

Aditya-L1 mission tracks Coronal Mass Ejections (CMEs)

Using data from the **Visible Emission Line Coronagraph (VELC)** onboard Aditya-L1, scientists from the Indian Institute of Astrophysics (IIA), in collaboration with NASA, have successfully estimated key parameters of a CME.

- This is the first visible-light spectroscopic observation of a CME ever.
- **Coronal Mass Ejections (CMEs)** are large expulsions of plasma and magnetic field from the Sun's corona.

About Aditya-L1 Mission

- It is **India's first dedicated solar mission**.
- It was launched in 2023 by PSLV-C57
- **Objectives:** To understand Coronal Heating and Solar Wind Acceleration; flares and near-earth space weather; Solar wind distribution and temperature anisotropy etc.
- **Lifespan:** 5 years
- **7 payloads:**
 - ⊕ **Remote Sensing Payloads:** VELC, Solar Ultraviolet Imaging Telescope (SUIT), etc.
 - ⊕ **In-situ Payloads:** Aditya Solar wind Particle Experiment (ASPEX), etc.
- It placed in a **halo orbit** around the **Lagrange point 1 (L1)** of the Sun-Earth system, which is about 1.5 million km from the Earth.
 - ⊕ **Halo orbit** is a periodic, three-dimensional orbit at L1 involving Sun, Earth and a spacecraft.
 - ⊕ **At Lagrange points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them.**
 - ◆ These points are used to reduce fuel consumption needed to remain in position.

Other Major Solar Missions

- **Hinotori (ASTRO-A)** launched by Japan in 1980s.
- **Parker Solar Probe** launched by US in 2018 (first spacecraft to "touch" the sun).
- **Solar and Heliospheric Observatory Satellite (SOHO)** mission launched Jointly by NASA-ESA (longest-lived Sun-watching satellite).

Minamata Convention agrees to end the use of dental amalgam by 2034

The decision was taken at the sixth meeting of the Conference of the Parties to the **Minamata Convention on Mercury (COP-6)** in Geneva to **reduce mercury pollution**.

- It was also agreed to step up global efforts to eliminate **mercury-added skin-lightening products**.

About Mercury

- **Properties:**
 - ⊕ Mercury (Hg) is a naturally occurring, **heavy, silvery-white transition metal** with atomic number 80.
 - ⊕ It is **ductile, malleable**, and is able to **conduct heat and electricity**.
 - ⊕ It is the **only common metal that is liquid at room temperature**.
- **Sources:**
 - ⊕ **Natural:** Include **volcanic eruptions**, emissions from the **ocean**, etc.
 - ⊕ **Anthropogenic:** **Mining** (e.g. during gold mining), **fossil fuel combustion**, **metal and cement production**, etc.
- **Usage:** Historically used in **thermometers, barometers, fluorescent lighting, certain batteries, and dental amalgams**.
- **Toxicity:**
 - ⊕ Mercury emitted into the air eventually settles into water or onto land. Once deposited, **certain microorganisms can change it into methylmercury**.
 - ◆ Methylmercury is a highly toxic form that **builds up in fish, shellfish and animals that eat fish (bioaccumulation)**.
 - ⊕ Even very small amounts of mercury exposure can be highly toxic, affecting the **nervous system, kidneys, skin, eyes, digestive system and immune system**.

About Minamata Convention on Mercury

- It is a **global legally binding treaty signed in 2013** (entered into force in 2017) to protect human health and the environment from adverse effects of Mercury.
- It is **named after Minamata Bay of Japan**, which suffered severe, decades-long mercury poisoning in the mid-20th century.
- **Membership:** 153 Parties **including India**.
- **Secretariat:** UNEP serves as the Secretariat, supporting implementation and helping countries meet obligations.

ICAR conducts study to assess various factors impacting Soil Organic Carbon (SOC)

Scientists at the Indian Council of Agricultural Research (ICAR) have developed an agro-ecological base map to assess the impact of fertiliser use, cropping systems, and other factors on **SOC**.

