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NEPAL FLASH FLOOD

Why in news?

Severe flash floods in Nepal resulted in the deaths of over thousands, left hundreds missing, and caused widespread destruction of critical infrastructure.

Causes of the Nepal Flash Floods

The catastrophic flash floods in Nepal are driven by a combination of natural triggers and human-induced amplifiers:

Ice-Rock Avalanche & Cryospheric Changes: Scientists suspect an ice-rock avalanche triggered the disaster. Elevation-Dependent Warming (EDW) is accelerating permafrost thaw which removes the "ice-cement" holding rocks together and expanding moraine-dammed glacial lakes, heightening the risk of Glacial Lake Outburst Floods (GLOFs).

Anomalous Weather Interaction: The disaster was fueled by the unseasonal or anomalous interaction of a Western Disturbance with active monsoon weather systems, producing intense, localized cloudbursts over steep terrain.

Geological & Tectonic Fragility: The Himalayas are young, continuously uplifting fold mountains traversed by active fault lines (such as the Main Central Thrust, Main Boundary Thrust, and Himalayan Frontal Thrust), making fractured rocks extremely susceptible to mass wasting and landslides.

Anthropogenic Pressures: Unplanned infrastructure projects, unscientific hill-cutting, tunneling for hydropower, and dumping excavated muck directly into riverbeds transform high-discharge water flows into lethal debris torrents.



Impact of the Disaster

Human & Economic Loss: The floods have caused over 150 fatalities, left hundreds missing, and severely damaged critical infrastructure, housing, and livelihoods.

Transboundary River Risks for India: Major Himalayan rivers originating in or passing through Nepal—specifically the Bhote Koshi, Gandak, and Karnali rivers (along with the Kosi) flow directly into India, creating severe downstream flood and sedimentation risks for northern states like Bihar and Uttar Pradesh. **Ecological & Infrastructure Destruction:** Siltation, destruction of run-of-the-river hydropower projects, and shifting river channels threaten long-term regional water and energy security.

India's Role and Stake

Transboundary Water Management & Early Warning: Because Himalayan river systems flow seamlessly across borders, India relies heavily on cooperative hydrological data-sharing mechanisms with Nepal to issue early warnings for downstream areas.

Disaster Diplomacy & Humanitarian Assistance: As a first responder in the neighborhood, India often extends immediate Humanitarian Assistance and Disaster Relief (HADR), search-and-rescue support, and medical aid during major regional calamities.

Joint Basin-Scale Resilience: India has a vital stake in advocating for integrated basin-wide disaster management, as localized activities, cloudbursts, or glacial breaches in the trans-Himalayan region directly imperil Indian plains.

Way Forward

Modernizing Multi-Hazard Early Warning Systems (MHEWS): Integrate satellite telemetry, high-altitude Automated Weather Stations (AWS), Interferometric Synthetic

Aperture Radar (InSAR), and Doppler radars to extend real-time warning windows for transboundary communities.

Enforcing Ecological Carrying Capacity: Mandate Strategic Environmental Assessments (SEAs) and landscape-level cumulative impact assessments before approving major linear or hydel infrastructure in fragile river basins.

Strict Regulation of Floodplains: Enforce strict zoning laws to prohibit permanent, high-density construction on active river terraces and "No-Development Zones".

Bio-Engineering for Slope Stabilization: Shift away from rigid concrete retaining walls toward nature-based slope stabilization methods, such as deep-rooting grasses (e.g., Vetiver), geo-textiles, and contoured vegetative terraces. **Strengthening Bilateral Frameworks:** Institutionalize robust, real-time institutional cooperation between India and Nepal for joint monitoring of glacial lakes, weather patterns, and river discharge data.

GLAW LAKE – ARUNACHAL PRADESH

Why in news?

On 3 August 2026, Glaw Lake was designated India's 101st Ramsar Site, becoming Arunachal Pradesh's first Ramsar Site.

Location: Kamlang Tiger Reserve and Wildlife Sanctuary, Lohit district, Arunachal Pradesh, in the Eastern Himalayas.

Type: Freshwater lake, fed by perennial mountain streams.

Biodiversity:

The lake and its catchment support rich plant diversity, including over 150 tree species and 49 orchid species. The wider landscape provides habitat for several big cats and water-dependent birds.

In addition to general big cats and birds, the catchment is a critical sanctuary for the critically endangered White-bellied Heron, plus species like the snow leopard, red panda, red goral, hoolock gibbon, clouded leopard, and four distinct hornbill species.

Community significance: The lake is sacred to the local Mishmi community.

SHIPKI LA PASS – HIMACHAL PRADESH

Why in news?

Traditional India–China border trade through Shipki La resumed on 1 August 2026, after a six-year suspension.

Location: Kinnaur district, Himachal Pradesh, on the India–China border adjoining the Tibet Autonomous Region.

Geographical significance: A high-altitude mountain pass, approximately 13,000 feet above sea level, associated with the historic trans-Himalayan trade route.

River connection: The Sutlej River enters India from Tibet in this region.

Trade arrangement: Traditional trade resumed through a barter-based system, with restrictions on the permitted goods and trading period.

Current challenge: Traders argued that the IGST burden made the limited seasonal trade commercially unviable. Customs-duty exemptions and IGST are distinct matters; the dispute concerned the tax treatment of eligible goods.

It reopened alongside Nathu La in Sikkim on the same weekend as part of a cautious thaw in India–China border commerce.

HALLANIYAT ISLANDS – OMAN

Why in news?

In August 2026, an oil spill from the grounded tanker Caroline Bezengi near Oman's Hallaniyat Islands raised serious concerns about marine pollution.

Location: Off the coast of the Dhofar Governorate in southern Oman, in the Arabian Sea.

Incident: The tanker was carrying Russian-origin crude oil. The grounding and continuing leakage threatened nearby coastal and marine ecosystems.

Environmental significance: The area is associated with marine wildlife, including Arabian Sea humpback whales and Socotra cormorants.

Wider implications: Oil spills can contaminate shorelines, affect seabirds and marine organisms, damage coastal habitats and disrupt fishing and tourism. Monsoon conditions can complicate containment and recovery operations.

Weather Complications: Response efforts have been severely hampered by the Khareef monsoon season, featuring 40-knot winds and 4-meter waves that blocked sea and air salvage teams.

PLACES IN NEWS - INDIA

Asan Conservation Reserve

Why in news?

In August 2026, the Supreme Court clarified that its earlier direction requiring prior approval for mining within a 10-km radius of the Asan Wetland Conservation Reserve should apply more broadly to wetland conservation reserves.

Location: Dehradun, Uttarakhand - near Himachal Pradesh.

Rivers: Confluence of the Asan and Yamuna rivers.

Ramsar Site: 21 July 2020 - Uttarakhand's first Ramsar Site.

Importance: Habitat for resident and migratory waterbirds along the Central Asian Flyway.

Jojari River (Rajasthan)

Why in news?

The Supreme Court imposed interim restrictions on construction within 100 metres of the river and pollution-causing activities within a 500-metre buffer to address severe river pollution.

About Jojari river

The Jojari is a seasonal river in western Rajasthan and a right-bank tributary of the Luni River. Unlike several Luni tributaries that originate in the Aravalli Range, the Jojari originates in the desert plains near Pondlu. It flows through the Jodhpur region and joins the Luni near Balotra. Industrial effluents, particularly from textile and chemical industries, are a major source of pollution. The river has become a focus of judicial intervention over contamination, untreated industrial discharge and damage to groundwater and agricultural land.

Senchal Wildlife Sanctuary (West Bengal)

Why in news?

A melanistic (black-coated) leopard cub was photographed near the sanctuary in the Darjeeling hills, highlighting the region's wildlife and conservation importance.

About Senchal Sanctuary

Senchal Wildlife Sanctuary is located on the outskirts of Darjeeling in West Bengal, at an elevation of approximately 1,500–2,600 metres, and covers about 38.6 sq km. Established in 1915, it is one of India's oldest wildlife sanctuaries. Its forests provide habitat for barking deer, wild boar, Himalayan black bear, Indian leopard and Himalayan flying squirrel. The two Senchal lakes supply drinking water to Darjeeling. In August 2026, a melanistic leopard cub was reportedly spotted near the sanctuary; melanism is the development of unusually dark pigmentation due to excess melanin.

Medak Fort (Telangana)

Why in news?

A special postal cover and stamp were released to promote the fort's historical heritage and tourism.

About Medak Fort

Medak Fort is a historic hill fort situated in Medak town, Telangana. It was constructed in the 12th century under Kakatiya ruler Pratapa Rudra and was originally known as Methuku Durgam. The fort later served the Qutb Shahi rulers. Its notable features include the Prathama Dwaram, Simha Dwaram and Gaja Dwaram, along with a mosque and granaries within the complex.

Buckingham Canal (Tamil Nadu)

Why in news?

The Greater Chennai Corporation cleared accumulated sand and construction debris near the Kodungaiyur landfill to improve water flow and reduce flooding risks ahead of the northeast monsoon.

About Buckingham Canal

The Buckingham Canal is a man-made navigation canal running parallel to India's Coromandel Coast through Andhra Pradesh and Tamil Nadu, extending for approximately 450 km. It historically connected coastal waterways and supported inland navigation. Initially developed as the Cochrane Canal, it was later renamed after the Duke of Buckingham and Chandos, the Governor of Madras. Parts of the canal form a constituent of National Waterway-4, which includes the Kakinada–Puducherry waterway system. Encroachment, sewage discharge, solid waste and siltation have reduced its navigability and drainage capacity. Its restoration has gained attention because of its potential role in Chennai's urban drainage and flood management.

Kollidam River (Tamil Nadu)

Why in news?

The Tamil Nadu government announced a ₹972-crore plan covering the Kollidam, Vellar and Noyyal rivers to address seawater intrusion and improve river conditions.

About Kollidam River

he Kollidam, also called the Coleroon, is the northern distributary of the Kaveri River in Tamil Nadu. It branches off from the Kaveri near the Upper Anaicut, or Mukkombu, region and flows eastwards towards the Bay of Bengal. It is important for irrigation, flood drainage and the hydrology of the Kaveri delta. The Kollidam is also recognised as National Waterway-55 under the National Waterways framework.

Pampa River (Kerala)

Why in news?

Heavy overnight rainfall caused the river to overflow at several locations, resulting in flooding in Pathanamthitta district.

About Pampa river

The Pampa, also spelt Pamba, is an important river in Kerala and is commonly identified as the state's third-longest river. It originates in the Pulachimalai Hills of the Western Ghats and flows through Pathanamthitta district towards the Kuttanad region, eventually draining into Vembanad Lake. The river is culturally significant because of its association with Sabarimala and the pilgrimage route to the Ayyappa temple. It also supports agriculture and wetland ecosystems in the Kuttanad region. Heavy rainfall can cause the river to rise rapidly, making floods and floodplain management important geographical concerns.

Thamirabarani River (Tamil Nadu)

Why in news?

The Madras High Court recognised the river as a juristic person for the limited purpose of protecting it from pollution and issued directions against dumping ritual waste into it.

About Thamirabarani river

The Thamirabarani, also known as Tamraparni or Porunai, originates in the Agastya Malai hills of the Western Ghats in Tamil Nadu. It flows through Tirunelveli and Thoothukudi districts before emptying into the Gulf of Mannar. Unlike many rivers in Tamil Nadu that are strongly seasonal, the Thamirabarani is perennial, sustained by rainfall from both the southwest and northeast monsoons as well as flows from its Western Ghats catchment. It is important for irrigation, drinking-water supply and the agricultural economy of southern Tamil Nadu.



PLACES IN NEWS – WORLD

Larak Island – Iran

Why in news?

In August 2026, Larak Island came into focus after US forces struck targets there amid tensions over the Strait of Hormuz.

About Larak Island

Located in the Persian Gulf near the Strait of Hormuz and the Iranian port of Bandar Abbas. It lies near Qeshm and Hormuz islands and is strategically important for monitoring maritime traffic and energy shipments. Because it sits directly next to the narrowest and primary shipping lane of the Strait of Hormuz through which roughly 20% of global oil and gas passes it is a vital vantage point for military surveillance and vessel monitoring.

Petermann Glacier – Greenland

Why in news?

On 4 August 2026, a section of its floating ice tongue measuring about 76 sq km broke away, forming a large tabular iceberg.

