Current Edge: Daily Brief

10th November 2025

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QUOTES OF THE DAY

"We are stuck with technology when what we really want is just stuff that works." – **DOUGLAS ADAMS**

WHAT THE OTHERS SAY

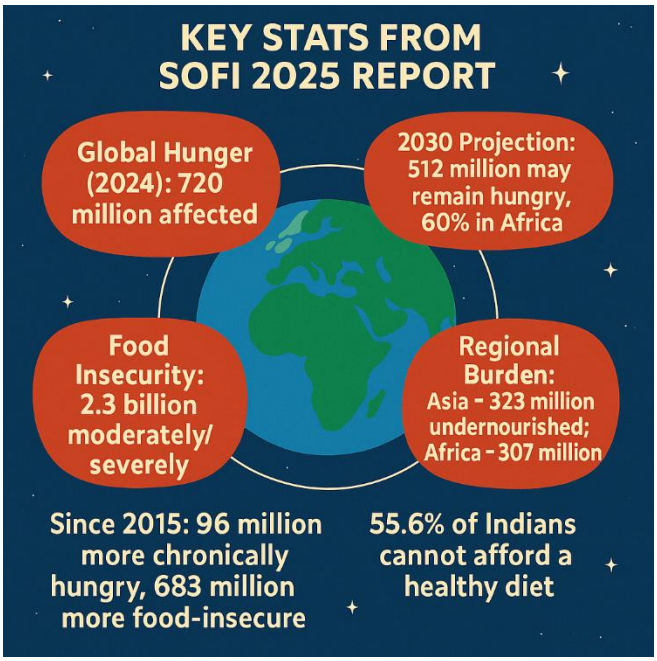
"The countries hit hardest by the climate crisis must not be left to deal with it alone." – **THE GUARDIAN**

HOME / SCI-TECH / HEALTH

Does India need nutritional transformation? | Explained

What are functional foods and smart proteins? Why is it necessary to ensure nutritional security? Which country was the first to approve the commercial sale of cultivated chicken? How is the smart protein ecosystem faring? How can public scepticisms about 'lab-food' be tackled?

IE Opinion; By Shambhavi Naik;
Syllabus: Pre/Mains – Society & Social Issues Link



Why in News?

→ India's push from **food security** → **nutritional security** via **functional foods** + **smart proteins** amid sustainability demands.

Why India Needs Nutritional Transformation?

- **Burden** → >⅓ children stunted; adult protein intake ↑ but **urban–rural divide** persists.

- **Nutrition > calories** → need proteins, vitamins, antioxidants → human capital, productivity gains.
- **Sustainability** → scale output **without** ↑ GHGs/water/land footprints; climate-resilient diets.
- **Acceptance** → scepticism of "lab-food"; taste/price parity + cultural fit needed.
- **Regulatory vacuum → FSSAI** lacks clear pathways for cultivated/precision-fermented foods (definitions, safety, labels).
- **Quality claims** → risk of **mislabeling/greenwashing**; weak post-market surveillance.
- **Skills/infra** → shortage in bioprocess, QA/QC, bioreactors, media; MSME access to shared facilities limited.
- **Farmer linkages** → limited contracts for protein crops/fermentation feedstocks; risk of value-chain exclusion.
- **Market structure** → possibility of **concentration**; IP/vendor lock-in for inputs.

India: Current Status (Policy, R&D, Market)

- **Policy** → BioE3 recognises functional foods & smart proteins; **DBT–BIRAC** grant windows active.
- **R&D (functional)** → bio-fortified staples: **Zn-rice (IIRR, Hyd)**; **Fe-pearl millet (ICRISAT)**.
- **R&D (smart proteins)** → **CCMB** cultivated-meat project **₹4.5 cr (DBT)**.
- **Market (functional)** → private lines by **Tata Consumer, ITC, Marico** (fortified staples/health SKUs).
- **Market (smart proteins, 2023)** → **~377** alt meat/egg/dairy SKUs by **70+ brands**; startups: **GoodDot, Blue Tribe, Evo**.
- **Size outlook (2030)** → plant-based foods **$85B (UBS) → $240B (Credit Suisse)**.

