DEPARTMENT OF EMPLOYMENT AND TRAINING

DAILY CURRENT AFFAIRS - 31.10.2026

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TamilNadu Highlights

Tamil Nadu Battery Energy Storage System (BESS) Policy 2026

Context

- The **Tamil Nadu Cabinet** approved the **Battery Energy Storage System (BESS) Policy 2026**.
- **Applies to:** Projects of **1 MW and above**.

Objectives

- Speed up **BESS installation** across **generation and transmission networks**.
- Improve use of **renewable energy**.
- Reduce **curtailment** – wastage of **renewable power** that cannot be absorbed by the **grid**.

Two Categories of BESS

Feature	Standalone BESS	Co-located BESS
What it is	Independent battery storage	Battery integrated with **solar**, **solar-hybrid**, **wind** or other **RE projects**
Capacity	More than **1 MW**	More than **1 MW**
Connection	**Transmission**, **distribution** or **private consumer networks**	Stores power from the associated **RE plant**
Uses	**Peak-hour demand**, **grid support**, other approved services	Supply during **peak demand** or when needed
Incentive	**100% waiver** of **transmission and wheeling charges**	**100% waiver** of **transmission and wheeling charges**

- **Co-located BESS** applies to both **existing and new** solar, wind or hybrid projects.

Significance

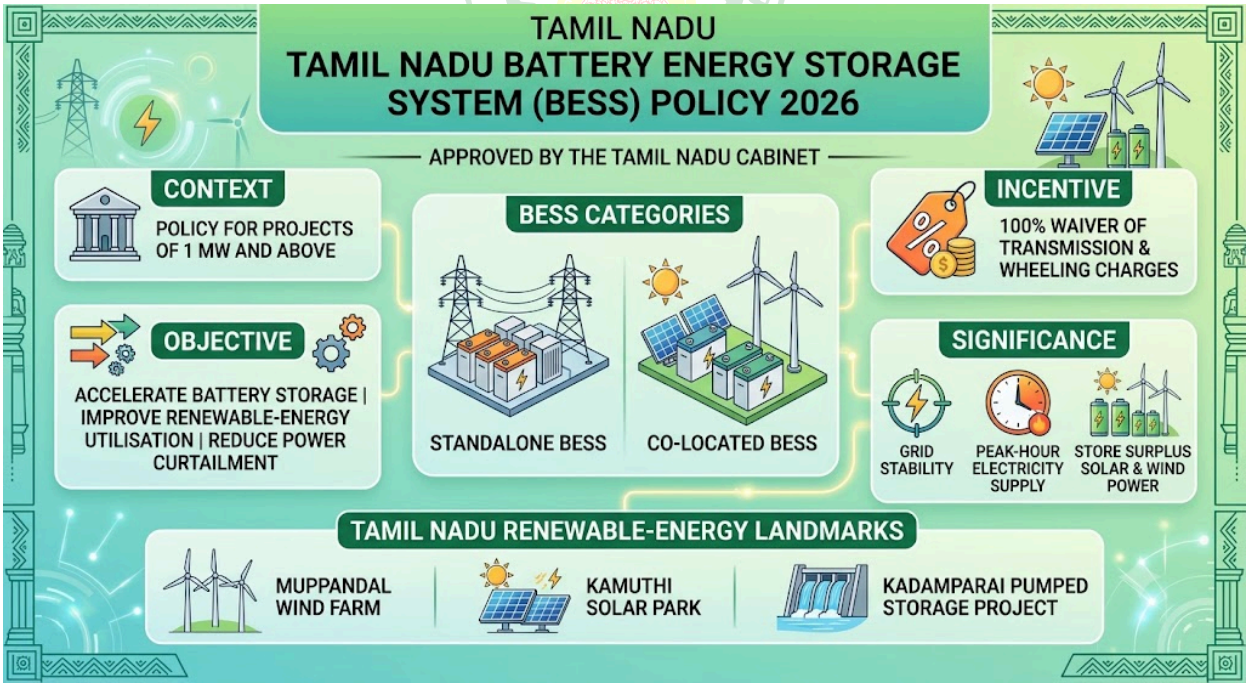
- **Grid Stability:** Balances the **intermittent nature** of **solar and wind**.
- **Less Curtailment:** Stores surplus **wind (monsoon)** and **solar (daytime)** power.
- **Peak Demand:** Supplies power in **evening peak hours**.
- **Investment: Waivers** make **BESS projects** financially viable.
- Supports **Tamil Nadu's renewable energy leadership** and **net-zero goals**.

Challenges

- High **battery costs** and **import dependence** (**lithium**, **cobalt**; mostly from **China**).
- **Battery degradation** in **10–15 years**.
- **Safety (fire risk)** and **recycling** of used batteries.
- **Revenue loss** for the **transmission utility** due to waivers.

