

- Traditionally used by the **Great Andamanese**, one of the indigenous **Negrito tribes** of the islands.
- **Seeds and roots** are used in traditional medicine for treating **tooth infections**.
- **Ripe fruits** are used by local Ranchi and Bengali communities to prepare a **sweet-and-sour chutney** with jaggery, chilli, ginger, garlic, and salt.

Importance

- Acts as an important **genetic resource** for crop improvement.
- May help develop:
 - **Disease-resistant brinjal varieties**
 - **High-yielding cultivars**
 - **Climate-resilient crops**
- Strengthens India's documentation of endemic plant diversity.
- Highlights the ecological significance of the **Andaman and Nicobar Islands**, a recognised **biodiversity hotspot**.
- Supports future research in plant breeding and sustainable agriculture.

HOG DEER

SOURCE: THE HINDU

Why in News?

A rare **albino Hog Deer** was recently sighted in **Kaziranga National Park, Assam**, attracting the attention of wildlife researchers and conservationists.



About Hog Deer

- The **Hog Deer** (*Axis porcinus*) is a medium-sized deer belonging to the **Cervidae (deer) family**.
- It derives its name from its unique habit of **running with its head lowered**, resembling the movement of a wild pig rather than leaping like other deer.

Habitat and Distribution

Habitat

- Found in:
 - **Tall grasslands**
 - **River floodplains**
 - **Marshes**
 - **Reed beds**
 - **Woodlands near wetlands**

Distribution

- Native to **South and Southeast Asia**.
- Found in **India, Pakistan, Myanmar and Thailand**
- Introduced into **Sri Lanka, Australia and United States**

Distribution in India

- Mainly occurs in the **Terai grasslands and Brahmaputra floodplains**.
- Distributed from **Punjab to Arunachal Pradesh**, with important populations in **Assam**, especially **Kaziranga National Park**.

Key Features

Physical Characteristics

- Scientific Name: ***Axis porcinus***
- Height: Around **70 cm** at the shoulder.
- Weight: Approximately **50–110 kg**.
- Stocky body with **short legs** and a **wedge-shaped face**.
- Brown coat with yellowish or reddish tinge and a **dark stripe along the back**.
- Males possess **three-tined antlers**, while females lack antlers.
- Characterised by **large rounded ears** with white fringes and a **bushy tail**.

Behaviour

- Mostly **solitary** in nature.
- **Non-migratory** and territorial.
- Gives a **whistling call** or warning bark when threatened.
- Runs through dense grass with its head lowered.

Threats

- Loss and fragmentation of grassland habitats.
- Encroachment and agricultural expansion.
- Hunting and poaching.
- Flood-related habitat degradation.

Conservation Status

- **Scientific Name:** *Axis porcinus*
- **IUCN Red List:** **Endangered**
- **Wildlife (Protection) Act, 1972:** **Schedule I**

GOVERNMENT RELEASES FIRST NATIONAL REPORT ON THE NAGOYA PROTOCOL

SOURCE: DTE

Why in News?

The **Ministry of Environment, Forest and Climate Change (MoEFCC)** has released **India's First National Report on the Nagoya Protocol**, highlighting the country's progress in implementing the **Access and Benefit Sharing (ABS)** framework.

What is the Nagoya Protocol?

- The **Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS)** is a **supplementary agreement to the Convention on Biological Diversity (CBD)**.
- It was **adopted in 2010 at Nagoya, Japan**, and **entered into force in 2014**.
- India ratified the Protocol in **2012**.

- The Protocol provides a **legal framework** to ensure that benefits arising from the use of **genetic resources and associated traditional knowledge** are shared fairly with the country and communities providing them.

Objectives of the Nagoya Protocol

Ensure Fair Benefit Sharing

- Promotes equitable sharing of **monetary and non-monetary benefits** arising from the utilization of biological resources.

Conserve Biodiversity

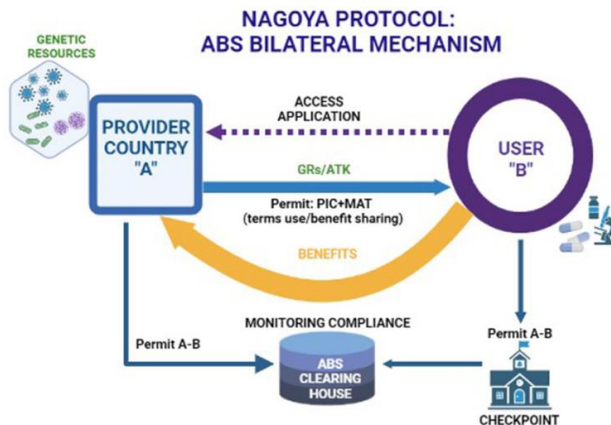
- Encourages sustainable use of biological resources by creating incentives for conservation.

Protect Traditional Knowledge

- Recognizes and safeguards the knowledge of **indigenous and local communities** associated with biological resources.

Prevent Biopiracy

- Prevents unauthorized access and commercial exploitation of biological resources without prior approval.



Key Features of the Protocol

Prior Informed Consent (PIC)

- Individuals or companies must obtain permission from the **competent national authority** before accessing biological resources.

Mutually Agreed Terms (MAT)

- Access is governed through agreements specifying **resource use, benefit-sharing arrangements, intellectual property rights, and responsibilities.**

Access and Benefit Sharing (ABS)

- Benefits may include:
 - Royalties
 - Technology transfer
 - Research collaboration
 - Capacity building
 - Sharing of scientific knowledge
 - Monetary compensation

ABS Clearing-House

- An international online platform that records permits, compliance certificates and information on ABS implementation.

India's ABS Framework

India has developed one of the world's strongest institutional mechanisms for implementing the Nagoya Protocol under the **Biological Diversity Act, 2002**, which has now been updated through the **Biological Diversity (Amendment) Act, 2023**.

Its three-tier institutional structure includes:

- National Biodiversity Authority (NBA)** at the national level.
- State Biodiversity Boards (SBBs)** in States and Union Territories.
- Biodiversity Management Committees (BMCs)** at the local body level.

BMCs prepare **People's Biodiversity Registers (PBRs)**, documenting local biological resources and traditional knowledge.

Key Highlights of India's First National Report

1. Large-Scale ABS Approvals

- India granted over **12,800 approvals** under the ABS mechanism between **2017 and 2025**, reflecting growing implementation of biodiversity regulations.

2. Global Leadership

- India has issued the **highest number of Internationally Recognized Certificates of Compliance (IRCCs)** through the ABS Clearing-House, demonstrating strong compliance with the Nagoya Protocol.

3. Benefit Sharing

- Revenue generated through ABS mechanisms has been transferred to **local communities, forest dwellers and biodiversity conservers**, supporting conservation and livelihood improvement.

4. Strong Institutional Network

- More than **2.7 lakh Biodiversity Management Committees (BMCs)** have been established across the country, making India one of the largest community-based biodiversity governance systems globally.

5. Capacity Building

- Thousands of awareness programmes and training workshops have strengthened the implementation capacity of local institutions and stakeholders.

Significance for India

- Protects India's rich biodiversity** from unauthorized commercial exploitation.
- Ensures **economic benefits reach indigenous communities** conserving biological resources.
- Promotes **sustainable bio-economy**, biotechnology research and innovation.
- Supports India's commitments under the **Convention on Biological Diversity (CBD)** and the **Kunming-Montreal Global Biodiversity Framework (GBF)**.
- Strengthens **community participation** in biodiversity conservation and sustainable resource management.

Challenges

- Difficulty in tracing biological resources through complex supply chains.

- Limited awareness among local communities regarding ABS provisions.
- Weak digital documentation and monitoring systems.
- Delays in processing approvals and benefit-sharing agreements.
- Emerging challenges related to **Digital Sequence Information (DSI)** and sharing benefits from digital genetic data.

Way Forward

- Develop a fully integrated **digital ABS portal** for transparent approvals, monitoring and compliance.
- Strengthen **People's Biodiversity Registers (PBRs)** with regular updating and digitization.
- Improve awareness through regional language training programmes for local communities.
- Establish scientific guidelines for valuation of biological resources and benefit-sharing.
- Formulate a clear national policy on **Digital Sequence Information (DSI)** to ensure equitable sharing of benefits from modern biotechnology.
- Promote greater collaboration among research institutions, industries and local communities while safeguarding biodiversity.

Conclusion

India's First National Report on the Nagoya Protocol demonstrates that biodiversity conservation and economic development can complement each other, and **strengthening transparent Access and Benefit Sharing mechanisms will ensure that biological resources** continue to support sustainable livelihoods, scientific innovation and ecological security for future generations.

SCIENCE AND TECHNOLOGY

MEDICAL HEALTH/VACCINES/DISEASES

NIPAH VIRUS IN KERALA

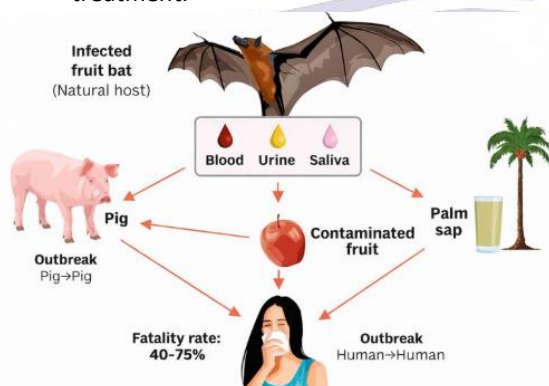
SOURCE: WHO

Why in News?

A **Nipah Virus (NiV)** case was recently reported in **Kozhikode, Kerala**, once again raising concerns over recurring zoonotic spillover events in the State.

What is Nipah Virus (NiV)?

- **Nipah Virus (NiV)** is an emerging **zoonotic virus** belonging to the **Henipavirus** genus under the **Paramyxoviridae** family.
- It was first identified in **Malaysia in 1998** during an outbreak among pig farmers.
- The **Indian Flying Fox (Pteropus medius)**, commonly known as the **fruit bat**, is the natural reservoir of the virus.
- The **World Health Organization (WHO)** has identified Nipah as a **Priority Pathogen** because of its **high fatality rate**, epidemic potential, and the absence of approved vaccines or specific antiviral treatment.



Transmission of Nipah Virus

Animal-to-Human Transmission

- Direct contact with infected **fruit bats**, pigs, or other infected animals.
- Consumption of food contaminated by bat saliva, urine, or droppings, particularly fruits and raw date palm sap.

Human-to-Human Transmission

- Occurs through close contact with infected patients.
- Transmission is possible through **respiratory droplets**, body fluids, and contaminated hospital equipment.
- Hospital-acquired (**nosocomial**) infections have been reported during previous outbreaks.

Case Fatality Rate (CFR): Approximately **40–75%**, depending on the outbreak and healthcare response.

Why is Kerala Highly Vulnerable?

Presence of Natural Reservoir

- Fruit bats carrying Nipah virus are widely distributed across Kerala.

Western Ghats Biodiversity

- Kerala lies along the **Western Ghats**, one of the world's richest biodiversity hotspots, leading to frequent human-wildlife interactions.

Habitat Disturbance

- Deforestation, urban expansion, plantations, and agricultural activities increase contact between bats and humans.

High Population Density

- Dense settlements close to forested areas facilitate zoonotic spillover.

Seasonal Pattern

- Most outbreaks occur between **April and September**, coinciding with fruiting seasons, bat breeding, and increased viral shedding.

Kerala's Public Health Response

Strengthened Surveillance

- Continuous monitoring of **Acute Encephalitis Syndrome (AES)** and **Severe Acute Respiratory Infections (SARI)**.

Improved Diagnostic Capacity

- Expansion of **Virus Research and Diagnostic Laboratories (VRDLs)** for rapid testing.

Hospital Infection Control

- Strict isolation protocols, PPE usage, contact tracing, and infection prevention measures have significantly reduced hospital transmission.

Community Surveillance

- A large volunteer network supports early reporting of unusual illnesses and animal deaths.

One Health Approach

- Kerala has adopted the **One Health** framework, integrating **human health, animal health, and environmental management** for disease surveillance and control.

Research Collaboration

- Collaboration with the **National Institute of Virology (NIV), Pune**, for surveillance, genomic studies, and development of diagnostics and therapeutic interventions.