About Petermann Glacier

Located in northwestern Greenland, in the Arctic region. It is a major outlet glacier of the Greenland Ice Sheet. It drifted south into the Nares Strait after narrowly surviving a brush with Joe Island. Researchers from an international team co-led by the University of Ottawa are tracking it to assess regional shipping risks.

Lake Erie – North America

Why in news?

A 1,256-MW nuclear power plant on the southern shore of Lake Erie in Ohio has unintentionally created a wildlife refuge. Its 1,100-acre buffer zone provides habitat and nesting grounds for threatened spotted turtles.

About Lake Erie

Lake Erie is one of the five Great Lakes of North America, shared by the United States and Canada. It is the southernmost and shallowest of the five Great Lakes. It is connected to Lake Ontario by the Niagara River and forms part of the Great Lakes–St. Lawrence River system, which drains into the Atlantic Ocean.

Federal nuclear safety regulations require an extensive buffer zone. Out of the plant's 1,100-acre total footprint, more than 850 acres of natural forests and marshes have remained untouched since the early 1980s.Because Ohio has lost roughly 90% of its historical wetlands, this accidental sanctuary has become a rare breeding ground for the threatened spotted turtle. The site was formally certified as an urban wildlife refuge back in 1993.

Mount Ararat — Türkiye

Why in news?

In August 2026, a German–Turkish scientific team completed a detailed geophysical survey of its summit glacier to help identify a suitable site for future ice-core drilling

About Mount Ararat

Located in eastern Türkiye, near the borders with Armenia and Iran. At approximately 5,137 metres, it is Türkiye's highest mountain. It is a volcanic massif situated near the junction of Anatolia, the Caucasus and West Asia.

Delft Island – Sri Lanka

Why in news?

In August 2026, Sri Lanka announced plans to develop Delft Island as a zero-emission ecotourism destination..

About Delft Island

Also known as Neduntheevu, it lies off northern Sri Lanka, southwest of the Jaffna Peninsula, in the Palk Strait. It is the largest inhabited island in the Palk Strait and has a flat, semi-arid landscape with coralline soil and limited freshwater.



Madura Island – Indonesia

Why in news?

In August 2026, a passenger ferry caught fire near Madura Island while travelling from Java towards South Sulawesi, prompting rescue operations.

About Madura Island

Madura lies off the northeastern coast of Java and forms part of East Java Province. The Madura Strait separates it from Java, while the Java Sea lies to its north. The Suramadu Bridge connects Madura Island with Surabaya on Java.

CLOUDED LEOPARD CONSERVATION ACTION PLAN

Why in News?

Meghalaya launched **Mission Clouded Leopard** on **4 August, International Clouded Leopard Day** a dedicated conservation initiative to protect the clouded leopard, the state animal.

Key Features of the Conservation Action Plan

Habitat Protection: Protects the clouded leopard's forest habitats and addresses habitat loss and fragmentation.

Scientific Monitoring: Promotes camera-trap surveys, population monitoring, genetic analysis and environmental DNA (eDNA) techniques to understand the species' distribution and population trends.

Landscape Connectivity: Encourages the conservation of forest corridors to connect fragmented habitats and facilitate wildlife movement across landscapes.

Wildlife Crime Prevention: Strengthens anti-poaching measures and efforts to combat illegal wildlife trade.

Community Participation: Involves local communities in conservation activities and promotes sustainable practices around forest habitats.

Capacity Building: Improves the skills and resources of frontline forest staff for effective wildlife monitoring and protection.

Research and Collaboration: Encourages long-term scientific research and coordination among conservation agencies, researchers and local communities.

About the Clouded Leopard

Scientific Name: *Neofelis nebulosa*.

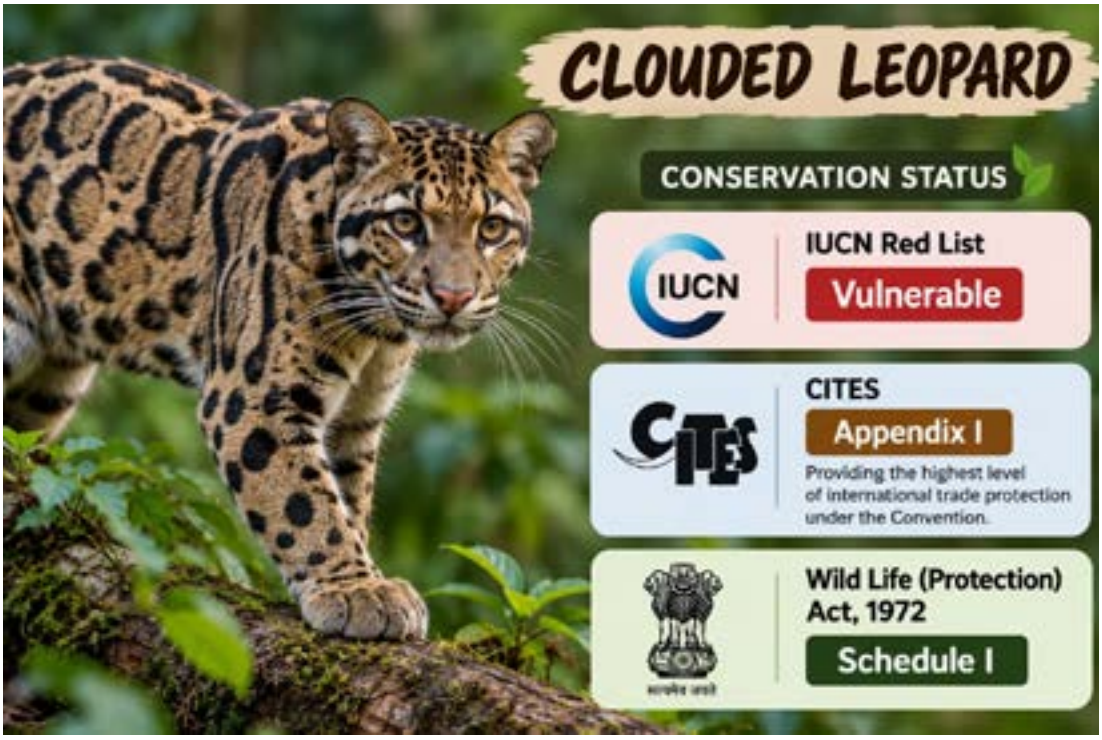
Distribution: Found in Northeast India, including Meghalaya, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram and Tripura, with additional occurrences in parts of the eastern Himalayas. Its range extends into Southeast Asia.

Habitat: Primarily inhabits tropical and subtropical forests. It is highly arboreal and spends considerable time in trees.

Distinctive Features: Its coat bears distinctive cloud-shaped markings. It has exceptionally long canine teeth relative to its body size and is an elusive, medium-sized wild cat.

Ecological Role: As a predator, it contributes to regulating prey populations and maintaining ecological balance in forest ecosystems.

UNCCD COP17: COMBATING DESERTIFICATION



Why in News?

The **17th Conference of the Parties (COP17) to the UNCCD** was held in Ulaanbaatar, Mongolia, from **17–28 August 2026.**

Theme: *Restoring Land, Restoring Hope.*

Key Issues Discussed

Mongolia's Initiative: Nearly 77% of Mongolia's land is degraded. Its *Billion Trees Campaign*, launched in 2021, aims to plant one billion trees by 2030.

Global Drought Framework: Countries failed to agree on a legally binding drought protocol at COP16 in Riyadh (2024), with divisions continuing between binding and non-binding approaches.

Riyadh Global Drought Resilience Partnership: Launched at COP16, it received

pledges exceeding **US$12 billion** to support drought preparedness, early-warning systems and resilience.

Land Degradation: Countries have pledged to restore around **1 billion hectares**, while global degradation affects an estimated **1.5–2 billion hectares**. Around 40% of countries do not report land-degradation data.

Drought Impacts: Drought affects approximately **1.8 billion people**, threatening food and water security and livelihoods.

Drought Resilience Index (DRI): Uses AI-powered analytics and vulnerability mapping to assess countries' drought preparedness and adaptive capacity.

Drought Resilience Investment Facility (DRIF): Launched by UNCCD and Luxembourg to mobilise public and private finance for drought resilience, water security and land restoration.

Finance and Implementation: Emphasis on mobilising finance, improving technology access, involving local and Indigenous communities, and redirecting harmful subsidies towards sustainable land management.

About UNCCD

Established: Adopted in 1994; entered into force in 1996.

Nature: Legally binding international agreement addressing desertification, land degradation and drought, particularly in drylands.

Objective: Combat desertification and mitigate drought impacts through international cooperation and effective action.

Headquarters: Bonn, Germany.

Key Target: Land Degradation Neutrality (LDN)—balancing land degradation with restoration and rehabilitation.

INDIA'S FIRST GUIDE TO GRASSLANDS AND OTHER OPEN NATURAL ECOSYSTEMS

Why in News?

India launched its first-ever **Guide to Grasslands and Other Open Natural Ecosystems (ONEs)** at **UNCCD COP17** in Ulaanbaatar, Mongolia, on 17 August 2026.

Key Features of the Guide

Objective: Promote science-based conservation, restoration and sustainable management of grasslands and other open ecosystems alongside forests.

Ecosystem Coverage: Includes Himalayan and Terai grasslands, Thar Desert, Banni landscapes, Deccan savannas, rocky plateaus, ravines, scrublands and coastal ecosystems.

Ecological Significance: These ecosystems support biodiversity, soil and water processes, soil carbon storage and climate resilience.

Livelihoods: Sustain pastoral communities, livestock-based livelihoods and traditional practices such as Rajasthan's *Orans* and *gauchar* lands.

Thematic Coverage: Includes geographical distribution, ecological characteristics, biodiversity, associated communities, pastoralism, fire ecology and carbon sequestration.

Institutional Collaboration: Organised by the Ashoka Trust for Research in Ecology and the Environment (ATREE), in collaboration with IUCN, the Centre of Excellence on Sustainable Land Management, ICFRE and ISRO's Space Applications Centre.

Significance

Policy Recognition: Challenges the classification of grasslands, scrublands and ravines as "wastelands" merely because they lack tree cover.

Land Restoration: Supports India's efforts to achieve **Land Degradation Neutrality (LDN)** targets.

Community-based Conservation: Recognises pastoralists and local communities as important custodians of open natural ecosystems.

Landscape-level Planning: Promotes integrated conservation, biodiversity protection, climate resilience and sustainable livelihoods.

ASIATIC LION CONSERVATION IN INDIA

Why in News?

On **World Lion Day, 10 August 2026**, India highlighted the rise in Asiatic lion population from **523 in 2015 to 891 in 2025,** reflecting progress in scientific conservation, habitat expansion and community participation.

World Lion Day: Observed annually on 10 August, it was established in 2013 by conservationists Dereck and Beverly Joubert.

Significance of Asiatic Lion Conservation



Historical Decline: Overhunting and habitat loss reduced the Asiatic lion population to fewer than 50 individuals in the late 1890s, surviving in Gujarat's Gir forests.

Population Recovery: Legal protection, improved prey availability, habitat expansion and community participation have helped the population reach 891 in 2025.

Project Lion: Launched on 15 August 2020, it promotes landscape-level conservation through habitat improvement, disease monitoring, radio-collaring, camera traps, prey management and human-wildlife conflict mitigation.

Range Expansion: The lion's distribution expanded to approximately **35,000 sq. km across 11 districts of Saurashtra**. Barda Wildlife Sanctuary recorded 17 lions by 2025.

Community Participation: The Gir Gram Samiti initiative (2019) brings forest officials and villagers together to support wildlife protection and conflict management.

Technology: SIMBA (Software with Intelligent Marking Based Identification of Asiatic lions), GPS tracking and GIS-based monitoring support individual identification, surveillance and conservation planning.

WESTERN GHATS ESA: SEVENTH DRAFT NOTIFICATION

Why in News?

The Union Government's 7th draft notification, issued in July 2026, proposes declaring 56,825.7 sq. km of the Western Ghats across six states as an Ecologically Sensitive Area (ESA).

Key Provisions of the Draft

Prohibited Activities

Mining and quarrying: New mining, stone quarrying and sand mining are prohibited. Existing mines must be phased out within five years of the final notification or upon expiry of their leases, whichever comes first.

Industries: New thermal power projects and red-category industries are prohibited.

