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ADULTERY AND MILITARY DISCIPLINE IN THE INDIAN ARMY

Context

- An Armoured Corps officer was issued a show-cause notice under the Army Rules, 1954, proposing administrative termination of service over allegations of adultery.

What is Adultery?

- **Section 497 of the Indian Penal Code, 1860 (IPC),** recognised the crime of adultery and provided the accompanying punishment.
- It defined adultery as "whoever has sexual intercourse with a person who is and whom he knows or has reason to believe to be the wife of another man, without the consent of that man, such sexual intercourse is guilty of the offence of adultery".
  - Under it, **only a man could be prosecuted** and punished for committing the crime of adultery.
  - For someone to be punished for adultery, he must have had sexual intercourse with another man's wife, **without that man's consent.**
- **Punishment:** It was punishable with up to five years imprisonment and a fine.

Decriminalization of Adultery

- The Supreme Court of India, in the landmark judgment of **Joseph Shine v. Union of India (2018), struck down Section 497 IPC**, declaring it **unconstitutional**. The court held that:
  - Adultery is a private matter and **does not warrant criminal prosecution.**
  - It violates A**rticle 14 (Right to Equality) and Article 21 (Right to Life and Personal Liberty)** of the Constitution.
  - Marriage is a personal relationship, and the state should not interfere by imposing criminal liability.
- However, the SC clarified that **adultery would remain a moral wrong** and could be invoked as a **ground in civil proceedings.**

Why Adultery Can Invite Action in the Army?

- **Article 33** of the Constitution empowers Parliament to modify or restrict the fundamental rights of members of the armed forces to ensure the proper discharge of their duties and the maintenance of discipline.
- **Sections 45** (conduct unbecoming of an officer and the character expected of him) and **Section 63** (any act or omission prejudicial to good order and military discipline) of the **Army Act, 1950,** continue to apply to promiscuous or adulterous conduct that affects unit cohesion or discipline.
- **In 2023**, the Supreme Court clarified that the Joseph Shine judgement does not invalidate or hinder disciplinary actions taken under the Army Act, Navy Act, and Air Force Act.

Arguments in Favour of Decriminalising of Adultery in India

- **Gender Equality:** As per the law, only men could be prosecuted; decriminalising it promotes gender equality.
- **Personal Autonomy:** Criminalising adultery undermines personal freedom and choice in relationships.
- **Encouragement of Healthy Relationships:** Decriminalising adultery shifts the focus from punishment to addressing marital issues and encourages individuals to resolve personal disputes privately instead of using the legal system.
- **Overburdening of Legal System:** Decriminalising adultery would reduce the burden on the judicial system, allowing courts to focus on more pressing criminal matters.

Arguments Against Decriminalising of Adultery in India:

- **Protecting Marital Integrity:** Criminalizing it helps protect the sanctity of marital bonds and discourages actions that undermine relationships.
- **Deterrence:** The threat of legal consequences may act as a deterrent to infidelity.
- **Social and Moral Values:** Decriminalizing it could be seen as encouraging behavior that erodes the foundation of family and societal structures.
- **Impact on Women:** In societies where patriarchy is still prevalent, removing criminal consequences might encourage men to engage in infidelity.
- **Malimath Committee:** In 2003, the Committee on Reforms of the Criminal Justice System, proposed that adultery be retained as an offense but on gender-neutral terms.

Way Ahead

- Military authorities should ensure that disciplinary proceedings comply with statutory requirements, established procedures and principles of natural justice.

- Courts and tribunals should continue to balance the armed forces' legitimate requirements of discipline with the procedural and legal protections available to service personnel.