Key Findings

- **Temperature:** SOC is negatively correlated with temperature (as temperature raises SOC declines).
- **Imbalanced fertiliser application:** SOC declined due to imbalanced fertiliser application.
 - ⊕ In Haryana, Punjab, and parts of Western Uttar Pradesh fertiliser application, skewed towards urea and phosphorus has negatively impacted organic carbon in the soil.
- **Cropping Pattern:** Rice-based and pulse-based cropping systems generally contribute to higher organic carbon in the soil compared to wheat or coarse-grain systems.
- **Micronutrients:** Soils with low SOC content often exhibit **higher deficiency of micronutrients**, and vice versa.
- **Elevation:** Higher land elevation is generally associated with higher SOC content, and vice versa.

Recommendations

- **Promote Plantation:** Cover all the soils with crops, and try to establish a large number of plantations.
- **Facilitate Carbon credit:** Incentivize those farmers who are able to trap more carbon dioxide from the soil, and convert into SOC.
- **Encourage carbon sequestration:** For soils with very low carbon, the governments should promote carbon sequestration by changing cropping patterns.

Soil Organic Carbon (SOC)

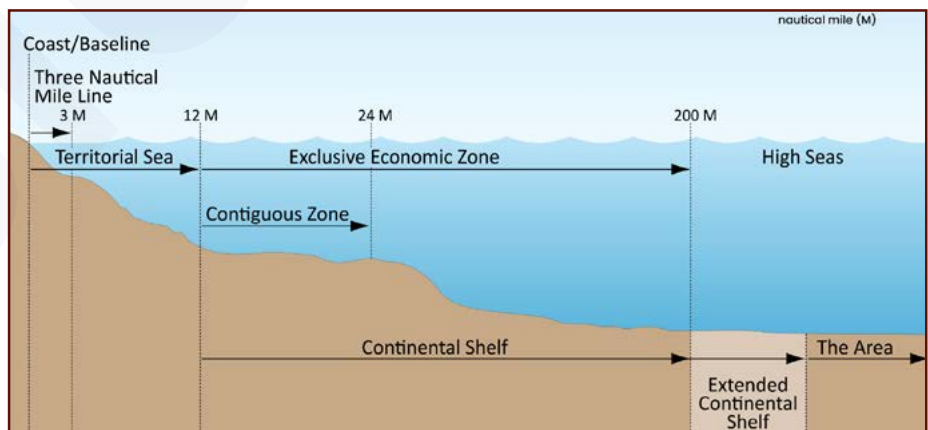
- **Definition:** It is the carbon component of organic matter (approximately 60%).
 - ⊕ It includes all living and dead organic material in the soil, such as plants, soil organisms, and animal materials.
 - ⊕ It does not include fresh, undecomposed plant material on the surface.
- If there is **more carbon** in soil, then it will absorb **more heat**.

Centre Notifies 'Sustainable Harnessing of Fisheries in the Exclusive Economic Zone (EEZ)' Rules

It is aimed at realizing the **vision of a prosperous and inclusive Blue Economy** and unlocking the untapped potential of India's 11,099 km coastline and more than 23 lakh sq. km EEZ, esp. Andaman & Nicobar and Lakshadweep islands (49% of EEZ).

Key Highlights of the Rules

- **Cooperatives and Community-Led Models:** Exclusive priority to **Fishermen Cooperative Societies and Fish Farmer Producer Organizations (FFPOs)** for deep-sea fishing.
 - ⊕ Introduction of **Mother-and-Child Vessel Concept** (Large mother vessels + smaller child boats), **allowing mid-sea transshipment**.
- **Comprehensive Support and Capacity Building:** Through training programs, and capacity-building initiatives across the value chain.
 - ⊕ Access to easy and affordable credit under **Pradhan Mantri Matsya Sampada Yojana (PMMSY)** and the **Fisheries and Aquaculture Infrastructure Development Fund (FIDF)**.
- **Promoting Sustainable Fishing and Mariculture:**
 - ⊕ Curbing harmful practices such as **LED light fishing, pair trawling and bull trawling**.
 - ⊕ **Fisheries Management Plans in consultation with state governments** to restore declining fish stocks.
 - ⊕ **Mariculture practices such as sea-cage farming and seaweed cultivation will be promoted** as alternate livelihoods.
- **Other:** Access pass for **mechanized and large-sized motorized vessels** through the **online ReALCRaft portal** (Small fishers exempted; Foreign vessels not allowed in EEZ)
 - ⊕ Fish resources **originated from the Indian EEZ** to be **recognized as 'Indian origin'**, etc.