Way Forward

- **Regulatory framework (India)** → FSSAI **novel foods code**: clear definitions (plant/fermentation/cell-cultured), tiered safety (GRAS-like), allergenicity/tox, LCA-backed claims, **front-of-pack labels**, traceability & post-market surveillance.
- **Coordination** → **MoHFW–MoFPI–DBT–DARE/ICAR–DST** taskforce; single-window approvals; standards for **DIAAS/PDCAAS** protein quality.
- **R&D & infra (PPP)** → **precision-fermentation & cell-culture pilot plants**, shared downstream facilities, indigenous bioreactors/media; concessional finance + PLI-style incentives.
- **Skilling & jobs** → NSDC/ITI curricula: upstream/downstream bioprocess, GMP, regulatory; reskill dairy/meat workers; entrepreneurship for MSMEs.
- **Farmer inclusion** → contract farming for **soy/pea/millets**, supply lignocellulosic feedstocks, by-product valorisation; assured procurement (ICDS/Mid-Day Meals/hospitals) for fortified/alt-protein SKUs.
- **Public trust & adoption** → transparent safety data portals, third-party audits, chef-led taste trials, localisation of textures/spices; price-support for initial parity.
- **Sustainability guardrails** → mandatory **LCA** for claims, renewable energy in plants, water recycling, waste valorisation.
- **Export & standards** → align with Codex/EU novel food norms; testing labs accredited; branding India as **"Sustainable Protein Hub."**
- **Global case studies → lessons:**
  - **Japan (1980s)**: functional foods framework → model for evidence-based claims & labels.
  - **Singapore (2020)**: first to approve **cultivated chicken** → emulate risk-proportionate, agile review.
  - **China**: alt proteins in food-security strategy → integrate into India's nutrition & innovation policies.
  - **EU – Farm to Fork**: funding + standards for sustainable proteins → mirror via mission-mode programs.

Test Your Knowledge

Q. Smart proteins include which of the following?
1) Plant-based proteins
2) Fermentation-derived proteins
3) Cultivated meat

Select the correct answer using the code below:
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Hint:
Smart proteins span plant-based (restructured legumes/cereals), fermentation-derived (microbial/precision fermentation), and cultivated meat (animal cells grown in bioreactors). All three are included.

News / Explained / Explained Global / How Trump's 'G-2' framing for US-China relations could impact allies

Premium

How Trump's 'G-2' framing for US-China relations could impact allies

While foreign policy analysts have come to expect the unexpected from Trump, this was unusual even within that context. It was, after all, a US President acknowledging China's great power status, treating it as somewhat equal to the US in the global power hierarchy.

IE Explained; By Shubhajit Roy;
Syllabus: Pre/Mains – International Relations Link

Why in News?

Trump's "G-2" remark before meeting Xi Jinping (Busan, Oct 2025) signals US recognition of China as equal power → raises concern among allies (India, Japan, Australia) over US policy shift in Indo-Pacific.

Concept of G-2

- **Origin** → Coined (2005) by C. Fred Bergsten (Peterson Institute) in *The United States and the World Economy*.
- **Purpose** → Strengthen US ties with key powers (EU, China, Japan, Saudi Arabia) → coordinate macroeconomic & global issues.
- **Role Post-2008 Crisis** → US–China cooperation vital for global recovery & climate compact (Bergsten, *Foreign Affairs*).
- **Expert Support** → Brzezinski & Niall Ferguson backed concept; Obama–Hu Jintao diplomacy hinted similar approach.
- **China's Rise Since** → Under Xi (2013→) assertive power projection → BRI expansion, SCS militarisation, tech nationalism.
- **US Shift Under Trump 1.0** → 2017 NSS labelled China "strategic rival" → revival of *Quad* (India–Japan–Australia–US) to balance Beijing.