Source: IE

2 YEARS OF PM INTERNSHIP SCHEME

Context

- The PM Internship Scheme has completed **2 years of its implementation.**

PM Internship Scheme

- **Announced in:** Union Budget 2024-25.
- **Aim:** To provide real-life work experience to job seekers in top companies.
- **Implementing Agency:** Ministry of Corporate Affairs.
- **Eligible candidates** aged 18–25 (not in full-time employment) upon selection receive ₹9000/ month, a ₹6000 joining grant, and hands-on exposure.
- **Internships can be 6 or 9 months** in duration and are available for different qualifications including Class 10, Class 12, ITI, Diploma, Graduation and PG.
- **The top companies** have been identified based on the average Corporate Social Responsibility expenditure of the last three years.
  - Participation of the companies in the scheme is **voluntary**.
- **Eligibility:**
  - Do not have a family member earning over ₹8 lakh per annum.
  - 18 to 25 years (relaxation for OBC/SC/ST).
  - ITI: Matriculation + ITI in relevant trade.
  - Diploma: Intermediate + AICTE-recognized diploma.
  - Degree: Bachelor's degree from UGC/AICTE-recognized university.

Key Changes in the Scheme

- **Expanded coverage:** The scheme has been expanded beyond the top 500 companies to include MSMEs and sunrise sectors.
- **Higher stipend:** The monthly stipend has been increased to ₹9,000.
- **Flexible duration:** The internship period has been reduced from 12 months to 6–9 months.
- **Relaxed eligibility:** The eligible age group has been expanded from 21–24 years to 18–25 years, and master's degree holders and final-year undergraduate and postgraduate students have been included.

Performance

•PM Internship Scheme since October 2024

	ROUND I	ROUND II	ROUND III
Internships opportunities posted by companies	1,27,508	1,18,948	1,54,366
Total applications	6,21,000	4,55,000	3,50,259
Number of companies that participated	280	327	340
Number of candidates who received offers	60,866	71,192	25,794
Joined	8,760	7,308	14,620**
Completed	3,731	2,880*	—

*Internships in Round II are ongoing *No internship has been completed in Round III ** data as on 06.08.2026

- The changes in the scheme has **resulted in a sharp 67% to 100% increase in youth joining the scheme in the third round.**
  - The Round III, which was launched in April this year, will end in December.

Significance of PMIS

- **Improve Job Readiness:** Practical industry exposure can help bridge the gap between academic qualifications and workplace requirements.
- **Supports demographic dividend:** It can help convert India's large youth population into a productive workforce.
- **Promotes industry participation:** Involving MSMEs and sunrise sectors can widen internship opportunities beyond large corporations.

Way Ahead

- **Improve internship quality:** Internship roles should involve meaningful work, specialised skill development and mentorship rather than routine assignments.
- **Monitor completion and outcomes:** The government should track completion rates, skill acquisition and subsequent employment, rather than relying only on enrolment figures.
- **Improve industry–education linkages:** Companies and educational institutions should coordinate to align internship opportunities with emerging labour-market needs.

Source: IE

INDIA'S NUCLEAR PROGRAMME

Context

- Union Minister Dr. Jitendra Singh has said that **India's nuclear programme is dedicated to peaceful purposes and not warfare,** reaffirming the vision that has guided the country's nuclear journey since its inception.
  - He highlighted that **nuclear energy** would play an increasingly important role in **meeting India's future energy requirements.**

Status of Nuclear Power in India

- **Installed Capacity:** India has 25 active nuclear reactors with a total capacity of 8.7 gigawatt-electric (GWe). Nuclear power reactors in the country generated 56,681 million units of energy in 2024-25.
- **Consistent Contribution:** Nuclear power has always contributed about 3% of India's overall electricity production.
- **Planned Expansion**: Nuclear capacity of India to increase around 3x in next few years.
  - Through international cooperation, indigenous 700 Megawatt (MW) reactors and 1,000 MW reactors are under development, and the installed capacity is expected to touch 22.38 GW by 2031-32.
- **International Cooperation:** India has signed Inter-Governmental Agreements (IGAs) on Civil Nuclear Cooperation for peaceful purposes with 18 countries, indicating the rising worldwide confidence in India's nuclear program.
- **Reactors Under Construction:** 10 reactors with around 8 GWe of capacity are under construction. Another 10 units with some 6.6 GWe of capacity are in the pre-project stage.