Do You Know?

- **Tamil Nadu** is among India's top States in **wind and solar capacity** (**Muppandal**, **Kamuthi solar park** in **Ramanathapuram**).
- **TANGEDCO** was restructured in **2024** into:
  - **Tamil Nadu Power Distribution Corporation (TNPDCL)**.
  - **Tamil Nadu Green Energy Corporation (TNGECL)**.
  - **Tamil Nadu Power Generation Corporation (TNPGCL)**.
- **Centre's VGF Scheme for BESS (2023): ₹3,760 crore** for **4,000 MWh** of battery storage.
- **Energy Storage Obligation (ESO)** – **Ministry of Power** target for **discoms** to buy a share of power from storage.
- **BESS vs Pumped Storage (PSP):**
  - **BESS: 2–4 hours** discharge; life **10–15 years**.
  - **PSP: 6–12+ hours**; life **40–60 years**.
- **Kadamparai (Coimbatore)** – **Tamil Nadu's pumped storage hydro project**.
- **Battery Waste Management Rules, 2022** – **Extended Producer Responsibility (EPR)** for batteries.



Topic: Sports

Khelo India Sports Goods Manufacturing Scheme

Context

- The **Union Cabinet** approved the **Khelo India Sports Goods Manufacturing Scheme**.
- **Outlay: ₹1,856.67 crore** for **2026 to 2033–34**.

About

- **Ministry: Ministry of Youth Affairs and Sports**.
- **Aim:** Make India a **global sports goods manufacturing and export hub**; reduce imports (**Make in India**, **Khelo Bharat Niti 2025**, **Viksit Bharat 2047**).

Key Features

- **Sports Goods Manufacturing Zones:** Clusters with units, suppliers, **testing labs**, **prototyping** – via **BHAVYA** and **NICDC industrial parks**.
- **Investment and Production Incentives: ₹1,130 crore** – **investment** and **turnover-linked**.
- **MSME Modernisation:** Traditional hubs like **Jalandhar** and **Meerut**; **Common Facility Centres (CFCs)**.
- **International Certification: ₹105 crore** for **FIFA**, **FIH**, **BWF**, **World Athletics** certification.
- **R&D Centres of Excellence:** With **ANRF – smart equipment**, **polymers**, **carbon composites**, **protective gear**.
- **Skilling and Exports:** Via **MSDE** and **Export Promotion Mission (EPM)**.

Do You Know?

- **Khelo India:** Launched **2017–18**.
- **Fit India Movement: 29 August 2019** (**National Sports Day** – birthday of **Major Dhyan Chand**).
- **ANRF** = **Anusandhan National Research Foundation (Act 2023)**.

Topic: Personalities in news

Dr. Homi Jehangir Bhabha – 117th Birth Anniversary (30 October)

About

- **Indian nuclear physicist** and **institution builder**.
- **"Father of the Indian Nuclear Programme"**.

Early Life

- **Born: 30 October 1909**, **Bombay**, in a **Parsi family**; related to the **Tata family**.

- **Education: Elphinstone College**, **Royal Institute of Science**, **Cambridge (Gonville and Caius College)** – first **mechanical engineering**, then **theoretical physics**.
- **PhD (1935)** under **Ralph H. Fowler** at the **Cavendish Laboratory**; worked with **Niels Bohr**, **Wolfgang Pauli**, **Enrico Fermi**.

Scientific Contributions

- **Bhabha Scattering:** Formula for **electron-positron scattering**.
- **Cascade Theory of Cosmic Ray Showers (1937)** with **Walter Heitler**.
- **Meson Theory:** Early confirmation of **Einstein's time dilation**.

Institutional Contributions

- **Three-Stage Nuclear Power Programme:**
  - **Stage 1: PHWRs – natural uranium**.
  - **Stage 2: Fast Breeder Reactors – plutonium**.
  - **Stage 3: Advanced Heavy Water Reactors – thorium**.
- **TIFR (1945)** – with **Dorabji Tata Trust** support.
- **Atomic Energy Establishment, Trombay (1954)** → renamed **BARC (1967)**.
- **Atomic Energy Act, 1948**.
- **First Chairman, Atomic Energy Commission (AEC); first Secretary, Department of Atomic Energy (DAE, 1954)**.
- **Apsara (August 1956): Asia's first nuclear research reactor**, at **Trombay**.
- **President**, first **UN Conference on Peaceful Uses of Atomic Energy (Geneva, 1955)**.

Do You Know?

- **Bhabha** died in an **Air India plane crash** on **Mont Blanc (Alps)** on **24 January 1966**.
- Awarded the **Padma Bhushan (1954)**.
- India's **thorium reserves** are among the world's largest (**monazite sands** of **Kerala**, **Tamil Nadu**, **Odisha**).
- **PFBR Kalpakkam (TN)** reached **first criticality** in **April 2026** – India's entry into **Stage 2**.
- **IGCAR (Indira Gandhi Centre for Atomic Research), Kalpakkam**, leads **fast breeder research**.