Implications for Allies & Global Balance

- **Trump's New Framing** → G-2 = parity signal → potential dilution of *Quad* & FOIP vision.
- **India** → Tariffs ↑ to 50% → Quad summit deferred → talks of "new Quad" (Philippines inclusion) → yet India's size & role make exclusion unrealistic.
- **Japan & Australia** → Concern over US reliability → G-2 focus may undercut collective deterrence vs China.
- **ASEAN & Others** → Fear of reduced US engagement → space for China ↑ via RCEP, BRI.
- **Systemic Impact** → G-2 framing → pushes bipolarity (US–China) ↓ multipolar cooperation (G20, Quad, BRICS).
- **India's Diplomatic Course** → Maintain strategic autonomy → deepen Quad+, EU, ASEAN, Global South partnerships.
- **Possible Scenario** → If Trump–Xi bonhomie fades (like Trump–Putin), allies may regain leverage & cohesion.

Test Your Knowledge

Q. In the present geopolitical context (2025), the term "G-2" signifies:
(a) A revived strategic partnership projecting parity between the US and China in global power hierarchy
(b) A new economic forum replacing the G-20 with emerging economies
(c) A joint military command mechanism for Indo-Pacific security
(d) A diplomatic initiative under the Quad to counter Chinese influence

Hint:
Trump's 2025 "G-2" framing → acknowledges China as near-equal global power → raises concern among US allies (India, Japan, Australia) over dilution of anti-China coordination in Indo-Pacific.

HOME / SCI-TECH / SCIENCE

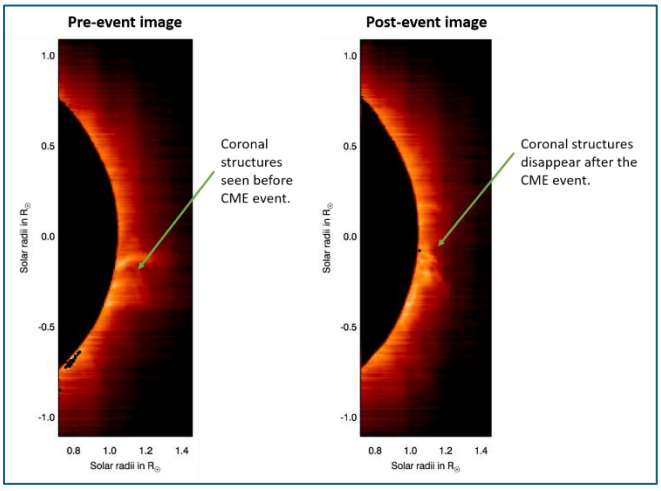
Aditya-L1 gets a close look at eruptions from the sun

Scientists from IIA and NASA study very first spectroscopic observations of coronal mass ejection in the visible wavelength range; the solar observatory is expected to observe more such eruptions

TH Science; By Hemanth C.S.;
Syllabus: Pre/Mains – Science & Tech Link

Why in News?

Aditya-L1's *Visible Emission Line Coronagraph (VELC)* captures world's **1st visible-wavelength spectroscopic data** of a *Coronal Mass Ejection (CME)* — closest-ever to Sun's surface.



Aditya-L1 Mission Snapshot

- **Launch** → 2 Sept 2023 (PSLV-C57) from Sriharikota
- India's 1st solar observatory → **placed at *Sun–Earth L1*** *(1.5 mn km)*
- Lead → ISRO; Core payload → **VELC** (by Indian Institute of Astrophysics)
- **Intl. collaboration** → IIA + NASA scientists
- **Continuous 24×7 solar observation** → "sun never sets" at L1 point
- **Aim** → study solar corona, solar wind, CMEs, magnetic storms

Breakthrough Discovery

- 1st *spectroscopic CME* observation in **visible range** (not just imaging)
- Observed ***very near solar surface*** → unprecedented proximity data
- Enables ***direct measurement*** **of CME** birth parameters
- Confirms instrument sensitivity & calibration of VELC

CME Parameters (Measured by VELC)

- Electron density → **≈370 mn/cm³** (vs **10–100 mn/cm³** in normal corona)
- Mass → **≈270 mn tons** (≃180× Titanic iceberg)
- Energy → **9.4 × 10²¹ J**
- Temperature → **1.8 mn K**
- Speed → **264 km/s (initial velocity)**
- Location → Close to Sun's visible limb (coronal base)
- Observation timing → near onset of ejection (few minutes after lift-off)