Need to Increase Nuclear Capacity

- **Nuclear Capacity Goal:** India's plans to increase its nuclear power capacity from the current 8,180 MW to 22,480 MW by 2031-32 and eventually 100 GW by 2047.
- **Energy Demand Growth:** India's electricity demand is expected to increase 4-5 times by 2047, and nuclear power will help meet base-load demand alongside renewables.
- **India's Targets:** To reduce the emission intensity of its GDP by 44% by 2030 from the 2005 level.
  - To achieve 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030.

India's Three-stage nuclear programme

- **Establishment:** India's nuclear journey began shortly after Independence with the establishment of the **Atomic Energy Commission in 1948.**
  - **In 1956,** Asia's first research reactor, **Apsara**, was commissioned at the Bhabha Atomic Research Centre (BARC) in Trombay.
  - **India was the second Asian nation** to build a nuclear power plant in **1969** at Tarapur, just after Japan.
- India has a three-phase programme of nuclear power visioned by **Dr Homi J Bhabha,** the father of India's nuclear programme.
- **First Stage (Pressurised Heavy Water Reactors - PHWRs):** The first stage of the Indian nuclear program was the building of a fleet of PHWRs.
  - The fissile material for these reactors is natural uranium (U-238) with small amounts of U-235.
  - Deuterium oxide (heavy water) as moderator and coolant.
  - The primary goal in this stage was to generate plutonium-239 as a by-product of uranium fuel.
  - Plutonium-239 is a fissile material used as fuel in nuclear reactors.
- **Second Stage (Fast Breeder Reactors – FBRs):** The second stage of the program is the use of Fast Breeder Reactors (FBRs).
  - FBRs are designed to work in a fast neutron spectrum and produce more fissile material than they consume.
  - In this step, the plutonium-239 from the first stage and U-238 are used as fuel to make energy and more Pu-239 and U-233.
  - Uranium-233 is another fissile material that can be used as fuel in nuclear reactors.
- **Third Stage Advanced Heavy Water Reactors (AHWRs**): The program is expected to end with the deployment of Advanced Heavy Water Reactors (AHWRs).
  - The reactors will use thorium-232 (Th-232) as fuel, which will be used to produce U-233 and electricity. Pu-239 will be used.
  - India has lots of thorium. The goal of this stage is to tap the potential of thorium as nuclear fuel.

Challenges

- **Limited domestic experience:** India's nuclear program has been primarily based on Pressurised heavy-water reactor (PHWRs) and fast breeder

reactors, limiting domestic experience in Light Water Reactor (LWR) design and operation.

Light Water Reactors

- **Light Water Reactors** form a mainstay of the **global nuclear program** currently account for over **85% of the civil nuclear reactor capacity in the world.**
  - They use **ordinary (light) water as both a coolant and a neutron moderator**.
- **LWRs** entail **simpler design and engineering** compared to heavy water reactors given that they use normal water as **both coolant and moderator**.
- **Low Cost:** It usually involves lower construction costs due to economies of scale and they are considered **more thermally efficient.**

Limited domestic uranium: India has its own stocks of low-grade uranium. It also imports uranium. The long-term growth of nuclear power depends on arrangements for fuel supplies with other countries.

- **High capital cost:** Nuclear power facilities demand huge capital and long construction periods.
- **Technology Challenges:** India is developing breakthrough technologies such as SMRs at an early stage.
- **Public safety and concerns**: Local opposition and delays in project completion are possible due to nuclear accidents.
- **Thorium gap:** Though India has large thorium reserves, commercial technology is still under development.