Topic: Economy

Container Manufacturing Promotion Scheme (CMPS)

Context

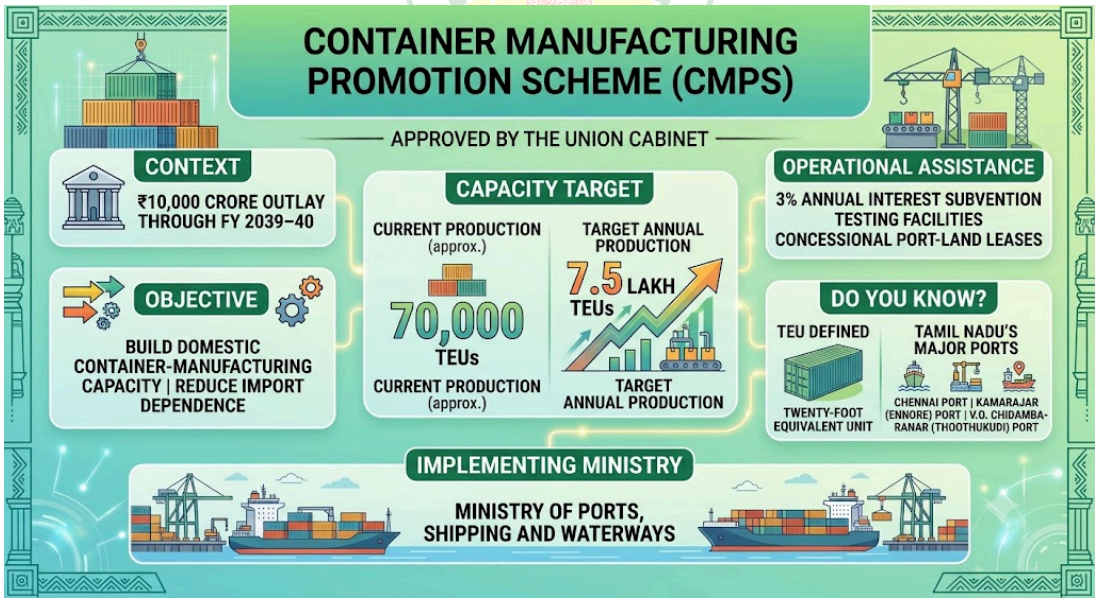
- The **Union Cabinet** approved the **CMPS** with a **₹10,000 crore** outlay through **FY 2039–40**.

About

- **Ministry: Ministry of Ports, Shipping and Waterways (MoPSW)**.
- **Aim:** Make India **self-reliant in containers**; reduce **imports**, **forex outflow** and **China's dominance** in global container supply.

Key Features

- **Capacity: 70,000 TEUs → 7.5 lakh TEUs** a year (**tenfold**).
- **Operational Assistance: ₹8,891 crore** to offset Indian makers' **30–40% cost disadvantage**.
- **Interest Subvention: ₹859 crore – 3% annual subsidy** on loans.
- **Testing and Certification: ₹150 crore** for **domestic labs** (reduce reliance on overseas **ISO/CSC testing**).
- **Port Land:** Leases at **25% of normal rates**.
- **Local Content: 70% → 90% by FY33**.



Significance

- Avoids **container shortages** and **leasing-cost spikes**.
- **Jobs: 3,000 direct** and **50,000 indirect**.
- Demand for **steel**, **castings**, **coatings**.

Do You Know?

- **TEU** = **Twenty-foot Equivalent Unit** – standard container size measure.
- **China** makes over **95% of the world's shipping containers**.
- **Maritime India Vision 2030** and **Maritime Amrit Kaal Vision 2047** guide port-sector growth.
- **Tamil Nadu ports: Chennai**, **Kamarajar (Ennore)**, **V.O. Chidambaranar (Thoothukudi)** – all **major ports**.

Dearness Allowance (DA) Hiked to 63%

Context

- The **Union Government** raised **DA** and **Dearness Relief (DR)** by **3 percentage points – 60% → 63%** of **basic pay/pension**.
- **Effective: 1 July 2026** (**retrospective**).

About DA

- A **cost-of-living allowance** for **government employees**; called **Dearness Relief (DR)** for **pensioners**.
- **Aim:** Protect **real wages** and **purchasing power** from **inflation**.

How DA Is Calculated (7th CPC Formula)

- Based on the **All India Consumer Price Index for Industrial Workers (AICPI-IW)**, compiled by the **Labour Bureau**.
- **12-month average AICPI-IW** (**base 2016 = 100**).
- **Linking Factor 2.88:** Converts the **2016 series** to the old **2001 = 100** series.
- **Base Constant 261.42 (7th CPC)**.
- Result **rounded down** to the nearest whole number.

