

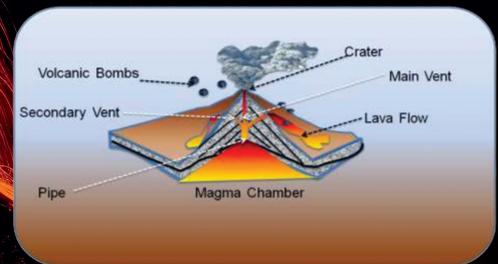


Volcanoes

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VOLCANOES

A volcano is a vent or a fissure in the crust from which lava (molten rock), ash, gases, rock fragments erupt from a magma chamber below the surface



Types: On basis of -

Periodicity of Eruption:

- Active volcano: Recently Erupted
- Dormant Volcano: Potential for eruption, no imminent signs
- Extinct: No recent eruptions, low possibility in future

Nature of Eruption:

- Hawaiian: Calmest types (low gaseous content)
- Strombolian: Formation of large gas bubbles in magma
- Vulcanian: More explosive
- Plinian eruptions: Magma's volatile gases rise via a narrow conduit
- Icelandic: Often build lava plateaus

Shape of Volcanoes:

- Shield volcanoes: Composed of basaltic lava, low slope
- Cone volcanoes (Cinder Cones): Most abundant
- Composite cones (stratovolcanoes): Formed by layers of diverse materials.

Volcanic Features:

Extrusive :

- Crater: Cone-shaped vent for magma
- Caldera: Large, crater-like depression
- Volcanic Plateaus: Levelled areas from fissure eruptions

Intrusive:

- Batholiths: Central core of a volcanic mountain.
- Dyke: Vertical intrusion cutting across country rock bedding.
- Sills: Tabular intrusions along sedimentary bedding.
- Laccoliths: Magma injection along horizontal sedimentary bedding.

Minor:

- Geysers: Underground water above 100°C, powered by magma, results in powerful eruptions with steam and diluted minerals.
- Hot Springs: Heated water flows quietly along fault zones.

Distribution of Volcanoes:

- Subduction zones (Circum Pacific Belt)
- Divergence zones (Mid Atlantic Ridge)
- Intra-plate oceanic volcanism (Hawaiian chain)
- Mid-continental belt and volcanoes in Mediterranean region

Volcanoes in India:

- No volcanoes in Himalayans
- Barren Island (Only active volcano)

Products of Volcanic Eruption:

- Gases: H, C, O, S, N, CH₄, NH₃
- Solid: Pyroclastic materials
- Liquid: Lava



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Seven Years of the Insolvency and Bankruptcy Code

For Prelims: [Insolvency and Bankruptcy Code \(IBC\)](#), [National Company Law Tribunal](#) , [Insolvency, Bankruptcy](#)

For Mains: Challenges faced by the IBC, Indian Economy and issues relating to planning, mobilization of resources, growth, development and employment.

[Source: TH](#)

Why in News?

The [Insolvency and Bankruptcy Code \(IBC\)](#), introduced in 2016, has been a transformative tool in resolving **stressed assets and improving the credit culture** in India.

- However, a recent report by CRISIL Rating highlights certain challenges that are impacting the success of the IBC as it completes seven years.

Note

- CRISIL Rating is a subsidiary of CRISIL Limited, a leading [credit rating agency](#) in India.
- It is a full-service rating agency that rates the entire range of debt instruments, from manufacturing companies to financial institutions.

What's Hampering the IBC's Success?

- **Falling Recovery Rates:**
 - Recovery rates have witnessed a significant **decline from 43% to 32%** between March 2019 and September 2023.
 - The recovery rate is the percentage of the admitted claims that the creditors recover from the resolution or liquidation of the corporate debtor under the IBC.
 - **Root Causes:**
 - **Limited Judicial Bench Strength:** The IBC resolution process is impeded by a **shortage of judges**, resulting in a **deceleration of case processing**. This, in turn, contributes to prolonged resolution times.
 - **Delays in Default Identification:** Time-consuming processes for identifying and acknowledging defaults contribute to reduced recovery rates. It hampers the **timely initiation of resolution proceedings**, contributing to reduced recovery rates.
 - **Impact:**
 - Diminution in asset values.
 - Sub-optimal recoveries, affecting creditors and stakeholders.
- **Increased Resolution Time:**
 - The average resolution time has surged from **324 to 653 days**, well beyond the stipulated 330 days.
 - Resolution time is the duration between the admission of the insolvency application and the approval of the resolution plan or the order of liquidation by the [National Company Law Tribunal \(NCLT\)](#).
 - **Root Causes:**
 - **Prolonged Pre-IBC Admission Stage:** Significant delays in this stage, **lasting 650 days in fiscal 2022 (up from about 450 days in fiscal 2019)**.
 - **Impact:**
 - Slower resolution processes.
 - Suppression of recovery rates due to delays in initiating proceedings.

What is the Insolvency and Bankruptcy Code (IBC), 2016?

- **About:**
 - The IBC, 2016 is the **bankruptcy law of India** that consolidates and amends the **existing laws relating to insolvency and bankruptcy** of corporate persons, partnership firms, and individuals.
 - Insolvency is a state where the **liabilities** of an individual or an organization **exceeds its asset** and that entity is unable to raise enough cash to meet its obligations or debts as they become due for payment.
 - Bankruptcy is when a person or company is **legally declared incapable of**

paying their due and payable bills.

