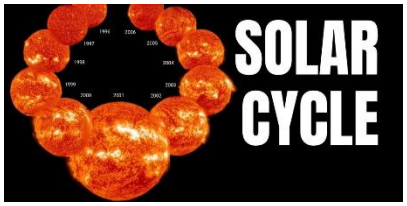
SOLAR CYCLE



- It describes an **approximately 11-year cycle of solar activity** driven by the **sun's magnetic field.**
- It is indicated by the **frequency and intensity of sunspots visible** on the surface.
- Every 11 years or so, the **Sun's magnetic field completely flips.**
- This means that the Sun's north and south poles switch places. Then it takes about another 11 years for the Sun's north and south poles to flip back again.
- The solar cycle affects activity on the **surface of the Sun,** such as sunspots, which are caused by the Sun's magnetic fields.
- As the magnetic fields change, so does the amount of activity on the Sun's surface.
- It can be tracked by **counting the number of sunspots.**
- **Cycle Stages:**
    - **Solar minimum:** It is the **beginning of a solar cycle** or when the Sun has the least sunspots.
    - **Solar maximum:** It is the **middle of the solar cycle** or when the **Sun has the most sunspots.**
    - As the cycle ends, it fades back to the solar minimum, and then a new cycle begins.
- **Impact:** The solar cycle has the **potential to impact Earth's climatic conditions** through changes in solar radiation, cosmic rays, and ozone distribution.

What is Sun's supergranulation?

- The Sun's supergranulation refers to a physical pattern covering the surface of the quiet Sun with a typical **horizontal scale of approximately 30,000 km** and a **lifetime of around 1.8 d.**
- Supergranulation was **discovered by Hart** (1954) using Doppler images of the Sun.

EKLAVYA MODEL RESIDENTIAL SCHOOLS

- It is a **flagship intervention** of **the Ministry of Tribal Affairs launched in 1998.**
- It aims to provide **quality residential education** to Scheduled Tribes students **from Class 6th to 12th in remote areas** to enable them to access the best opportunities in education and to bring them at par with the general population.
- The programme was revamped **during the year 2018-19** to expand the geographical outreach and enhance the quality of facilities.
- EMRSs to be set up in every block with more than **50% ST population** and at **least 20,000 tribal persons.**
- **Governance:** The **National Education Society for Tribal Students** (NESTS), an autonomous organization, has been set up under the Ministry of Tribal Affairs to establish and **manage EMRS across the country.**
- **Features of Eklavya Model Residential Schools:**
    - EMRSs are co-educational **residential schools from Class VI to XII.**
    - Eklavya schools will **be on par with Navodaya Vidyalayas** and will have special facilities for preserving local art and culture besides providing training in sports and skill development.
    - **Infrastructure:** The school infrastructure will include classroom, administrative block, hostels, playground.
    - CBSE curriculum is followed in these schools, and education is completely free.
    - Each school has a capacity of 480 students with an **equal number of seats for boys and girls.**
    - **Non-ST students can be admitted** in these schools on **seats up to 10%** of the total seats. And also **reservation of 20**% of seats under sports quota for deserving ST students who have excelled in the field of sports.

SOFTWARE TECHNOLOGY PARKS OF INDIA

Recently, the Software Technology Parks of India (STPI) organised STPI Tech Summit 2026: India's Next Leap at New Delhi which coincided with its 35th Foundation Day.

- It is a premier Science & Technology organization established in 1991 under the **Ministry of Electronics and Information Technology (MeitY).**
- **Objective:** STPI's main objective has been the promotion of **software exports from the country.**
- It promotes software exports from the country and has been implementing the **Software Technology Park (STP) scheme** and **Electronics Hardware Technology Park (EHTP) scheme** for the promotion of the IT/ITES industry.
- STPI helps in facilitating software development, export, and compliance with regulatory requirements, including customs and foreign exchange rules.
- Further, STPI is nurturing pan India start-up ecosystem through its initiatives like Centres of Entrepreneurship (CoEs) & Next Generation Incubation Scheme (NGIS).

STPI Services:

- **Infrastructure Support:** Provides plug-and-play office space with IT infrastructure for software exporters.
- **Customs Clearances:** Facilitates duty-free imports of capital goods, consumables, and other goods necessary for software export.
- **Statutory Compliance:** Ensures compliance with export regulations and assists companies in meeting their export obligations.
- **Consultation and Guidance:** Offers advice and support on matters related to exports, tax exemptions, and regulatory issues.