Significance of the One Health Approach

- Strengthens surveillance of wildlife reservoirs.
- Enables early detection of zoonotic diseases.
- Promotes coordination among health, veterinary and environmental departments.
- Supports integrated outbreak response and pandemic preparedness.
- Reduces the risk of future spillover events.

Challenges

- Complete elimination of bat-human interaction is not feasible due to the widespread presence of fruit bats.
- No licensed vaccine or specific antiviral treatment is currently available.
- Habitat destruction and climate change continue to increase zoonotic disease risks.
- Maintaining long-term surveillance and public awareness requires sustained institutional support.
- Human-to-human transmission poses risks to healthcare workers if infection control measures weaken.

Way Forward

- Strengthen the **One Health** approach through closer coordination between public health, veterinary and forest departments.
- Expand ecological surveillance of bat populations and monitor zoonotic hotspots using GIS and genomic surveillance.
- Improve laboratory infrastructure and rapid response teams across vulnerable districts.
- Promote public awareness regarding safe handling of fruits, avoidance of contaminated food, and early reporting of symptoms.
- Support research on vaccines, monoclonal antibodies, antiviral drugs, and rapid diagnostic technologies through **ICMR, NIV**, and international collaborations.

- Integrate Nipah surveillance with India's broader **Integrated Disease Surveillance Programme (IDSP)** and pandemic preparedness strategies.

Conclusion

Kerala's recurring Nipah outbreaks demonstrate that while zoonotic spillover **cannot be completely prevented, strong surveillance, rapid diagnosis, robust infection control, and a comprehensive One Health approach** can effectively contain outbreaks and strengthen India's preparedness against future emerging infectious diseases.

SPACE TECHNOLOGY

INDIA'S EVOLVING SPACE ARCHITECTURE

SOURCE: PIB

Why in News?

The **Press Information Bureau (PIB)** recently released a comprehensive report highlighting India's transformation into a leading global space power over the past decade.

What is India's Evolving Space Architecture?

- India's evolving space architecture refers to a **comprehensive framework of institutions, policies, infrastructure, private participation, and advanced technologies** that supports the peaceful exploration and commercial utilization of outer space.
- It aims to:
 - Promote **scientific research** and space exploration.
 - Expand **space-based services** for governance and socio-economic development.
 - Encourage **private investment and innovation**.
 - Strengthen India's role in the **global space economy**.
 - Support national objectives under **Aatmanirbhar Bharat** and **Digital India**.

Major Components of India's Space Architecture

Strong Institutional Framework

- **ISRO (Indian Space Research Organisation)** remains the principal agency responsible for research, satellite development, launch missions, and deep-space exploration.

- **IN-SPACe (Indian National Space Promotion and Authorization Centre)** serves as an independent regulator facilitating private participation.
- **NewSpace India Limited (NSIL)** commercializes ISRO technologies and promotes industrial partnerships.
- The **Indian Space Policy, 2023** clearly defines the roles of government agencies and private enterprises, encouraging greater competition and investment.

Major Achievements

Expansion of Commercial Space Sector

- India's commercial space ecosystem has expanded rapidly due to policy liberalization.
- Space startups have grown from a handful of firms to **hundreds of active enterprises**, working in:
 - Satellite manufacturing
 - Launch services
 - Space applications
 - Earth observation
 - Geospatial technologies

Growing International Launch Capability

- India has emerged as a trusted launch partner for numerous countries.
- Launch vehicles such as **PSLV** have successfully placed hundreds of foreign satellites into orbit, enhancing India's reputation as a reliable and cost-effective launch provider.

Satellite-Based Public Services

Space technologies now contribute significantly to:

- **Agriculture**
 - Crop monitoring
 - Precision farming
 - Drought assessment
- **Disaster Management**
 - Cyclone tracking
 - Flood mapping
 - Forest fire monitoring
- **Communication**
 - Telemedicine
 - Tele-education
 - Digital connectivity
- **Navigation**
 - **NavIC (Navigation with Indian Constellation)** provides indigenous regional positioning and navigation services.

Emerging Space Missions

Human Spaceflight

- **Gaganyaan Mission** aims to demonstrate India's indigenous human spaceflight capability.

Space Station

- India plans to establish the **Bharatiya Antariksh Station (BAS)** in Low Earth Orbit, marking a major milestone in long-duration human space missions.

Planetary Exploration

Future missions include:

- **Chandrayaan-4** (Lunar Sample Return)
- **Chandrayaan-5/LUPEX** in collaboration with Japan
- **Venus Orbiter Mission**
- Advanced Earth observation satellites
- Climate-monitoring missions like **TRISHNA** (India-France collaboration)

Reusable Launch Vehicles

- Development of **Next Generation Launch Vehicle (NGLV)** and reusable launch technologies aims to reduce launch costs and improve commercial competitiveness.

Significance of India's Space Programme

Scientific Advancement

- Promotes frontier research in astronomy, planetary science, remote sensing, and space technology.

Economic Growth

- Expanding commercial launches, satellite manufacturing, downstream applications, and startups contribute to economic development and employment.

National Security

- Satellites support border surveillance, secure communication, navigation, maritime security, and disaster response.

Digital Governance

- Space applications strengthen:
 - Digital India
 - Smart Cities
 - Land record modernization
 - Weather forecasting
 - Rural connectivity

Global Leadership

- India's affordable space technologies strengthen South-South cooperation and international partnerships through initiatives such as the **South Asia Satellite**.

Challenges

Limited Share in Global Space Economy

- Despite technological success, India's contribution to the global commercial space market remains relatively modest.

High Capital Requirements

- Human spaceflight, deep-space exploration, reusable launch vehicles, and advanced infrastructure require sustained investment.

Technology Gaps

- Advanced propulsion systems, reusable technologies, life-support systems, and deep-space exploration demand continuous R&D.

Private Manufacturing Capacity

- Scaling laboratory innovations into large-scale commercial production remains a challenge.

Skilled Human Resources

- The sector requires greater availability of highly specialized scientists, engineers, and aerospace professionals.

Way Forward

- Strengthen implementation of the **Indian Space Policy, 2023** to promote innovation and ease of doing business.
- Expand private sector participation through **IN-SPACE**, **NSIL**, and startup incubation programmes.
- Accelerate development of reusable launch vehicles and advanced propulsion technologies.
- Complete new launch infrastructure, including the **Kulasekarapattinam Spaceport**, to increase launch capacity.
- Promote wider integration of **NavIC** across transportation, logistics, disaster management, smartphones, and strategic sectors.
- Increase investment in semiconductor manufacturing, AI, robotics, and advanced materials for future space missions.
- Deepen international collaborations while preserving strategic autonomy through indigenous technology development.

Conclusion

India's evolving space architecture combines scientific excellence, technological innovation, and private participation to strengthen national development, strategic self-reliance, and India's position as a leading global space power.

EMERGING TECHNOLOGIES

THE STRATEGIC SHIFT IN INDIA'S NUCLEAR TRIAD

SOURCE: THE HINDU

Why in News?

The **Stockholm International Peace Research Institute (SIPRI)**, in its **2026 Yearbook**, reported that **12 of India's estimated 190 nuclear warheads are operationally deployed** for the first time.

What is India's Nuclear Triad?

- A **Nuclear Triad** refers to the capability to launch nuclear weapons from **three platforms**, ensuring survivability and an assured retaliatory strike.
- India's nuclear triad consists of:
 - **Land-based ballistic missiles** (Agni series).
 - **Aircraft capable of delivering nuclear weapons.**
 - **Sea-based nuclear-powered ballistic missile submarines (SSBNs)** carrying **Submarine-Launched Ballistic Missiles (SLBMs).**
- A fully operational triad strengthens **second-strike capability**, making deterrence more credible.

INDIA'S NUCLEAR TRIAD

LAND VECTOR | Operational since mid-2000s

Prithvi-II (350-km), **Agni-I (700-km)**, **Agni-II (2,000-km)** & **Agni-III (3,000-km)** inducted **Agni-V (over 5,000-km)** in the process of induction. **Agni-IV Prime (4,000-km)** being developed

AIR VECTOR | Operational since mid-2000s

Sukhoi-30MKI, **Mirage-2000** & **Jaguar** fighters modified to deliver nuclear bombs

SEA VECTOR | Now operational

▶ **6,000-tonne INS Arihant** THE **INS ARIHANT STORY** (codenamed **S-2**), armed with four 750-km range **K-15** nuclear missiles, is now operational
 ▶ **6,000-tonne INS Arighat (S-3)** launched in 2017. Will be operational by 2020
 ▶ **7,000-tonne S-4 & S-4*** subs, each armed with six longer range nuclear missiles, under construction. Will be launched by 2020-2022
 ▶ **13,500-tonne S-5 submarines**, each armed with 12 longer-range nuclear missiles, at planning stage
 ▶ **K-4 missiles (3,500-km range)** undergoing trials. **K-5 & K-6** missiles (5,000-6,000-km range) being developed

India's Nuclear Doctrine

No First Use (NFU)

- India adopted the **No First Use** policy in **2003**, declaring that nuclear weapons will only be used in **retaliation against a nuclear attack**.
- However, India reserves the right to retaliate with nuclear weapons against **chemical or biological weapon attacks**.

Credible Minimum Deterrence

- India maintains only the minimum nuclear capability necessary to deter adversaries rather than engaging in an arms race.

Civilian Political Control

- Nuclear weapons remain under the authority of the **Nuclear Command Authority (NCA)**.
- The **Political Council**, chaired by the **Prime Minister**, alone can authorize the use of nuclear weapons.

Key Highlights of SIPRI 2026 Report

Expansion of Nuclear Arsenal

- SIPRI estimates that India possesses around **190 nuclear warheads**, showing a gradual increase over previous years.

Operational Deployment

- Around **12 warheads** are assessed to be operationally deployed, while the majority remain in reserve.

Strengthening Sea-Based Deterrence

- Deployment of **Arihant-class SSBNs** and development of longer-range **K-series SLBMs** have significantly improved India's survivable nuclear deterrent.

Modernization of Missile Systems

- India is inducting **canisterized Agni-IV, Agni-V and Agni-P missiles**, enabling quicker deployment, improved mobility and enhanced operational readiness.

Strategic Significance

Strengthens Second-Strike Capability

- Operational deployment enhances India's ability to retaliate even after absorbing a first nuclear strike.

Enhances Credible Deterrence

- A survivable nuclear force discourages adversaries from contemplating a nuclear attack.

Supports Strategic Stability

- India's restrained posture reinforces regional stability by maintaining deterrence without adopting an aggressive nuclear strategy.

Improves Maritime Security

- Sea-based deterrence provides greater survivability because **ballistic missile submarines** are difficult to detect and neutralize.

Challenges

Two-Front Security Environment

- India must simultaneously maintain deterrence against **China's expanding nuclear capabilities** and **Pakistan's tactical nuclear weapons**.

Weakening Global Arms Control

- The erosion of international arms-control agreements has increased uncertainty in the global strategic environment.

Emerging Technologies

- **Artificial Intelligence (AI)**, **hypersonic missiles**, **cyber warfare** and **autonomous systems** reduce decision-making time and increase escalation risks.

Anti-Submarine Warfare

- Advances in underwater surveillance and anti-submarine technologies challenge the survivability of sea-based deterrence.

Way Forward

- Continue adhering to the principles of **Credible Minimum Deterrence** and **No First Use** while strengthening second-strike capability.
- Accelerate induction of advanced **Submarine-Launched Ballistic Missiles (SLBMs)** such as **K-4, K-5 and K-6** to enhance the sea-based leg of the nuclear triad.
- Modernize **cyber security**, satellite surveillance and secure communication systems protecting nuclear command-and-control networks.
- Strengthen indigenous defence technologies under **Atmanirbhar Bharat**, particularly in missile systems, submarines and strategic infrastructure.
- Continue supporting **global nuclear disarmament**, confidence-building measures and multilateral arms-control initiatives while safeguarding national security.

Conclusion

India's evolving nuclear posture reflects a measured strengthening of its deterrence capability rather than a shift towards an offensive doctrine, and **by reinforcing its nuclear triad while maintaining civilian control and the No First Use policy, India continues to balance national security with responsible nuclear stewardship.**

SACHET EMERGENCY ALERT SYSTEM

SOURCE: THE HINDU

Why in News?

The Government of India recently tested the **SACHET Cell Broadcast Emergency Alert System** by sending a nationwide emergency notification with a siren sound to mobile phones.

What is the SACHET Emergency Alert System?