Key Features

- Revised **twice a year** – effective **1 January** and **1 July**.
- Calculated only on **basic pay**.
- **Fully taxable – Section 17(1), Income-tax Act, 1961**.
- **Arrears** paid as a **lump sum**.
- **CDA vs IDA:**
    - **CDA (Consumer DA): Central civil servants** and **defence personnel**.
    - **IDA (Industrial DA): PSU executives**; revised **quarterly**.

Do You Know?

- **7th Central Pay Commission:** Chaired by **Justice A.K. Mathur**; implemented from **1 January 2016**.
- **8th Pay Commission** was announced in **January 2025**.
- **CPI-IW** is compiled by the **Labour Bureau, Shimla**.

Topic: Science & Technology

ISRO Launches NVS-03 Navigation Satellite

- **Launched: 30 October 2026** on **GSLV-F18** from **Satish Dhawan Space Centre, Sriharikota**.
- **Mass: ~2,250 kg**.
- **Orbit: Geosynchronous Transfer Orbit (GTO)**, to be raised to **Geosynchronous Orbit**.
- **Coverage: India** plus **1,500 km** beyond its borders.
- **Mission Life: 12 years** (vs **10 years** for first-generation **IRNSS**).

Key Features

- **Indigenous Rubidium Atomic Clock**, plus imported clocks.
- **Bands: Civil L1 (1575.42 MHz)** + **L5** and **S bands** – **L1** makes it compatible with **GPS chipsets** in phones.
- **Two Services:**
  - **SPS (Standard Positioning Service)** – **civilians**.
  - **RS (Restricted Service)** – **encrypted**, for **defence**.
- **Anti-spoofing** and **anti-jamming** security.

Significance

- Restores **NavIC coverage** after **atomic clock failures** in older satellites and the failed **orbit-raising of NVS-02**.
- Less dependence on foreign navigation systems (**GPS**).

Do You Know?

- **NavIC** = **Navigation with Indian Constellation** (formerly **IRNSS**); needs **7 satellites** for full service.
- **NVS-01** launched **May 2023**; **NVS-02** in **January 2025** (**orbit-raising failed**).
- **Other Global Systems: GPS (USA)**, **GLONASS (Russia)**, **Galileo (EU)**, **BeiDou (China)**; regional: **QZSS (Japan)**.



IN-SPACe's AI INSPIRED Programme

Context

- **IN-SPACe** selected **six private space tech entities** for **seed grants** of up to **₹1 crore** each under **AI INSPIRED**.

About IN-SPACe

- **Full Form: Indian National Space Promotion and Authorisation Centre**.
- **Autonomous single-window nodal agency** under the **Department of Space (DoS)**.
- **HQ: Bopal, Ahmedabad**.
- Acts as both **regulator** and **promoter** for **Non-Government Entities (NGEs)** in space.

Key Functions

- **Single-window authorisation** for **private satellites**, **launches**, **launch pads**, **ground stations**, **re-entry**.
- Access to **ISRO infrastructure** (launch, testing, labs).
- **Technology transfer** from **ISRO** to industry.
- **Startup funding** and **incubation**.
- **Regulation** – **satellite operations**, **space debris**, **spectrum**.

About AI INSPIRED

- Under **IN-SPACe's Seed Fund Scheme**.

- Supports **AI/ML solutions** for **space applications**.
- **Funding:** Up to **₹1 crore per entity**; total **₹6 crore**.
- **Focus Areas:**
  - **AI-based planetary landing**.
  - **Satellite servicing and refuelling**.
  - **Optical space debris detection**.
  - **Adaptive Attitude Determination and Control Systems (ADCS)**.
- Also offers **mentorship**, **ISRO testing facilities**, **technology transfer**.

Do You Know?

- **IN-SPACe** was set up in **June 2020** as part of **space sector reforms**.
- **Indian Space Policy, 2023** defines roles of **ISRO**, **IN-SPACe**, **NSIL** and **private players**.
- **FDI in space:** Up to **100%** allowed (**2024 liberalisation**).
- **NSIL (NewSpace India Limited) – ISRO's commercial arm**.

Topic: Schemes and Initiatives

Punah Bharan Mobile App for Groundwater Recharge

Context

- The **Union Minister of Jal Shakti** launched the **Punah Bharan mobile app** and **web portal** for **scientific groundwater recharge planning**.

About Punah Bharan

- A **geospatial decision-support tool** for **village-level planning** of **artificial recharge structures**.
- **Developed By: BISAG-N (Bhaskaracharya National Institute for Space Applications and Geo-informatics)**.
- **In Collaboration With: National Water Mission (NWM), Department of Water Resources, RD&GR, Ministry of Jal Shakti**.
- **Aim:** Move from **ad-hoc** to **data-driven recharge planning**.