Government Initiatives

- **Nuclear Energy Mission & Capacity Targets:** The Government has launched a Nuclear Energy Mission aimed at expanding nuclear power capacity to about 100 GW by 2047.
  - This mission emphasises enhancing domestic capabilities and adopting advanced technologies.
- **Indigenous Reactor Development:** Such as Bharat Small Reactors are under development to support scalable deployment.
  - While these are PHWR and SMR variants, they lay the groundwork for a broader nuclear innovation ecosystem.
- **Three-Stage Nuclear Power Programme:** India has a long-term strategy to utilise India's thorium reserves through PHWRs, Fast Breeder Reactors and thorium-based reactors.
- **SHANTI Act, 2025:** It enables capacity expansion, advanced reactor technologies and wider participation in nuclear power generation.
- **Research & Development Funding:** The Union Budget 2025-26 allocated significant funding (around ₹20,000 crores) for R&D in advanced nuclear technologies.
- **International Cooperation & Tech Access:** The government is working on international partnerships and technology transfer mechanisms that can help bridge experience gaps in technologies.

Way Ahead

- India is pursuing an **indigenous small reactor programme,** with three types of SMR, developed by the **Bhabha Atomic Research Centre for demonstration.**
  - These are the **200 MWe Bharat Small Modular Reactor** (BSMR-200), a **55 MWe small modular reactor (SMR)**, and a **5 MWt high-temperature gas-cooled reactor** for hydrogen production.
  - The government has set a target of having **at least five indigenously designed and operational SMRs by 2033.**
- **Repurpose Old Thermal Power Sites:** The government is conducting studies to repurpose old thermal power plant sites for nuclear sites.
  - Such repurposed sites may **ultimately be more suitable for SMRs and smaller-capacity nuclear projects** rather than large conventional reactors.
- The **indigenously designed and built Prototype Fast Breeder Reactor (PFBR)** at Kalpakkam in Tamil Nadu successfully attained **its first criticality** in April 2026, marking the **initiation of a sustained nuclear chain reaction.**
  - With this achievement, India entered the **second stage of its three-stage nuclear power programme**.
  - Once fully operational, **India will become only the second country** in the world after Russia to operate a commercial fast breeder reactor.

Source: PIB

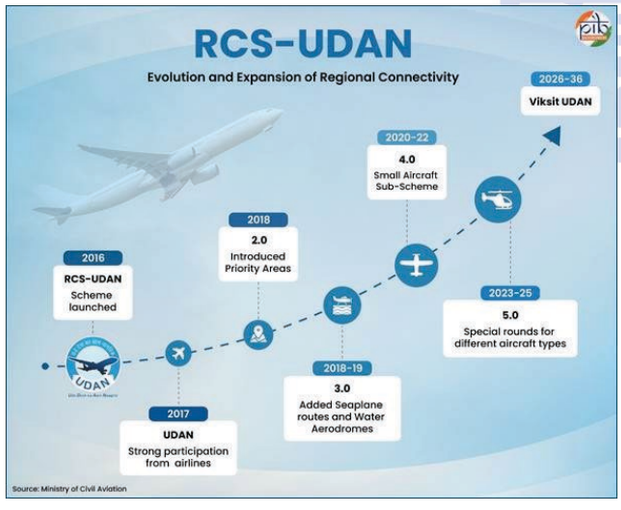
10 YEARS OF UDAN SCHEME

In News

- The **UDAN Scheme completed ten years** and considerably expanded the regional aviation network of India by **linking unserved and underserved areas.**

UDAN Scheme

- The Prime Minister of India launched the **Regional Connectivity Scheme (RCS) – UDAN ("Ude Desh ka Aam Nagrik") in 2016.**
- It was conceptualised under the **National Civil Aviation Policy (NCAP) 2016** with a 10 year vision to connect **Tier-2 and Tier-3 cities** through a market driven and financially supported approach.
- It entered its operational stage with the inauguration of the first RCS-UDAN flight from **Shimla to Delhi in April 2017.**
- It incentivised the **airlines with concessions and Viability Gap Funding (VGF)** to fly on the rural routes with cheap rates and enhanced accessibility.