- **SACHET (meaning "Alert")** is India's **Integrated Emergency Alert System** designed to send **real-time disaster warnings** directly to mobile phones using **Cell Broadcast Technology**.
- It has been developed by the **Department of Telecommunications (DoT)** in collaboration with

the **National Disaster Management Authority (NDMA)**.

- The system delivers **geo-targeted emergency alerts** during natural disasters, industrial accidents, security threats, and other public emergencies.



How does SACHET Work?

- SACHET uses **Cell Broadcast Technology (CBT)**, where mobile towers simultaneously transmit alerts to all devices connected within a particular geographic area.
- Unlike SMS, it is a **one-to-many communication system**, allowing millions of users to receive alerts instantly.
- It:
 - Does **not require internet connectivity**.
 - Does **not require mobile numbers**.
 - Works even during heavy network congestion.
 - Sends alerts with **loud alarm sounds, vibration and pop-up notifications**.
 - Supports **multiple Indian languages** for wider accessibility.

Key Features of SACHET

Real-Time Emergency Alerts

- Provides immediate warnings during **Cyclones, Floods, Earthquakes, Tsunamis, Landslides, Industrial accidents, Chemical leaks, Security emergencies and wars**

Geo-Targeted Communication

- Alerts are transmitted only to people located within the affected area, avoiding unnecessary panic elsewhere.

No Internet Requirement

- Functions entirely through cellular networks, ensuring communication even when internet services are disrupted.

Privacy-Friendly

- Does not collect personal information or phone numbers.
- Messages are broadcast to all devices connected to a cell tower without tracking individuals.

Multilingual Support

- Emergency messages can be transmitted in **multiple regional languages**, improving accessibility across India.

Cell Broadcast vs SMS

Cell Broadcast	SMS
One-to-many communication	One-to-one communication
Instant delivery to all users in an area	Individual message delivery
Works during network congestion	Can be delayed during heavy traffic
No phone number required	Requires recipient database
Geo-targeted alerts	Limited location targeting
Better privacy protection	Depends on user database

Significance of SACHET

Strengthens Disaster Preparedness

- Enables early warnings, allowing people sufficient time for evacuation and protective measures.

Improves Last-Mile Connectivity

- Ensures emergency information reaches even remote and disaster-prone regions.

Supports Disaster Risk Reduction

- Contributes to reducing casualties and economic losses through timely communication.

Enhances National Security

- Can be used during war, terrorist attacks, industrial accidents, pandemics, and other public emergencies.

Supports Digital Governance

- Demonstrates the use of indigenous digital infrastructure for citizen-centric governance.

Institutional Framework

- **Department of Telecommunications (DoT)** – Nodal agency for implementation.

- **National Disaster Management Authority (NDMA)** – Disaster management coordination.
- **Telecom Service Providers (TSPs)** – Disseminate alerts through mobile networks.
- **State Disaster Management Authorities (SDMAs)** – Issue localized emergency warnings.
- **District Disaster Management Authorities (DDMAs)** – Coordinate local emergency response.

Challenges

- Limited public awareness regarding emergency alert messages.
- Older mobile devices may not fully support Cell Broadcast features.
- Need for periodic testing to maintain system reliability.
- Effective coordination required among telecom operators, disaster management agencies and State governments.
- Continuous modernization is necessary to integrate emerging technologies and improve multilingual communication.

Way Forward

- Expand nationwide deployment of **Cell Broadcast Technology** across all telecom networks.
- Conduct regular mock drills and public awareness campaigns to familiarize citizens with emergency alerts.
- Integrate SACHET with **IMD, INCOIS, CWC, ISRO**, and State disaster management agencies for real-time hazard-specific warnings.
- Improve accessibility through regional languages, voice-based alerts, and support for persons with disabilities.
- Strengthen telecom infrastructure and backup communication systems to ensure uninterrupted alerts during disasters.

Conclusion

The SACHET Emergency Alert System marks a significant advancement in India's disaster management framework, and by **combining indigenous technology, real-time communication and location-specific alerts**, it can greatly enhance public safety and build a more resilient and disaster-ready nation.

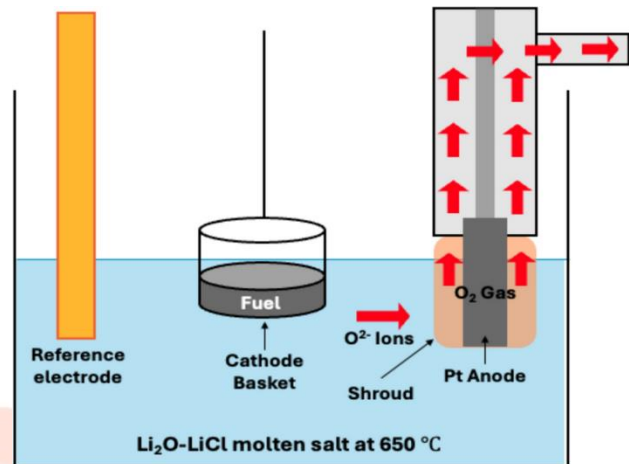
PRELIMS POINTERS IN NEWS

PYROPROCESSING

SOURCE: THE HINDU

Why in News?

Pyroprocessing has recently been in the news due to its growing importance in **advanced nuclear fuel recycling** and next-generation **fast reactor technologies**.



About Pyroprocessing

- **Pyroprocessing** refers to a group of **high-temperature industrial processes** that physically or chemically transform materials, generally at temperatures **above 800°C** .
- Unlike conventional wet chemical methods, pyroprocessing is a **dry processing technique**, making it suitable for industries requiring high-temperature material treatment.

Key Features

- Involves **high-temperature** processing under controlled conditions.
- Operates mainly through **thermal, chemical, and electrochemical** reactions.
- Dry process that minimizes the use of liquid chemicals.
- Suitable for processing complex materials and industrial waste.
- Enhances material recovery and resource efficiency.

Applications

1. Cement Industry

- Largest industrial application of pyroprocessing.
- Finely ground **limestone, clay, and iron ore** are fed into a **rotary kiln**.
- At around **900°C** , limestone releases **carbon dioxide (calcination)**.
- At nearly **1450°C** , the material partially melts to form **clinker**.
- Clinker is then ground to manufacture **cement**.

2. Metallurgy

- Used in extraction and purification of metals.
- Includes processes such as:
 - **Roasting** – converts sulphide ores into oxides.
 - **Smelting** – separates metals from impurities (slag).
 - **Calcining** – heats limestone to produce lime.
- Essential in producing metals such as **iron, copper, zinc, and lead**.

3. Nuclear Industry

- Used for **reprocessing spent nuclear fuel**.
- Fuel is processed in molten salts containing **lithium chloride** and **potassium chloride**.
- **Electrochemical separation** isolates reusable nuclear materials.
- Supports advanced **Fast Breeder Reactors (FBRs)** and future nuclear fuel cycles.

VARYA

SOURCE: THE HINDU

Why in News?

Avataar has launched **Varya**, an indigenous **AI-powered video generation model**, with support from the **IndiaAI Mission**.



About Varya

- **Varya** is an **AI-based video generation model** designed to create high-quality videos quickly and at a significantly lower computational cost.
- It has been developed by **Avataar**, an AI-native transformation company, with support from the **IndiaAI Mission**.

Key Features

Efficient AI Model

- Uses **distilled video generation**, reducing processing steps from around **50** to only **4**.
- Maintains video quality despite lower computational requirements.

Cost Effective

- Generates video at approximately **₹0.48 per second**.
- Claimed to be significantly more affordable than many leading global AI video models.

India-Centric Design

- Optimised for Indian contexts, including Festivals, Regional cultures, Clothing, Food, Public spaces and Local lifestyles

Easy Content Creation

- Users can:
 - Enter a text prompt.
 - Upload an image.
 - Generate AI videos.
 - Extend stories by creating additional clips.

About Distilled Video Generation

- A **model compression technique** in **Artificial Intelligence**.
- A smaller **student model** learns from a larger **teacher model**.
- Transfers knowledge while reducing unnecessary computations.
- Produces similar quality outputs using far fewer processing steps.
- Results in:
 - Faster inference
 - Lower computing cost
 - Reduced energy consumption
 - Greater scalability

SOLVE PLATFORM OF ISRO

SOURCE: THE HINDU

Why in News?

ISRO recently conducted the **first ground test** of the **SOLVE (Sub-Orbital Launch Vehicle for Experiments)** solid motor at **Satish Dhawan Space Centre, Sriharikota**.



About SOLVE Platform

- **SOLVE (Sub-Orbital Launch Vehicle for Experiments)** is a solid motor-based test platform developed by the **Indian Space Research Organisation (ISRO)**.
- It has been designed to carry out **Integrated Parachute Tests (IPTs)** for evaluating the **Crew Module Deceleration System (CMDS)** of the **Gaganyaan Mission**.

Objective

- Validate the **Crew Module's parachute recovery system** under different operational conditions.
- Ensure safe descent and splashdown of astronauts during the **Gaganyaan mission**.
- Improve the reliability and safety of India's human spaceflight programme.

Key Features

Testing Process

- Carries the **Crew Module** to an altitude of approximately **10–17 km**.
- The module is separated from the launch platform during the test.

Parachute Recovery System

- A sequence of **10 parachutes** is deployed in different stages.
- Gradually reduces the module's speed before **sea splashdown**.

Platform Design

- Derived from the **PSLV Strap-on Solid Motor**.
- Modified specifically for **Gaganyaan testing requirements**.

Technical Modifications

- Equipped with:

- **Slow burn-rate solid propellant**
- **Straight nozzle**
- **Secondary Injection Thrust Vector Control (SITVC)** for better flight stability.

Recent Gaganyaan Preparatory Tests

- **Integrated Air Drop Test (IADT-02):** Validated the **Crew Module's parachute recovery sequence**.
- **Mission MITRA:** Conducted in **Leh** to study astronauts' physiological responses under mission-like conditions.

About Gaganyaan Mission

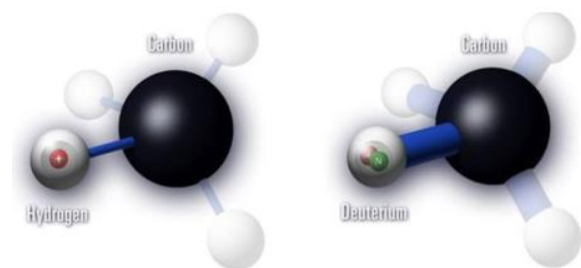
- India's **first indigenous human spaceflight programme**.
- Developed by **ISRO**.
- Aims to send **three Indian astronauts (Gaganyatris)** to **Low Earth Orbit (LEO)** at about **400 km** for nearly **three days**.
- Mission includes:
 - **Two unmanned test flights**
 - **One crewed mission**
- Major components:
 - **Crew Module**
 - **Service Module**

DEUTERATED COMPOUNDS

SOURCE: INDIAN EXPRESS

Why in News?

The **Department of Atomic Energy (DAE)** recently inaugurated the **Versatile Deuterated Compounds Production Plant** at **Vadodara**.



About Deuterated Compounds

- **Deuterated compounds** are chemical substances in which one or more atoms of **ordinary hydrogen (Protium – ^1H)** are replaced by **Deuterium (^2H or D)**.
- **Deuterium** is a **stable, naturally occurring, non-radioactive isotope** of hydrogen that contains.

Key Features

Stable Isotope

- Deuterium is a **non-radioactive isotope** of hydrogen.
- Chemically similar to hydrogen but approximately **twice as heavy**.

Stronger Chemical Bonds

- Replacement of hydrogen with deuterium forms **stronger chemical bonds**.
- These bonds require more energy to break.

Kinetic Isotope Effect

- Chemical and metabolic reactions involving deuterium occur **more slowly**.
- Improves molecular stability without significantly altering chemical behaviour.

Applications

Nuclear Magnetic Resonance (NMR) Spectroscopy

- Widely used as solvents and reference materials.
- Improves spectral clarity and analytical accuracy.

Pharmaceutical Industry

- Used in developing **deuterated medicines**.
- Slower metabolism increases:
 - Drug half-life
 - Therapeutic effectiveness
 - Reduction of unwanted metabolic by-products.

Medical Research

- Used in:
 - Cancer research
 - Metabolic studies
 - Drug development
 - Biomedical investigations.