Key Features

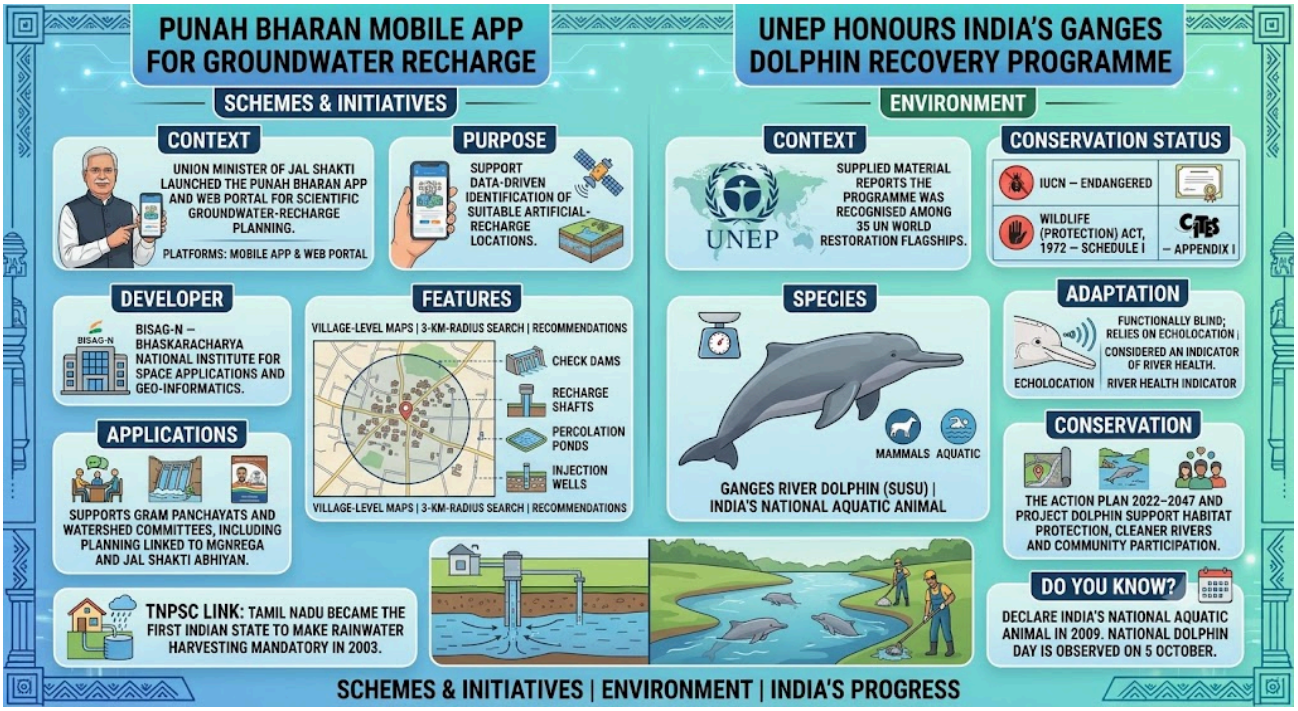
- **3-km radius search** for **recharge zones** near the user.
- **Site-specific suggestions: Check dams, recharge shafts, percolation ponds, injection wells**.
- **Village-level ARS (Artificial Recharge Structure) zonation maps**.
- **Multi-layer GIS: Rainfall, groundwater levels, aquifer yield, slope, drainage**.

Significance

- Helps **Gram Panchayats**, **engineers** and **watershed committees**.
- Improves spending under **MGNREGA**, **Jal Shakti Abhiyan**, **Atal Bhujal Yojana**.
- Boosts **aquifer recharge** in **over-exploited areas**.

Do You Know?

- **"Punah Bharan"** means **"refilling"/recharge**.
- **BISAG-N** is in **Gandhinagar, Gujarat**; under **MeitY**.
- **Jal Shakti Abhiyan: Catch the Rain** – launched **2021**.
- **Atal Bhujal Yojana (2019): Community-led groundwater management** in **7 States**.
- **Tamil Nadu** was the **first State** to make **rainwater harvesting mandatory (2003)**.



Topic: Environment

UNEP Honours India's Ganges Dolphin Recovery Programme

Context

- **UNEP's** report **"Nature's Comeback – Scaling Ecosystem Restoration for People and Planet"** named India's **Ganges River dolphin recovery programme** among **35 UN World Restoration Flagships**.

About the Ganges River Dolphin

- **Freshwater cetacean**; called **"Susu"** (from its breathing sound).