Construction: Specified construction projects with a built-up area of 20,000 sq. m or more, and townships exceeding prescribed thresholds, are prohibited.

Regulated Activities

Hydropower projects: Subject to environmental assessment and prescribed conditions, including minimum uninterrupted river flow during the lean season.

Permitted Activities

Local livelihoods: No blanket ban on farming or mandatory eviction of residents is proposed.

Existing residential buildings: Repair and renovation are permitted.



Agriculture and plantations: Routine agricultural and plantation activities are not prohibited by the draft.

Background: Gadgil Committee vs Kasturirangan Committee

Madhav Gadgil Committee (2011)

Recommended declaring the entire Western Ghats an ESA.

Proposed three graded Ecologically Sensitive Zones: ESZ-I, ESZ-II and ESZ-III.

Favored stringent conservation measures.

Faced opposition over restrictions on development and livelihoods.

K. Kasturirangan Committee (2013)

Recommended declaring approximately 37% of the Western Ghats an ESA, around 60,000 sq. km.

Sought to balance ecological protection with sustainable development.

Its recommendations formed the basis of subsequent draft notifications.

NATIONAL BIODIVERSITY AUTHORITY (NBA)

Why in News?

The NBA constituted an Expert Committee on Invasive Alien Species following an NGT suo motu proceeding highlighting their ecological and socio-economic threats.

About the National Biodiversity Authority

Established: Under the Biological Diversity Act, 2002.

Nature: Autonomous statutory body.

Headquarters: Chennai, Tamil Nadu.

Nodal Ministry: Ministry of Environment, Forest and Climate Change (MoEFCC).

Three-Tier Institutional Structure

National Biodiversity Authority (NBA): National-level regulatory, advisory and facilitative functions.

State Biodiversity Boards (SBBs): State-level regulation of access to biological resources, particularly for commercial utilisation by Indian entities.

Biodiversity Management Committees (BMCs): Grassroots biodiversity conservation and documentation at the local-body level

Composition

Chairperson: An eminent person with expertise in biodiversity conservation, sustainable use and benefit-sharing.

10 Ex officio Members: Government representatives.

5 Non-Official Members: Experts and professionals in biodiversity-related fields.

Appointment: All members are appointed by the Central Government.

Key Functions

Regulatory

Regulates access to biological resources and traditional knowledge, ensuring fair and equitable benefit-sharing.

Foreign individuals and companies require prior NBA approval to access Indian biological resources and associated traditional knowledge, subject to exemptions.

Prior NBA approval is required before applying for IPRs in India or abroad based on Indian biological resources or associated traditional knowledge, subject to applicable provisions.

Determines benefit-sharing terms when granting approvals.

Advisory

Advises Central and State Governments on biodiversity conservation, sustainable use and benefit-sharing.

Recommends Biodiversity Heritage Sites and their management measures.

Facilitative

Builds the capacity of SBBs and BMCs.

Conducts awareness and training programmes.

Ensures monetary and non-monetary benefits reach communities conserving biological resources.

THE SATPURA–MELGHAT TIGER CORRIDOR

Why in News?

The Standing Committee of the National Board for Wildlife (SC-NBWL) recommended in-principal wildlife clearance for a proposed third railway line between Jujharpur and Chichonda in Madhya Pradesh, which passes through the Satpura–Melghat tiger corridor. The recommendation is subject to wildlife-protection safeguards.

Key Facts

Location: Central India, connecting Madhya Pradesh and Maharashtra.

Connects: Satpura Tiger Reserve (Madhya Pradesh) with Melghat Tiger Reserve (Maharashtra).

SC-NBWL: Standing Committee of the National Board for Wildlife, which examines wildlife-related project proposals.

Legal framework: Wildlife (Protection) Act, 1972.

Ecological role: Enables wildlife movement, gene flow and dispersal between habitats, reducing population isolation and inbreeding risks.

Wildlife: Tigers, leopards, sloth bears and herbivores.

Associated protected areas: Satpura National Park, Bori and Pachmarhi sanctuaries, and Gugamal National Park.

Railway Project: Key Details

The proposed third railway line forms part of the Itarsi–Nagpur route expansion.

The project involves 206.09 hectares within the notified corridor, comprising 74.69 hectares of forest land and 131.4 hectares of non-forest land.

Wildlife overpasses and other mitigation measures are required to maintain safe animal movement; their design and placement must be supported by scientific assessment.

Why Are Tiger Corridors Important?

Maintain connectivity between fragmented habitats.

Enable genetic exchange and reduce inbreeding.

Support dispersal and recolonization of habitats.

Reduce the ecological isolation of protected areas.

WORLD ELEPHANT DAY 2026: ELEPHANT CONSERVATION IN INDIA

Why in News?

World Elephant Day, observed annually on **12 August**, highlights the ecological and cultural importance of elephants. India hosts nearly 60% of the world's wild Asian elephant population. The **Synchronous All India Population Estimation of Elephants (SAIEE) 2021–25** estimates India's wild elephant population at **22,446**.

Significance of Elephants

Ecological Role: Elephants are keystone species that facilitate seed dispersal, nutrient cycling and forest regeneration. Their movement helps maintain ecological connectivity and biodiversity.

Cultural Significance: Elephants are deeply associated with Indian religious traditions, royal heritage and temple festivals.

Key Conservation Measures

Project Elephant: Launched in 1992, this initiative of the Ministry of Environment, Forest and Climate Change provides financial and technical support to States for elephant habitat protection, captive elephant management and human-elephant conflict mitigation.

Elephant Reserves: India has **33 Elephant Reserves**, covering major elephant habitats across 14 elephant-range States.

Elephant Corridors: India has identified **150 elephant corridors** to facilitate safe movement between fragmented habitats. The *Elephant Corridors of India, 2023* report identifies 52 corridors in the East-Central region, 48 in the North-East, 32 in the Southern region and 18 in the Northern region.

Scientific Monitoring: SAIEE 2021–25 used India's first synchronised, DNA-based elephant census, combining genetic profiling of dung samples with block counts and line-transect surveys.

Railway Safety: Measures include underpasses, overpasses, thermal cameras, seismic sensors and AI-enabled acoustic detection systems. Reported elephant deaths due to train collisions declined from 26 in 2013 to 12 in 2024.

Captive Elephant Monitoring: The **Gajah Suchana** mobile application maintains a genetic database of registered captive elephants to help verify their identity and curb illegal transfers.

Legal Safeguards: The Wildlife (Protection) Act, 1972, and the Captive Elephant (Transfer or Transport) Rules, 2024, support regulation and protection.

Major Challenges

Habitat Loss and Fragmentation: Infrastructure development restricts elephant movement and disrupts ecological connectivity.

Human-Elephant Conflict: Crop damage, property loss and human casualties can undermine community support for conservation.

Infrastructure Risks: Railway lines and other transport corridors pose risks of injury and mortality.

Illegal Trade: Unlawful capture, transport and transfer of captive elephants remain concerns.

Way Forward

Conservation requires landscape-level planning, restoration of elephant corridors, safer infrastructure, scientific monitoring and timely compensation for affected communities. Coordination between States and community participation are essential for long-term coexistence between people and elephants.

COASTAL EROSION IN INDIA

Why in News?

According to the **National Centre for Coastal Research (NCCR)**, approximately **33.6% of India's coastline is vulnerable to erosion**, while 26.9% shows accretion and 39.6% remains relatively stable. Coastal erosion threatens settlements, ecosystems and livelihoods along India's coast.

What is Coastal Erosion?

The gradual wearing away and retreat of coastal land due to waves, tides, currents, storms and sea-level rise.

India's Coastline: India has a coastline of approximately 7,516.6 km, including mainland and island coastlines, across 13 coastal States and Union Territories.

Causes of Coastal Erosion

Natural Causes: Strong wave action, tides, currents, cyclones, storms, monsoonal changes and sea-level rise.

Human Activities: Ports, breakwaters, groynes, seawalls and coastal reclamation can disrupt natural sediment transport and intensify erosion in adjoining areas.

Loss of Natural Barriers: Destruction of mangroves, coastal vegetation and sand dunes reduces shoreline stability.

Climate Change: Rising sea levels and extreme weather events increase the vulnerability of low-lying coastal regions.

Effects of Coastal Erosion

Livelihood Loss: Damage to fishing infrastructure, boat-landing sites and coastal settlements affects fishing communities.

Ecological Damage: Loss of mangroves, wetlands, dunes and other coastal habitats threatens biodiversity.

Saltwater Intrusion: Seawater entering agricultural land and freshwater sources can reduce soil fertility and water availability.

Infrastructure Damage: Roads, ports, tourism facilities and housing may be damaged.

Disaster Vulnerability: Shoreline retreat increases exposure to storm surges, coastal flooding and cyclones.

Government Initiatives

National Centre for Coastal Research (NCCR): Uses satellite imagery, GIS and field surveys to monitor shoreline changes and identify vulnerable stretches.

Coastal Regulation Zone (CRZ) Notification, 2019: Regulates development along coastal stretches and seeks to protect sensitive ecosystems and coastal livelihoods.

Coastal Management Information System (CMIS): Collects data on nearshore coastal processes and waves to support coastal protection planning.

Coastal Vulnerability Mapping: The Indian National Centre for Ocean Information Services (INCOIS) prepares Coastal Vulnerability Index maps to assess coastal risks.

Coastal Zone Management Plans: Support the identification of erosion-prone areas and the preparation of appropriate management measures.

Prevention and Mitigation

Nature-Based Solutions: Restore mangroves, wetlands, dunes and coastal vegetation to stabilize sediments and reduce wave energy.

Beach Nourishment: Replenish eroded beaches with suitable sand, subject to environmental assessment.

Scientific Shoreline Management: Base interventions on site-specific studies of

wave patterns, currents and sediment transport.

Regulated Coastal Development: Avoid unsuitable construction in vulnerable areas and assess the cumulative impacts of ports and other infrastructure.



Integrated Coastal Planning: Combine ecosystem restoration, engineering measures, disaster preparedness and community participation.

GREEN INDIA MISSION:CAG FINDINGS

The Comptroller and Auditor General (CAG) audit report has flagged severe implementation gaps and target shortfalls in the National Mission for a Green India (GIM) across 16 States and Union Territories from 2015–16 to 2024–25.

Key Audit Findings & Shortfalls

Forest Quality Improvement Target: Achieved 0.11384 million hectares against a target of 1.4 million hectares (a 91.87% shortfall).

Forest Cover Increase Target: Achieved 0.03409 million hectares against a target of 1.4 million hectares (a 97.57% shortfall).

Site Attribution: Roughly 70% of sampled project sites showed no GIM-attributable changes.

Carbon Assessment: Carbon sequestration assessments were conducted in only

two states (Madhya Pradesh and Chhattisgarh).

Major Causes for Gaps

Funding Shortfall: The mission received only ₹1,149.14 crore (47.88%) out of the ₹2,400 crore approved budgetary support, and failed to secure broader projected allocations of ₹10,600 crore.

Lack of Scheme Convergence: Programs operated in isolation without coordination with other major initiatives like CAMPA, MGNREGS, Nagar Van Yojana, and School Nursery Yojana.

Poor Planning & Prioritization: Selection of project areas often ignored high-climate-vulnerability landscapes in favor of low-to-moderate vulnerability zones, failing to use a proper bottom-up planning approach. [3, 5]

Weak Financial Controls: Eight States and Union Territories failed to maintain proper annual accounts, and 14 states lacked public web links for transparency.

Green India Mission (GIM)

One of the eight missions under the National Action Plan on Climate Change (NAPCC), launched in February 2014 and revised for 2021–2030 by MoEFCC.

Objectives

Core Goal: Restore and enhance forest and tree cover to address climate change through mitigation and adaptation.

Landscape Approach: Promote holistic ecosystem restoration rather than isolated tree planting.

Livelihoods: Improve ecosystem services and incomes of forest-dependent communities.

Revised Targets (2021–2030)

Forest Restoration: Cover 24–25 million hectares through afforestation and restoration.

Carbon Sink: Target 3.39 billion tonnes of CO_2 equivalent by 2030.

Priority Regions: Aravalli ranges, Western Ghats, Himalayas and mangroves.

Monitoring: Five-tier monitoring framework.

Implementation and Funding

Decentralised Implementation: Joint Forest Management Committees (JFMCs) and local institutions.

Convergence: CAMPA, MGNREGS, Nagar Van Yojana and National Afforestation Programme.