- The IBC aims to provide a time-bound and creditor-driven process for insolvency resolution and to improve the credit culture and business environment in the country.
- IBC resolves claims involving insolvent companies. This was intended to tackle the bad loan problems that were affecting the banking system.
- **Regulating Authority:**
 - The Insolvency and Bankruptcy Board of India (IBBI) was established under the Insolvency and Bankruptcy Code, 2016.
 - It is a statutory body, responsible for making and implementing rules and regulations for insolvency and bankruptcy resolution of corporate persons, partnership firms, and individuals in India.
 - The IBBI has 10 members, representing the Ministry of Finance, the Ministry of Corporate Affairs, and the [Reserve Bank of India](#).
- **Adjudicating Authority:**
 - [National Company Law Tribunal \(NCLT\)](#) has jurisdiction over companies, other limited liability entities.
 - **Debt Recovery Tribunal (DRT)** has jurisdiction over individuals and partnership firms other than Limited Liability Partnerships.
- **Amendments in the IBC:**
 - The IBC has undergone significant amendments in the past 12 months to address emerging challenges and enhance its effectiveness.
 - These amendments include the approval for the sale of assets or resolution plans on a segregated basis, an increase in the number of **NCLT benches to 16**, and extended timelines for filing claims.
 - Sector-specific amendments, provisions for the audit of corporate debtors, and modifications in Form G2 have been introduced to address unique challenges.
- **Achievements:**
 - Since its inception in 2016, **IBC has resolved Rs. 3.16 lakh crore** of debt stuck in 808 cases in seven years, according to CRISIL.
 - It has resolved a significant amount of stressed assets with **better recovery rates** compared to previous mechanisms like the Debt Recovery Tribunal, the [Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002](#) and [Lok Adalat](#).
 - IBC has achieved higher recovery rates, with creditors realizing 32% of admitted claims on average and 169% of the liquidation value.
 - In contrast, other mechanisms had recovery rates ranging from 5-20%.
 - IBC's deterrent effect is evident as borrowers, fearing the loss of companies, have proactively settled over Rs. 9 lakh crore in **debt before cases entered the insolvency process**.
 - This highlights a significant behavioral change among borrowers, showcasing the efficacy of the Insolvency and Bankruptcy Code in encouraging timely settlements.

How Can the IBC Overcome Challenges?

- CRISIL Rating suggested a **CDE approach** to enhance the IBC's performance, where C stands for Capacity augmentation, D for Digitalisation and E for Expansion of pre-pack resolutions to large corporates.
 - Capacity augmentation involves **enhancing the infrastructure and human resources** of key institutions like the NCLT, responsible for IBC implementation.
 - This aims to boost case throughput, mitigating the backlog of 13,000 cases in different stages of resolution.
 - Digitalisation refers to creating a digital platform for **connecting all the stakeholders** involved in the IBC process.
 - This will help eliminate data asymmetry, enhance transparency, and facilitate faster decision-making.
 - Expansion of the pre-packaged insolvency resolution process (PPIRP) to large corporates will help in preventing value erosion due to time.

Legal Insights:

Read comprehensively about [Important Institutions](#):

- [Debt Recovery Tribunal](#)
- [National Company Law Tribunal](#)

www.drishtijudiciary.com

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Which of the following statements best describes the term 'Scheme for Sustainable Structuring of Stressed Assets (S4A)', recently seen in the news? (2017)

- (a) It is a procedure for considering ecological costs of developmental schemes formulated by the Government.
- (b) It is a scheme of RBI for reworking the financial structure of big corporate entities facing genuine difficulties.
- (c) It is a disinvestment plan of the Government regarding Central Public Sector Undertakings.
- (d) It is an important provision in 'The Insolvency and Bankruptcy Code' recently implemented by the Government.

Ans: (b)

Special Category Status

For Prelims: [Special Category Status](#), [Bihar Caste-based Survey, 2022](#), Planning Commission, [Article 370](#), Centrally Sponsored Scheme.

For Mains: Special Category Status, Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

Source: [TH](#)

Why in News?

Recently, the Bihar Cabinet has passed a resolution seeking the grant of [Special Category Status \(SCS\)](#) to Bihar.

- The demand comes in the backdrop of the findings from the ["Bihar Caste-based Survey, 2022"](#), which revealed that **nearly one-third of Bihar's population continues to live in poverty.**

What is a Special Category Status?