E85 FUEL

- It is a **high-ethanol blended fuel** comprising **80–85 per cent ethanol** and **14–19 per cent petrol**, specifically designed for use in flex-fuel vehicles.
- The initiative aims to **facilitate the adoption of Flex-Fuel Vehicles** (FFVs), which are capable of operating on ethanol blends from E20 to E100, without restricting consumers to a single blend.
- **Benefits of E85 Fuel:**
  - **Lower Price:** E85 is **priced lower than conventional petrol** to ensure that the economic benefits of domestically produced ethanol are passed on to consumers.
  - **Reduce lifecycle Greenhouse gas:** Flex-fuel vehicles operating on E85 can **reduce lifecycle greenhouse gas emissions** by around 61 per cent compared to conventional petrol vehicles.
  - **Knock Resistance:** With a **Research Octane Number** (RON) of about 108, ethanol **offers superior knock resistance** that allows engines to operate at higher compression ratios and optimized ignition timing.
  - **Cleaner Combustion:** Higher ethanol blends promote cleaner and more complete combustion, **resulting in near-zero particulate matter emissions** contributing to improved urban air quality.

JAN SAMARTH PORTAL

- It is a unique digital platform for **credit-linked government schemes launched in 2022.**
- **Objectives:** It was conceptualised with the twin objectives of **expanding the reach of government-sponsored schemes** and **streamlining the credit delivery process.**

- It **facilitates ease of access** to all beneficiaries, financial institutions, Central/State Government Agencies, and Nodal Agencies.
- It connects various stakeholders of the **financial ecosystem on a single platform** and promotes inclusive development and ease of doing business.
- **Features of Jan Samarth Portal:**
    - It is available in **8 different languages** for ease of access to rural and underprivileged population in the country.
    - It is a digital **marketplace with front-end user interface for beneficiaries**, integrated with a wide range of centralized data sources.
    - It eases the loan application and disbursement process as the applicant can upload his application and the rule engine for approval of the applications is inbuilt.
    - It provides a single-window facility for **15 Credit-linked Central Government Schemes application** submissions and **254 Member Lending Institutions** (including all Public Sector Banks) to choose from.
    - It has a dedicated grievance redressal channel for both beneficiaries and Banks.

ANUSANDHAN NATIONAL RESEARCH FOUNDATION

- It was established through the **Anusandhan National Research Foundation Act, 2023.**
- It is functioning under **the Department of Science & Technology (DST).**
- The **Science and Engineering Research Board (SERB)** has been merged into ANRF.

Objective: To seed, grow, and promote R&D, and foster a research and innovation culture across universities, colleges, research institutions, and R&D labs in India.

- It acts **as an apex body** to provide high-level **strategic direction of scientific research** in the country as per recommendations of the National Education Policy.
- It has been established to promote research and development and **foster a culture of research and innovation** throughout India's Universities, Colleges, Research Institutions, and R&D laboratories.

- **Funding Target:** It aims to mobilise funds **amounting to ₹50,000 crore** during 2023–28 through multiple streams including the ANRF Fund, Innovation Fund, Science and Engineering Research Fund, and Special Purpose Funds.
- ANRF forges collaborations among the industry, academia, research institutions and government departments.

NILGIRI TAHR

- It is a **mountain ungulate** endemic to the **southern part of the Western Ghats.**
- It is also known by the **name Nilgiri Ibex or simply Ibex**. Locally the animal is called 'Varayaadu'.
- It is the **only mountain ungulate** in southern India.
- **Habitat:** It inhabits the **open montane grassland** habitat of the southwestern ghats montane rain forests Eco region.
- **Distribution:** It is found in a roughly 400 km stretch **in the Western Ghats,** which falls in the states of **Kerala and Tamil Nadu.**
- The **Eravikulam National Park** (Kerala) has the highest density and largest surviving population of Nilgiri tahr.
- **Features of Nilgiri Tahr:**
  - These are **stocky goats with short,** coarse fur and a bristly mane.
  - The **males are found to be larger than the females,** and have a darker color when mature.
  - **Both sexes have curved horns**, which are larger in the males.
- **Conservation Status:**
  - **IUCN:** Endangered
  - **Wildlife (Protection) Act of India, 1972:** Schedule I.

Threats: Habitat loss due to rampant deforestation, competition with domestic livestock, hydroelectric projects in Nilgiri tahr habitat, and monoculture plantations.