Progress

- **Lines Operationalised:** The plan has operationalised 687 regional lines in India.
- **Aerodromes Operationalised**: Total 95 aerodromes including 17 heliports and 02 water aerodromes have been operationalised.
- **Flights Operated**: Under the plan more than 3.68 lakh flights have been operated.
- **Passengers Carried** : The initiative has enabled 1.72 crore passengers to fly.

Latest Developments

- The Union Cabinet has approved the launch and implementation of the **Regional Connectivity Scheme – Modified UDAN for a period of ten years from FY 2026-27 to FY 2035-36** with a total outlay of Rs.28,840 crore .

Components of the Modified UDAN scheme

- Development of 100 airports from existing unserved airstrips over a period of eight years with an outlay of ₹12,159 crore
- Construction of 200 modern helipads in remote, hilly, island and aspirational areas with an estimated cost of ₹3,661 crore
- Allocation of ₹10,043 crore over ten years as Viability Gap Funding (VGF) to the airlines for operating regional routes.

Significance

- **Inclusive growth:** Tier 2 and 3 cities are now integrated into the national market.
  - For ex: Vijayawada to Kadapa, earlier 8 to 10 hours by road, is now a short flight.
- **Infrastructure expansion:** Operational airports rose from 74 in 2014 to 165 by July 2026.
- **Strategic and regional balance:** Connectivity to the North East, hills and islands strengthens border area integration.
- **Economic multiplier:** Regional airports support tourism, MSMEs and perishable exports.
- **Industry demand:** The scheme created demand for ATR and smaller aircraft, MRO services and pilot training, which supports aviation sector jobs.

Challenges and Concerns

- **Route sustainability**: Many routes collapse once VGF ends after three years. Airlines have little incentive to continue where load factors are low and demand has not matured.
- **Dormant airports:** Several airports were built or revived without demand assessment. Parliamentary and audit reports have flagged underused infrastructure and poor last mile connectivity to terminals.
- **Fiscal burden**: Dependence on subsidy raises questions about long term viability and fiscal prudence.
- **Airline fragility**: Small regional carriers face high ATF costs, VAT on fuel varying across states, leasing costs and aircraft shortages. Several operators have exited the market.

- **Operational and safety issues:** Hilly terrain, short runways, weather and thin MRO support increase risk and cancellations.

Way Forward

- **Demand led planning:** Assess catchment potential before awarding routes, and link airports with rail, road and local transport.
- **Rationalise taxes:** Bring ATF under GST or harmonise state VAT to lower operating costs.
- **Support airlines:** Encourage aircraft leasing, MRO hubs in India and pilot training to reduce structural costs.
- **Phase out VGF gradually:** Shift from subsidy to market viability through bundled routes, cross-subsidy, and bundling with commercial routes.

Source: PIB

DISASTER RESILIENCE OF TELECOM INFRASTRUCTURE

Context

- A study by the Coalition for Disaster Resilient Infrastructure (CDRI) and the National Disaster Management Authority (NDMA) has identified multi-hazard vulnerabilities in telecom towers across five high-risk states of India-Assam, Gujarat, Odisha, Tamil Nadu and Uttarakhand.

Key Findings of the Report

- The study mapped 48,416 telecom towers across **Tamil Nadu** and found **57%** face high or very high cyclonic wind risk.
- In Gujarat and Uttarakhand, **28% and 25%** of telecom towers are exposed to very high cyclonic winds, respectively.
  - While **12%** of Gujarat's telecom towers face flood exposure, 10% of those in Uttarakhand are located in areas with high landslide susceptibility.
- Additionally, all towers in Assam and Uttarakhand, and 12% of towers in Gujarat, are located in high and very high **seismic zones (Zone IV and V).**

Coalition for Disaster Resilient Infrastructure (CDRI)