Hydrology and Environmental Science

- Acts as a **tracer isotope** for:
 - Groundwater studies
 - Water resource mapping
 - Wastewater monitoring
 - Climate and environmental research.

Semiconductors and Electronics

- Enhances durability of:
 - Semiconductors
 - Microchips
 - Fibre-optic communication systems.
- Reduces chemical degradation of electronic components.

BEROBENATIDE – NEW ANTI-OBESITY DRUG

SOURCE: THE INDIAN EXPRESS

Why in News?

Pfizer has announced encouraging clinical trial results for **Berobenatide**, an experimental **once-monthly anti-obesity injection**.



About Berobenatide

- Berobenatide** is an **investigational (experimental) anti-obesity and anti-diabetic drug** developed by Pfizer.
- It belongs to the class of **GLP-1 (Glucagon-Like Peptide-1) receptor agonists**, which are widely used for managing **obesity** and **Type 2 Diabetes Mellitus**.

Working Mechanism

GLP-1 Receptor Agonist

- Mimics the natural **GLP-1 hormone**, which is released by the intestine after meals.
- Stimulates **GLP-1 receptors** present in the pancreas, stomach, and brain.

Effects on the Body

- Reduces appetite** by increasing the feeling of fullness.
- Slows stomach emptying**, leading to prolonged satiety.
- Improves **blood glucose regulation** by enhancing insulin secretion when blood sugar levels rise.
- Suppresses excess **glucagon** release, reducing glucose production by the liver.

Extended-Release Design

- Engineered to remain active in the body for a much longer duration.
- Provides sustained activation of GLP-1 receptors, allowing **monthly dosing**.

Dosage Pattern

- Treatment begins with **weekly injections** during the initial phase.
- Patients later shift to **one injection every month**.
- Reduces annual injections from approximately **52 to 12**, improving convenience.

Clinical Findings

- Clinical trials showed **body weight reduction of up to 12.3%** in participants without diabetes.
- Weight loss continued even after patients transitioned to monthly injections.
- Studies are ongoing to evaluate long-term benefits and safety.

Limitations

- Long-term **cardiovascular safety** data are still being generated.
- Requires further large-scale clinical trials before regulatory approval.
- Possible side effects may include nausea, vomiting, diarrhoea, and gastrointestinal discomfort, similar to other GLP-1 therapies.

Other Important Anti-Obesity Drugs

1. Semaglutide

- Marketed as **Ozempic** (diabetes) and **Wegovy** (obesity).
- Developed by **Novo Nordisk**.

2. Tirzepatide

- Marketed as **Mounjaro** (diabetes) and **Zepbound** (obesity).
- Developed by **Eli Lilly**.
- Acts on both **GLP-1** and **GIP (Glucose-dependent Insulinotropic Polypeptide)** receptors.

URANIUM DOWNBLENDING: THE SCIENCE BEHIND THE US–IRAN NUCLEAR DEAL

SOURCE: THE HINDU

Why in News?

The recent **US–Iran Memorandum of Understanding (MoU)** includes a commitment by Iran to **downblend its highly enriched uranium stockpile** under **IAEA supervision** in return for sanctions relief.

Uranium Downblending Process



What is Uranium Downblending?

- Downblending** is the reverse of uranium enrichment.
- It reduces uranium enrichment from **high levels (20%, 60% or above)** to **below 5% U-235**, which is generally suitable for civilian nuclear reactors.
- The process increases the **breakout time**, i.e., the time required for a country to produce sufficient weapons-grade uranium for a nuclear weapon.
- It is carried out under strict safeguards of the **International Atomic Energy Agency (IAEA)** to ensure transparency and compliance.

Basics of Uranium Enrichment

- Natural uranium contains:

- Uranium-238 (U-238):** Approximately **99.3%**, non-fissile.
- Uranium-235 (U-235):** Approximately **0.7%**, fissile isotope capable of sustaining a nuclear chain reaction.
- Enrichment increases the proportion of **U-235**.
- Typical enrichment levels:
 - 3–5%:** Civilian nuclear power reactors.
 - Around 20%:** Research reactors.
 - 90% or above:** Weapons-grade uranium.

How Does Uranium Downblending Work?

Preparation of Enriched Uranium

- Highly enriched uranium, generally stored as **uranium hexafluoride (UF₆)**, is converted into gaseous form through controlled heating.

Selection of Blend Material

- The enriched uranium is mixed with:
 - Natural uranium**
 - Depleted uranium**
 - Low enriched uranium**
- The proportion depends on the desired final enrichment level.

Controlled Mixing

- Automated systems precisely regulate the mixing process to achieve the target enrichment.

- Continuous monitoring ensures that enrichment remains within prescribed limits.

Verification

- Advanced monitoring equipment measures uranium enrichment in real time.
- The **IAEA** conducts inspections, sampling, surveillance, and verification throughout the process.

Conversion for Civilian Use

- The final uranium is converted into **uranium dioxide (UO₂)** fuel pellets suitable for nuclear power generation.

Significance of Uranium Downblending

Strengthens Nuclear Non-Proliferation

- Reduces the immediate availability of weapons-grade nuclear material.

Increases Breakout Time

- Extends the time required to reconvert civilian material into weapons-grade uranium, providing the international community with early warning.

Supports Peaceful Nuclear Energy

- Enables continued civilian use of nuclear technology for electricity generation, medicine, agriculture, and scientific research.

Builds International Confidence

- Transparent implementation under **IAEA safeguards** enhances trust among nations.

Facilitates Diplomatic Agreements

- Downblending often serves as a confidence-building measure in international nuclear negotiations.

Role of the IAEA

- The **International Atomic Energy Agency (IAEA)** is the global organization responsible for promoting peaceful uses of nuclear energy while preventing nuclear weapon proliferation.
- **Its responsibilities include:**
 - Monitoring enrichment facilities.
 - Inspecting nuclear materials.
 - Verifying compliance with safeguard agreements.
 - Applying tamper-proof seals and surveillance systems.
 - Laboratory analysis of uranium samples.

Challenges Associated with Downblending

Retained Technical Capability

- Even after downblending, a country may retain enrichment technology and expertise.

Verification Difficulties

- Continuous monitoring becomes difficult if inspection access is restricted.

Political Uncertainty

- Diplomatic agreements may weaken due to changing political leadership or international tensions.

Incomplete Monitoring

- Withdrawal from additional verification protocols can reduce transparency.

Possibility of Re-Enrichment

- If enrichment facilities remain operational, uranium can potentially be enriched again unless strict safeguards continue.

India's Perspective

- India supports **peaceful uses of nuclear energy** while maintaining a **credible minimum deterrence**.
- As a responsible nuclear power, India follows:
 - Strong export controls.
 - Nuclear safety standards.
 - IAEA safeguards for civilian facilities under the **India-specific Safeguards Agreement**.
- India also supports international efforts aimed at preventing nuclear proliferation through peaceful dialogue and multilateral cooperation.

Way Forward

- Strengthen the role of the **IAEA** through uninterrupted inspections and transparent verification mechanisms.
- Ensure long-term compliance with nuclear agreements through sustained diplomatic engagement.
- Promote universal adherence to global nuclear safety and non-proliferation norms.
- Encourage peaceful nuclear cooperation for energy security while preventing misuse of nuclear materials.
- Develop stronger confidence-building measures between countries to reduce strategic mistrust and regional instability.

Conclusion

Uranium downblending is an important non-proliferation tool that lowers the risk of nuclear weapon development while supporting peaceful nuclear energy under effective international verification.

SECURITY

BORDER MANAGEMENT

POK PROTESTS CAUSES, CRACKDOWN AND THE 12 SEATS CONTROVERSY

SOURCE: THE HINDU

Why in News?

Violent protests have intensified in **Pakistan-occupied Kashmir (PoK)** ahead of local elections, leading to casualties and a strong crackdown by Pakistani authorities.

What are the PoK Protests?

- The protests are a **mass public movement** against Pakistan's governance in PoK, demanding:
 - Greater political representation**
 - Reduction in electricity tariffs**
 - Affordable wheat and essential commodities**
 - Greater administrative autonomy**
 - End to excessive federal interference**
- The movement is led primarily by the **Joint Awami Action Committee (JAAC)**, comprising traders, civil society groups, professionals, and local activists.

Historical Background

- The present unrest has its roots in long-standing political and economic grievances.
- After the **Instrument of Accession (1947)**, the erstwhile princely State of Jammu & Kashmir legally acceded to India.
- Following the **1947–48 conflict**, Pakistan occupied parts of the territory, presently referred to as **Pakistan-occupied Kashmir (PoK)** and **Gilgit-Baltistan**.
- India consistently maintains that these territories are **an integral and inalienable part of India**.



Major Causes Behind the Protests

Political Representation Issues

- Local residents believe that democratic institutions function under the **strong influence of Pakistan's federal government**.
- Decision-making powers remain concentrated with Islamabad rather than elected local representatives.

The 12 Reserved Seats Controversy

- The immediate trigger was the Pakistan Supreme Court's decision to retain **12 Assembly seats reserved for migrants from Jammu & Kashmir living in Pakistan**.
- These representatives are elected **outside PoK**, leaving local voters without any role in their selection.
- Protesters argue that:
 - The arrangement reduces genuine local representation.
 - It enables Islamabad to influence the Assembly through nominated loyalists.
 - Salaries of these representatives are paid from PoK's own budget despite lacking local electoral legitimacy.

Economic Grievances

- Rising electricity tariffs despite hosting major hydropower projects.
- Increase in food prices and reduction in subsidised wheat.
- Limited industrial development and employment opportunities.

Hydropower-Related Concerns

- Projects like the **Mangla Dam** displaced thousands of local residents.
- Despite contributing significantly to electricity generation, many residents continue to face:
 - High electricity bills.
 - Limited local benefits.
 - Inadequate rehabilitation.

Governance Issues

- Perceived dominance of centrally appointed officials over elected institutions.
- Weak fiscal autonomy.
- Limited transparency and accountability.

Pakistan's Response

- Pakistan has largely relied on **law-enforcement measures** instead of political dialogue.
- Actions include:
 - Ban on the **Joint Awami Action Committee (JAAC)**.
 - Arrest warrants against protest leaders.
 - Registration of serious criminal cases.
 - Large-scale deployment of security forces.
 - Restrictions on public gatherings and communications.

Gilgit-Baltistan: Similar Challenges

- **Gilgit-Baltistan (GB)** faces comparable governance issues:
 - Limited constitutional status.
 - Administrative dependence on Islamabad.
 - Infrastructure deficits.
 - Political underrepresentation.
- Unlike PoK, Gilgit-Baltistan also experiences **sectarian tensions** and occupies an important strategic position due to the **China-Pakistan Economic Corridor (CPEC)**.

India's Position

- India maintains that:
 - The **entire Union Territories of Jammu & Kashmir and Ladakh**, including **PoK and Gilgit-Baltistan**, legally belong to India under the **Instrument of Accession (1947)**.
 - Pakistan's administrative actions in these territories have **no legal validity**.
 - India has consistently opposed projects like **CPEC**, as they pass through Indian territory under Pakistan's illegal occupation.
- India has also condemned violence against peaceful protesters and called for respect for **human rights**.

Significance for India

National Security

- Developments directly affect India's western borders and overall regional security.

Strategic Importance

- PoK connects Pakistan with China through **Gilgit-Baltistan**, increasing its geopolitical significance.

Water Security

- Several rivers of the **Indus River System** pass through these regions, making them strategically important.

Diplomatic Importance

- The issue influences India's engagement with Pakistan, China, and international organisations.

Challenges

- Continued political instability in PoK.
- Human rights concerns.
- Growing strategic cooperation between Pakistan and China.
- Militarisation of disputed territories.
- Limited access for independent international observers.

Way Forward

- Encourage **peaceful dialogue** and democratic participation.
- Ensure **greater political representation** and local governance.
- Improve transparency and fiscal accountability.
- Protect the rights of local communities affected by infrastructure projects.
- Strengthen socio-economic development through investments in education, healthcare, and employment.
- Resolve disputes through **peaceful bilateral mechanisms** in accordance with established agreements while respecting India's sovereignty.

Conclusion

The recent protests in Pakistan-occupied Kashmir reflect **deep-rooted concerns over governance, political representation, and economic development**. A durable solution requires greater democratic accountability, respect for human rights, and inclusive development while ensuring regional peace and stability.