Funding: Dedicated GIM allocations and National CAMPA funds.

ENVIRONMENTAL PERFORMANCE INDEX (EPI) 2026

Why in News?

India ranked 176th out of 177 countries in Yale University's Environmental Performance Index (EPI) 2026, scoring 22.46 points. Laos ranked last, while Estonia topped the index with 74.79 points. Experts described India's ranking as a wake-up call, while also questioning the index's methodology.

About the Environmental Performance Index (EPI)

Published by: Yale University's Center for Environmental Law & Policy.

Purpose: Evaluates countries' environmental performance and outcomes.

2026 assessment: Uses 47 indicators across 12 environmental issues.

Focus areas: Environmental health, ecosystem vitality and climate change.

Approach: Assesses current environmental conditions and performance rather than only government policy commitments.

India's Performance in EPI 2026

Overall rank: 176th out of 177 countries.

Score: 22.46 points.

Environmental health: 174th.

Biodiversity: 174th.

Climate change: 130th.

Waste management: 141st.

Sanitation: 141st.

Major Environmental Concerns

Air pollution: India's air-quality score declined by 0.15 points over the decade, despite ₹16,423 crore being spent under the National Clean Air Programme (NCAP), launched in 2019.

Biodiversity loss: India ranked 174th, highlighting concerns over ecosystem degradation and habitat protection.

Declining indicators: Performance also deteriorated in fisheries, tree cover and pesticide pollution.

Urban environmental challenges: Air quality, wastewater treatment and urban environmental management remain areas of concern.

Climate change: India performed comparatively better, improving its score by 13.98 points over the decade.

National Clean Air Programme (NCAP)

Launched: 2019.

Objective: Reduce air pollution through coordinated action and improve air quality in targeted cities.

Significance: It represents India's efforts to address air pollution, although the EPI assessment indicates that significant challenges remain.

REGENERATIVE AGRICULTURE IN INDIA

Why in News?

India is promoting regenerative agriculture to restore soil health, improve biodiversity and strengthen resilience to climate change. As of March 2026, natural farming clusters covered 8.80 lakh hectares and enrolled 18.19 lakh farmers. The Per Drop More Crop scheme covered about 109 lakh hectares as of May 2026.

About Regenerative Agriculture

Regenerative agriculture is a holistic farming approach that aims to restore and improve soil health, biodiversity and ecosystem resilience, while sustaining long-term agricultural productivity.

India's agriculture and allied sectors recorded 4.45% growth during FY 2016–FY 2025, the highest decadal growth over previous decades.

Key principles:

Minimise soil disturbance.

Protect living roots of perennial crops.

Maintain soil cover.

Integrate livestock into farming.

Limit chemical inputs.

Enhance biodiversity.

Unlike sustainable agriculture, which primarily seeks to maintain existing conditions, regenerative agriculture aims to actively improve them.

Major Regenerative Farming Practices

Natural farming: Uses biological inputs such as Beejamrut, Jeevamrut, Neemastra and Dashparni, along with mulching, multi-cropping and minimal tillage.

Soil management: Green manuring, cover cropping and mulching improve soil fertility, organic matter and moisture retention.

Micro-irrigation: Drip and sprinkler systems improve water-use efficiency and reduce wastage.

Integrated Farming Systems (IFS): Combines crops, livestock, fisheries, horticulture, agroforestry and apiculture to diversify income and reduce risks.

Agroforestry: Integrates trees with crops to improve soil moisture, store carbon and generate additional income.

Climate-resilient agriculture: Promotes balanced nutrient use, efficient water management, effective pest control and soil-moisture conservation.

Benefits

Environmental: Restores soil fertility, enhances biodiversity, increases carbon storage and reduces erosion and runoff.

Economic: Reduces dependence on external inputs, lowers cultivation costs and can improve farm profitability.

Social: Creates livelihood opportunities and strengthens farmers' resilience to climate and market shocks.

Climate resilience: Improves water retention and helps farming systems withstand droughts, floods and rainfall variability.

It contributes to Sustainable Development Goal 13 — Climate Action, particularly Target 13.1 on strengthening resilience and adaptive capacity to climate-related hazards.

Government Initiatives

National Mission on Natural Farming (NMNF), 2024

Provides ₹4,000 per acre per year for two years, covering up to one acre per farmer.

Envisages 10,000 Bio-input Resource Centres.

As of 5 March 2026: 18,786 clusters, 8.80 lakh hectares and 18.19 lakh enrolled farmers.

Paramparagat Krishi Vikas Yojana (PKVY), 2015

Supports organic farming with ₹31,500 per hectare over three years.

Covered 16.90 lakh hectares as of 31 October 2025.

Per Drop More Crop (PDMC)

Promotes drip and sprinkler irrigation.

Provides financial assistance of 55% for small and marginal farmers and 45% for other farmers.

Covered approximately 109 lakh hectares as of May 2026.

Rainfed Area Development Programme (RAD)

Promotes Integrated Farming Systems through a cluster approach.

Provides ₹30,000 per family for IFS adoption and ₹10,000 per cluster for training.

Covered 9.53 lakh hectares and benefited 15.73 lakh farmers as of December 2025.

Agroforestry Component under PM-RKVY

Supports nurseries, quality planting material, research and skill development.

By 31 October 2025, 176.59 lakh saplings had been raised in 614 nurseries.

Soil Health Card Scheme, 2015

Provides soil-test reports covering 12 parameters and crop-specific nutrient recommendations.

25.89 crore cards had been generated as of 13 March 2026.

Challenges and Way Forward

Regenerative agriculture requires farmer awareness, location-specific practices, reliable access to biological inputs and effective extension services. Wider adoption should be supported through farmer training, scientific monitoring, market linkages and convergence among existing schemes.

Species in News

HOUBARA BUSTARDS

Why in news?

Uzbekistan, Kazakhstan and the UAE released 672 captive-bred Asian Houbara Bustards (Chlamydotis macqueenii) in Uzbekistan's Aral Sea region

The Houbara Bustard is a large, ground-dwelling desert bird comprising two species: the Asian Houbara (Chlamydotis macqueenii) and the African Houbara (Chlamydotis undulata). Both inhabit arid and semi-arid regions and possess sandy-brown plumage that provides camouflage.

Key Species

Asian Houbara: Found from the Sinai Peninsula and Central Asia to Mongolia. It migrates to Pakistan and the Arabian Peninsula during winter.

African Houbara: Found in North Africa west of the Nile and the Canary Islands. It is mostly sedentary.

Characteristics and Ecology

Size: 55–75 cm in length, with a wingspan of up to 170 cm.

Diet: Omnivorous, feeding on seeds, insects and small desert creatures.

Behavior: Males perform elaborate courtship displays during breeding.



Conservation Status

IUCN Red List: Vulnerable.

CITES: Appendix I, which provides the highest level of protection against international commercial trade.

Threats

Major threats include poaching, habitat loss and sport hunting, particularly in the Asian Houbara's wintering grounds in Pakistan and the Arabian Peninsula.

SLENDER-BILLED VULTURE (GYPS TENUIROSTRIS)

Why in news?

Five captive-bred Slender-billed vultures along with five White-rumped vultures were released into the wild using the 'Soft Release' scientific method in the Biswanath Wildlife Division of Kaziranga National Park, Assam.

Habitat: Wetlands, wooded areas and open countryside.



Distribution: Found in India across the Gangetic plains, from Himachal Pradesh to northern Odisha, and eastwards through Assam. It also occurs in Bangladesh, Nepal, Myanmar and Cambodia.

Characteristics:

Has a long, slender neck, pale underparts and a dark, thin bill.

Less common near human habitation than other vultures.

Diet: Feeds on carrion, often gathering in large flocks around carcasses.

Behaviour: A proficient glider that undertakes long search flights to locate food.

Reasons for Population Decline: Exposure to diclofenac and other non-steroidal anti-inflammatory drugs (NSAIDs), ingested through the carcasses of cattle and buffalo treated with these drugs before death.

Conservation Status:

IUCN Red List: Critically Endangered.

Wild Life (Protection) Act, 1972: Schedule I

WHITE-RUMPED VULTURE (GYPS BENGALENSIS)



Other Names: Indian White-backed Vulture, Oriental White-backed Vulture.

Habitat: Primarily inhabits plains, but also occurs in hilly regions, villages and cities near cultivated areas.

Distribution: Pakistan, India, Bangladesh, Nepal, Bhutan, Myanmar, Thailand, Laos, Cambodia and southern Vietnam.

Characteristics:

An Old-World vulture native to South and Southeast Asia.

Has an unfeathered head and neck, broad wings and a short tail.

Adults have darker, blackish plumage, a white neck-ruff and a white patch on the lower back and upper tail.

Males and females are approximately equal in size.

Diet: Primarily feeds on animal carcasses, helping remove dead animals from the environment.

Conservation Status:

IUCN Red List: Critically Endangered.

Wild Life (Protection) Act, 1972: Schedule I.

Threats:

Veterinary diclofenac residues in cattle carcasses cause fatal kidney failure and visceral gout in vultures.

Uninsulated power lines, pesticide residues, and habitat loss continue to endanger vulture populations.

BLACK-NECKED CRANE (GRUS NIGRICOLLIS)



Characteristics: A medium-sized crane with a whitish-grey body, black head and upper neck, red markings around the eyes, and long legs adapted for wading.

Local Names: "Cha thung-thung" in Ladakh and "thungdung karma" in Arunachal Pradesh.

Distribution: Inhabits high-altitude marshes and lakes of the Tibetan Plateau, including Tibet, Qinghai, Xinjiang and Gansu, as well as Sichuan in China and eastern Ladakh in India. Small wintering populations occur in the Sangti and Zimithang valleys of Arunachal Pradesh.

Diet: Omnivorous, feeding on sedge tubers, plant roots, earthworms, insects, other invertebrates and frogs.

Breeding:

Breeds at elevations of 2,600–4,900 metres.

Nests in gently sloping wetlands using grasses and sedges.

Important breeding sites include Hanle, Tso Kar, Nyoma and surrounding wetlands in the Changthang Cold Desert Wildlife Sanctuary, Ladakh.

Cultural Significance: Sacred in Ladakh's Buddhist culture, symbolising peace, purity and good fortune.

Threats: Wetland disturbance from human activities, infrastructure expansion, increasing tourism, habitat degradation and climate change.

HEAT WAVES

Why in news?

August 2026 was India's **hottest August since records began in 1901**, with a national average mean temperature of **28.01°C** (0.67°C above normal), driven by background global warming and a strengthening **El Niño**.

Heat Waves in India

A heat wave is a period of abnormally high temperatures, mainly occurring in

north-western India during summer. It typically occurs between March and June, sometimes extending into July. Heat waves cause physiological stress, adversely affect human health, and may result in deaths.

IMD Criteria for Heat Waves

Minimum temperature threshold: At least 40°C in plains and 30°C in hilly regions.

When normal maximum temperature is ≤ 40°C:

Heat Wave: Departure of 5°C–6°C from normal.

Severe Heat Wave: Departure of 7°C or more.

When normal maximum temperature is > 40°C:

Heat Wave: Departure of 4°C–5°C from normal.

Severe Heat Wave: Departure of 6°C or more.

Actual maximum temperature: A heat wave is declared when it reaches 45°C or more, irrespective of the normal maximum temperature.

Government Initiatives

NDMA Heat Action Plans (2019): Promote vulnerability assessments and heat-mitigation measures. HAPs have been prepared across 23 states, 195 districts and 64 cities, as reported in the PIB release.

India Cooling Action Plan (ICAP): Aims to reduce cooling demand, improve energy efficiency and promote sustainable cooling.

AMRUT 2.0: Supports parks, waterbody restoration and green mobility. A pilot to assess urban heat mitigation covers 12 cities.

Urban Green Guidelines, 2014: Promote vegetation, open spaces, green roofs and climate-sensitive urban design.

Delhi SAPCC 2.0: Includes cool roofs, cooling corridors, urban green spaces, wetland restoration and heat-warning systems.

CLOUDBURSTS IN INDIA

Why in News?

The India Meteorological Department (IMD) rejected reports of cloudbursts in Assam and Nagaland, clarifying that the Upper Assam floods resulted from prolonged heavy rainfall rather than cloudbursts.

What is a Cloudburst?

IMD definition: Rainfall of 100 mm or more within one hour over an area of 20–30 sq. km.