- **About:**

- SCS is a classification given by the **Centre to assist development of states that face geographical and socio-economic** disadvantages.
- The Constitution does not make a provision for SCS and this classification was later done on the recommendations of the **5th Finance Commission in 1969**.
- Status was first accorded to Jammu and Kashmir, Assam and Nagaland in 1969.
- SCS for plan assistance was granted in the past by the National Development Council of the **erstwhile Planning Commission**.
- Eleven States including Assam, Nagaland, Himachal Pradesh, Manipur, Meghalaya, Sikkim, Tripura, Arunachal Pradesh, Mizoram, Uttarakhand and Telangana have been accorded the special category state status.
 - Telangana, the newest State of India, **was accorded the status as it was carved out of another state** Andhra Pradesh.
- SCS is different from **Special status which imparts enhanced legislative and political rights**, while SCS deals with only economic and financial aspects.
 - For instance, J&K used to have Special status before **Article 370** was repealed.
- **Parameters (Based on Gadgil Formula):**
 - Hilly Terrain;
 - Low Population Density and/or Sizeable Share of Tribal Population;
 - Strategic Location along Borders with Neighbouring Countries;
 - Economic and Infrastructure Backwardness; and
 - Nonviable Nature of State finances.
- **Benefits:**
 - In the past, SCS states used to receive approximately 30% of central assistance, determined by the Gadgil-Mukherjee formula.
 - However, following the recommendations of the 14th and **15th Finance Commissions (FC)** and the dissolution of the Planning Commission, this assistance to SCS States has been subsumed in an increased **devolution of the divisible pool funds for all States (increased to 41% in the 15th FC from 32%)**.
 - The Centre pays 90% of the funds required in a **Centrally-Sponsored Scheme** to special category status states as against **60% or 75% in case of other states**, while the remaining funds are provided by the state governments.
 - Unspent money in a financial year does not lapse and is carried forward.
 - Significant concessions are provided to these states in excise and customs duties, income tax and corporate tax.
 - **30% of the Centre's Gross Budget** goes to Special Category states.

Why is Bihar Demanding Special Category Status (SCS)?

- **Economic Disparities:**
 - **Bihar faces significant economic challenges, including a lack of** industrial development and limited investment opportunities.
 - The bifurcation of the state resulted in the shifting of industries to **Jharkhand, exacerbating the employment and economic growth** issues in Bihar.
- **Natural Calamities:**
 - The state grapples with **natural calamities like floods in the northern region** and severe droughts in the southern part.
 - These recurring disasters **disrupt agricultural activities**, affecting livelihoods and economic stability.
- **Lack of Infrastructure:**
 - Infrastructure, especially in terms of irrigation facilities and water supply, remains inadequate.
 - The absence of sufficient resources for irrigation impacts agricultural productivity, a primary **source of livelihood for a large portion of the population**.
- **Poverty and Social Development:**
 - Bihar has a high poverty rate, with a significant number of families living below the poverty line.
 - With a per-capita GDP of around Rs 54,000, Bihar has **consistently been one of the poorest States**. Bihar is home to around 94 lakh poor families and the granting of SCS will help the government get about RS 2.5 lakh crore required to fund various welfare

measures over the next five years.

- **Funding for Development:**

- Seeking SCS is also a means to secure substantial financial assistance from the central government, allowing Bihar to access funds required for development projects and addressing long-standing socio-economic challenges.

Does Bihar Fulfill Criteria for the Grant of SCS?

- Although Bihar meets most of the criteria for the grant of SCS, it does not fulfil the requirement of **hilly terrain and geographically difficult areas**, which is considered to be the **primary reason for difficulty** in infrastructural development.
- In 2013, the Raghuram Rajan Committee set up by the Centre, placed Bihar in the “**least developed category**” and suggested a new methodology based on a ‘multi-dimensional index’ for devolving funds instead of a SCS, which can be **revisited to address the State’s socio-economic backwardness**.

Do other States also Want SCS?

- Since its bifurcation in 2014, Andhra Pradesh has asked for a grant of SCS on the grounds of revenue loss due to **Hyderabad going to Telangana**.
- Additionally, Odisha has also been requesting for the SCS, highlighting its vulnerability to natural calamities such as cyclones and a large tribal population (nearly 22%).
- However, the Central government citing the 14th FC report, which made a recommendation to the Centre that no State be accorded the SCS, has repeatedly denied their demands.

What are the Concerns Related to Special Category Status?

- **Resource Allocation:**

- Granting SCS entails providing additional financial assistance to the state, which can strain the **central government’s resources**. Balancing the allocation of funds among various states becomes crucial, and granting SCS might lead to disparities or **dissatisfaction among non-SCS states**.

- **Dependency on Central Assistance:**

- States with SCS often become heavily reliant on central assistance. This could potentially **discourage efforts toward self-sufficiency** and independent economic growth strategies.

- **Implementation Challenges:**

- Even after the grant of SCS, there might be challenges in utilizing the funds effectively **due to administrative inefficiencies**, corruption, or lack of proper planning. Ensuring that the allocated funds are used for intended purposes is a significant challenge.

Way Forward

- There is a need to **revisit and refine the criteria for granting SCS** to ensure fairness and transparency. Clearly define the parameters for eligibility based on socio-economic indicators, infrastructure development, and other relevant factors.
 - There is a need to encourage **states to create comprehensive development plans** that focus on sustainable growth, job creation, infrastructure development, and human capital enhancement. SCS should be a part of a broader strategy for holistic development.
 - Implement policies that gradually reduce states' dependency on central assistance by promoting self-sufficiency and economic diversification. Encourage states to generate their revenue streams.
-

ECI Revokes Rythu Bandhu Scheme Disbursement

For Prelims: [Model Code of Conduct](#), [Election Commission of India](#), [Rythu Bandhu scheme](#), [PM Kisan Samman Nidhi](#)

For Mains: Role of the ECI in the Evolution of MCC, Model Code of Conduct - Importance in elections and its criticism.

Source: [IE](#)

Why in News?

The [Election Commission of India \(ECI\)](#) has revoked its earlier 'no objection' for the disbursement of funds under **Telangana's Rythu Bandhu scheme**.