**EMERGING SECURITY CHALLENGES-
GLOBAL COMMONS**

DRONE WARFARE - HOW DRONE WARFARE IS RESHAPING MILITARY POWER

SOURCE: INDIAN EXPRESS

Recent conflicts in **Ukraine, West Asia, and Lebanon** have demonstrated that **drones have become central to modern warfare**, transforming military strategy, surveillance, and precision strikes.

What is Drone Warfare?

- **Drone Warfare** involves the deployment of remotely operated or autonomous **Unmanned Aerial Systems (UAS)** in military operations.
- Drones perform multiple functions including:
 - **Intelligence, Surveillance and Reconnaissance (ISR)**
 - **Target identification and artillery correction**
 - **Precision strikes on military assets**
 - **Electronic warfare and communication support**
 - **Logistics and supply delivery**
 - **Battlefield damage assessment**
- Modern drones range from **small quadcopters** to **long-range armed UAVs** capable of operating hundreds of kilometres away.

Evolution of Drone Warfare

- Initially, drones were primarily used for **reconnaissance and surveillance**.
- Advances in **Artificial Intelligence (AI)**, sensors, satellite navigation, and communication systems have transformed drones into offensive military platforms.
- Recent wars have shown that inexpensive commercial drones can inflict significant damage on expensive military assets such as tanks, artillery, and air defence systems.



Major Features of Modern Drone Warfare

Low-Cost but High Impact

- A relatively inexpensive drone can destroy military equipment worth millions of dollars.
- Reduces dependence on costly fighter aircraft for many battlefield tasks.

Precision Strike Capability

- Modern drones can accurately attack strategic targets with minimal collateral damage.

Persistent Surveillance

- Continuous monitoring provides real-time intelligence for commanders.

Reduced Risk to Soldiers

- Remote operations reduce direct exposure of military personnel to hostile environments.

Network-Centric Operations

- Drones operate alongside satellites, sensors, AI, and communication systems to create an integrated battlefield.

Global Trends in Drone Warfare

Ukraine Conflict

- Ukraine extensively uses **First-Person View (FPV) drones**, loitering munitions, and long-range strike drones.
- Innovative **fibre-optic drones**, resistant to electronic jamming, have enhanced battlefield effectiveness.

West Asia

- Countries and non-state actors increasingly deploy drones for deterrence, surveillance, and attacks on strategic infrastructure.

Changing Nature of Warfare

- Modern conflicts demonstrate that **industrial production capacity**, innovation, and rapid adaptation are becoming as important as conventional military strength.

Significance of Drone Warfare

Strengthens National Security

- Enhances border surveillance and early threat detection.

Force Multiplier

- Increases operational capability without proportionately increasing manpower.

Supports Asymmetric Warfare

- Smaller forces can challenge technologically superior adversaries through low-cost drone systems.

Improves Situational Awareness

- Provides continuous battlefield intelligence for faster decision-making.

Enhances Disaster Response

- Besides military use, drones assist in disaster management, search and rescue, mapping, and humanitarian relief.

Challenges Associated with Drone Warfare

Electronic Warfare

- Radio-frequency jamming and GPS spoofing can disrupt drone operations.

Cybersecurity Risks

- Drone communication systems are vulnerable to hacking and cyberattacks.

Swarm Drone Threats

- Coordinated drone swarms can overwhelm conventional air defence systems.

Rapid Technology Proliferation

- Commercial drones are easily modified for military or terrorist purposes.

Legal and Ethical Issues

- Increasing use of autonomous weapons raises concerns regarding accountability and compliance with **International Humanitarian Law (IHL)**.

Counter-Drone Capability Gap

- Many countries continue to face shortages of effective detection and neutralization systems.

India's Preparedness and Strategic Importance

Growing Border Challenges

- India faces drone-related threats along both the **western border with Pakistan** and the **northern border with China**.

Indigenous Drone Development

- Programmes such as **Make in India**, **Atmanirbhar Bharat**, and **Innovations for Defence Excellence (iDEX)** encourage domestic drone manufacturing.

Counter-Drone Systems

- India is developing **electronic jamming systems**, laser-based weapons, and integrated air defence solutions.

Modernisation of Armed Forces

- The Army, Navy, and Air Force are increasingly integrating UAVs into surveillance, logistics, intelligence, and combat operations.

Way Forward

- Strengthen **indigenous drone manufacturing** under **Make in India** and promote private-sector participation.

- Accelerate research in **AI-enabled autonomous drones**, secure communication systems, and anti-jamming technologies.
- Develop **integrated counter-drone architecture** combining radar, electro-optical sensors, electronic warfare, and directed-energy weapons.
- Enhance collaboration among **DRDO**, armed forces, startups, academia, and industry to accelerate innovation.
- Build specialised training and doctrine for drone operations across all three defence services.
- Strengthen international cooperation on drone regulations while ensuring responsible use under international law.

Conclusion

Drone warfare has fundamentally transformed military operations by combining **affordability, precision, and technological innovation**. For India, **strengthening indigenous drone capabilities, modern counter-drone systems, and advanced defence technologies** will be essential to safeguard national security and maintain strategic superiority in future conflicts.

PRELIMS POINTERS IN NEWS

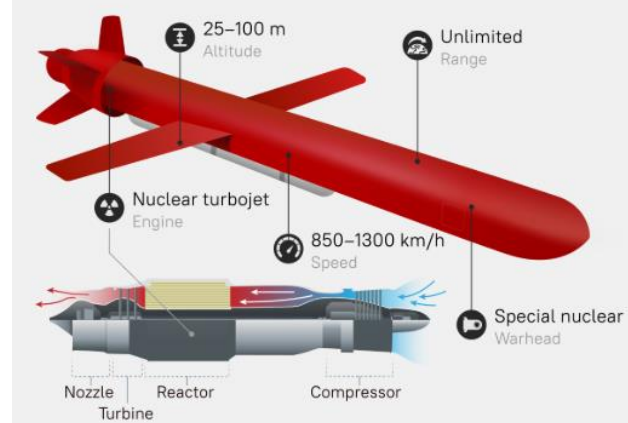
BUREVESTNIK MISSILE

SOURCE: THE HINDU

Why in News?

Russia's **Burevestnik** nuclear-powered cruise missile has again drawn global attention after recent research suggested it may leave a **radioactive trail** during flight.

Russian Burevestnik global-range intercontinental cruise missile



About Burevestnik Missile

- **Burevestnik** (Russian for "Storm Petrel") is a **ground-launched, nuclear-powered, nuclear-capable cruise missile** developed by Russia.
- It is regarded as the **world's first nuclear-powered cruise missile**, designed to overcome conventional missile range limitations.
- The missile was publicly unveiled by **Russian President Vladimir Putin** in **2018** as one of Russia's next-generation strategic weapon systems.
- **NATO** designates the missile as **SSC-X-9 Skyfall**.

Key Features

Nuclear Propulsion

- Powered by a **miniature nuclear reactor** instead of conventional jet fuel.
- The reactor heats incoming air to generate thrust, enabling prolonged flight.

Virtually Unlimited Range

- Unlike conventional cruise missiles, its range is not constrained by fuel capacity.
- Can theoretically remain airborne for **extended periods** before reaching its target.

Low-Altitude Flight

- Designed to fly at **very low altitudes**, reducing radar detection.
- Capable of following complex and unpredictable flight paths.

Strategic Capability

- Intended to carry a **nuclear warhead**.
- Designed to bypass advanced missile defence systems through evasive routing.

Strategic Importance

- Enhances Russia's **nuclear deterrence capability**.
- Challenges existing **missile defence systems** due to its long endurance and unpredictable trajectory.
- Represents a new generation of **strategic nuclear delivery systems**.

INDIAN COAST GUARD (ICG)

SOURCE: THE HINDU

Why in News?

The **Indian Coast Guard (ICG)** observed the **International Day of Yoga (IDY) 2026** through its nationwide initiative "Yoga Sangam 2026."



About Indian Coast Guard

- The **Indian Coast Guard (ICG)** is India's **maritime law enforcement and search-and-rescue force**, functioning under the **Ministry of Defence**.
- It is a **maritime armed force** responsible for safeguarding India's maritime interests, enforcing maritime laws, protecting marine resources, and ensuring coastal security.
- The force was formally established under the **Coast Guard Act, 1978**, and has grown into a multi-mission organisation operating throughout India's maritime zones.

Establishment

- **Established:** 18 August 1978
- **Legal Basis:** Coast Guard Act, 1978
- **Administrative Ministry:** Ministry of Defence
- **Headquarters:** New Delhi
- **Headed by:** Director General, Indian Coast Guard

Motto

- **"Vayam Rakshamah" (We Protect)**

Major Functions

Maritime Security

- Protects India's **territorial waters, Exclusive Economic Zone (EEZ)**, and offshore assets.

Search and Rescue (SAR)

- Assists ships, fishermen, and people in distress at sea.
- Coordinates maritime rescue operations under international obligations.

Law Enforcement

- Prevents:
 - Smuggling
 - Illegal fishing
 - Piracy
 - Human trafficking
 - Narcotics trafficking
 - Maritime pollution.

Marine Environment Protection

- Responds to oil spills and marine pollution incidents.

- Protects marine biodiversity and ecologically sensitive coastal regions.

National Defence

- Assists the **Indian Navy** during wartime and national emergencies.
- Supports coastal surveillance and maritime domain awareness.

Scientific Support

- Assists in oceanographic surveys and collection of marine scientific data.

INS TARKASH

SOURCE: INDIAN EXPRESS

Why in News?

INS Tarkash, a frontline stealth frigate of the **Indian Navy**, recently visited **Port Victoria, Seychelles**, during its operational deployment in the **South-West Indian Ocean Region**.



About INS Tarkash

- **INS Tarkash** is a **stealth-guided missile frigate** of the **Indian Navy**, designed for multi-role naval operations.
- It is the **second ship** of the **Talwar-class (Modified Krivak III-class)** guided missile frigates.
- The warship was **built by the Yantar Shipyard in Kaliningrad, Russia**, and commissioned into the Indian Navy on **9 November 2012**.

Key Features

General Characteristics

- **Class:** Talwar-class Stealth Guided Missile Frigate
- **Displacement:** Approximately **3,850 tonnes**
- **Length:** **124.8 metres**
- **Beam:** **15.2 metres**
- **Draft:** **4.2 metres**

Propulsion and Performance

- Powered by **four gas turbine engines**.
- Maximum speed exceeds **30 knots** (around **56 km/h**).

- Operational endurance of about **30 days**.
- Operational range of approximately **4,500 nautical miles**, enabling long-distance deployments.

Stealth Capability

- Incorporates advanced **stealth technology**.
- Special hull and superstructure design reduce **radar cross-section**, making detection by enemy radar more difficult.
- Designed to minimise infrared and acoustic signatures.

Weapons and Combat Systems

- Equipped with **BrahMos Supersonic Cruise Missiles** for precision strike capability.
- Armed with:
 - **Surface-to-Air Missiles (SAMS)**
 - **100 mm Naval Gun**
 - **Close-In Weapon Systems (CIWS)**
 - **Torpedoes**
 - **Anti-submarine Rocket Launchers**
- Integrated with advanced **fire-control, navigation, and electronic warfare** systems.
- Capable of engaging **surface, air, and submarine** threats simultaneously.

Aviation Capability

- Can operate one naval helicopter, including:
 - **Kamov Ka-28** (Anti-Submarine Warfare)
 - **Kamov Ka-31** (Airborne Early Warning)

Role and Operations

- Maritime surveillance and patrol.
- Anti-surface, anti-submarine, and anti-air warfare.
- Protection of Sea Lines of Communication (**SLOCs**).
- Escort operations for naval task forces.
- Humanitarian Assistance and Disaster Relief (**HADR**).
- Participation in multinational naval exercises and anti-piracy missions.

SOCIETY

POPULATION AND ASSOCIATED ISSUES

SHOULD INDIA INCENTIVISE BIGGER FAMILIES?

SOURCE: THE HINDU

Why in News?

Andhra Pradesh has announced cash incentives of ₹30,000–₹50,000 for women giving birth to a third or fourth child, citing concerns over declining fertility.

India's Changing Demographic Scenario

Declining Fertility Rate

- India's **Total Fertility Rate (TFR)** has steadily declined over the last three decades.
- Several states including **Andhra Pradesh, Tamil Nadu, Kerala, Karnataka and Delhi** have fertility levels well below replacement.
- Fertility decline reflects improvements in **female education, healthcare, urbanisation and family planning awareness**.