- **India's National Aquatic Animal**; **State Aquatic Animal of Assam**.
- **Status:**
  - **IUCN: Endangered**.
  - **WPA 1972: Schedule I**.
  - **CITES: Appendix I**.
- **Habitat: Deep pools**, **river bends** and **confluences** of the **Ganga–Brahmaputra–Meghna** and **Karnaphuli–Sangu** systems (**India**, **Nepal**, **Bangladesh**).

Key Characteristics

- **Functionally blind** – uses **echolocation (ultrasonic clicks)**.
- **Indicator species** of **river health**.
- **Swims sideways** near the riverbed to catch fish.
- **Air-breathing** – surfaces every **30–120 seconds**.

Recovery Programme

- **Action Plan (2022–2047)** under **MoEFCC** and **Project Dolphin**.
- Part of the **UN Decade on Ecosystem Restoration (UNEP and FAO)**.
- **Community Conservation: Fishers**, youth and **Ganga Praharis** in **surveillance**, **eco-tourism**, **rescue**; **green jobs**.
- **Synergy with National Mission for Clean Ganga (NMCG): E-flows**, less pollution, removing barriers.
- **Vikramshila Gangetic Dolphin Sanctuary (Bihar)** – **India's only dolphin sanctuary**.

Do You Know?

- Declared **National Aquatic Animal** in **2009**.
- **Project Dolphin** was announced on **15 August 2020**.
- **National Dolphin Day: 5 October**.
- **UN Decade on Ecosystem Restoration: 2021–2030**.
- **First population survey (2025)** estimated about **6,300 river dolphins** in India.

Death of Cheetah Cub KNG22 – First Gunshot Death under Project Cheetah

Context

- **19-month-old** cheetah cub **KNG22** died after vets found **five firearm pellets** in its body.
- Rescued outside **Kuno National Park, Madhya Pradesh**.

About KNG22

- **India-born cub** of female cheetah **Nirva**.
- **First documented poaching/shooting death** under **Project Cheetah**.
- **Found: Compartment 748, Morena Territorial Forest Division**, outside **Kuno's core**.
- **Injured: 25 October 2026**; **died: 27 October 2026**.
- **Project Cheetah deaths** now total **26**.

Monitoring and Protection

- **VHF/Satellite radio collars**.
- **Drone** and **aerial surveillance**.
- **Cheetah Mitras: 350+ trained village volunteers**.
- **Fencing** and **predator bomas** – incl. **Gandhi Sagar** and **Madhav**.

Implications

- **Poaching risks** outside **protected areas**.
- Danger of **unlicensed guns** used for **crop protection**.
- Need to expand **Kuno's landscape** to **1,800 sq km** and secure **corridors** to **Gandhi Sagar** and **Veerangana Durgavati** reserves.

Do You Know?

- **Project Cheetah:** Launched **17 September 2022** – **world's first intercontinental large carnivore translocation**.
- Cheetahs came from **Namibia (8, 2022)** and **South Africa (12, 2023)**.
- **Cheetah** declared **extinct in India** in **1952**.
- **Gandhi Sagar Wildlife Sanctuary (MP)** – India's **second cheetah home (2025)**.
- **African cheetah: IUCN Vulnerable**; **Asiatic cheetah** (only in **Iran**): **Critically Endangered**.

Topic: Awards and Honor

Captain Smit Machchhar Receives UAE's First-Class Order of Zayed II

Context

- Indian pilot **Captain Smit Machchhar** received the **UAE's First-Class Order of Zayed II** for bravery in protecting **174 passengers** during an **in-flight cockpit assault** on a **Flydubai flight (Dubai–Tel Aviv)**.

About the Order of Zayed II

- A **national civilian decoration** of the **UAE** for **foreign diplomats**, **dignitaries** and **distinguished individuals** – for **public service**, **diplomacy** or **gallantry**.
- Named after **Sheikh Zayed bin Sultan Al Nahyan** – **founding father** and **first President of the UAE**.
- **First Class** is its **highest grade**.
- Different from the **Order of Zayed** – **UAE's highest civilian honour** for **Heads of State** (**PM Narendra Modi** received it in **August 2019**).
- **Conferred by: UAE President Sheikh Mohamed bin Zayed Al Nahyan**.



Indian Recipients

- **Navdeep Singh Suri** – Former **Ambassador to UAE (2016–2019)**.
- **Sunjay Sudhir** – Former **Ambassador to UAE (2021–2025)**.
- **Captain Smit Machchhar** – for **civilian bravery in aviation**.

Significance

- Strengthens the **India–UAE Comprehensive Strategic Partnership**.
- Recognises **aviation courage** and **crisis leadership**.

Do You Know?

- **India–UAE CEPA** – India's **first CEPA after 2014**; in force since **1 May 2022**.
- **India–UAE Comprehensive Strategic Partnership: 2017**.
- **UAE** has about **35 lakh+ Indians** – the **largest Indian diaspora abroad**.