- The move comes amid allegations of violations of the [Model Code of Conduct \(MCC\)](#).

Why did the ECI Reverse Rythu Bandhu Disbursement?

- The ECI gave a 'no objection' for Rythu Bandhu disbursement during the MCC period, like for other existing Central and state government schemes, on the condition that it would not be published for political gains and that the disbursement would not be **during the silence period, i.e. the 48 hours preceding the date of poll**.
 - The scheme, similar to [PM Kisan Samman Nidhi](#), aimed to **assist farmers**, and the government received permission under certain guidelines.
- A speech by a Telangana minister, **publicizing the release of funds** under the Rythu Bandhu scheme **during the elections**, was found to violate the MCC and prompted the ECI's reversal.
- The EC's order directs an immediate withdrawal of permission for Rythu Bandhu disbursement during the MCC.
 - Disbursement is now halted until the MCC in Telangana ceases to apply, potentially impacting farmers' financial aid.

Rythu Bandhu Scheme

- It is a Telangana government initiative that provides **farmers with investment support for agriculture and horticulture crops**.
- The idea is to **reduce the debt burden of the farmers**. As per the scheme, each farmer gets a [Direct Benefit Transfer \(DBT\)](#) of Rs.5,000 per acre each season for the purchase of seeds, fertilizers, pesticides and other requirements.
- Beginning with 50.25 lakh farmers in 2018, when the scheme was launched, the Rythu Bandhu beneficiaries have gone up to 70 lakh.

What is ECI's Model Code of Conduct (MCC)?

- **About:**
 - The MCC, is a set of guidelines issued by the ECI, that regulates parties and candidates before elections, aligning with **Article 324 of the Constitution**.
 - It empowers the EC to oversee and ensure **fair elections to Parliament and State Legislatures**.
 - It is active from election schedule announcement to result declaration.

▪ MCC for Political Parties and Candidates:

◦ General Conduct:

- Parties and candidates must avoid activities that **create mutual hatred or tension** among different castes, communities, religious, or linguistic groups.
- Criticism of other parties should be **limited to policies, past records, and work, avoiding personal aspects.**
- Appeals to **caste or communal feelings for votes are prohibited.**
- Places of worship should not be used for election propaganda.

◦ Party in Power:

- The MCC incorporated certain restrictions in 1979, regulating the conduct of the party in power.
- Ministers must not combine **official visits with election work** or use official machinery for the same.
- Ministers and authorities **should refrain from granting payments**, announcing financial grants, laying foundation stones, promising projects, making ad-hoc appointments, or **influencing voters in favour of the party in power** from the time elections are announced.
- The party **must avoid advertising at the cost of the public exchequer** or using official mass media for publicity on achievements to improve chances of victory in the elections.
- Ministers from the central or state government **should not enter polling stations** or counting places except in their **capacity as candidates, voters, or authorized agents.**

◦ Election Manifestos:

- ECI directs that political parties and candidates must adhere to the following guidelines while releasing election manifestos for any election (Parliament/State Legislatures):
 - Manifestos should align with the Constitution and MCC.
 - Avoid promises that may influence voters unduly.
 - Manifestos should reflect rationale and financial considerations.
- Manifestos shall **not be released during the prohibitory period**, as prescribed under **Section 126 of the [Representation of the People Act \(RPA\) 1951](#)**, for single or multi-phase elections.

◦ Meetings:

- Parties must **inform the local police authorities of the venue and time** of any meeting in time to enable the police to make adequate security arrangements.

◦ Processions:

- If **two or more candidates plan processions along the same route**, the political parties must establish contact in advance to ensure that the **processions do not clash.**
- **Carrying and burning effigies representing** members of other political parties is **not allowed.**

◦ Polling Day:

- Only voters and those with a valid pass from the EC are allowed to enter polling booths.
- All authorized party workers at **polling booths should be given suitable badges or identity cards.**
 - Identity slips supplied by them to voters **shall be on plain (white) paper** and **shall not contain any symbol, name of the candidate or the name of the party.**

◦ Observers:

- The EC will appoint observers to whom any candidates may report problems regarding the conduct of the election.

▪ Legality of MCC:

- Though the MCC does not have any statutory backing, it has come to acquire strength in the past decade because of its strict enforcement by the EC.
- Certain provisions of the MCC may be enforced through invoking corresponding provisions in other statutes such as the [Indian Penal Code of 1860](#), [Code of Criminal Procedure of 1973](#), and **RPA of 1951.**

- In 2013, the Standing Committee on Personnel, Public Grievances, Law and Justice **recommended making the MCC legally binding** and recommended that the MCC be made a part of the RPA 1951.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims:

Q. Consider the following statements: (2017)

1. The Election Commission of India is a five-member body.
2. Union Ministry of Home Affairs decides the election schedule for the conduct of both general elections and bye-elections.
3. The Election Commission resolves the disputes relating to splits/mergers of recognised political parties.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 only
- (c) 2 and 3 only
- (d) 3 only

Ans: (d)

Mains:

Q. Discuss the role of the Election Commission of India in the light of the evolution of the Model Code of Conduct. (2022)

Decentralised Autonomous Organisations

For Prelims: [Decentralised Autonomous Organisations](#), [Cryptocurrencies](#), Blockchain technology, Democratic, and self-executing systems, [Intellectual Property](#).