Demographic Transition

- India has moved from a phase of **rapid population growth** towards **population stabilization**.
- While some states are entering an ageing phase, others still have relatively young populations.

Reasons Behind Calls for Larger Families

Ageing Population

- Lower fertility gradually increases the proportion of elderly citizens.
- Demand for **healthcare, pensions and social security** is expected to rise.

Future Labour Force Concerns

- Fewer births today may reduce the size of the working-age population in coming decades.
- This could affect economic growth and tax revenues.

Political Representation

- States with lower population growth fear losing parliamentary seats after future **delimitation exercises** based on population.

Economic Sustainability

- A shrinking workforce may increase the **dependency ratio**, placing greater pressure on productive workers.

Can Financial Incentives Increase Fertility?

Limited Impact

- International evidence shows that **cash incentives alone rarely produce sustained increases in fertility**.

Changing Social Preferences

- Couples increasingly prefer **smaller families** due to changing lifestyles and aspirations.

High Cost of Raising Children

- Rising expenditure on **education, healthcare, housing and childcare** discourages larger families.

Women's Education and Employment

- Higher female education and workforce participation often result in **later marriages and fewer children**.

Quality over Quantity

- Parents increasingly prefer investing more resources in fewer children.

International Experience

France and Sweden

- Better fertility outcomes through **Affordable childcare, Paid parental leave, Flexible work arrangements and Gender-friendly policies**

Hungary

- Introduced tax exemptions and housing incentives.
- Fertility improved only marginally and remains below replacement level.

Poland

- Cash support produced temporary improvements but failed to reverse long-term decline.

South Korea

- Despite spending billions on pro-natalist policies, fertility remains among the world's lowest.

Japan and Singapore

- Continue to struggle with ageing despite extensive government incentives.

Challenges in Reversing Fertility Decline

Permanent Social Change

- Fertility behaviour changes permanently as societies develop.

Urbanisation

- Urban families prefer fewer children due to higher living costs and limited space.

Delayed Marriage

- Increasing marriage age shortens reproductive years.

Changing Family Structure

- Nuclear families reduce traditional childcare support available in joint families.

Career Aspirations

- Professional goals influence reproductive decisions.

Impact on India's Federal Structure

Uneven Demographic Transition

- Different states are at different stages of demographic change.

Policy Diversity

- Younger states require employment generation.
- Ageing states need better elderly care and healthcare infrastructure.

Delimitation Debate

- States that successfully controlled population growth seek protection against losing political representation.

Does India Face an Immediate Labour Shortage?

- India still possesses one of the world's largest **working-age populations**.
- Major challenges remain:
 - **Unemployment**
 - **Underemployment**
 - **Skill mismatch**
 - **Low Female Labour Force Participation Rate (FLFPR)** despite recent improvements.
- The immediate concern is creating **quality employment**, not labour scarcity.

Can Migration Address Regional Population Decline?

- **Inter-state migration** helps balance labour shortages across regions.
- Migration supports industrial growth and economic integration.
- However, social and political concerns may arise in destination states.

Alternative Solutions Beyond Higher Fertility

Invest in Human Capital

- Improve **education, healthcare and skill development**.

Increase Female Labour Force Participation

- Expand childcare support and flexible work opportunities.

Promote Healthy Ageing

- Strengthen healthcare, pensions and elderly care services.

Improve Productivity

- Invest in **technology, innovation and automation** to offset future labour shortages.

Develop the Silver Economy

- Promote sectors such as elderly healthcare, assistive technologies, insurance and caregiving services.

Way Forward

- Adopt **state-specific demographic policies** instead of a uniform national approach.
- Focus on **human capital development** rather than merely increasing population.
- Expand affordable childcare, maternity benefits and family-friendly workplace policies.
- Protect states with successful population stabilization during future delimitation exercises.
- Strengthen social security systems to prepare for an ageing population.
- Promote balanced regional development and facilitate safe labour mobility across states.

Conclusion

India's demographic challenge is best addressed through stronger human capital, higher productivity and better social security rather than relying solely on incentives for larger families.

VULNERABLE SECTIONS OF SOCIETY

RENAMING POLYCYSTIC OVARY SYNDROME (PCOs) AS POLYENDOCRINE METABOLIC OVARIAN SYNDROME (PMOs)

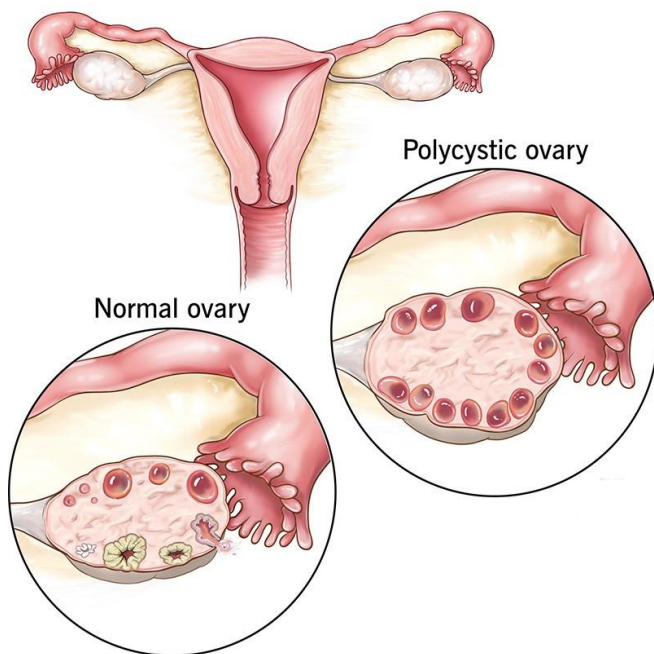
SOURCE: INDIAN EXPRESS

Why in News?

An international panel of experts has recommended renaming **Polycystic Ovary Syndrome (PCOS)** as **Polyendocrine Metabolic Ovarian Syndrome (PMOS)** to better reflect the disease's hormonal and metabolic nature.

What is PMOS (Earlier Known as PCOS)?

- **PMOS** is a **complex endocrine-metabolic disorder** affecting the **ovaries, hormones, metabolism, and reproductive system**.
- It is characterized by:
 - **Hormonal imbalance**
 - **Irregular ovulation**
 - **Excess androgen (male hormone) production**
 - **Insulin resistance**
 - **Metabolic disturbances**
- It is one of the leading causes of **female infertility** worldwide.



Why is the Name Being Changed?

Misleading Existing Terminology

- The term "**Polycystic Ovary Syndrome**" focuses only on ovarian cysts.
- Many affected women **do not develop multiple cysts**.
- Ovarian cysts are **not mandatory for diagnosis**.

Reflects the True Nature of the Disease

The proposed name highlights:

- **Polyendocrine** → Multiple hormonal glands are involved.
- **Metabolic** → Insulin resistance and metabolic disorders are central features.
- **Ovarian** → Ovarian dysfunction remains an important component.
- **Syndrome** → Represents a collection of multiple clinical manifestations.

Improves Patient Awareness

- Helps patients understand that the condition affects **overall health**, not merely fertility.

Causes and Risk Factors

Genetic Factors

- Family history significantly increases the risk.
- Multiple genes regulating insulin and hormone metabolism are involved.

Hormonal Imbalance

- Increased secretion of **androgens** interferes with normal ovulation.

Insulin Resistance

- Reduced response to insulin leads to higher insulin levels.
- Excess insulin stimulates androgen production.

Lifestyle Factors

- Sedentary lifestyle
- Obesity
- High-calorie diet
- Poor sleep quality
- Chronic stress

Environmental Factors

- Exposure to endocrine-disrupting chemicals may also contribute.

Diagnosis

Diagnosis is commonly based on the **Rotterdam Criteria**, requiring any **two** of the following:

- **Irregular or absent ovulation**
- **Clinical or biochemical signs of excess androgen**
- **Polycystic ovaries on ultrasound**

Additional investigations include:

- Blood sugar levels
- Lipid profile
- Hormonal evaluation
- Thyroid function tests
- Ultrasound examination

Global and Indian Burden

- Globally, PMOS affects nearly **8–13% of women of reproductive age**, although many cases remain undiagnosed.
- In India, studies estimate prevalence between **10% and 20%**, particularly among urban women due to changing lifestyles.
- Rising obesity, sedentary behaviour, unhealthy diets, and stress are increasing disease burden among adolescents and young adults.

Government Initiatives

- **National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD)** promotes screening for obesity, diabetes, and metabolic disorders.

- **Ayushman Arogya Mandirs (Health and Wellness Centres)** provide preventive and reproductive health services.
- **Rashtriya Kishor Swasthya Karyakram (RKSK)** focuses on adolescent reproductive and menstrual health.
- **POSHAN Abhiyaan** encourages healthy nutrition and lifestyle among women and adolescents.

Challenges

- **Delayed diagnosis** due to lack of awareness.
- Social stigma surrounding menstrual and reproductive disorders.
- Limited access to endocrinologists and reproductive specialists in rural areas.
- Poor lifestyle habits among adolescents.
- Lack of standardized screening programmes.
- Under-recognition of mental health complications.

Way Forward

- Increase **public awareness** regarding hormonal and metabolic disorders.
- Promote **early screening** in adolescent girls with menstrual irregularities.
- Integrate PMOS screening into school and college health programmes.
- Encourage multidisciplinary management involving **gynecologists, endocrinologists, nutritionists, psychologists, and fitness experts.**
- Strengthen research on genetic, environmental, and metabolic aspects of PMOS.
- Promote healthy lifestyle practices through preventive healthcare initiatives.

Conclusion

Renaming PCOS as PMOS highlights its true endocrine and metabolic nature, encouraging early diagnosis, comprehensive treatment, and better long-term health outcomes for women.

PRILIMS POINTER IN NEWS

KORAGA TRIBE

SOURCE: THE HINDU

Why in News?

The **UN-Habitat World Cities Report 2026** highlighted the poor housing conditions and social exclusion faced by the **Koraga Tribe**, bringing renewed attention to their welfare.



About Koraga Tribe

- The **Koraga Tribe** is one of the oldest indigenous tribal communities of **South India**, predominantly residing in **Dakshina Kannada** and **Udupi** districts of **Karnataka** and **Kasaragod** district of **Kerala**.
- The Government of India has classified the Koragas as a **Particularly Vulnerable Tribal Group (PVTG)** because of their low socio-economic status, dependence on traditional livelihoods, and limited access to modern development.

Language

- Native language is **Koraga Bhasha**, belonging to the **Dravidian language family**.
- They also communicate in **Tulu, Kannada, Malayalam, and Konkani**.

Social Organisation

- Traditionally follows a **matrilineal family system**.
- Society is divided into **clans known as "Bali"**.
- Village affairs are supervised by an elderly leader called the **Mooppa**, who resolves disputes and guides community decisions.

Culture

- Famous for **basket weaving**, bamboo handicrafts, folk dances, and traditional music.
- **Dholu (drum)** and **Voote (flute)** are important musical instruments.
- Songs and dances are performed during festivals, marriages, and community rituals.

Religion

- Follow **Hinduism** along with indigenous tribal beliefs.
- Worship **Bhutas (spirits)**, village deities, and ancestors.

- Nature worship remains an important part of their religious practices.

Significance

- Preserves India's **tribal cultural heritage**.
- Promotes traditional handicrafts and sustainable forest-based livelihoods.
- Reflects the importance of inclusive tribal development.
- Highlights the need for social justice and improved access to education, healthcare, and housing.

MAHADEV KOLI TRIBE

SOURCE: THE HINDU

Why in News?

The **Mahadev Koli Tribe** was recently highlighted for its **traditional ecological knowledge** and sustainable use of medicinal plants in the **Western Ghats of Maharashtra**.



About Mahadev Koli Tribe

- The **Mahadev Koli** (also called **Mahadeo Koli**) is a **Scheduled Tribe (ST)** primarily inhabiting the **Western Ghats of Maharashtra**, with smaller populations in **Goa**.
- They derive their name from **Lord Mahadev (Shiva)**, whom they regard as their principal deity.

Distribution

- Predominantly found in **Maharashtra**.
- Major concentrations include:
 - **Pune**
 - **Nashik**
 - **Ahmednagar**
 - Other parts of the **Western Ghats**.
- Smaller populations are also found in **Goa**.