It can trigger flash floods, landslides and debris flows.

Formation: Intense convection, cumulonimbus clouds and strong updrafts produce extreme, localized rainfall. Orographic lifting intensifies the process in mountainous regions.

Geographical Susceptibility

Himalayas: Uttarakhand, Himachal Pradesh and Jammu & Kashmir.

Northeast India: Heavy monsoon rainfall and complex terrain.

Western Ghats: Orographic uplift of moisture-laden monsoon winds.

The steep slopes in these regions increase the risk of flash floods and landslides.

Forecasting Challenges

Highly localized events are difficult to capture using conventional weather models.

Rapid development leaves limited warning time.

Mountain terrain obstructs Doppler Weather Radar observations.

Sparse rain gauges and Automatic Weather Stations limit real-time monitoring.

Government Initiatives

Nowcasting: Short-term forecasts and alerts for localized extreme weather.

Mission Mausam: Expansion of Doppler Weather Radar coverage and use of AI to improve hyperlocal forecasting.

Way Forward

Strengthen high-resolution weather monitoring, expand radar and rain-gauge networks, improve community-based warning systems, regulate construction in hazard-prone areas and integrate disaster-risk assessments into Himalayan development planning.



KIMI K3

Why in news?

Recently, Chinese start-up Moonshot AI has launched Kimi K3, an advanced AI model intensifying the global AI race between China and the United States.

About Kimi K3

Kimi K3 is the latest AI model developed by Moonshot AI, a Chinese start-up founded in 2023 by Yang Zhilin, a graduate of Tsinghua University and Carnegie Mellon University.

According to the company, Kimi K3 is among the world's largest open-weight AI models, containing approximately 2.8 trillion parameters.

In AI systems, parameters are the numerical values learned during training that determine how the model processes information and generates responses.

A larger number of parameters generally reflects greater computational investment, although model performance also depends on factors such as data quality, architecture, and training techniques.

Kimi K3 offers capabilities across multiple domains, including:

* Coding assistance
* Financial consulting
* Deep research
* Video editing
* General conversational AI

Following its launch, demand reportedly surged to such an extent that Moonshot AI temporarily paused new user registrations.

How It Works?

Sparse Latent Mixture-of-Experts (MoE): Uses a Stable LatentMoE framework housing 896 experts, dynamically activating only 16 experts per token to maintain high computational efficiency while keeping resource demands manageable during inference.

Kimi Delta Attention (KDA): Incorporates custom architectural improvements to process massive context windows smoothly without performance degradation.

Attention Residuals (AttnRes): Optimizes information flow across deep network layers, allowing the model to perform deeper multi-step reasoning and retain long-horizon focus during extended coding tasks.

Key Features:

Massive 1 Million-Token Context Window: Capable of ingesting and processing entire software repositories, complex legal stacks, or extensive technical documentation in a single prompt.

Autonomous Long-Horizon Coding: Executes end-to-end software engineering tasks with minimal human intervention, including writing GPU kernel optimizations, building compilers, and designing microchips.

Integrated Visual &Multimodal Reasoning: Combines core software engineering with image and spatial reasoning, supporting automated tasks in game development, front-end design, and Computer-Aided Design (CAD).

Open-Weight Availability: Moonshot released full model weights on Hugging Face alongside a detailed technical report under an open license, enabling global self-hosting and research.

MOON BASE PROGRAMME

Why in news?

Recently, India has received an invitation to join NASA's Moon Base programme, an initiative that could mark a turning point for ISRO.

About the Moon Base Programme:

To establish an enduring human presence on the Moon, explore volatile water-ice resources in the lunar South Pole, and establish a technological stepping stone for future crewed missions to Mars.

The Moon Base programme is an ambitious NASA-led initiative to build humanity's first permanent lunar outpost near the lunar South Pole. It serves as a sustainable surface habitat where astronauts will live, work, conduct scientific research, and test deep-space survival technologies.

Lead Agency: National Aeronautics and Space Administration (NASA).

Phased Rollout: Phase 1 (2026–2029): Gain reliable surface access, conduct robotic reconnaissance, and test early technologies.

Phase 2 (2029–2032): Deploy foundational surface infrastructure (power networks, logistics, communications, and lunar terrain vehicles).

Phase 3 (2032+): Assemble a permanently crewed, expandable outpost for extended astronaut stays.

Key Features:

Strategic South Pole Positioning: Capitalizes on the unique geology of the lunar South Pole, where high elevated ridges receive near-continuous sunlight for solar energy, while nearby craters shield vast deposits of water ice.

Commercial & Private Sector Integration: Heavily leverages commercial partners (such as Astrobotic, Blue Origin, Firefly Aerospace, and Intuitive Machines) for cargo landers, surface rovers, and autonomous drones.

In-Situ Resource Utilization (ISRU): Focuses on harvesting lunar regolith and extracting water ice to generate oxygen, drinking water, and rocket propellant on-site.

Phased Modular Infrastructure: Built step-by-step using expandable surface habitats, uncrewed logistics landers, surface power grids, and pressurized rovers.

Open Scientific Data Architecture: Designed under the Artemis Accords framework to enable transparent, international sharing of lunar scientific data and environmental observations.

What India Stands to Gain?

Joining the programme makes strategic sense for ISRO for several reasons.

ISRO has its own plans for human spaceflight missions, a space station, and eventually landing humans on the Moon.

Participating in the Moon Base programme offers the opportunity to gain valuable experience in planning and executing complex missions of this nature, allowing India to leapfrog in technology development.

ISRO has demonstrated it can execute such missions independently, but doing so would require considerable time and enormous financial resources.

Space exploration has reached a stage where a ten-year gap in technology development can leave a nation significantly behind. It would also make little economic sense to reinvent capabilities that already exist elsewhere.

IN-SPACE RE-ENTRY GUIDELINES

Why in news?

Recently, the Indian National Space Promotion and Authorisation Centre (IN-SPACe) released the 'Authorisation for Undertaking Planned Re-entry of Space Objects' guidelines.

Planned & Unplanned Re-entry:

Planned Re-entry refers to the controlled return of a space object into Earth's atmosphere by managing its landing location, trajectory, or timing using suitable technical measures.

The guidelines distinguish it from:

Unplanned Re-entry – Natural orbital decay without active control.

Post-Mission Disposal (PMD) – End-of-life disposal measures to minimize space debris and ensure long-term sustainability of outer space.

Features of Re-entry Guidelines:

- **Mandatory Authorization:** All Indian planned re-entries require IN-SPACe approval; foreign operators must apply via an incorporated Indian entity.
- **Natural Burn-up Exemption:** Uncontrolled re-entries do not need separate approval if full atmospheric burn-up is pre-disclosed in an approved Space Debris Mitigation Plan.
- **Planning Timelines:** Detailed trajectory, survivability, and risk data must be declared during satellite licensing, revalidated ~3 months before re-entry, or filed >6 months in advance for post-launch plans.
- **Safety & Risk Standards:** Expected Casualty (Ec) must not exceed 1 in 10,000 times, backed by technical, ballistic, and impact-zone assessments.
- **Hazard Warnings:** Requires an IN-SPACe Advisory Note and aviation/maritime warnings (NOTAM/NAVAREA) issued starting ~45 days prior.
- **Liability & Insurance:** Applicants must carry third-party insurance and indemnify the Indian government against claims under the 1972 Liability Convention.
- **Cross-Border Clearance:** Prior approval from affected nations is mandatory if re-entry impacts their territory or EEZ.

About IN-SPACe:

Headquartered in Bopal, Ahmedabad, the Indian National Space Promotion and Authorisation Centre (IN-SPACe) is an autonomous, single-window agency under the Department of Space (DOS) that bridges ISRO and the private sector. It is mandated to promote, authorize, and supervise commercial space endeavors—including rocket and satellite manufacturing, space services, launches, and re-entry operations—while granting non-governmental entities access to DOS and ISRO infrastructure and testing facilities.

Magnetorheological Fluid

Recently, scientists at the Indian Institute of Technology (IIT) Patna have developed an innovative hybrid magneto-rheometer that promises to advance research and applications of magnetorheological (MR) fluids.

About Magnetorheological Fluid:

It is a fluid that has good magnetic properties. It responds to the magnetic field and changes its properties when a magnetic field is presented.

Property: These fluids can rapidly change their mechanical properties when exposed to a magnetic field, increasing in apparent viscosity, to the point of becoming a viscoelastic solid.

Composition: These fluids contain magnetic micro-sized iron particles, non-magnetic-based fluid, and some additives in order to mitigate sedimentation and agglomeration.

Carrier fluids: The various carrier fluids used in the preparation of MR fluids are mineral oil, silicon oil, castor oil, soybean oil, kerosene, synthetic oils, honge oil, organic oil, water-based oils, etc.

Potential Applications: It is ideal for adaptive technologies such as brakes, clutches, shock absorbers, vibration control systems, dampers, actuators, and medical devices.

However, for obtaining better vibration control, silicone oil is the most preferred one due to its higher viscosity index, lower friction characteristics, higher flash point, and higher shear strength. The fluid can transmit force which can be controlled with an electromagnet, giving rise to its many possible control-based applications.

EVEREST ENGINE

Why in news?

Bengaluru-based Astrobase Space Technologies unveiled EVEREST, India's first privately built 800 kN Full-Flow Staged Combustion (FFSC) LOX-Methane rocket engine.

About EVEREST Engine:

The engine delivers 800 kN thrust, has a specific impulse of about 340 seconds, and offers a 50%-110% throttle range. It is being designed for reusable medium-lift launch vehicles. It is a Full-Flow Staged Combustion engine where, both the fuel and oxidiser pass through separate pre-burners before entering the main combustion chamber.

The gases generated drive the turbopumps and are then fed into the main chamber, ensuring more complete utilisation of propellants and higher efficiency.

LOX-methane's relatively clean combustion, combined with an FFSC architecture designed for multiple cycles, makes the system well suited to reusable launch applications.

Why it is significance?

Reusable Launch Capability: Astrobase is developing the engine as part of a reusable launch system aimed at improving turnaround time, precision control and launch economics. Its published vehicle architecture targets about 3 tonnes to 500-km LEO with return-to-launch-site recovery.

Government Support: Astrobase is a recipient of IN-SPACe's Technology Adoption Fund, which supports private-sector development of technically demanding space technologies such as advanced propulsion systems.

Global Significance: According to Astrobase, India is the fourth country after Russia, the US and China to develop FFSC technology, and Astrobase is the fourth commercial company globally to develop a high-thrust FFSC engine.

Strategic Significance: If successfully tested and operationalised, the engine could strengthen India's capabilities in reusable launch vehicles, high-cadence launches, indigenous propulsion and commercial access to space, expanding opportunities in the global space economy.

GLUEBALL

Why in news?

Recently, Scientists have found some of the strongest evidence yet for a long-predicted form of matter known as a glueball, with the particle X(2370) emerging as a leading candidate.

About Glueball:

QCD predicts that gluons can bind together to form short-lived composite particles called glueballs, whose dominant constituents are gluons rather than quark-antiquark pairs found in conventional mesons.

Detection Challenge: Glueballs are highly unstable and decay rapidly into lighter particles. They can also mix with ordinary hadrons having similar quantum properties, making their experimental identification extremely difficult.

Discovery: The X (2370) particle was first observed in J/ψ meson decays in 2011, with its mass and properties broadly matching theoretical predictions for a pseudoscalar glueball.

Further analysis of data from J/ψ decays has strengthened the possibility that X(2370) is a glueball candidate, as its observed characteristics align with theoretical expectations.

Significance: If the glueball interpretation of X(2370) is confirmed, it would provide landmark experimental evidence for a form of hadronic matter composed predominantly of gluons—the force carriers of the strong interaction themselves.

HYDERACENE

Why in news?

Recently, The University of Hyderabad (UoH) recently secured an Indian patent for HYDERACENE, a dual-action material designed specifically for rocket propellants and high-performance defence applications.

About HYDERACENE

It is a novel polymer-based material developed for use in solid rocket propellants for defence and space applications.

About the patent:

The innovation was developed by Mutyalanaidu Ganivada, Sourav Jana, and Tushar Jana of the School of Chemistry, with the University of Hyderabad as the patentee. The patented material, formally described as Ferrocene Polyethylene Glycidyl Grafted Hydroxyl-Terminated Polybutadiene, was synthesised using ring-opening polymerisation.