Scientific Insights

- **1st *quantitative spectral data*** of CME → visible emission lines (Fe XIV, Fe X)
- **Enables estimation of *plasma parameters*** → density, velocity, temperature
- **Near-Sun data crucial** → CME evolution, shock formation, particle acceleration
- **Helps compute *mass & energy loss rate*** of Sun per CME
- **Enhances *space weather forecasting*** accuracy
- **Supports *coronal heating* & *magnetic reconnection*** studies

Broader Implications

- **CMEs** → major drivers of *geomagnetic storms, auroras, satellite disruptions*
- **Early CME detection** → better *space-weather alerts* for Earth & satellites
- **Strengthens India's role in *heliophysics*** & *global solar monitoring network*
- **Complements NASA's *Parker Solar Probe*** & **ESA's *Solar Orbiter*** **missions**

Future Outlook

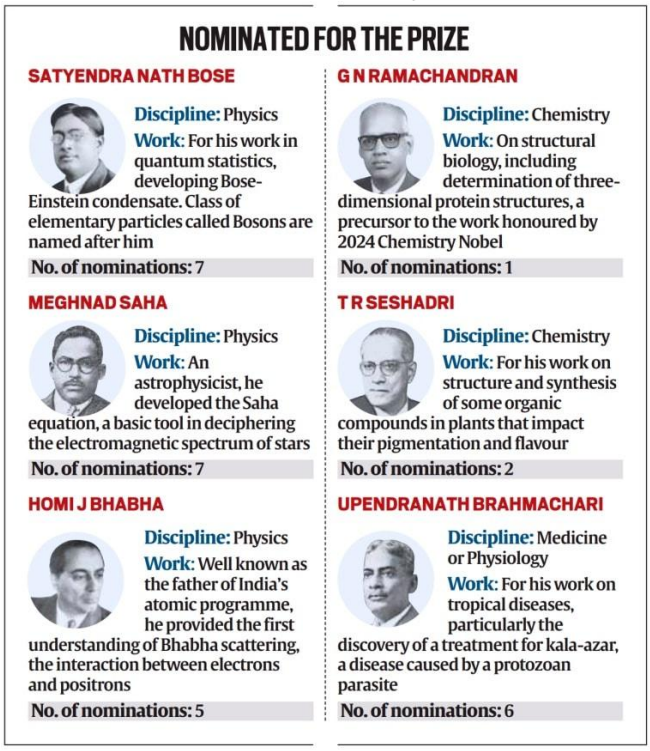
- Sun nearing ***Solar Cycle 25 peak*** → ↑ CME frequency (2024–26)
- VELC fully operational → continuous CME database expected
- **Multiple future observations** → refine *CME initiation & propagation models*
- **Foundation for *Aditya-L2*** or advanced solar missions from India

Test Your Knowledge

Q. Recently, scientists reported the first spectroscopic observation of a Coronal Mass Ejection (CME) near the Sun.
Which of the following parameters can be determined from such spectroscopic data?
1) Electron density
2) Temperature
3) CME mass and velocity
4) Sun's internal nuclear fusion rate

Select the correct answer using the code below:
(a) 1 and 2 only
(b) 1, 2 and 3 only
(c) 2, 3 and 4 only
(d) 1, 3 and 4 only

Hint:
Spectroscopy yields CME density, temperature, speed, mass; not internal fusion rate.



News / Explained / Explained Sci-Tech / An Expert Explains | Why Indian science fails to produce Nobel laureates

An Expert Explains | Why Indian science fails to produce Nobel laureates

The major problem remains that the current nature of academia is resistant to change and blocks visionaries. Until this system is dismantled and replaced with transparent hiring, merit-based funding, and visionary leadership, India will remain a land of potential, not of discovery

TH Science; By Vivek Polshettiwar;
Syllabus: Pre/Mains – Science & Tech Link

Why in News?

India hasn't produced a **science Nobel laureate in 94 years** → exposes deep flaws in **academic leadership, hiring, and research culture**.