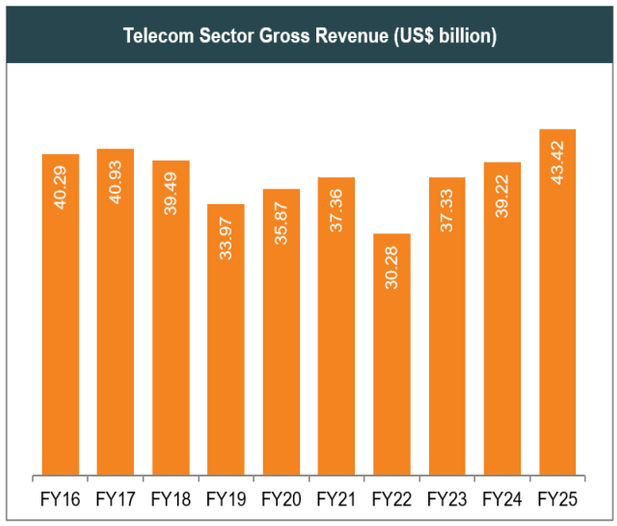
- **Establishment:** CDRI was established in **2019** under the leadership of the Government of India with the support of **United Nations Office for Disaster Risk Reduction (UNDRR)** during the **United Nations Climate Action Summit in 2019 in New York.**
- **Members:** It is a multi-stakeholder global partnership of national governments, UN agencies and programmes, multilateral development banks, the private sector, and academic institutions.
- **Secretariat:** New Delhi.
- **CDRI aims** to promote the resilience of infrastructure systems to climate and disaster risks, thereby ensuring sustainable development.
  - The CDRI supports countries to upgrade their systems to ensure disaster and climate resilience of existing and future infrastructure.

National Disaster Management Authority

- It is the apex statutory body for Disaster Management in India, established through the **Disaster Management Act, 2005.**
- The Act envisaged the creation of the NDMA, headed by the **Prime Minister,** and **State Disaster Management Authorities (SDMAs)** headed by respective **Chief Ministers**, to spearhead and implement a holistic and integrated approach to Disaster Management in India.
- **Functions & Responsibilities;**
  - **Lay down policies** on disaster management,
  - **Approve plans** prepared by the ministries or departments of the Government of India in accordance with the National Plan,
  - **Lay down guidelines** to be followed by the state authorities in drawing up the State Plan,
  - **Coordinate the enforcement and implementation** of the policy and plans for disaster management,
  - **Recommend provision of funds** for the purpose of mitigation etc.

Telecommunication Sector of India

- India is the **second-largest telecommunications market** globally as of 2026, with a total **telephone subscriber base of 1,337.54 million** and a **tele-density of 93.69%** as of April 2026.
- The sector has contributed about **15% to global GDP** in the past decade and is projected to reach a **$2.8 trillion market by 2030.**
- **The total internet subscribers** in the country reached **1.09 billion** at the end of March 2026.
- As of April 2026, the Indian broadband market remains highly concentrated, with the **top five service providers** (Reliance Jio Infocomm Ltd., Bharti Airtel Ltd., Vodafone Idea Ltd , Bharat Sanchar Nigam Ltd., Atria Convergence Technologies Ltd.) accounting for **98.61** percent of the total subscriber base.



***Source**: Telecom Regulatory Authority of India's Performance Indicator Report*

Initiatives taken by the Government

- **GatiShakti Sanchar Portal:** A single-window clearance platform that fast-tracks Right-of-Way (RoW) permissions for laying optical fiber and telecom towers across states.
- **BharatNet Project:** Focuses on connecting all Gram Panchayats and rural habitations with high-speed optical fiber broadband, backed by the updated Digital Bharat Nidhi framework.
- **Production Linked Incentive (PLI) Scheme:** Encourages domestic manufacturing of telecom and networking products to reduce import dependency and drive local exports.
- **Bharat 6G Vision:** It aims to transform India from a consumer of telecom technology into a leading global provider, developer, and exporter of affordable, advanced communications systems.
- **Telecommunications Act, 2023:** Replaces Indian Telegraph Act of 1885 to modernise spectrum management, strengthen public safety, and streamline licensing rules.