Why is this Innovation Significant?

In conventional solid rocket propellants, two critical components are required:

The Binder: A glue-like polymer that holds all active fuel components together while providing structural integrity.

The Catalyst: A specialized chemical additive that speeds up and controls the burning rate of the propellant.

Traditionally, these are two separate materials. HYDERACENE acts as both at the same time—a polymer binder-cum-catalyst.

This improves long-term stability by preventing the catalyst from separating from the binder over time and enables more controlled and efficient combustion in solid rocket motors.

Hyderacene has also been developed as an indigenous alternative to Butacene, a commercially used material in aerospace and defence applications.

BUTACENE is largely imported from European countries.

Named after the city of Hyderabad, the patented material is designed for use in high-performance rocket propellants and other advanced defence applications requiring controlled burn rates and improved propulsion efficiency.

SRAVAANI

Why in news?

Recently, researchers at IISc's SPIRE Lab, in collaboration with ARTPARK and Google, have released SraVaani.

About SraVaani

It is the first multilingual Indian speech recognition model. It extends automatic speech recognition to several regional and non-scheduled Indian languages that remain underserved by existing speech technology. It covers 20 scheduled languages and 45 regional languages and dialects. It can convert spoken words into text across 10 scripts and automatically identify the language being spoken, without users having to select one first.

The model supports languages such as Garo, Angika, Chakma, Kokborok, Tulu, Bundeli and Bajjika.

The SraVaani model is based on Project Vaani, one of IISc's major programs, to understand the linguistic diversity of India. The project has gathered around 31,000 hours of speech data obtained from over 156,000 speakers from 165 regions, thus providing the needed information about natural conversational-speech to the researchers. SraVaani uses a FastConformer-based automatic speech recognition architecture.

Applications: It could support applications in areas such as education, digital services, banking, healthcare, e-governance and customer support, particularly where users prefer interacting in regional languages.

ROTATING DETONATION ENGINES

Why in news?

Recently, Indian start-up D-Propulse successfully demonstrated India's first indigenous 5 kN air-breathing Rotating Detonation Engine (RDE), at a DRDO facility in Hyderabad, achieving Technology Readiness Level-5 (TRL-5).

About Rotating Detonation Engine:

A RDE is advanced propulsion technology that uses continuous supersonic detonation waves, potentially offering higher thermodynamic efficiency and a more compact combustor than conventional engines.

Working Mechanism:

While a Pulsed Detonation Engine (PDE) burns fuel intermittently along a straight tube, an RDE employs an annular combustion chamber (a ring-shaped channel between two concentric cylinders).

Fuel and oxidizer are continuously injected into the annulus ahead of the traveling detonation wave, sustaining a continuous, circular detonation wave traveling at thousands of cycles per second to generate sustained thrust.

Deflagration vs. Detonation:

Deflagration: The flame front travels at subsonic speeds (below the speed of sound) at constant pressure, allowing the fuel-air mixture to expand as it heats up, resulting in significant heat loss.

Detonation: The flame front propagates at supersonic speeds (above the speed of sound), creating a high-energy shock wave at constant volume; this compresses the unburned mixture immediately before combustion, converting significantly more chemical energy directly into pressure and thrust.

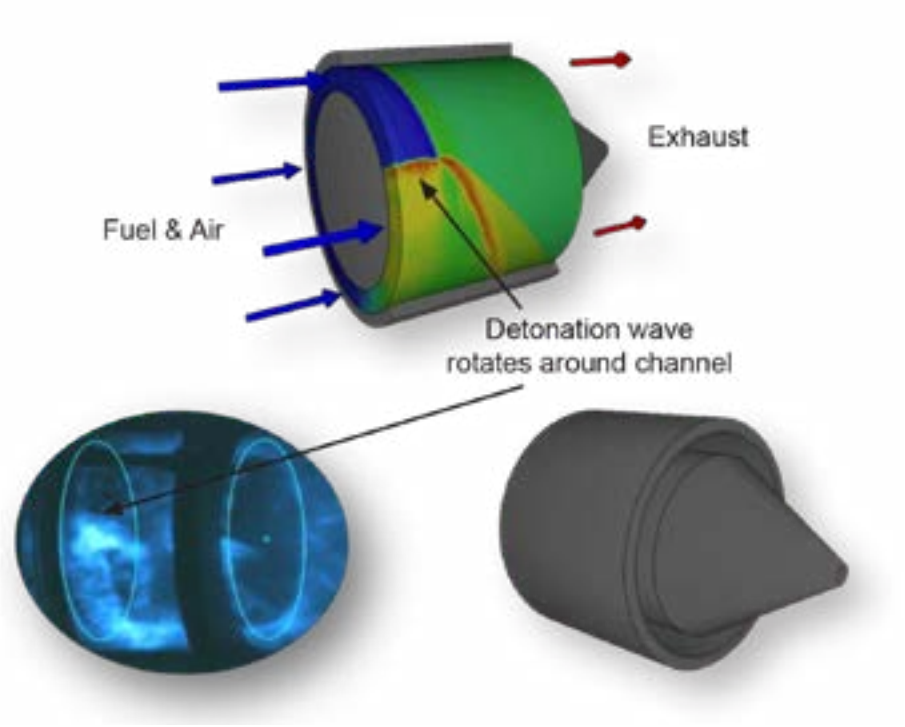
Key Strategic Applications:

Hypersonic Applications: RDE-based propulsion can potentially be used in hypersonic cruise missiles (BrahMos-II), high-speed aircraft/UAVs and ramjet-type propulsion systems.

Space Launch Vehicles & In-Space Thrusters: Enhances the payload-to-fuel mass ratio for orbital and deep-space missions.

Engineering and Material Hurdles: RDE requires materials that can withstand severe thermal and physical stress: temperatures exceeding 2,000˚C, 10 to 100 atmospheres of pressure, and detonation velocities higher than 1,500 m/s.

Global R&D Status: Technology remains in the Research & Development (R&D) phase worldwide, with aerospace entities such as Lockheed Martin, GE Aerospace, Astrobotic, and SpaceWorks actively conducting hot-fire tests for missile and space applications.



NITROSAMINES

Why in news?

Recently, Nitrosamines are frequently in news since they are hidden chemicals present in foods, water, pharmaceuticals, and tobacco that are linked to cancer risk.

About Nitrosamines:

Nitrosamines are organic compounds that contain alkyl and an aryl group with the following nitrogen and oxygen group: N–N=O. They are formed when amines react with nitrites or nitrates under conditions such as high temperature, acidic environment, or the presence of oxidizing agents.

Nitrosamines are not carcinogenic by themselves. They become harmful after cytochrome P450 enzymes convert them into highly reactive compounds.

Effects of Nitrosamines:

These reactive compounds bind to DNA and form DNA adducts. This process causes mutations that can initiate the development of cancer. During metabolism, nitrosamines also generate reactive oxygen species (ROS). These damage DNA, proteins, and lipids, further promoting the initiation and progression of cancer.

Major Sources of Exposure:

Food & Beverages: Fried, grilled, cured, and processed meats are the major dietary sources.They are also found in processed fish, cocoa, beer, and other alcoholic drinks.

Water Contamination: Nitrosamines form during water disinfection and wastewater treatment.NDMA (N-nitrosodimethylamine) is a potent carcinogen detected in drinking water sources, including India.

Pharmaceuticals & Cosmetics: Some medicines and cosmetics may contain nitrosamines.

Tobacco Products: Tobacco smoke is an important source of human exposure.

Impacts:

Cancer Risk: Long-term exposure, even at very low concentrations, is linked to an increased risk of stomach, colon, pancreatic, and colorectal cancers.

Other Health Effects: Nitrosamines can also cause liver damage, respiratory problems, and reproductive toxicity.

INDIGENOUS AFRICAN SWINE FEVER VACCINE

Why in news?

Recently, Scientists at the ICAR-NIHSAD, Bhopal, have developed India's first indigenous live attenuated vaccine against African Swine Fever (ASF).

About African Swine Fever:

African Swine Fever is a highly contagious viral disease affecting domestic and

wild pigs. It is caused by the African Swine Fever Virus and can produce high fever, internal bleeding and mortality rates of up to 100%.

ASF is a listed disease of the World Organisation for Animal Health (WOAH, formerly OIE) and is covered under its Terrestrial Animal Health Code. Member countries are required to notify WOAH of outbreaks.

Transmission: ASF spreads through direct contact with infected pigs or carcasses, contaminated feed, food waste, equipment and other materials, as well as through soft ticks in certain regions.

Human Health Risk: ASF is not a zoonotic disease and does not infect humans, but people can indirectly spread the virus through contaminated clothing, footwear, vehicles, equipment and pork products.

Global Outbreak: ASF was first described in Kenya in 1921. Following its emergence in Georgia in 2007, it spread widely across Europe and later reached Asia, Oceania and parts of the Caribbean, while continuing to affect several African countries.

Outbreak in India: ASF was first detected in India in 2020 and subsequently spread across several States and Union Territories, particularly affecting the North-Eastern region and causing large-scale pig deaths, movement restrictions and disruption of pork production and trade.

Key Features of African Swine Fever (ASF) Vaccine:

India's first indigenous vaccine against African Swine Fever.

Developed using a live attenuated ASF Virus (Genotype II) with unique gene deletions.

Uses the widely available MA-104 cell line, making it suitable for affordable large-scale production.

Successfully tested for safety, purity, genetic stability, immune response and protective efficacy, and field validated with the Department of Animal Husbandry and Dairying (DAHD).

Recommended for healthy pigs above eight weeks of age.

Administered as a 1 mL intramuscular injection, followed by a booster dose after 14 days.

Expected to reduce pig mortality, minimise economic losses and strengthen India's animal health security.





SECURITY

AGNI - 4 BALLISTIC MISSILE

Why in news?

Recently, India successfully conducted the test launch of the Agni-4 medium-range ballistic missile from the Integrated Test Range (ITR), Chandipur, Odisha.

About Agni-4:

It is an indigenously developed, intermediate-range, surface-to-surface ballistic missile belonging to India's Agni missile series.



Developed by the Defence Research and Development Organisation (DRDO), Agni-IV is approximately 20 metres long, has a strike range of about 4,000 km and can carry a payload of around 1,000 kg.

The missile uses advanced avionics, onboard computers, inertial navigation and guidance systems to achieve high accuracy and maintain stability during flight.

The successful test demonstrated Agni-4's operational readiness and reinforced India's credible strategic-deterrence capability.

MQ-9B SEAGUARDIAN

Why in news?

Recently, ndia has signed a ₹1,943-crore contract with General Atomics, USA, to lease two MQ-9B SeaGuardian HALE RPAS for 30 months, strengthening the Indian Navy's Maritime Domain Awareness in the Indian Ocean Region.

About MQ-9B SeaGuardian:

It is a High-Altitude Long-Endurance remotely piloted unmanned aircraft designed primarily for persistent maritime surveillance.

It provides long-duration Intelligence, Surveillance and Reconnaissance over vast ocean areas.

It is equipped with advanced maritime sensors, radar and electro-optical/infrared systems.

Capabilities of MQ-9B SeaGuardian:

Persistent surveillance: Monitors large maritime areas for prolonged periods.

Maritime ISR: Tracks vessels and suspicious maritime activity.

Anti-Submarine Warfare: Can support submarine detection using specialised sensors and sonobuoys.

Long-range coverage: Enhances surveillance beyond the reach of conventional short-endurance platforms.

Why It Matters for India:

It strengthens Maritime Domain Awareness across the Indian Ocean.

It helps monitor Sea Lines of Communication and maritime traffic.

It complements manned platforms such as the P-8I.

It provides additional surveillance capacity on India's eastern and western maritime fronts.

It is useful against emerging sub-surface and maritime security threats.

INDIAN ARMY RAISES FIRST BAAZ BATTALION IN PUNJAB

Why in news?

Recently, the Indian Army has raised its first Baaz Battalion of sophisticated drones in Punjab to enhance aerial agility, responsiveness and battlefield reach.

About Baaz battalion:

The Indian Army has raised its first Baaz Battalion of sophisticated drones in the border state of Punjab. The name 'Baaz' has been derived from a bird of prey. The

Vajra Corps (11 Corps), known as the defenders of Punjab, is the first Army formation to operationalise the Baaz Battalion.