For Mains: Decentralised Autonomous Organisations, Achievements of Indians in science & technology.

[Source: TH](#)

Why in News?

Decentralised Autonomous Organisations (DAOs) represent a groundbreaking innovation at the intersection of [Blockchain Technology](#) and governance.

What are Decentralised Autonomous Organisations (DAOs)?

▪ About:

- DAOs are the digital entities that operate without centralised control and are governed by smart contracts and the consensus of their members, often utilising [Cryptocurrencies](#) as

a means of decision-making and resource allocation.

- DAOs have garnered attention for their potential to change various industries, including finance, art, and governance, **by fostering transparent, democratic, and self-executing systems.**
- These entities are not only reshaping traditional business structures but also challenging the way we perceive trust, governance, and collaboration in the digital world.
- The idea behind DAOs is **to create self-sustaining, community-driven entities governed by smart contracts** on blockchain networks.

▪ **Various Use Cases:**

- **Global Financial Ecosystem:** In the realm of decentralized finance, platforms like Compound and Maker **DAOs have introduced lending and borrowing services**, enabling users to participate in the global financial ecosystem without relying on traditional banks.
- **In the Art World:** In the art world, **artists are tokenising their creations and utilising DAOs** to manage royalties and maintain control over their intellectual property.
- **Supply Chain Management:** Supply chain management is **another arena where DAOs are gaining traction**, as they offer transparency and traceability in global supply chains, ensuring the authenticity and quality of products.
- **Governance of Online Communities:** Even in the governance of online communities, DAOs have emerged as tools for decision-making, with platforms like DAOstack facilitating decentralised governance structures for internet communities.

▪ **Significance:**

- **Decentralization and Democratic Governance:** DAOs embody decentralization, shifting power away from central authorities.
 - They promote democratic decision-making, allowing token holders to propose and vote on decisions. This equitable distribution of influence ensures a more inclusive and fair governance structure.
- **Transparency and Trust:** Smart contracts underpinning DAOs **ensure transparency and immutability.** This fosters trust among participants by offering a clear view of operations and reducing the opacity often associated with centralized organizations.
 - However, vulnerabilities in these smart contracts can raise security concerns.
- **Inclusivity and Global Collaboration:** One of the most significant advantages of DAOs is their ability to **transcend geographical and socio-economic barriers.**
 - They enable global participation, fostering diversity and innovation by allowing individuals from various backgrounds to collaborate and contribute.
- **Facilitating New Forms of Collaboration:** DAOs facilitate direct cooperation among participants with shared objectives, eliminating the need for intermediaries.
 - This environment **encourages innovation, cooperation, and the free flow of ideas**, unrestricted by hierarchical structures.

What are the Challenges Related to DAOs?

▪ **Security Vulnerabilities:**

- Vulnerabilities in smart contracts have led **to notorious incidents like the DAO hack in 2016**, raising questions about the security and **immutability of blockchain systems.**
- These incidents highlight the **need for rigorous security audits** and ongoing improvements in code reliability.

▪ **Legal and Regulatory Uncertainty:**

- The decentralized nature of DAOs poses challenges in **legal classification, taxation, liability assignment**, and compliance with regulations across various jurisdictions.
- Questions regarding governance, **Intellectual Property**, and cross-border operations remain **largely unanswered, requiring regulatory adaptation.**

▪ **Governance and Dispute Resolution:**

- Decentralized decision-making makes **it challenging to resolve disputes** and assign responsibilities within DAOs.
- The automated nature of smart contracts **raises questions about accountability and handling conflicts** without traditional legal mechanisms.

Way Forward

- Despite the challenges, DAOs continue to evolve and offer transformative potential across diverse industries. Ongoing discussions and adaptations are crucial for maximizing their benefits while mitigating risks, ensuring a future where decentralized innovation aligns with legal compliance.
- DAOs represent a paradigm shift in organizational structures, offering a glimpse into a future where decentralized, transparent, and democratic systems play a pivotal role in shaping various sectors.

Collection of Farm Fire Data in India

For Prelims: Consortium for Research on Agroecosystem Monitoring and Modeling from Space, Suomi NPP satellite, Moderate Resolution Imaging Spectroradiometer (MODIS), Visible Infrared Imaging Radiometer Suite, [Baler Machine](#), [Happy Seeder](#), [Bio-enzyme PUSA](#)

For Mains: Aspects Related to Data Collection of Farm Fires, Innovative Techniques for Crop-Residue Management.

Source: [IE](#)

Why in News?

As the [farm fire](#) season draws to a close, a total of **55,725** instances of such fires have been documented across six **North Indian States** from **September to November, 2023**.

- These figures have been attained **via [satellite surveillance](#)**, adhering to established and standardized monitoring protocols.

What are Farm Fires?

- Farm fires usually refer to deliberate fires set on agricultural fields, primarily after the **harvest season to clear [crop residue](#)**, particularly in regions practicing stubble burning.
 - These fires often involve **burning leftover straw, stubble, or crop residues** to prepare fields for the next planting season quickly.
 - **However, farm fires can also occur accidentally due to machinery malfunctions** or other unintended causes.
- While it can be a cost-effective and time-saving method for farmers, **it contributes significantly to air pollution**, emitting large amounts of **smoke, [particulate matter](#), and [greenhouse gases](#) into the atmosphere**.