Social and Cultural Features

- **Scheduled Tribe** under the Constitution of India.
- Speak **Marathi** and use the **Devanagari script**.

- Society consists of **24 exogamous clans**, with clan names commonly used as surnames.
- Mostly live in **nuclear families**.
- Their dress and customs resemble those of the **Kunbi** and **Maratha** communities.

Religious Beliefs

- Primarily follow **Folk Hinduism**.
- Worship **Lord Mahadev (Shiva)** as the principal deity.
- Each clan also worships its own **family or clan deity**.
- Traditional rituals are closely associated with forests, hills, and nature.

Traditional Ecological Knowledge

- Possess extensive knowledge of medicinal plants.
- Use more than **50 native tree species** belonging to several plant families for treating various ailments.
- Follow sustainable harvesting practices that help conserve forest biodiversity.
- Their indigenous knowledge contributes to climate resilience and ecosystem conservation.

Historical Importance

- **Tanaji Malusare**, the legendary commander of **Chhatrapati Shivaji Maharaj**, belonged to the Mahadev Koli community.
- He is remembered for his extraordinary bravery in the **Battle of Sinhagad (1670)**.

THEWA ART

SOURCE: INDIAN EXPRESS

Why in News?

During his visit to **Slovakia**, the **Prime Minister of India** presented **Thewa motif cufflinks** as a diplomatic gift to the Slovak President.



About Thewa Art

- **Thewa Art** is a unique and highly specialised **traditional jewellery craft** of **Rajasthan**, renowned for its intricate fusion of **23-carat gold work** with **coloured glass**.
- The word "**Thewa**" means "**setting**", referring to the process of fixing delicately carved gold onto coloured glass.

Origin

- Originated in **Pratapgarh, Rajasthan**.
- Traditionally attributed to **Nathu Lal Sonewal**, an eminent artisan.
- Practised for nearly **400 years** by hereditary craftsmen.

Process of Thewa Art

Preparation

- Thin sheets of **23-carat gold** are handcrafted.

Designing

- Intricate motifs are manually carved by removing portions of the gold sheet using fine tools.

Thermal Bonding

- The carved gold sheet is permanently fused onto coloured glass using a **traditional thermal bonding technique**.
- No glue, solder, or synthetic adhesive is used.

Final Assembly

- The decorated glass is mounted into jewellery or decorative objects using traditional methods.

Recognition

- Awarded the **Geographical Indication (GI) Tag** in **2014**.
- Recognised as an important element of India's traditional handicraft heritage.

Significance

- Preserves Rajasthan's unique jewellery-making tradition.
- Generates livelihood opportunities for artisan families.
- Promotes India's cultural diplomacy through handcrafted gifts.
- Supports the objectives of **Vocal for Local, One District One Product (ODOP)**, and handicraft exports.
- Demonstrates India's rich intangible cultural heritage and skilled craftsmanship.

SAHARIYA TRIBE

SOURCE: THE HINDU

Why in News?

- The **President of India** recently interacted with **Cheetah Mitras** and members of the **Sahariya Tribe** during her visit to **Kuno National Park** in **Sheopur district, Madhya Pradesh**.



About Sahariya Tribe

- The **Sahariya Tribe** is one of India's **Particularly Vulnerable Tribal Groups (PVTGs)**, recognised for its socio-economic vulnerability and dependence on forests.

Distribution

- Mainly found in **Madhya Pradesh** and **Rajasthan**
- They generally reside in separate tribal settlements known as "**Seharana**."
- Houses are traditionally built using:
 - Stone slabs (**Patore**)
 - Stone boulders
 - Mud in some areas.

Social and Cultural Features

- Classified as a **Particularly Vulnerable Tribal Group (PVTG)**.
- Also known by names such as **Seher, Sair** and **Savar**.

Language

- Their original language has largely disappeared.
- They now speak regional dialects, mainly **Hindi** and local languages of their respective regions.

Religion

- Primarily follow **Hinduism** blended with **animistic beliefs**.
- Worship local deities such as:
 - **Bhavani**
 - **Gond Devta**
 - **Bijasur**
- Nature worship continues to remain an important part of their traditions.

Sub-Groups

The community is traditionally divided into **five occupational groups**:

- **Jati** – Farmers

- **Arsi** – Weavers
- **Muli** – Iron workers
- **Kindal** – Basket makers
- **Kumbi** – Potters

Livelihood

- Collection of **Minor Forest Produce (MFP)**.
- Small-scale agriculture.
- Agricultural wage labour.
- Preparation of **catechu (katha)** from **Khair trees**.
- Animal rearing and seasonal employment.

KALAMKARI PAINTING

SOURCE: INDIAN EXPRESS

Why in News?

The **Prime Minister of India** recently presented a **Kalamkari painting depicting the Mahabharata** to the **President of France** as a diplomatic gift.



About Kalamkari Painting

- **Kalamkari** is a renowned **traditional textile art** of **Andhra Pradesh**, involving **hand-painted** or **block-printed** designs on cotton fabric using **natural dyes**.
- The term "**Kalamkari**" is derived from two Persian words:
 - **Kalam** – Pen

- **Kari** – Craftsmanship

- The art flourished under the **Qutb Shahi rulers of Golconda** during the **16th–17th centuries**.
- It is celebrated for its intricate designs, mythological themes, and eco-friendly production process.

Technique

Fabric Preparation

- Cotton cloth is treated with **buffalo milk** and natural astringents.
- Fabric is dried under sunlight.

Drawing

- Outlines are created using a **bamboo or date-palm pen (Kalam)**.
- Natural mordants are used for fixing colours.

Dyeing

- Fabric undergoes repeated dyeing using natural colours extracted from Roots, Leaves, Bark, Seeds, Minerals such as iron and copper.

Finishing

- Wax-resist technique and multiple washing stages produce vibrant, long-lasting colours.

Major Styles

1. Srikalahasti Kalamkari

- Practised in **Srikalahasti, Tirupati District**.
- Entirely **hand-painted** using the kalam.
- Features:
 - Mythological stories
 - Hindu deities
 - Temple architecture
 - Epics such as the **Ramayana** and **Mahabharata**.

2. Machilipatnam (Pedana) Kalamkari

- Originated in **Pedana**, near **Machilipatnam**.
- Uses **wooden block printing**.
- Influenced by **Persian art** during the Golconda Sultanate.

Recognition

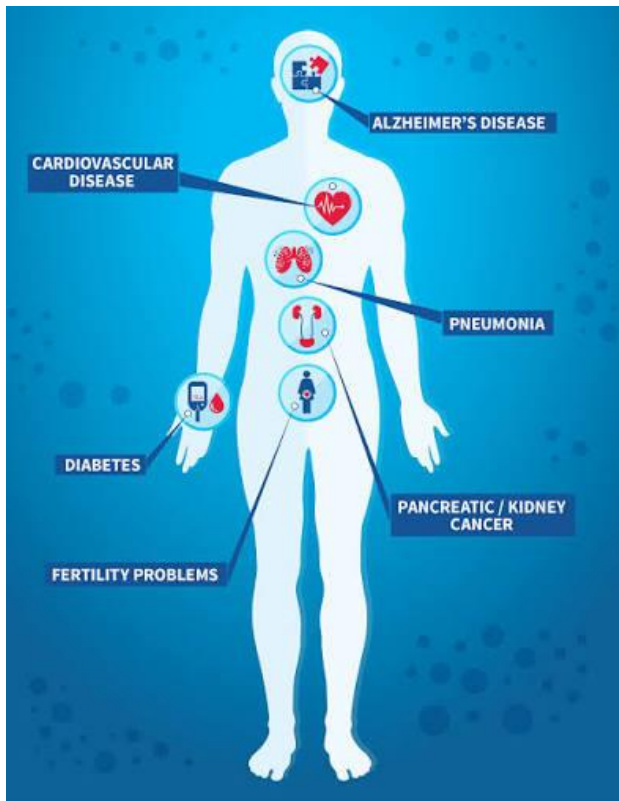
- **Machilipatnam Kalamkari** received the **Geographical Indication (GI) Tag** in **2008**.
- **Srikalahasti Kalamkari** received the **GI Tag** in **2009**.

RISE OF NON-COMMUNICABLE DISEASES (NCDs) IN INDIA

SOURCE: SRS STATISTICAL REPORT 2024

Why in News?

The **Sample Registration System (SRS) Statistical Report 2024** revealed that **Non-Communicable Diseases (NCDs)** accounted for **60% of all deaths in India** during **2022–24**, up from **52.8% in 2015–17**.



Key Findings of the SRS Statistical Report 2024

Rising Mortality due to NCDs

- **NCDs contributed nearly 60% of all deaths** during 2022–24, reflecting a significant increase over the previous decade.
- **Cardiovascular diseases** remain the leading cause, contributing over **30% of total deaths**.
- **Cancer, chronic respiratory diseases, diabetes, and digestive disorders** also account for a significant share of mortality.

Premature Deaths

- NCDs account for a large proportion of deaths among the **30–69 years** age group, affecting India's productive workforce.

Urban-Rural Trend

- Urban areas continue to report a higher NCD burden.
- However, rural areas are also witnessing a steady increase due to lifestyle changes and ageing.

Regional Variation

- Developed states have a relatively higher share of NCD-related deaths, while **EAG states** continue to face the **double burden** of communicable and non-communicable diseases.

Major Causes for the Rising Burden of NCDs

Lifestyle Changes

- **Sedentary lifestyles**, unhealthy diets, obesity, inadequate physical activity, tobacco consumption,

alcohol abuse, and chronic stress have significantly increased NCD prevalence.

Rapid Urbanisation

- Urban living has increased exposure to processed foods, pollution, reduced physical activity, and mental stress.

Population Ageing

- Rising life expectancy has increased the proportion of elderly people, who are more vulnerable to chronic illnesses.

Environmental Factors

- **Air pollution**, occupational exposure, and climate-related health risks contribute to respiratory and cardiovascular diseases.

Behavioural Risk Factors

According to WHO, the four major behavioural risk factors are:

- **Tobacco use**
- **Harmful alcohol consumption**
- **Unhealthy diet**
- **Physical inactivity**

Impact of Rising NCDs

Public Health Burden

- Increased long-term treatment requirements place enormous pressure on India's healthcare system.

Economic Consequences

- Rising healthcare expenditure increases **out-of-pocket expenses**, reducing household savings and productivity.
- Premature deaths reduce labour force participation and economic growth.

Threat to Demographic Dividend

- Growing illness among working-age adults affects India's demographic advantage.

Social Consequences

- Families face prolonged caregiving responsibilities, financial distress, and reduced quality of life.

Mental Health Concerns

- Rising stress, anxiety, depression, and suicides indicate increasing mental health challenges alongside other NCDs.

Government Initiatives

National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD)

- Focuses on **screening, early diagnosis, treatment, and management** of major NCDs.

Ayushman Bharat

- **Ayushman Arogya Mandirs (Health and Wellness Centres)** provide community-level screening and preventive healthcare.
- **PM-JAY** offers financial protection for secondary and tertiary care.

National Mental Health Programme

- Expands access to mental healthcare and counselling services.

Mental Healthcare Act, 2017

- Recognizes mental healthcare as a legal right.

Fit India Movement

- Promotes physical activity and healthy lifestyles.

Eat Right India Campaign

- Encourages balanced diets, food safety, and healthy nutrition.

National Tobacco Control Programme (NTCP)

- Reduces tobacco consumption through awareness, regulation, and cessation support.

Challenges

Curative-Oriented Healthcare

- Greater emphasis on treatment than prevention.

Late Diagnosis

- Inadequate screening leads to delayed detection.

Health Infrastructure Gaps

- Shortage of specialists, diagnostics, and healthcare facilities, especially in rural areas.

Lifestyle Risk Factors

- Increasing obesity, pollution, unhealthy food consumption, and stress continue to drive NCD prevalence.

Weak Surveillance

1. Disease registries and mortality data require further strengthening.

Way Forward

- Strengthen **preventive healthcare** through regular community screening and early diagnosis.
- Expand **Ayushman Arogya Mandirs** for comprehensive primary healthcare services.
- Promote **healthy diets, regular physical activity, yoga, and behavioural change** through sustained awareness campaigns.
- Integrate **mental healthcare** into primary healthcare, schools, workplaces, and colleges.
- Strengthen **tobacco and alcohol control policies** through effective enforcement.
- Improve healthcare infrastructure, diagnostic services, and specialist availability, particularly in underserved regions.