Historical Context & Global Comparison

- **C.V. Raman (1930)** → only Indian citizen Nobel in science.
- Indians abroad → **Khorana (1968), Chandrasekhar (1983), Ramakrishnan (2009)**.
- **94-yr drought** vs. China (5 laureates since 1957), Japan (20+ laureates).
- India's **R&D spend ~0.7% of GDP** vs. **US (2.8%), China (2.4%), Korea (4.9%)**.
- Global Innovation Index 2024 → **Rank 40**, below smaller economies like Estonia, Portugal.

Core Problem → Resistant & Bureaucratic Academia

- **Leadership crisis** → control > creativity; few "builders" since **Bhabha–Sarabhai era**.
- Admin-heavy institutes → directors act as bureaucrats, not scientists.
- **Funding growth (₹1.25 lakh cr, 2024–25)** ≠ output growth → research inertia persists.
- Example: ISRO, TIFR excel due to **visionary autonomy**, unlike most CSIR/IIT labs.
- **Seniority-based promotions** → demotivates young innovators.

Flawed Hiring, Patronage & Institutional Politics

- **Opaque recruitment** → network, region, language bias > merit.
- 40% of PhDs (DST 2023) → **no permanent academic position**.
- **Average age of faculty recruit**: 37–40 yrs → global avg ~31 yrs.
- Young researchers fight for **lab space, grants, PhD students**; 3–5 yrs setup delay.
- Case: IISc postdocs leaving → lack of tenure-track pathway.
- **Brain drain** ↑ → 1.6 lakh Indian-origin researchers abroad (UNESCO 2023).
- Institutions reward **loyalty > performance**, blocking fresh ideas.

Distorted Research Culture → Quantity > Quality

- **Output obsession** → number of papers, not originality.
- India 5th in publication volume but **<1% among top 1% cited** (Scimago 2023).
- **200+ medals/fellowships** yearly → awards inflation, diluted prestige.
- Example: CSIR labs publish prolifically but few **global patents or high-impact breakthroughs**.
- **Citation race** → discourages long-term, risky, interdisciplinary research.
- **No India-based institution** in Nature Index Asia-Pacific Top 50 (2024).
- Fear of failure + committee culture → kills innovation appetite.

Leadership Reform → Empower "Gen Z" Scientists

- **Average leadership age >60 yrs**; reform needs **40–50 yrs cohort** in top roles.
- "Gen Z" scientists → globally trained, patent filings ↑ 40% (2010–24).
- Leadership rotation every 5 yrs → ensure accountability & dynamism.
- Half of key posts (DST, DBT, CSIR, VCs, PSA office) → open to younger achievers.
- Past model → **Bhabha–Sarabhai's youth-led transformation** post-1947.
- **Visionary leadership**, not administrative control, builds discovery culture.

The Way Forward

- Raise **R&D investment → 3% of GDP** (OECD avg 2.7%).
- Make **hiring, funding & evaluation transparent**; use global peer-review (NSF, ERC model).
- **National Research Foundation (NRF 2024)** → align basic & applied science goals.
- Strengthen **startup-research linkages** (AIM, NIDHI, i-STEM).
- Incentivize **collaborative, interdisciplinary, high-risk projects**.
- Reward **mentorship, societal impact, and innovation**, not seniority.
- Reform academies → reduce ceremonial awards, increase accountability metrics.

Test Your Knowledge

Q. Which of the following statements is/are correct regarding India's innovation ecosystem?

1) India ranks among the top 50 nations in the Global Innovation Index.
2) India's startup ecosystem is among the top 3 globally in terms of volume.
3) India's patent-to-publication ratio is higher than the global average.