What are the Major Aspects Related to Data Collection of Farm Fires?

- **Data Collection Body:**
 - [Indian Agricultural Research Institute's \(IARI\) Consortium for Research on Agroecosystem Monitoring and Modeling from Space \(CREAMS\)](#) Laboratory issues a daily report on **paddy residue fires**.
 - It was set up in **2013**, with the primary purpose of **monitoring crop conditions against extreme climatic events**.
 - This comprehensive bulletin details farm fire incidents in **Punjab, Haryana, Uttar**

Pradesh, Rajasthan, Madhya Pradesh, and Delhi.

- It includes a **district-wise breakdown** of recorded incidents from 2020 onwards, specifying fire location, satellite used, timestamp, and intensity.
- The report is shared with central and state-level agencies, to guide actions and **identify hotspots needing focused interventions.**

▪ Data Collection Through Satellites:

- Three sensors aboard three different NASA satellites: **one called [Visible Infrared Imaging Radiometer Suite \(VIIRS\)](#) aboard the **Suomi NPP satellite**, and **two called Moderate Resolution Imaging Spectroradiometer (MODIS)**, aboard the **Terra and Aqua satellites**, collect this data by recording land surface temperatures.
 - Each satellite passes over the **Indian subcontinent twice every 24 hours**, at different times.**
- In the past five years, the lab has used a different satellite set to map burned areas. [Sentinel-2 satellites](#), **part of the European Space Agency**, serve this purpose.

▪ Monitoring Protocol:

- IARI acquires satellite data from its ground station and the [National Remote Sensing Centre](#), ensuring year-round monitoring of farm fires across the country.
- Prior to **2021**, varied methodologies led to discrepancies in **recorded farm fire** events across different monitoring centers.
- However, the [Commission for Air Quality Management](#) implemented a **standardized protocol in 2021.**
 - IARI reprocessed 2020 data using this protocol, enabling comparative analysis from 2020 onward.

▪ Identifying Paddy Fires:

- Identifying paddy fires involves **distinguishing them from forest fires** or those originating from industries.
 - This process begins by **identifying paddy cultivation areas** and mapping farm fires accordingly.
 - Paddy cultivation exhibits a **distinct reflectance signature** over time due to its **typical background of water**, unlike other crops like sugarcane or maize. Overlaying this signature with fire events helps discern paddy fires.
- Satellites determine **active paddy fires by detecting an increase in land surface temperature above specific thresholds**, distinguishing fire events from surroundings.

Note

Detecting a fire **relies more on the quantity of burnt residue** than the area affected. A higher amount of residue burnt results in a notable increase in temperature compared to the surroundings, **indicating greater fire intensity and the likelihood of detection.**

- **Fire intensity**, measured as energy emitted per unit area and time, offers insights into the quantity of residue burnt.
- **Limitations and Challenges**
 - **Weather Influence:** Climatic conditions, particularly **cloud cover and water vapor**, can obstruct satellite sensors, hindering accurate readings and data acquisition.
 - **Seasonal and Time-of-Day Variability:** Changes in seasons and **discrepancies between day and night conditions** affect the effectiveness of fire detection thresholds, creating hurdles for consistent monitoring.

What are the Innovative Techniques for Crop-Residue Management?

- [Baler Machine](#)
- [Happy Seeder](#)
- [Bio-enzyme PUSA](#)

Conclusion

Understanding the complexities and limitations of data collection is crucial in **devising effective strategies to address farm fires and mitigate their impact on environmental and public health concerns**. Continual advancements in technology and methodology remain integral to refining monitoring approaches for better insights and proactive interventions.

HERVH's Role in Eliminating Unfit Cells

[Source: TH](#)

Why in News?

Researchers have uncovered a previously unnoticed cellular mechanism within the **inner cell mass of the early embryo**, shedding light on a mechanism that silently eliminates unfit cells before birth.

- At the core of this finding is the **gene Human endogenous retrovirus subfamily H (HERVH)**, which plays a crucial role in determining the fate of cells in [embryonic development](#).

What Happens in the Inner Cell Mass?

- **Inner Cell Mass:**
 - In the early stages of embryonic development, cells organize themselves into a crucial structure called the inner cell mass.
 - This mass contains [pluripotent cells](#), capable of forming any cell type in the human body.
- **HERVH:**
 - In 2016, researchers made a surprising discovery while analyzing gene expression data from early human embryos.
 - Research identified a group of **non-committed cells** (they did not become a part of the later stages of the embryo) **within the inner cell mass** that undergo **early elimination**.
 - Most inner cell mass cells express **HERVH, a gene crucial for maintaining pluripotency**.
 - However, the **non-committed cells, destined for elimination, do not express HERVH**.
- **The Role of HERVH in Cell Fate:**
 - The absence of HERVH in non-committed cells revealed a startling connection to "jumping genes" or **transposons** (dangerous little pieces of [Deoxyribonucleic Acid \(DNA\)](#) that **can insert themselves into different regions of the genome, damaging it and **leading to cell death**).
 - HERVH protects cells from transposons, preventing DNA damage and ensuring the survival of cells committed to forming the developing embryo.**
- **Life and Death:**
 - HERVH-expressing cells survive, forming the embryo, while non-committed cells face destruction through cell death.
- **Placenta:**
 - Survived cells form the placenta also exhibit transposon activity, although without HERVH expression.
 - Despite this, these cells show greater tolerance to transposons, avoiding cell death.
 - The placenta, distinct from other fetal cells, **is discarded after childbirth**.
- **Implications for Medicine and Beyond:**
 - HERVH's role in pluripotency has implications for **regenerative medicine, offering potential avenues for stem cell research**.