- Develop robust digital disease surveillance and cause-of-death registration systems for evidence-based policymaking.
- Adopt a "**Health in All Policies**" approach by integrating health considerations into urban planning, education, food regulation, transport, and environmental policies.

Conclusion

Reducing the growing burden of Non-Communicable Diseases requires a strong preventive healthcare system, healthier lifestyles, early diagnosis, and coordinated multi-sectoral action to ensure a healthier and more productive India.

TELANGANA'S AEROSPACE VISION 2047

Telangana's Aerospace Vision 2047 is a long-term strategic roadmap launched by the **Government of Telangana** to transform the state into one of the world's leading **aerospace, defence, aviation, and space technology hubs** by the year **2047**, coinciding with **100 years of India's Independence (Viksit Bharat@2047)**.

The vision aims to build a globally competitive aerospace ecosystem by promoting **advanced manufacturing, research and development (R&D), innovation, skill development, exports, and investment**.

Objectives of Aerospace Vision 2047

- **Develop Telangana as a Global Aerospace Hub** for manufacturing, design, maintenance, repair, and overhaul (MRO).
- **Strengthen indigenous defence production** under the vision of **Atmanirbhar Bharat**.
- Promote **high-value exports** in aerospace and defence sectors.
- Encourage **innovation, startups, and deep-tech enterprises**.
- Build a **future-ready skilled workforce**.
- Integrate Telangana into **global aerospace supply chains**.
- Support India's ambitions in **space technology** and **civil aviation**.

Key Pillars of Telangana's Aerospace Vision 2047

1. Aerospace Manufacturing Hub

- Promote manufacturing of Aircraft components, Aero engines, Precision engineering products, Avionics systems and Defence equipment
- Encourage establishment of global manufacturing units through industrial parks.

2. Defence and Homeland Security

- Strengthen defence manufacturing ecosystem.
- Promote production of Missiles, Radar systems, Electronic warfare systems, Defence electronics and Unmanned systems
- Support indigenous defence technologies under **Make in India**.

3. Space Technology Ecosystem

- Develop Telangana as a major centre for Satellite manufacturing, Launch vehicle components, Space electronics and Space startups

Strengthen collaboration with **ISRO, IN-SPACe, NSIL**, and private space companies.

4. Maintenance, Repair and Overhaul (MRO)

- Establish world-class **MRO facilities** for Commercial aircraft, Defence aircraft and Helicopters
- Reduce India's dependence on overseas maintenance facilities.

5. Research, Development and Innovation

- Promote advanced R&D in Artificial Intelligence (AI), Robotics, Autonomous systems, Advanced materials, Additive manufacturing (3D Printing) and Digital twins
- Encourage collaboration among industry, academia, and research institutions.

6. Skill Development

- Develop specialised training programmes for:
 - Aerospace engineers
 - Aircraft technicians
 - Drone operators
 - Space technology professionals
- Partner with universities, engineering colleges, and industries to bridge skill gaps.

7. Startup and MSME Promotion

- Support aerospace startups through:
 - Incubation centres
 - Innovation grants
 - Venture funding
- Integrate **MSMEs** into global aerospace supply chains.

Existing Strengths of Telangana

- **Hyderabad** is home to India's largest aerospace and defence manufacturing ecosystem.
- Presence of major organisations such as:
 - **DRDO**
 - **Bharat Dynamics Limited (BDL)**
 - **Hindustan Aeronautics Limited (HAL)**
 - **Bharat Electronics Limited (BEL)**
 - **Mishra Dhatu Nigam (MIDHANI)**
 - **National Remote Sensing Centre (NRSC)**
- Hosts leading global aerospace companies such as **Lockheed Martin, Boeing, Collins Aerospace, Safran, GE Aerospace, Pratt & Whitney, and RTX**.
- Presence of **Adibatla Aerospace SEZ**, one of India's largest aerospace manufacturing clusters.

Expected Outcomes

Position Telangana among the **top global aerospace destinations**

- Generate **high-skilled employment opportunities**.
- Increase **FDI and private investments**.
- Boost aerospace and defence exports.
- Promote technology transfer and innovation.
- Strengthen India's strategic and defence capabilities.
- Support the vision of **Viksit Bharat@2047**.

Significance

Economic Importance

- Accelerates industrial growth.
- Enhances export earnings.
- Diversifies the state's manufacturing base.

Strategic Importance

- Supports **national security** through indigenous defence production.
- Reduces dependence on imports.

Technological Importance

- Promotes advanced technologies such as AI, drones, semiconductors, and space systems.

Employment Generation

- Creates high-value jobs for engineers, technicians, researchers, and skilled workers.

Global Competitiveness

- Integrates Telangana into international aerospace manufacturing and supply chains.

Challenges

- High capital investment requirements.
- Need for continuous technological upgrades.
- Global competition from established aerospace hubs.
- Requirement of highly skilled manpower.
- Supply chain resilience and critical mineral availability.
- Cybersecurity risks in aerospace manufacturing.

Way Forward

- Expand aerospace industrial corridors and dedicated parks.
- Increase public-private partnerships (PPP).
- Strengthen collaboration with **ISRO, DRDO**, academia, and global firms.
- Promote indigenous R&D through innovation funds.
- Enhance ease of doing business and investment facilitation.
- Focus on sustainable aerospace manufacturing and green aviation technologies.

Conclusion

Telangana's Aerospace Vision 2047 provides a comprehensive roadmap to transform the state into a

globally competitive aerospace and defence powerhouse while contributing significantly to India's technological self-reliance, economic growth, and national security.

MANGROVE ENCROACHMENT IN WEST GODAVARI

Large portions of mangrove forests near **Perupalem, West Godavari**, have reportedly been converted into **illegal aquaculture ponds**, violating environmental regulations.



Key Highlights

- **Mangrove cover** has declined drastically from nearly **2,000 acres in the 1950s** to about **510 acres** at present.
- Around **70 acres** of mangrove and creek areas were allegedly converted into aquaculture ponds.
- Several aquaculture farms are operating within the prohibited **300–500 metre buffer zone** around mangrove forests.
- Environmental organizations have demanded:
 - **GPS-based surveys**
 - Verification using **historical land records**
 - Removal of illegal encroachments.
- The issue may be taken before the **National Green Tribunal (NGT)** for legal intervention.

About Mangroves

- **Mangroves** are salt-tolerant trees and shrubs that grow in the **intertidal zones** of tropical and subtropical coastlines.
- They thrive where **freshwater mixes with seawater**, such as estuaries, deltas, lagoons, and tidal creeks.
- India possesses approximately **4,992 sq. km** of mangrove cover (India State of Forest Report 2023), with Andhra Pradesh hosting significant mangrove ecosystems in the **Godavari** and **Krishna** deltas.

Ecological Importance of Mangroves

1. Natural Coastal Protection

Mangroves act as natural bio-shields, protecting coastal regions from **cyclones, storm surges, tidal waves, coastal flooding, and tsunamis** by absorbing wave energy and reducing the impact of natural disasters.

- Their **extensive root systems stabilize coastal soil**, prevent shoreline erosion, reduce sediment loss, and protect coastal infrastructure and human settlements.

2. Biodiversity Hotspots

- **Mangrove forests serve as important breeding, spawning, nursery, and feeding grounds** for numerous marine organisms such as **fish, crabs, shrimps, molluscs, prawns, and other aquatic species**, thereby supporting fisheries.
- They provide **habitat and shelter for a wide variety of wildlife**, including **migratory birds, reptiles, amphibians, mammals, and several endangered and endemic plant and animal species**, making them one of the most productive ecosystems on Earth.

3. Blue Carbon Ecosystems

- **Mangroves are among the world's most efficient blue carbon ecosystems**, storing significantly larger quantities of carbon in their biomass and soil than most terrestrial forests for long periods.
- By **absorbing and storing atmospheric carbon dioxide**, mangroves play a crucial role in **mitigating climate change**, reducing greenhouse gas concentrations, and enhancing climate resilience.

4. Livelihood Support

- **Mangroves provide sustainable livelihood opportunities** to millions of coastal communities by supporting **fisheries, aquaculture, honey collection, fuelwood, medicinal plants, and other non-timber forest products (NTFPs)**.
- They also **promote eco-tourism, nature-based recreation, and environmental education**, generating additional income while encouraging the conservation of coastal ecosystems.

Causes of Mangrove Degradation

- Expansion of **aquaculture**, particularly shrimp farming.
- Illegal land encroachments.
- Urbanisation and infrastructure development.
- Pollution from industrial and domestic sources.
- Weak enforcement of environmental regulations.
- Climate change and rising sea levels.

Legal and Institutional Framework

Coastal Regulation Zone (CRZ) Notification

- Issued under the **Environment (Protection) Act, 1986**.
- **Mangroves are classified under CRZ-I**, providing the highest level of protection.
- Prohibits ecologically damaging activities within notified areas.

National Green Tribunal (NGT)

- Established under the **National Green Tribunal Act, 2010**.
- Adjudicates environmental disputes and ensures speedy implementation of environmental laws.

Forest (Conservation) Act, 1980

- Restricts diversion of forest land for non-forest purposes without prior approval.

Biological Diversity Act, 2002

- Promotes conservation and sustainable use of biodiversity.

Environmental Impacts

- Increased vulnerability to cyclones and coastal disasters.
- Loss of fish breeding habitats affecting fisheries.
- Decline in biodiversity and ecosystem services.
- Higher greenhouse gas emissions due to destruction of blue carbon ecosystems.
- Increased coastal erosion and saline water intrusion.

Way Forward

- Strict enforcement of **CRZ-I regulations**.
- Conduct **GIS and GPS-based mapping** of mangrove areas.
- Remove illegal aquaculture ponds through coordinated departmental action.
- Promote **sustainable aquaculture** outside ecologically sensitive zones.

Restore degraded mangrove ecosystems through community participation.

- Strengthen monitoring using **remote sensing** and satellite imagery.
- Increase awareness among coastal communities regarding the ecological and economic importance of mangroves.

Conclusion

Protecting the mangroves of West Godavari is essential for conserving biodiversity, strengthening climate resilience, and ensuring sustainable livelihoods through effective enforcement of environmental laws and community-based conservation.



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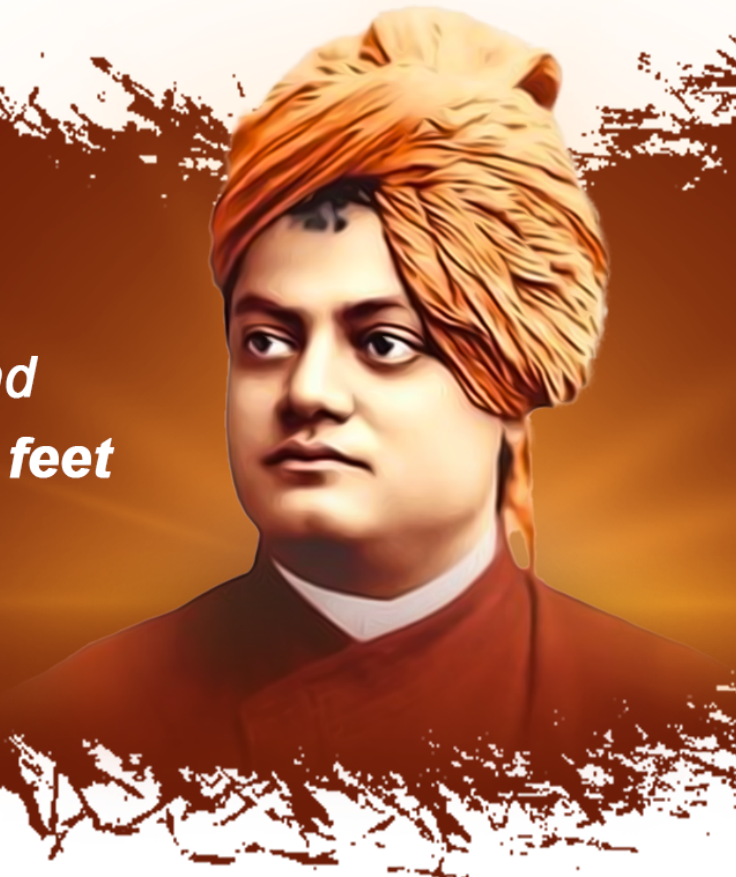
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