Way Ahead

- **Improve local hazard mapping:** Identify vulnerable sites at district and sub-district levels and prioritise investment according to overlapping risks.
- **Enhance inter-agency coordination:** Develop joint restoration protocols involving telecom operators, power utilities, road agencies and disaster management authorities.
- **Strengthen restoration capacity:** Maintain fuel reserves, emergency equipment and trained local teams to accelerate repairs following disasters.

Source: TH

NEWS IN BRIEF

ELECTRICAL INTERCONNECTION BETWEEN INDIA AND SAUDI ARABIA

Context

- India and Saudi Arabia reviewed progress on their proposed electrical interconnection initiative and discussed opportunities to expand power-sector cooperation during a virtual bilateral meeting.

About

- The India-Saudi Arabia electrical interconnection is a proposed bilateral project to link the power grids of both nations via a long-distance undersea **high-voltage direct current (HVDC) cable.**
- **Initial Agreement:** A formal Memorandum of Understanding (MoU) was signed in **2023** in Riyadh, covering electrical interconnections, green hydrogen, and supply chains.
- It involves a planned **1,700 km undersea high-voltage power link** valued at roughly ₹47,000 crore ($5.5 billion).
  - The project aims to enable **2 GW** of power exchange, emergency support, and renewable energy integration.

Source: DD News

CHINA MERCHANTS WITHDRAWS FROM COLOMBO PORT PROJECT

Context

- China's state-owned China Merchants Port Holdings has withdrawn from a proposed $392 million logistics hub project at **Sri Lanka's Colombo Port.**

About the Project

- The **South Asia Commercial and Logistics Hub (SACLH)** was announced in 2023, with China Merchants set to hold a **70% stake in the joint venture**. The Sri Lanka Ports Authority (SLPA) and local construction company Access Engineering were each to hold 15%.
- The partners have agreed to terminate the project, citing changes in external circumstances, implementation timelines and commercial considerations.
- However, the withdrawal does not indicate a broader exit from Sri Lanka's maritime sector. China Merchants continues to operate the

Colombo International Container Terminal (CICT) and is involved in the management of **Hambantota Port**.

India's Position

- **Existing presence:** India already has a strong presence through its investment in the Colombo West International Terminal. The Adani led terminal is a 35 year concession with John Keells and SLPA as partners.
- **Neighbourhood First and SAGAR/ MAHASAGAR:** India's approach stresses development partnership, connectivity and shared security rather than debt dependent leverage.
- **Crisis support:** India extended around $4 billion in assistance in 2022 and backed Sri Lanka's IMF programme, which built goodwill.
- **Domestic port capacity:** Vizhinjam and planned mega ports such as Great Nicobar aim to reduce reliance on foreign transshipment hubs.

Source: TH

SPACE RADIATION

In News

- A study published in the Monthly Notices of the Royal Astronomical Society under the **SNIFFLES programme** found that low-Earth orbit (LEO) satellites from Starlink, OneWeb and China's Guowang emit radio signals that interfere with **radio astronomy**.

Space Radiation

- It is high energy particles, mostly atomic nuclei without their electrons, that travel at close to the speed of light.
- **Types**:
  - Particles trapped in the Earth's magnetic field
  - Particles shot into space during solar flares (solar particle events)
  - Galactic cosmic rays, which are high-energy protons and heavy ions from outside our solar system.
    - All of these kinds of space radiation represent ionizing radiation.

Latest Research

- A OneWeb signal at 1,613.19 MHz could interfere with observations of hydroxyl (OH) ions, while some emissions were up to 100 billion times brighter than typical astronomical sources, potentially overwhelming telescopes.
- The study recommends applying existing international radio-emission regulations to satellites and continuously monitoring emissions by satellite operators, designers and space agencies, particularly as direct-to-cell services expand.