The battalion will serve as the "eyes in the sky", providing enhanced battlefield awareness and an operational edge. It aims to strengthen the Army's aerial agility, responsiveness and battlefield reach.

The initiative highlights the importance of technology, innovation and operational excellence in strengthening India's aerial edge on the future battlefield. The deployment of sophisticated drones is expected to enhance the Army's surveillance, responsiveness and battlefield capabilities, particularly along the border.

JAVELIN ANTI-TANK MISSILES

Why in news?

Recently, India has signed a deal to acquire around 60 Javelin anti-tank guided missiles (ATGMs) for the Indian Army through the US Foreign Military Sales (FMS) route.

About the Javelin Missile System:

System Type: It is a man-portable, shoulder-fired, medium-range anti-tank guided missile (ATGM) designed for individual or dismounted infantry use.

Fire-and-Forget Technology: Utilizes a passive imaging-infrared seeker that automatically tracks targets post-launch, allowing troops to immediately relocate and evade counter-fire.

Soft Launch Capability: Ejects the missile using an initial motor before main ignition, minimizing exhaust and enabling safe firing from confined spaces like bunkers and buildings.

Range & Weight: Offers an effective operational range of 2.5 to 4 km and weighs approximately 22 kg, ensuring high mobility for infantry units.

Combat Proven: Extensively battle-tested in high-intensity global conflicts, including deployments in Iraq, Afghanistan, and Ukraine.

Manufacturing Consortium: Jointly produced by the Javelin Joint Venture (comprising US defence majors Lockheed Martin and RTX).

Strategic Synergy: The procurement strengthens the U.S.-India Major Defence Partnership and paves the way for potential mutually beneficial co-production, which aligns with India's goal of bolstering its domestic defence industrial base.

DRDO TO TRANSFER MISSILE TECHNOLOGY TO INDIAN DEFENCE INDUSTRY

Why in news?

Recently, Defence Minister has approved the transfer of DRDO-developed technologies for all conventional missile systems to Indian defence companies, marking a major step towards strengthening Aatmanirbharta in defence.

Objective of the transfer:

The technology transfer will allow eligible Indian industries to undertake production of DRDO-developed missile systems after meeting applicable technical qualifications, certifications, and regulatory requirements.

The move aims to accelerate the transition of missile systems from the development stage to industrial-scale production, enhance domestic manufacturing capabilities, strengthen the defence industrial base, and increase indigenous value addition.

Greater Private Sector Participation: The move will create opportunities for private defence companies, MSMEs, and technology partners to become part of the missile manufacturing supply chain, enabling wider participation in India's defence ecosystem.

India's Missile Capability Base: The country possesses a diverse missile inventory, including the Agni series of ballistic missiles and the BrahMos supersonic cruise missile, reflecting India's growing indigenous missile development capability.

Defence Production: The initiative forms part of a broader push to deepen private-sector participation in defence manufacturing. India achieved its highest-ever defence production of ₹1.54 lakh crore in 2024–25, while defence exports reached a record ₹23,622 crore. The government has set targets to increase defence production to ₹1.75 lakh crore in the current fiscal year and ₹3 lakh crore by 2029.

The move will enhance domestic manufacturing capabilities, increase indigenous value addition, and strengthen India's defence industrial ecosystem by reducing dependence on imported defence equipment.

OPERATION VAJRA AND BLACK HAWK

Why in news?

The Central Bureau of Narcotics (CBN) has dismantled an inter-state counterfeit drug network in Bihar under Operation Vajra, seizing illegal narcotic drugs, counterfeit medicines, and an illicit manufacturing unit.

And the Central Bureau of Narcotics (CBN), through its Madhya Pradesh and Uttar Pradesh Units, conducted 'Operation Black Hawk' near Lucknow.

About Op Vajra:

The action was carried out under Operation Vajra by the Central Bureau of Narcotics (CBN), Bihar & UP Unit. The operation targeted Gaya and Masaurhi (Patna) in Bihar.

CBN dismantled eight illegal godowns used for storing counterfeit medicines and narcotic drugs, along with one illicit manufacturing facility.

Counterfeit Medicines: Large quantities of counterfeit medicines, including Clavam-625, PAN-40, Betadine Ointment, Azithral, and other pharmaceutical preparations, were recovered.

Illicit Manufacturing Unit: A clandestine manufacturing unit at a farmhouse near Masaurhi (Patna) was dismantled.

Machinery, chemicals, equipment, and artificial flavouring agents used for manufacturing Buprenorphine and other narcotic drugs were seized under the NDPS Act, 1985.

About Op Black Hawk:

Operation Black Hawk was conducted by the Central Bureau of Narcotics (CBN) to intercept and disrupt an inter-State heroin trafficking network operating from the North-East to Uttar Pradesh.

The operation also aims to trace upstream suppliers and dismantle connected downstream distribution channels through follow-up financial and logistical investigations.

In the first operation, teams intercepted a vehicle after tracking it along the Sultanpur–Lucknow Highway.

In the second operation, a truck travelling along the Siliguri–Lucknow corridor was intercepted near Barabanki.

PARLIAMENTARY COMMITTEE REPORT ON CYBERCRIME, 2026

Why in news?

Recently, The DRSC on Home Affairs presented the report on 'Cyber Crime – Ramifications, Protection and Prevention'.

Key recommendations:

Grievance Redressal: Standardize a multilingual system across intermediaries featuring tracking, strict timelines, and auto-escalation under IT Rules 2021.

OTT Platforms: Review the feasibility of a Post-Release Review Panel, enforce stricter age verification and parental controls, and penalize non-compliance.

Online Ads: Mandate zero-trust offshore advertiser vetting via digital document verification and live identity authentication.

Cyber Financial Fraud: Fully operationalize the Central Payment Fraud Information Registry as a real-time, interoperable repository for banks and stakeholders.

CBI Jurisdiction: Partner with states and consider amending the DSPE Act (1946) to ease CBI investigations into inter-state and transnational cybercrime.

e-FIR: Implement a nationwide I4C roadmap to automatically convert NCRP complaints into e-FIRs.

Cyber Education: Mandate an age-appropriate cyber-safety curriculum from primary to senior secondary school, supported by teacher training and multilingual resources.

Legal Framework: Establish a recurring, multidisciplinary mechanism to routinely modernize cyber laws against evolving tech threats.

Unified Legislation: Draft comprehensive, tech-neutral cybercrime legislation with precise definitions and strict penalties for emerging offences.

Specialized Task Force: Form an Integrated Cybercrime Task Force with nationwide jurisdiction and inter-agency coordination for high-level cybercrime.



HISTORY







PARLIAMENTARY PANEL FLAGS SLOW DIGITISATION OF MANUSCRIPTS

Why in News?

The Department-related Parliamentary Standing Committee on Transport, Tourism and Culture, in its 393rd Report titled *"From Manuscript to Mission: Preserving, Mapping and Sustaining India's Cultural Heritage in the Age of Artificial Intelligence"*, presented in August 2026, flagged the slow pace of digitisation under the Gyan Bharatam Mission.

Gyan Bharatam Mission

Nodal Ministry: Ministry of Culture.

Announcement: Union Budget 2025–26; subsequently launched in September 2025.

Financial Outlay: ₹491.66 crore for 2025–2031.

Target: Digitisation of one crore manuscripts by 2030.

National Manuscript Survey: Launched in March 2026 to identify, document and geographically map manuscript collections across India.

National Digital Repository (NDR): Intended to provide digital access to India's manuscript heritage.

The mission aims to document, conserve, digitise and promote manuscripts, while strengthening research in Indian languages and traditional knowledge systems.

Key Concerns Raised by the Parliamentary Panel

Slow progress: The committee observed that digitisation was proceeding below the pace required to meet the mission's targets.

Incomplete digital access: Scanning a manuscript does not automatically make its contents searchable, machine-readable or accessible for research.

Fragile manuscripts: Palm-leaf manuscripts and damaged, fused or overwritten folios require specialised imaging and conservation techniques.

Fragmented collections: Manuscripts remain dispersed among public institutions, religious establishments, private collectors and overseas repositories.

Limited technological capacity: Improved handwritten text recognition and expert verification are necessary to interpret diverse Indian scripts accurately.

Major Recommendations

AI-assisted digitisation: Use artificial intelligence and handwritten text recognition to improve transcription, indexing and searchability.

Citizen participation: Establish a proposed *Akshar Mitra* platform for volunteer transcription, with independent verification of entries.

Scientific preservation: Introduce multispectral imaging for damaged texts and surface-relief imaging for palm-leaf manuscripts.

Academic collaboration: Engage universities and researchers in preparing verified editions and translations.

Open digital access: Make publicly funded manuscript images and verified transcriptions available for research, subject to appropriate safeguards.

International cooperation: Catalogue dispersed collections and facilitate access to manuscripts held abroad.

Significance

Digitisation can safeguard India's intellectual heritage, support research in history, mathematics, medicine, astronomy and philosophy, and improve access to traditional knowledge. It can also strengthen cultural diplomacy and help document knowledge relevant to contemporary scientific research.

Way Forward

India needs an integrated approach combining physical conservation, high-quality digitisation, expert verification, multilingual AI tools and long-term digital storage. Standardised protocols, adequate staffing, transparent progress monitoring and collaboration with manuscript custodians are essential to ensure that digitisation preserves not merely manuscript images, but also their knowledge and historical context.

VEERAGALLU DISCOVERY SHEDS LIGHT ON RULER VISHNUVARDHANA'S DEATH

Why in News?

A 12th-century *Veeragallu* (hero stone) was discovered at Neeragunda village in Arsikere taluk, Karnataka, during the restoration of the Hoysala-era Lakshmi Narayana Swamy Temple. Its Kannada inscription may resolve the long-standing debate over the death date of Hoysala ruler Vishnuvardhana.

Key Findings

The inscription commemorates Boppa, a Hoysala soldier, whose wife Maravve erected the memorial after his death.

It indicates that Boppa died soon after Vishnuvardhana's death at Bankapura, in present-day Karnataka.

The date mentioned in the inscription corresponds to **11 December 1141 CE**, challenging earlier estimates of 1149 or 1152 CE. Scholars are examining the evidence further.

What is a Veeragallu?

A Veeragallu, literally meaning "hero stone" in Kannada, is a memorial erected to commemorate individuals who died heroically, often in battles or while defending their community, cattle or territory.

Inscriptions: Record names, events, rulers and dates, providing valuable epigraphic evidence.

Sculptures: May depict the heroic act, the hero's ascent to heaven and religious imagery.

Historical significance: Reveal aspects of warfare, social customs, religious beliefs and political history in medieval South India.

About the Hoysala Dynasty

The Hoysalas ruled parts of present-day Karnataka and neighbouring regions between approximately the 11th and 14th centuries.

Vishnuvardhana was a prominent Hoysala ruler associated with territorial expansion and temple patronage.

Important Hoysala monuments include the temples at Belur, Halebidu and Somanathapura, collectively recognised as the **Sacred Ensembles of the Hoysalas**, a UNESCO World Heritage Site since 2023.

UTKALMANI PANDIT GOPABANDHU DAS

Why in News?

On 3 August 2026, President Droupadi Murmu unveiled a statue of Utkalmani Pandit Gopabandhu Das at Lajpat Bhawan in New Delhi, honouring his contributions as a freedom fighter, social reformer, educationist and journalist.

About Gopabandhu Das

Birth: 9 October 1877, Suando village, near Puri, Odisha.

Popular title: Utkalmani, meaning "Jewel of Odisha".

Death: 17 June 1928.

Major Contributions

Freedom Movement: Played a leading role in the Non-Cooperation Movement in Odisha and became the first president of the Utkal Pradesh Congress Committee in 1920.

Education: Established Satyabadi Bana Bidyalaya in 1909 at Sakhigopal, Odisha. It promoted national education, character-building and social equality.

Journalism: Founded *The Samaja*, an influential Odia newspaper, in 1919 to spread awareness and highlight public issues.

Linguistic Unification: Worked through the Utkal Sammilani to unite Odia-speaking regions under a common administrative framework.

Social Service: Dedicated himself to relief work during floods and other calamities, placing public welfare above personal interests.

Significance

Gopabandhu Das connected nationalism with education, journalism and social reform. His efforts contributed to the growth of political consciousness in Odisha and the wider freedom struggle. The movement for the unification of Odia-speaking areas ultimately culminated in the formation of Odisha as a separate province on **1 April 1936**, widely recognised as India's first province formed on a linguistic basis.