Select the correct answer:
a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only
d) 1 only

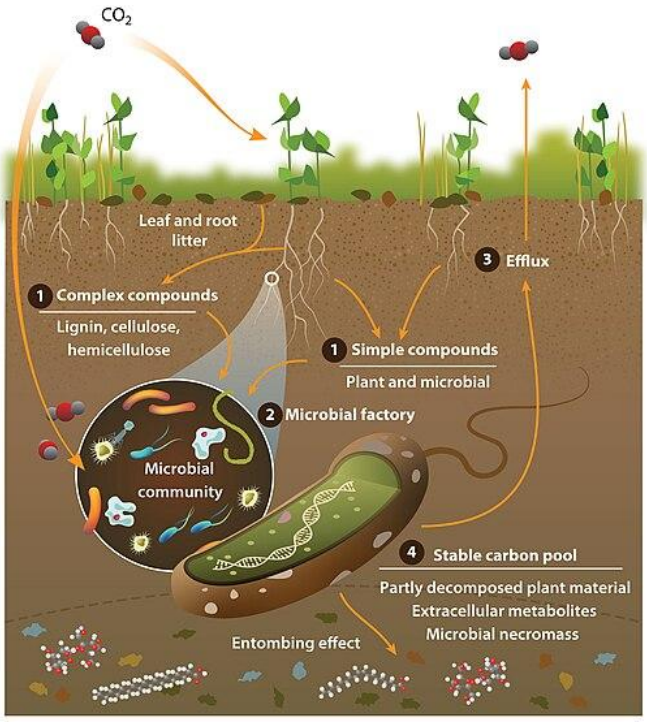
Hint:
Patent-to-publication ratio remains below global average.

Climate change, imbalance in fertilizer use impacts soil's organic carbon: ICAR study

Team of scientists study more than two lakh soil samples to find out impact of loss of natural soil carbon, suggests measures to Governments to address situation

TH News; By A. M. Jigeesh;
Syllabus: Pre/Mains – Environment Link

Why in News? → ICAR 6-yr study links climate change + fertiliser imbalance → major ↓ in soil organic carbon (SOC) across India's farmlands.



Key Study Insights

- **Scale & Scope** → 2.54 lakh soil samples → 620 districts → 29 States → 20 agro-ecological regions.
- **Institutions** → ICAR–IISS (Bhopal), 8 scientists incl. DG M.L. Jat.
- **Duration & Output** → 2017–23 study → published in *Land Degradation & Development* (UK).
- **Tool** → 'Agri-ecological base map' → SOC impact by crop & fertiliser use.

Drivers of SOC Depletion

- **Fertiliser imbalance** → Excess urea + P use (Haryana, Punjab, W-UP) → ↓ SOC >20%; balanced mix (Bihar) → SOC stable.
- **Climate change** → Each 1 °C ↑ temp → ~3–5% SOC loss (past FAO data).
- **Elevation** → ↑ altitude (hills > 800 m) → SOC > 1%; lowlands < 0.4%.
- **Cropping systems** → Rice/pulse → ↑ microbial C sequestration; wheat/coarse grains → ↓ SOC.
- **Land use** → Arable > barren SOC difference > 2×; barren lands rapid C loss.

Correlations & Impacts

- **SOC ↔ Micronutrients** → Low SOC → Zn, Fe, Mn deficiency ↑ (>50% samples deficient).
- **SOC ↔ Temperature** → Negative corr (R ≈ –0.7); Rajasthan & Telangana low SOC < 0.3%.
- **SOC ↔ Elevation/Rainfall** → High rain & altitude zones (NE India, W Ghats) → SOC ↑ > 1%.
- **SOC ↔ Soil Health** → ↓ SOC → ↓ microbial biomass → ↓ fertility → ↓ yield (10–15%).
- **SOC ↔ Climate feedback** → ↓ SOC → ↑ CO_2 emission → GHG loop ↑.
- **SOC ↔ Heat balance** → Low SOC → ↑ albedo → ↑ ground heat reflection.
- **SOC ↔ Food security** → Poor soil health → nutrient imbalance → yield instability.
- **SOC ↔ Economy** → ↓ SOC → ↓ C credit potential (India's C market ≈ $1.3 bn lost potential/yr).
- **SOC ↔ Environment** → Soil C loss = CO_2 flux ↑ → accelerates climate warming.