Topic: Geography

Yamuna River

Context

- **Delhi** plans a **tourist cruise** on the **Yamuna** before **Chhath Puja**, despite **DPCC data** showing **severe pollution downstream**.

About the Yamuna

- Major **sacred, perennial river** of **north India**.
- **Longest Indian river** that does **not flow directly into the sea**.
- **Origin: Yamunotri Glacier (6,387 m)**, near **Banderpooch peaks**, **Uttarkashi, Uttarakhand**.

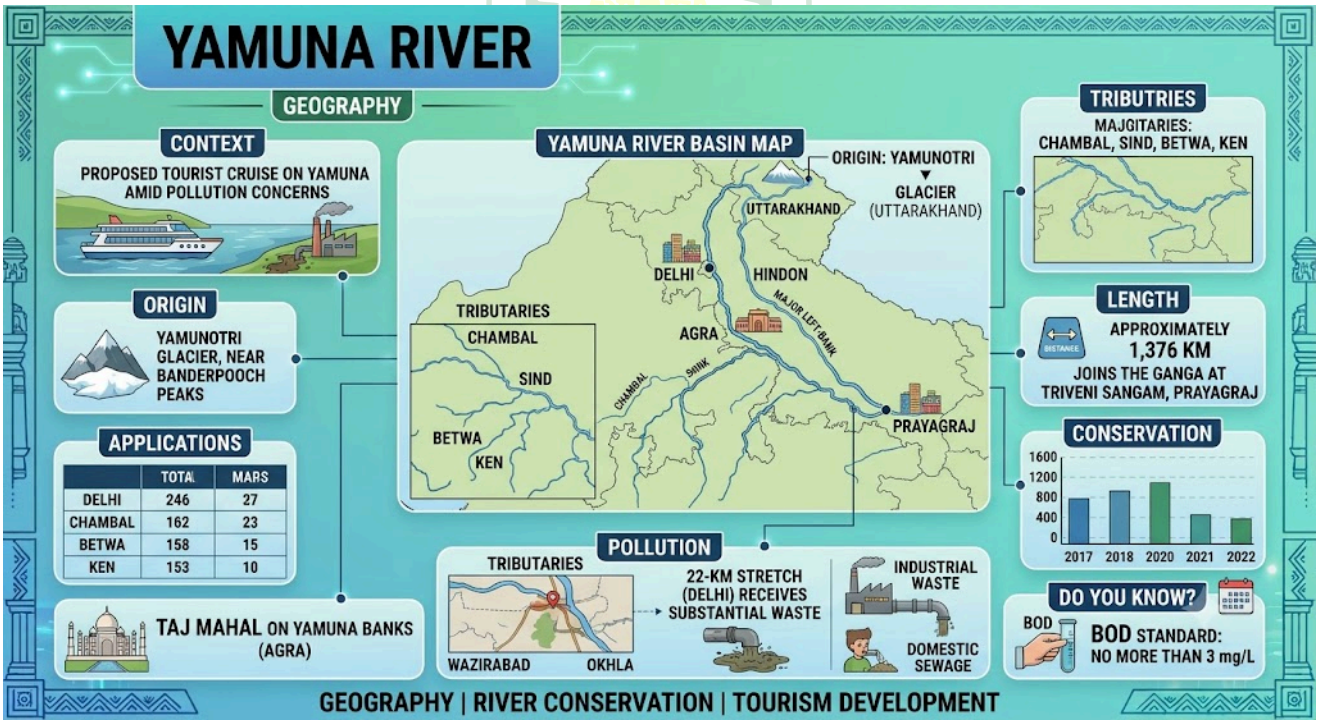
- **States: Uttarakhand**, **Himachal Pradesh**, **Haryana**, **Delhi**, **Uttar Pradesh**; basin extends into **Rajasthan** and **MP**.
- **Length: ~1,376 km**; **Basin: ~3.66 lakh sq km**.
- **Confluence:** Joins the **Ganga** at **Triveni Sangam, Prayagraj**.

Tributaries

- **Upper: Tons** (largest; **~60%** of upper flow), **Giri**, **Rishi Ganga**, **Hanuman Ganga**.
- **Right Bank: Chambal**, **Sind**, **Betwa**, **Ken**.
- **Left Bank: Hindon** (main left-bank tributary).

Key Features

- **Palaeochannel:** May once have flowed into the **Ghaggar–Hakra system** before **tectonic shifts**.
- **Delhi Stretch: 52 km**; the **22-km Wazirabad–Okhla stretch** gets heavy **sewage** and **industrial waste**.
- **Barrages: Dakpathar**, **Hathnikund**, **Wazirabad**, **Okhla** – divert water for **irrigation**, reducing **e-flows**.
- **Pollution: BOD 30–66 mg/L** downstream of **Wazirabad**; **toxic foam**.