- The researcher speculates that reducing transposon activity in the early embryo could **impact fitness, influencing infertility treatment and [in-vitro fertilization techniques](#)**.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. With reference to the recent developments in science, which one of the following statements is not correct? (2019)

- (a)** Functional chromosomes can be created by joining segments of DNA taken from cells of different species.
- (b)** Pieces of artificial functional DNA can be created in laboratories.
- (c)** A piece of DNA taken out from an animal cell can be made to replicate outside a living cell in a laboratory.
- (d)** Cells taken out from plasma and animals can be made to undergo cell division in laboratory petri dishes.

Ans: (a)

- In 2017, US researchers were successful in developing new semi-synthetic strain of E. coli bacteria that is a living organism that incorporates both natural and artificial DNA and is capable of creating entirely new, synthetic proteins
- A wide variety of double stranded DNA templates are replicated extensively in an in-vitro DNA replication system containing purified proteins.
- Through micro propagation, plants can be developed in the laboratory, for instance, chlamydomonas cells can be replicated in culture through light variations. **Therefore, option (a) is the correct answer.**

India to Chair International Sugar Organisation in 2024

[Source: PIB](#)

Why in News?

The recent announcement at the **63rd council meeting of the International Sugar Organisation (ISO)**, headquartered in London, heralded a significant moment for India.

- **India is set to chair the organization in 2024**, marking a pivotal milestone in its global stature within the **[sugar industry](#)**.

What is the International Sugar Organization?

- The **International Sugar Organization** serves as a vital intergovernmental body dedicated to enhancing the global sugar market. It represents:
 - **87%** of world sugar production
 - **64%** of world sugar consumption
- With a membership of around **88 nations, India being among them**, the organization encompasses a diverse range of countries.
- The ISO administers the **International Sugar Agreement (ISA), 1992** aiming to:
 - Foster international cooperation in sugar-related matters

- Facilitate intergovernmental discussions to improve the global sugar economy
- Collect and disseminate market information
- Encourage expanded sugar use, especially in non-traditional applications.

What is the Status of the Sugar Industry in India?

▪ About:

- India is the **largest consumer and second-largest producer of sugar globally**. With a substantial **15% share in global sugar consumption and a robust 20% production rate**, India's strategies significantly impact the international sugar market.
- India stands as the **Eastern Hemisphere's** market leader in sugar, complementing **Brazil's stronghold in the Western Hemisphere**.

▪ Geographical Conditions for the Growth of Sugar:

- **Temperature:** Between 21-27°C with hot and humid climate.
- **Rainfall:** Around 75-100 cm.
- **Soil Type:** Deep rich loamy soil.

▪ Distribution: The sugar industry is predominantly located across two primary production regions: the northern belt encompassing **Uttar Pradesh, Bihar, Haryana, Punjab and Bihar** and the southern belt comprising **Maharashtra, Karnataka, Tamil Nadu, and Andhra Pradesh**.

- The **southern region benefits from a tropical climate, which is conducive to higher sucrose content in crops**, resulting in increased yields per unit area compared to northern India.

▪ Related Indian Government Initiatives:

- **Fair and Remunerative Price (FRP):** The government has set the FRP for the 2023-2024 sugar season at **Rs. 315 per quintal**.
 - FRP is the minimum price that sugar mills must pay sugarcane farmers. It is announced annually by the Centre.
 - The government fixes the FRP based on recommendations from the **Commission for Agricultural Costs and Prices (CACP)**.
 - Under the FRP system, the price paid to farmers for sugarcane is not linked to the profits generated by sugar mills.
- **Ethanol Blended Petrol Programme**
 - **Ethanol** is an agricultural by-product primarily sourced from the **processing of sugarcane for sugar**, and can also be derived from alternative sources like rice husk or maize.
 - When ethanol is mixed with petrol to reduce the consumption of fossil fuels in vehicle operation, **it is termed Ethanol Blending**.
 - India aims to achieve a **20% ethanol-blended petrol target by the year 2025**.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q According to India's National Policy on Biofuels, which of the following can be used as raw materials for the production of biofuels? (2020)

1. Cassava
2. Damaged wheat grains
3. Groundnut seeds
4. Horse gram
5. Rotten potatoes
6. Sugar beet

Select the correct answer using the code given below:

(a) 1, 2, 5 and 6 only

- (b) 1, 3, 4 and 6 only
- (c) 2, 3, 4 and 5 only
- (d) 1, 2, 3, 4, 5 and 6

Ans: (a)

Q. Given below are the names of four energy crops. Which one of them can be cultivated for ethanol? (2010)

- (a) Jatropha
- (b) Maize
- (c) Pongamia
- (d) Sunflower

Ans: (b)

Walking Pneumonia

[Source: TH](#)

Why in News?

Recently, a mysterious influenza-like illness termed as **Walking Pneumonia** has gripped school children in China.