Source :TH

ADITYA-L1 MISSION OFFERS NEW INSIGHTS

Context

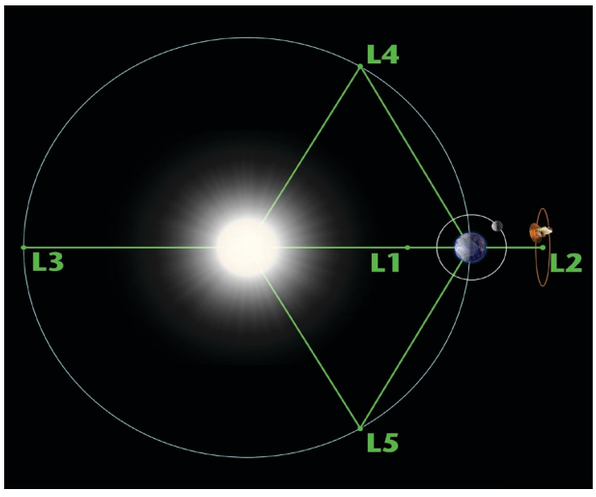
- Scientists have generated **Doppler velocity images** of activities taking place in the **solar corona** using data from **India's maiden solar mission, Aditya-L1.**

About

- The positive and negative Doppler velocities indicate **solar plasma moving away from and towards the direction of the observer.**
  - Doppler velocities measure the **speed and direction of moving objects by calculating the frequency shift** of waves that reflect off them (known as the Doppler effect).
- These images are expected to provide information on the **propagation of the coronal mass ejections along the Sun-Earth direction,** which were unavailable till date.

About Aditya-L1

- **Aditya-L1** was launched in **2023** and is the **first space-based Indian observatory to study the Sun.**
- It is placed at **Lagrangian point L1** for observing and understanding the chromospheric and coronal dynamics of the Sun.
  - **L1** is a location in space where the gravitational forces of two celestial bodies, such as the Sun and Earth, are in equilibrium. This allows an object placed there to remain relatively stable.
  - **There are five Lagrange points,** three are unstable and two are stable. The unstable Lagrange points are labeled L1, L2 and L3. The stable Lagrange points are labeled L4 and L5.



- **Advantages of placing Aditya-L1 around L1 point as compared to Low Earth Orbit (LEO):**
  - It provides a smooth Sun-spacecraft velocity change throughout the orbit, appropriate for helioseismology.
  - It is outside of the magnetosphere of Earth, thus suitable for the "in situ" sampling of the solar wind and particles.
  - It allows unobstructed, continuous observation of the Sun, and view of earth for enabling continuous communication to ground stations.
- **It is equipped with seven payloads** (instruments) on board with four of them carrying out remote sensing of the Sun and three of them carrying in-situ observation.

Seven Payloads of Aditya L-1.

- **The Visible Emission Line Coronagraph (VELC)** will study the Corona, imaging and spectroscopy, and Coronal mass ejections.
- **The Solar Ultraviolet Imaging Telescope (SUIT)** will focus upon the Photosphere and Chromosphere imaging- narrow and broadband. It will also measure the solar irradiance variations.
- **The Solar Low Energy X-ray Spectrometer (SoLEXS)** and **High Energy L1 Orbiting X-ray Spectrometer (HEL1OS)** will study the soft and hard X-ray flares from the Sun over a wide X-ray energy range.
- **The Aditya Solar wind Particle Experiment (ASPEX)** and **Plasma Analyser Package For Aditya (PAPA)** will analyze the electrons and protons in the Solar wind or particles. It will also study the energetic ions.
- **The Advanced Tri-axial High Resolution Digital Magnetometers** will study the interplanetary magnetic field at L1 point.

Source: TH

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