Do You Know?

- **Chambal** is the **largest tributary** of the Yamuna overall; **Tons** is the largest in the **upper reaches**.

- **Taj Mahal (Agra)** stands on the banks of the **Yamuna**.
- **Bathing-water standard (CPCB): BOD ≤ 3 mg/L**.
- **Upper Yamuna River Board** – manages **water sharing** among **5 States**.

Topic: Defence

India–Republic of Korea Navy (IN–RoKN) Bilateral Exercise

Context

- **INS Sahyadri** arrived at **Busan Naval Harbour, South Korea**, for the **IN–RoKN Bilateral Maritime Exercise**.

About

- **Bilateral exercise** between the **Indian Navy** and **Republic of Korea Navy**.
- **Host: South Korea** – harbour phase at **Busan**.
- **Aim:** Deeper **naval cooperation**, **interoperability**, a **free, open, rules-based Indo-Pacific**.

Key Features

- **Harbour Phase: Planning conferences**, **cross-deck visits**, sports, expert exchanges.
- **Sea Phase: INS Sahyadri** with **ROKS Munmu the Great** – **formation steaming**, **cross-deck helicopter operations**, **seamanship**.
- **Knowledge Sharing: Damage control**, **Maritime Domain Awareness (MDA)**.
- **Showcases Indigenous Shipbuilding: INS Sahyadri** built by **Mazagon Dock**.

Do You Know?

- **INS Sahyadri: Shivalik-class (Project 17) stealth frigate**; commissioned **2012**.
- **India–South Korea Special Strategic Partnership: 2015**.
- **SAGAR** = **Security and Growth for All in the Region (2015)**; expanded to **MAHASAGAR** in **2025**.

International Highlights

Oil Spill off the UAE Coast

Context

- **Copernicus Sentinel-2 satellite** images (**EU**) showed a large **oil spill** off the **UAE** spreading close to the **northern coastline**.
- A **trans-boundary marine pollution emergency** – **heavy crude/fuel oil** leaking from a damaged tanker into the **Persian Gulf**.

The Incident

- **Vessel:** Commercial tanker **Gem No. 2** (suspected source).
- **Cause:** Reportedly hit by an **unidentified projectile** near the **Strait of Hormuz**; fire later put out.
- **Spread:** Slicks moving towards **Umm Al Quwain**.
- **Response: Containment operations**; beaches closed at **Al Hamriyah (Sharjah)** and resorts in **Ras Al Khaimah**.
- **Concern:** Threat to **desalination plants**, the main source of **drinking water** in the Gulf.

Other Recent Oil Spills

- **Manila Bay, Philippines:** Tanker **MT Terra Nova** (**1.4 million litres** of fuel oil) sank off **Limay, Bataan**.
- **Pasir Panjang, Singapore:** Dredger **Vox Maxima** hit bunker vessel **Marine Honour** – **~400 tonnes** of fuel oil; **Sentosa beaches** shut.
- **Tobago:** Capsized barge (**Gulfstream**) leaked fuel oil – **national emergency**.
- **USA: Twelvepole Creek (West Virginia)** and other **pipeline spills**.

Impacts on Marine Ecosystems

- **Smothering and Hypoxia:** Oil blocks **sunlight and oxygen** – harms **corals** and **seagrass** (**Persian Gulf** has **500+ fish species**).
- **Loss of Insulation:** Oil coats **bird feathers** and **mammal fur** → **hypothermia**, **drowning**.
- **Bioaccumulation:** Toxic **PAHs (Polycyclic Aromatic Hydrocarbons)** move up the **food chain**.
- **Mangrove Damage:** Oil clogs **pneumatophores (breathing roots)** → **mangrove die-off**; loss of **fish nurseries**.

Cleanup Methods

- **Mechanical: Booms** to contain, **skimmers** to collect.
- **Chemical: Dispersants** break oil into droplets.
- **Bioremediation: Oil-eating bacteria** (e.g., **Alcanivorax borkumensis**) plus nutrients.
- **Sorbents and In-situ Burning: Polypropylene sorbent booms**; **controlled burning**.

Conclusion

- **Conflict** and **maritime security incidents** create serious **environmental risks**; **regional rapid-response protocols** are needed.

Do You Know?

- **MARPOL Convention (1973/78) – IMO** convention on preventing **pollution from ships**.

- **National Oil Spill Disaster Contingency Plan (NOS-DCP) – Indian Coast Guard** is the **nodal agency**.
- **Tamil Nadu Oil Spills:**
  - **Ennore (January 2017):** Collision of **MW Maple** and **BW Dawn**.
  - **Ennore (December 2023): CPCL refinery oil leak** during **Cyclone Michaung floods**.
- **Strait of Hormuz** links the **Persian Gulf** and **Gulf of Oman**.