- The outbreak's exact cause is unknown, but medical experts speculate it might be linked to **mycoplasma pneumoniae**, a common bacterial infection known as 'walking pneumonia.'
- Chinese authorities assert it involves familiar pathogens like **mycoplasma pneumoniae**, [adenovirus](#), and [influenza virus](#), ruling out novel pathogens like [Severe Acute Respiratory Syndrome \(SARS\) coronavirus](#).

What is Walking Pneumonia?

- **About:**
 - Walking pneumonia, also known as atypical pneumonia, is a **milder form of pneumonia** caused by bacteria like **Mycoplasma pneumoniae**.
 - It's termed "walking" pneumonia because its symptoms are often mild enough that **individuals can continue their daily activities** without requiring bed rest or hospitalization.
 - The condition is **more prevalent among children, particularly those aged 5 to 15**, who are in close contact at schools and can easily transmit the infection to family members.
- **Transmission:**
 - Transmission occurs through airborne **droplets from coughing**, sneezing, or talking, making close contact a significant factor in spreading the infection.
- **Symptoms:**
 - Typical symptoms include a persistent cough, fever, sore throat, headache, runny nose, ear pain, and sometimes chest discomfort due to coughing.
- **Treatment:**
 - Treatment typically involves antibiotics to target the specific bacteria causing the infection.

What are the Initiatives Related to Pneumonia?

- **India:**
 - [Social Awareness and Action to Neutralise Pneumonia Successfully \(SAANS\)](#): The aim is to reduce child mortality due to pneumonia, which contributes to around 15% of deaths of children under the age of five annually.
 - The government aims to achieve a target of reducing pneumonia deaths among children to less than three per 1,000 live births by 2025.
 - In 2014, India launched '[Integrated Action Plan for Prevention and Control of Pneumonia and Diarrhoea \(IAPPD\)](#)' to undertake collaborative efforts towards prevention of diarrhoea and Pneumonia related under-five deaths.
- **Global:**
 - The [World Health Organisation](#) and [United Nations Children's Fund \(UNICEF\)](#) had launched an integrated Global Action Plan for Pneumonia and Diarrhoea (GAPPD) with the objective of eliminating preventable childhood deaths from pneumonia and diarrhoea by 2025.

Power from Pressure: Understanding Piezoelectricity

[Piezoelectricity](#) is a fascinating process where certain materials, like [quartz](#) and [lead zirconate titanate \(PZT\)](#), create electric charges when they are **squeezed or stressed**.

- This happens because the **atoms in these materials get unevenly charged when pressure is applied**, leading to a small electric current.
 - Some materials can even turn **electric currents into physical movements**. These materials are widely used in devices like **sensors and accelerometers** because they are great at turning mechanical signals into electrical ones.
 - This effect is what made **quartz watches so popular and affordable**, as they use this technology to work.
- The name "**piezoelectric**" comes from Greek words meaning 'to squeeze' and amber's association with static electricity.

Read more: [Piezoelectric Effect](#)

Delays in Enforcing Insider Trading Norms for Mutual Funds

A year after [mutual funds](#) were brought under **insider trading** regulations by the [Securities and Exchange Board of India \(SEBI\)](#), operational challenges and **delays in enforcement persist**, impacting the implementation of key norms.

- [Insider trading](#) is the act of buying or selling stocks or other securities of a company **based on Unpublished Price Sensitive Information (UPSII) that can affect their value**.
 - This information is **not available to the public** and gives an unfair advantage to the insiders who use it.
 - Insider trading is **illegal**, but if an insider trades their holdings and reports it properly, it is an **insider transaction, which is legal**.
- The law requires insiders to report their trades to the authorities and follow certain rules to prevent insider trading.

Read more: [Mechanism to Prevent Insider Trading](#)

The Booker Prize 2023

Irish author Paul Lynch wins the 2023 [Booker Prize](#) for his novel 'Prophet Song'.

- The Booker Prize is the leading **literary award in the English-speaking world**.
- Each year, the prize is awarded to what is, in the opinion of the judges, the best-sustained **work of fiction** written in English and **published in the United Kingdom and Ireland**.
- The winner receives GBP 50,000 as well as the GBP 2,500 awarded to each of the six shortlisted authors.



Read more: ['Tomb of Sand' won International Booker Prize](#)

15 years of 26/11

India paid homage to the victims who lost their lives in the tragic acts of terrorism carried out 15 years back on [26th November, 2008 in Mumbai](#). The assailants belonged to the militant outfit, **Lashkar-e-Taiba**.

- **Indian Army Major Sandeep Unnikrishnan**, a member of the elite **National Security Guard (NSG)**, valiantly led efforts at the Taj Palace Hotel, successfully evacuating more than 50 hostages amid intense gunfire.
 - He made the ultimate sacrifice, losing his life while protecting numerous individuals from the terrorists' onslaught.
- **ASI Tukaram Omble**, in an extraordinary display of duty, **apprehended Lashkar terrorist Ajmal Kasab** despite sustaining over 40 gunshot wounds, unraveling critical details about Pakistan's terror scheme.
- In the aftermath of the 26/11 attacks in Mumbai, India, the [National Investigation Agency](#)

(NIA) was established in India.

Read more: [Cross-Border Terrorism](#)

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