Policy Recommendations

- **Soil cover & plantations** → All-season vegetation → ↑ C capture + reduce erosion.
- **Low-C soils (<0.25%)** → Targeted organic manure + irrigation support.
- **Carbon credit incentives** → Reward farmers for ↑ SOC (1 t C = 3.67 t CO_2 sequestered).
- **Climate-smart cropping** → Adopt rice-pulse-legume rotations for C gain.
- **Balanced fertilisation** → Integrated nutrient management (INM) promotion.
- **SOC map usage** → Guide land degradation programmes & C-credit assessment.

Test Your Knowledge

Q. Consider the following statements about Soil Organic Carbon (SOC):

1) SOC improves soil fertility by enhancing microbial activity and micronutrient availability.
2) SOC decreases with increase in temperature and increases with higher elevation.
3) SOC is a major determinant of soil albedo and ground heat reflection.

Which of the statements given above are correct?
(a) 1 and 2 only
(b) 2 and 3 only
(c) 1, 2 and 3
(d) 1 only

Hint:
↑ SOC → ↑ microbes & nutrients; ↓ with heat, ↑ with altitude; low SOC → ↑ heat reflection (↑ albedo).

News / Explained / India withdraws from Ayni airbase: What is it, how does this impact the country?

Premium

India withdraws from Ayni airbase: What is it, how does this impact the country?

Ayni was India's only full-fledged overseas base, and its location offered India a military foothold in central Asia and leverage over Pakistan. Its presence to project influence in the region dominated by major powers like Russia and China

IE Explained; By Amrita Nayak Dutta;
Syllabus: Pre/Mains – Security Link

Why in News?

→ India has **withdrawn from Ayni Airbase (Tajikistan)** — its **only full-fledged overseas base**, ending a 20-year strategic presence in Central Asia that offered leverage over Pakistan & proximity to China's Xinjiang.

Ayni Airbase – Overview & Significance

- **Location** → 20 km from Afghanistan's Wakhan Corridor → borders PoK & Xinjiang (China)
- **Built & Upgraded** → Soviet-era base → refurbished by India (↑ $80 mn) under 2002 Indo-Tajik pact
- **Infrastructure** → 3,200 m runway + hangars + fuel depots + ATC (by BRO) → capable for Sukhoi-30MKI, heavy lift aircraft
- **Deployment** → ~200 Indian Army & IAF personnel stationed
- **Operational Use** → Support to Northern Alliance (anti-Taliban) + 2021 Kabul evacuation
- **Strategic Value** → Only Indian base in Central Asia → proximity to PoK, Xinjiang & Afghan theatre → enhanced surveillance & quick-response capacity
- **Symbolic Significance** → Demonstrated India's regional reach & intent to project power beyond South Asia

Withdrawal – Reasons

- **Bilateral Pact Expiry (2002–2022)** → Agreement for rehabilitation & operation concluded; base handed to Tajikistan
- **Lease Non-renewal** → Dushanbe reportedly under **Russian & Chinese pressure** → resisted extension
- **Quiet Exit** → Personnel & equipment withdrawn in 2022 → information surfaced publicly in 2025
- **Official Stand** → India: "Facility handed after agreement conclusion" → no mention of strategic tensions

Implications for India

- ↓ **Strategic Presence** → No longer any operational base in Central Asia
- **Loss of Foothold** → Reduced ability to monitor Xinjiang–Wakhan–PoK corridor
- **Regional Vacuum** → ↑ Russian & Chinese dominance; reports of potential PLA presence in Tajikistan
- **Setback to Extended Neighbourhood Policy** → limits India's land-based engagement with CARs
- **Security & Intelligence Gap** → weaker early-warning/rapid-deployment capabilities in North-West frontier
- **Pivot to Maritime Strategy** → ↑ importance of Agaléga (Mauritius), Andaman, & IOR surveillance chain
- **Future Outlook** → Need for renewed Central Asia outreach via diplomacy, logistics access, joint exercises & energy cooperation

Test Your Knowledge

Q. Ayni Airbase, recently in news, is located in which of the following countries?
(a) Uzbekistan
(b) Tajikistan
(c) Turkmenistan
(d) Kyrgyzstan