DELHI-NCR'S CLEAN MOBILITY SCHEME: TARGETING OLD TRUCKS AND BUSES TO FIGHT AIR POLLUTION

Recently, the Union Cabinet approved a two-year Clean Mobility Scheme for Delhi-NCR. The scheme will incentivise owners of older, more polluting trucks and buses to replace them with BS-VI or stricter emission-compliant vehicles.

- Bharat Stage (BS) standards are emission regulations set by the government to limit the amount of pollutants a vehicle's engine can release.
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Standard	Came Into Force
BS-II	April 2000 (four-wheelers); October 2001 (heavy vehicles)
BS-III	April 2005
BS-IV	April 2010
BS-VI	April 2020

  - BS-VI is the current and strictest standard. It introduced tighter limits on pollutants, mandated cleaner fuels, and required advanced onboard diagnostic systems.
- India jumped directly from BS-IV to BS-VI in 2020, skipping BS-V entirely — a significant leap in emission control.

Why Old Trucks and Buses Are the Problem?

- Delhi-NCR has **2.98 crore registered vehicles**, growing at 7% per year. The transport sector is one of the dominant sources of pollution — alongside dust, industrial emissions, and biomass burning.
- But not all vehicles pollute equally. Old trucks and buses are disproportionately responsible for a large share of the damage.
- A vehicle that is mechanically "fit" can still be dangerously polluting if it runs on an old BS standard.
- As engines age, parts wear out, combustion becomes incomplete, and emission controls degrade.
- Old vehicles also lack modern systems like **diesel particulate filters** and **selective catalytic reduction** that BS-VI vehicles use to clean exhaust.

What the Scheme Proposes?

- The scheme incentivises vehicle owners to **voluntarily phase out** their older trucks and buses and replace them with cleaner alternatives.
- The treatment differs by how old the vehicle is:
    - BS-III and older vehicles — Scrapping is mandatory.
    - BS-IV vehicles — Owners may either scrap them or sell them outside NCR, but only to areas not covered under the National Clean Air Programme (NCAP).
- This ensures that older polluting vehicles are not simply relocated from Delhi to other vulnerable cities.
- **How This Fits Into India's Larger Clean Air Agenda?**
    - This scheme does not stand alone. Several earlier initiatives have worked towards cleaner transport in Delhi-NCR — the **PM-eBus Sewa scheme** for electric buses being a prominent example.
    - The **National Clean Air Programme (NCAP)**, launched in 2019, targets a 40% reduction in PM2.5 and PM10 concentrations by 2026 in 131 non-attainment cities — cities that consistently fail to meet air quality standards.
    - The Clean Mobility Scheme complements these by specifically addressing the legacy vehicle problem.

The Broader Pollution Context

- Delhi-NCR's air pollution is driven by multiple sources — transport, construction dust, industries, and seasonal factors like crop stubble burning and winter weather conditions.
- **Meteorology** matters too. Cold, still winter air traps pollutants near the ground, which is why Delhi's pollution peaks in November and December.
- The **Commission for Air Quality Management (CAQM)** — a statutory body set up specifically for Delhi-NCR air quality — has been monitoring these sources and directing action.

INDIA NEEDS INNOVATIVE STRATEGIES TO ELIMINATE TB

- More than a century after the introduction of the **BCG vaccine**, **tuberculosis (TB)** remains one of the world's deadliest infectious diseases.
- Despite significant medical advances, TB continues to impose a heavy burden, particularly in low- and middle-income countries **(LMICs)** such as India.
- Recent findings from the **PreVenTB trial** provide evidence that moderately effective vaccines can play a meaningful role in this effort.

Steps Required in Achieving TB Elimination

- **Strengthening Diagnostic Systems**
  - Improved **diagnostics** can identify infections at earlier stages, including latent and subclinical cases, enabling timely intervention and reducing transmission.
- **Expanding Preventive Therapy**
  - Preventive treatment can stop latent infections from progressing into active disease, thereby reducing the overall burden of TB.
- **The Importance of Vaccination**
  - Vaccination remains a critical component of TB control, especially in regions where access to healthcare services is uneven.
  - Even vaccines with moderate effectiveness can contribute significantly when deployed strategically.
- **Towards a Smarter TB Strategy**
  - TB elimination requires an integrated approach that combines:
    - Diagnostics
    - Preventive therapy
    - Targeted vaccination
    - Case management
    - Nutritional supplementation
    - Sustained public health investment