PINGALI VENKAYYA: ARCHITECT OF INDIA'S NATIONAL FLAG

Why in News?

On 2 August 2026, Prime Minister Narendra Modi paid tribute to freedom fighter Pingali Venkayya on his **150th birth anniversary**, recalling his contribution to the design of India's National Flag.

About Pingali Venkayya

Born: 2 August 1876 (150th birth anniversary observed in 2026).

Birthplace: Bhatlapenumarru, present-day Andhra Pradesh.

He was a freedom fighter, educationist, agriculturist and linguist, popularly associated with the design of the Indian Tricolour.

Contribution to the National Flag

In **1921**, Venkayya presented a flag design to Mahatma Gandhi at the Indian National Congress meeting in Vijayawada.

Gandhi suggested modifications, including a white stripe and the spinning wheel (*Charkha*).

The flag evolved over time, and the Constituent Assembly adopted the present National Flag on **22 July 1947**, replacing the Charkha with the Ashoka Chakra.

Key Facts about the National Flag

Design: Horizontal tricolour of saffron, white and green, with a navy-blue Ashoka Chakra containing 24 spokes.

Constitutional significance: The National Flag symbolises the ideals and aspirations of the nation.

Flag Code of India, 2002: Regulates the display of the National Flag, along with applicable legislation, including the Prevention of Insults to National Honour Act, 1971.

Significance

Venkayya's contribution reflects the role of national symbols in uniting people during the freedom struggle. The evolution of the Tricolour also illustrates how the national movement developed symbols representing a shared political identity.

VAISHYA TEKRI: A MAURYAN-ERA BUDDHIST HERITAGE SITE

Why in News?

In August 2026, Madhya Pradesh renewed efforts to excavate and restore **Vaishya Tekri**, a major archaeological mound in Ujjain believed to contain a Mauryan-era Buddhist stupa. The site is being investigated for its possible association with Emperor Ashoka and the spread of Buddhism.

Key Archaeological Findings

Location: Ujjain, Madhya Pradesh, an important ancient centre of the Avanti region.

Earlier excavation: Conducted in 1938–39 by the Archaeology Department of the erstwhile Gwalior State.

Estimated dimensions: The earlier report described a stupa with a base of approximately 350 feet and a height of around 100 feet.

Dating: Large bricks and punch-marked coins found during earlier investigations suggested a possible Mauryan-period origin.

Current status: Further scientific investigation is needed to establish the monument's precise chronology and association with Ashoka.

Historical Significance

Ashoka and Ujjain: Historical traditions associate Ashoka with Ujjain, where he is believed to have served as a provincial governor before becoming emperor.

Buddhist heritage: The stupa may provide insights into the development of Buddhism and its patronage during the Mauryan period.

Name: Local tradition associates the name Vaishya Tekri with Devi, who is traditionally linked to Ashoka and came from a merchant family.

Significance

Further excavation may improve understanding of ancient Ujjain's political, religious and cultural landscape. The project also highlights the importance of scientific archaeology and heritage conservation.

THOTLAKONDA BUDDHIST SITE

Why in News?

In August 2026, delegates from BRICS countries, accompanied by Union Minister for Youth Affairs and Sports Mansukh Mandaviya, visited the historic Thotlakonda Buddhist heritage site near Visakhapatnam, Andhra Pradesh, during India's BRICS Presidency. The visit highlighted India's Buddhist heritage and its cultural links with Asia.

Key Features

Location: Near Visakhapatnam, Andhra Pradesh, overlooking the Bay of Bengal.

Discovery: Identified during an aerial survey by the Indian Navy.

Period: Archaeological remains indicate occupation from approximately the 3rd century BCE to the 3rd century CE.

Major remains: Mahastupa, votive stupas, viharas, meditation areas, a dining hall, kitchens and rock-cut water cisterns.

Artefacts: Satavahana and Roman coins, Brahmi inscriptions, pottery and sculptural remains.

Name: Thotlakonda means "Hill of Cisterns", referring to its rock-cut water-storage structures.

Historical Significance

Thotlakonda was an important Buddhist monastic centre. Its location along the eastern coast and the discovery of foreign coins suggest connections with wider maritime trade networks. The site provides insights into Buddhist religious life, water management and cultural exchanges in ancient India.

Conservation

The site is protected under the Andhra Pradesh Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1960. Effective conservation requires protection from encroachment, unregulated construction and coastal development.

VAGDEVI IDOL: INDIA'S EFFORTS FOR REPATRIATION

Why in News?

In August 2026, India renewed diplomatic efforts to bring back the 11th-century Vagdevi idol, associated with Bhojshala in Dhar, Madhya Pradesh, from the **British Museum, London**. The issue gained prominence during the BRICS Culture Ministers' meeting in Bhopal, highlighting the international debate over the return of colonial-era cultural artefacts.

Key Facts

Deity: Vagdevi, another name for Goddess Saraswati, associated with knowledge and learning.

Period: 11th century CE, during the Paramara dynasty.

Location of origin: Dhar, Madhya Pradesh.

Present location: British Museum, United Kingdom.

Historical association: Dhar was an important centre of Sanskrit learning under Paramara ruler Raja Bhoja.

Why Is the Idol Significant?

The marble sculpture represents India's medieval artistic traditions and intellectual heritage. Its proposed repatriation reflects efforts to recover cultural objects removed from India during colonial rule.

Repatriation of Cultural Artefacts

Repatriation refers to the return of cultural objects to their country or community of origin. India has pursued the recovery of antiquities through diplomatic negotiations, provenance research and international cooperation.

The **1970 UNESCO Convention** seeks to prevent the illicit import, export and transfer of ownership of cultural property. However, the return of older artefacts often involves complex questions of historical evidence, ownership and the laws of the country holding them.

Way Forward

India needs stronger international cooperation, transparent provenance records, museum partnerships and sustained diplomatic engagement to facilitate the return of cultural heritage.

THIKSEY MONASTERY

Why in News?

In August 2026, US Ambassador to India Sergio Gor visited the historic Thiksey Monastery in Ladakh during his official visit to the Union Territory, highlighting the region's Buddhist heritage and cultural significance.

Key Features

Location: Thiksey village, approximately 19 km east of Leh, Ladakh, overlooking the Indus Valley.

Established: 1433 CE, by Spon Palden Sherab under the guidance of Jangsem Sherab Zangpo.

Buddhist tradition: Belongs to the Gelugpa school, also known as the Yellow Hat order of Tibetan Buddhism.

Architecture: A 12-storey monastic complex built along a hillside, resembling the Potala Palace in Lhasa, Tibet. It is often called the "Mini Potala of Ladakh".

Maitreya Buddha: Houses a 15-metre-high statue of Maitreya, the Buddha expected to appear in the future.

Religious heritage: Contains stupas, thangka paintings, wall murals, Buddhist scriptures and monastic shrines.

Religious and Cultural Significance

Thiksey Monastery is an important centre of Tibetan Buddhist learning, meditation and religious practices. Its annual **Gustor Festival** features traditional masked dances (*Cham*), symbolising the triumph of good over evil.

DHIMSA DANCE CREATES GUINNESS WORLD RECORD

Why in News?

On 31 July 2026, **13,102 participants** performed the largest Dhimsa dance at Bhogapuram, Andhra Pradesh, creating a Guinness World Record. The event was organised by the Department of Tribal Welfare, Government of Andhra Pradesh, ahead of the inauguration of Alluri Sitarama Raju International Airport.

About Dhimsa Dance

Origin: Associated with the tribal communities of the Araku Valley and the Eastern Ghats in Andhra Pradesh, with cultural links to the Koraput region of Odisha.

Performers: Traditionally performed mainly by women belonging to communities such as Bagata, Valmiki, Porja, Gadaba and Kondadora.

Style: Dancers form linked circles or chains and perform rhythmic, coordinated

movements.

Occasions: Festivals, weddings, harvest celebrations and community gatherings.

Musical instruments: Traditional percussion and wind instruments accompany the performance.

Cultural Significance

Dhimsa reflects community solidarity, collective participation and the close relationship between tribal communities and nature. It transmits cultural traditions across generations and forms an important part of the intangible cultural heritage of the Eastern Ghats.

Significance of the Record

The achievement brought national and international attention to Andhra Pradesh's tribal heritage. Such initiatives can support cultural preservation, promote tribal tourism and provide visibility to indigenous artistic traditions. However, sustained community participation and transmission of traditional knowledge are essential beyond record-setting events.

SREE NARAYANA GURU (1856–1928)

Why in News?

On **28 August 2026**, Prime Minister Narendra Modi paid tribute to Sree Narayana Guru on his **170th birth anniversary**, highlighting his contributions to social equality, education and human dignity.

Major Contributions

Social Reform: Challenged caste discrimination and promoted social equality through the message, "One Caste, One Religion, One God for Mankind."

Aruvippuram Consecration (1888): Consecrated a Shiva idol, challenging caste-based restrictions on temple worship.

SNDP Yogam (1903): Associated with the establishment of the Sree Narayana Dharma Paripalana Yogam to promote social and educational advancement.

Religious Harmony: Organised an All Religions Conference at Aluva in 1924, promoting interfaith understanding.

Literary Works: Authored *Atmopadesa Satakam* and *Daiva Dasakam*.

Significance

Sree Narayana Guru linked spiritual reform with education, self-respect and social justice, influencing Kerala's social reform movements and India's broader struggle against caste-based inequality.

RABINDRANATH TAGORE (1861–1941)

Why in News?

Rabindranath Tagore's death anniversary was observed on **7 August 2026**, with tributes highlighting his contributions to Indian literature, education and the freedom movement.

Major Contributions

Nobel Prize: First non-European to receive the Nobel Prize in Literature (1913) for *Gitanjali*.

National Anthems: Authored *Jana Gana Mana* (India) and *Amar Sonar Bangla* (Bangladesh).

Education: Founded Visva-Bharati at Santiniketan in 1921, promoting international cultural exchange and holistic education.

Nationalism: Renounced his British knighthood in 1919 in protest against the Jallianwala Bagh massacre.

Literature: Notable works include *Gora*, *Ghare-Baire* (*The Home and the World*) and *Kabuliwala*.

Significance

Tagore promoted universal humanism, freedom of thought and harmony between cultures. His educational philosophy emphasised creativity, nature and learning beyond conventional classrooms

SHAHEED UDHAM SINGH (1899–1940)

Why in News?

On **31 July 2026**, Prime Minister Narendra Modi paid tribute to Shaheed Udham Singh on his **86th martyrdom anniversary**, remembering his sacrifice in India's freedom struggle.

Major Contributions

Jallianwala Bagh Massacre: Witnessing the 1919 massacre profoundly influenced his revolutionary activities.

Assassination of Michael O'Dwyer: Shot the former Lieutenant Governor of Punjab in London on 13 March 1940, holding him responsible for the events of 1919.

Revolutionary Activities: Associated with the Ghadar movement and the wider overseas struggle against British colonial rule.

Symbol of Unity: Used the name *Ram Mohammad Singh Azad* during his trial, reflecting a message of religious unity and freedom.

Martyrdom

Udham Singh was executed at Pentonville Prison, London, on **31 July 1940**. His

remains were brought back to India in 1974.

Sangeet Natak Akademi Fellowships and Awards

Why in News?

On **13 August 2026**, President Droupadi Murmu conferred the Sangeet Natak Akademi Fellowships and Awards for **2024 and 2025** on 115 eminent artists at Vigyan Bhawan, New Delhi. The honours recognise outstanding contributions to India's performing arts.

About Sangeet Natak Akademi

Established: 1953; an autonomous body under the Ministry of Culture.

Headquarters: New Delhi.

Fields covered: Music, dance, drama, folk and tribal arts, puppetry and allied theatre arts.

Key Awards

Akademi Ratna: The prestigious Sangeet Natak Akademi Fellowship, carrying ₹3 lakh, a Tamrapatra and an Angavastram.

Akademi Puraskar: Award for outstanding achievement in performing arts, carrying ₹1 lakh, a Tamrapatra and an Angavastram.

Ustad Bismillah Khan Yuva Puraskar: Recognises promising young artists in performing arts.

Significance

The awards promote India's intangible cultural heritage, recognise the Guru–Shishya tradition and encourage the preservation of traditional and endangered art forms.