About Exclusive Economic Zone (EEZ)

- Adopted through the **1982 United Nations Convention on the Law of the Sea (UNCLOS)**.
- It is an area of the ocean **extending up to 200 nautical miles** immediately offshore from a country's land coast.
- A country retains **exclusive rights to the exploration and exploitation of natural resources** in its EEZ.

Legal Services Authorities Act, 1987 marks 30 years of Implementation

Act came into effect on **November 9, 1995**, this day is observed annually as **National Legal Services Day** to mark its implementation.
About Legal Services Authorities Act, 1987

- **Objective:** Establish legal aid organisations to ensure that **no citizen suffering from economic or other barriers is denied an equal opportunity for getting justice.**
- **Institutional Framework:**
 - ⊕ **National Legal Services Authority (NALSA):** Chief Justice of India shall be the Patron-in-Chief.
 - ⊕ **State Legal Services Authorities (SLSA):** Chief Justice of the High Court shall be the Patron-in-Chief.
 - ⊕ **District Legal Services Authorities (DLSA):** Headed by **District Judge.**
- **Eligibility:**
 - ⊕ SC/ST members, **women and children, victims of trafficking or disasters, the mentally ill or disabled, industrial workmen, persons in custody**, and those with income below the prescribed limit (below ₹5 lakh for Supreme Court cases).
 - ◆ **States can decide the threshold for eligibility under the act** which varies **from 1 Lakh to 3Lakh.**
 - ⊕ Senior citizens' eligibility for free legal aid depends on the Rules framed by the respective State Governments.
- **Legal aid Funds:** Provides for the **National, State, and District Legal Aid Funds.**
- **Establishment of Lok Adalats:** **Alternative dispute resolution mechanism** that settles cases amicably, **including pre-litigation matters.**

Other Initiatives for Legal Aids

- **Legal Aid Defense Counsel System (LADCS):** Provides **free criminal defense** under NALSA.
- **DISHA (Designing Innovative Solutions for Holistic Access to Justice) Scheme:** Focuses on digital access, pro bono services, and pre-litigation help.
- **Other: Legal Literacy and Legal Awareness Programme (LLLAP), etc.**

Also in News



Malabar Exercise

INS Sahyadri participates in the 29th edition of Malabar naval exercise taking place in **Guam**, a strategic US military base, in the **western Pacific Ocean**.

About Malabar Exercise

- **Aim:** To strengthen cooperation and security in the In-do-Pacific region.
- **Participating countries:** India, Australia, Japan, and the United States of America.



Functional Foods and Smart Proteins

Functional foods and smart proteins were recently mentioned in the news in the context of India's nutritional security.

What are Functional Foods?

- They are foods that provide **health benefits beyond basic nutrition**, either **naturally** or **leveraged through technologies** such as **nutrigenomics, bio-fortification, 3D food printing, and bioprocessing.**
- **Examples:** Vitamin-enriched rice, omega-3-fortified milk, probiotic yoghurt.

What are Smart Proteins?

- These are **proteins sourced using biotechnology** that aims to reduce reliance on conventional production.
- **It includes:** Plant-based proteins (to mimic animal meat and dairy), fermentation-derived proteins, cultivated meat, etc.



Molasses

Union Government has decided to remove 50 % export duty on molasses.

About the Molasses

- **Molasse** is a byproduct of the sugar beet and sugar cane refinement processes.
- **It is a dense, viscous liquid of dark brown tint**, rich in sugars, and containing a small percentage of water.
- It has different names according to the region, such as **exhausted honey, poor honey**, etc.
- Molasses contains more nutrients such as calcium, iron, magnesium and potassium and similar amounts of calories than other liquid sugars like honey.
- **Key Applications:** Beverage production, Ethanol production, fertilizers etc.



Biochemical Markers

Indian researchers have identified **biochemical markers in the blood** that could help **detect kidney complications in diabetic patients.**

About Biochemical Markers

- **Meaning:** They are **small molecules** (like sugars, amino acids, lipids) **produced during metabolic processes** in the body and are used by doctors **for ascertaining disease risks.**
 - ⊕ **For e.g.,** cholesterol tests are used to assess heart disease risk.
- **Components for identifying kidney complication:** Arabinol, myo-inositol, ribothymidine, and a toxin-like compound called 2PY, etc.



Sustainable Aviation Fuel

Government is going to announce a sustainable aviation fuel policy.

About Sustainable Aviation Fuel (SAF)

- **Meaning:** It is an **alternative fuel made from non-petroleum feedstocks** that reduces emissions from air transportation.
 - ⊕ It can help **reduce carbon emissions by up to 80 per cent** compared to conventional fuels.
- **Sources:** Waste fats, oils and greases, municipal solid waste, agricultural and forestry residues, etc.
- **Benefits:** Engine and infrastructure compatibility; Lesser emissions compared with conventional jet fuel, etc.



Montreal Protocol

Thirty-Seventh Meeting of the parties to the **Montreal Protocol on Substances that Deplete the Ozone Layer (MOP37)** has recently concluded.

- It **highlighted discrepancies in HFCs emissions** between reported and measured data, **lack of atmospheric monitoring stations** in many regions, etc.

About Montreal Protocol

- **Signed:** In 1987
- It is a **global legally binding treaty to eliminate production and use of Ozone depleting Substances (ODS)**.
- Implemented **under the Vienna Convention (adopted in 1985)**.
- **Kigali Amendment to Montreal Protocol:** Adopted in 2016 to **phase-down production and consumption of HFCs** (non-ODS but potent greenhouse gases).

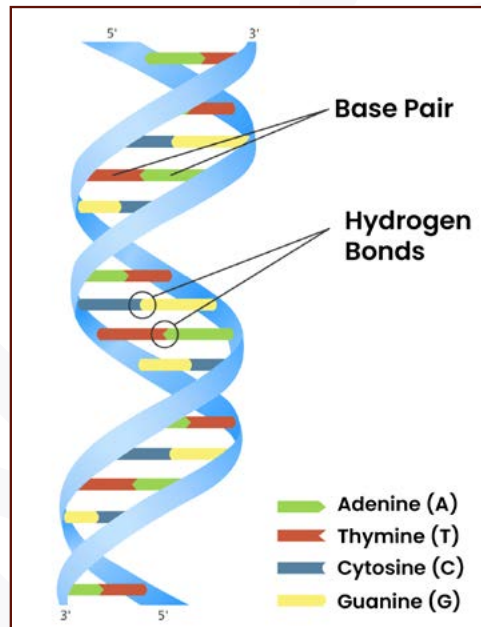


DNA's double-helix structure

The **Nobel laureate James Watson** co-credited with the pivotal **discovery of DNA's double-helix structure** died recently.

About double helix structure

- Double helix is the term used to describe the **shape of our hereditary molecule, DNA**.
- It consists of **two strands of DNA** twisted around one another and connected in the center by **hydrogen bonding**.
- Hydrogen bonds form specifically between the **nitrogenous bases (adenine, guanine, cytosine, and thymine)** of complementary nucleotides on **opposite DNA strands**.



Personality in News



Chittaranjan Das (C. R. Das) (1870 – 1925)

Lok Sabha Speaker paid tribute to freedom fighter, Deshbandhu Chittaranjan Das, on his birth anniversary.

About Chittaranjan Das (C. R. Das)

- Revered as Deshbandhu (Friend of the Nation) for his selfless leadership
- Key Contributions**
 - Successfully defended **Aurobindo Ghose** in the **Alipore Bomb Case (1908)** as a **lawyer**.
 - ⊕ Also, he was defence counsel in the **Dacca Conspiracy Case (1910-11)**.
 - **Participated** in the Non-Cooperation Movement (1920).
 - Served as the **President of Indian National Congress** in 1922 Gaya session (Bihar).
 - Founded the **Swaraj Party** in collaboration with Pt. Motilal Nehru, Vittihalbhai Patel and others, within the Congress (1923).
 - Established **National University at Dacca** (1921).
 - He was the 1st elected mayor of the Calcutta Municipal Corporation (1924).
- **Key literary Work:**
 - ⊕ **Newspaper:** 'Forward', later named 'Liberty' (Subhash Chandra Bose was the editor).
 - ⊕ **Books:** India for Indians, Freedom through Disobedience.
- **Values:** Patriotism, leadership, etc.

