Land Subsidence in Chenab Valley

For Prelims: Land subsidence, Himalayas, Earthquakes, Landslides, Joshimath, Land Subsidence

For Mains: Reasons for Land subsidence, and Measures and Recommendations.

Source: DTE

Why in News?

Recently, there were reports of Land subsidence in different parts of the **Chenab Valley,** especially in the Ramban, Kishtwar, and Doda districts, which led to destruction of several houses.

- Earlier, landslides were common during rain and snowfall in the region. However, there has been frequent occurrence of **land subsidence** in the last 10 to 15 years.

What is Land Subsidence?

- **About:**
  - According to the **National Oceanic and Atmospheric Administration (NOAA)**, Land subsidence is sinking off the ground because of underground material movement.
    - It can happen for many reasons, man-made or natural, such as the removal of water, oil, or natural resources, along with mining activities. Earthquakes, soil erosion, and soil compaction are also some of the well-known causes of subsidence.
    - It can happen over very large areas like whole states or provinces, or very small areas.
- **Causes:**
  - **Overexploitation of Underground Resources**: Extraction of resources like Water, Natural gas and Oil leads **to decreased pore pressure** and increased effective stress, causing ground subsidence.
    - Over 80% of the world's extracted water is used for irrigation and agricultural purposes, contributing to ground subsidence.
  - **Extraction of Solid Minerals:** Exploitation of **underground solid mineral** resources leads to **formation** of large empty space **underground (goaf),** which can lead to the ground sinking or subsiding.
    - Mining activities, such as coal mining, can lead to the formation of goaf areas, which contribute to ground subsidence.
  - **Load Exerted on Ground:**
    - The construction of tall buildings and heavy infrastructure can exert significant pressure on the ground, leading to soil deformation and subsidence over time.
    - **Soil creep is the slow, gradual movement of soil** downhill due to gravity and can contribute to ground subsidence over time.
  - **Soil Creeps**: Continuous **low load and soil creep can cause slow deformation** of the foundation, contributing to ground subsidence.
- **Examples:**
  - **Jakarta, Indonesia**: It is experiencing severe land subsidence (25 cm/year) due to

excessive groundwater extraction.
    - **Netherlands**: Land subsidence has been a major **problem due to the extraction of natural gas** from underground reservoirs.

What are the Reasons for Land Subsidence in the Chenab Region?

- **Geological Factors**: Region has the presence of **soft sedimentary deposits** and **alluvial soils,** which contributes to land subsidence.
    - These materials are **prone to compaction** under the weight of overlying structures and the influence of external forces such as groundwater extraction.
- **Unplanned Constructions and Urbanization:**
    - Urbanisation and unplanned construction in hilly regions put immense pressure on the land.
    - The Himalayan **foothills** have witnessed rapid development, leading to land subsidence.
- **Hydroelectric Projects:**
    - Construction of **hydroelectric stations** can alter the natural flow of water and impact the stability of the land.
        - **Eg: Joshimath**, a popular town for tourists, faces subsidence due to its proximity to a hydroelectric station.
- **Poor Drainage Systems:**
    - Inadequate drainage systems in the **Chenab region** can worsen land subsidence through waterlogging, increased groundwater levels, soil erosion, saltwater intrusion, and infrastructure damage.
- **Geological Vulnerability:**
    - Scattered rocks in the area are covered with old landslide debris comprising boulders, gneissic rocks, and loose soil, with a low bearing capacity.
    - These gneissic rocks are highly weathered and have a low cohesive value with a tendency of high pore pressure when saturated with water, especially during monsoons.

Joshimath Land Subsidence

- Earlier, Joshimath in Chamoli district in Uttarakhand faced a series of landslides and floods.
- Certain areas of Joshimath were **gradually "sinking" due to a combination** of human activities and natural causes.
- The experts propose the **cause of the land subsidence** to unregulated construction, high population density, disruption of natural water flow, and activities related to hydropower.

Way Forward

- **Sustainable and Regional Development Plan:**
    - When developing the Himalayas, it is essential to prioritise the preservation of the environment.
    - The strategy should focus on utilising the region's natural resources, including forests, water, biodiversity, and ecotourism, in a responsible and sustainable manner.
    - Implementing **efficient water management practices,** such as rainwater harvesting and water recycling, can help reduce excessive groundwater extraction and alleviate subsidence.
- **Continuous Seismic Monitoring and Early Warning Systems:**
    - Setting up monitoring networks to track ground movements and **seismic activity** can provide early warning of potential subsidence and earthquake-related hazards.
    - Continuous monitoring of the region must be done using **satellite technology** and ground-level scientific studies.
- **Regulating Mining and Resource Extraction:**
    - Enforcing strict regulations on mining activities and resource extraction to prevent the creation of voids underground can mitigate land subsidence risks.
- **Climate Change Mitigation:**

- Taking measures to address climate change, such as reducing greenhouse gas emissions and promoting sustainable practices, can slow down glacial melting and mitigate associated subsidence.

Mishra Committee Report of 1976 Regarding Joshimath Crisis

- In 1976, a committee was established to investigate the causes of the sinking phenomenon in Joshimath. The committee put forth several recommendations.
- **Imposition of Restrictions on Heavy Construction:**
  - Construction should only be allowed after examining the load-bearing capacity of the soil and the stability of the site, and restrictions should also be imposed on the excavation of slopes.
- **Keeping the Boulders:**
  - In the landslide areas, stones and boulders should not be removed from the bottom of the hill as it would remove toe support, increasing the possibility of landslides.
- **Conserving of Trees:**
  - It has also advised against cutting trees in the landslide zone. Extensive plantation work should be undertaken in the area to conserve soil and water resources.
- **Preventing Water Seepage:**
  - To prevent any more landslides in the future, the seepage of open rainwater must be stopped by the construction of a pucca drainage system.
- **River Training:**
  - The construction of structures to guide the river's flow should be carried out. Hanging boulders on the foothills should be provided with appropriate support.

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Drishti Mains Question:

Discuss the causes and consequences of land subsidence in the Himalayan region. How can effective land-use planning and sustainable water management practices mitigate the risks associated with this phenomenon?

UPSC Civil Services Examination Previous Year Questions (PYQs)

Prelims:

Q.1 Which one of the following ancient towns is well known for its elaborate system of water harvesting and management by building a series of dams and channelizing water into connected reservoirs? (2021)

(a) Dholavira
(b) Kalibangan
(c) Rakhigarhi
(d) Ropar

Ans: (a)

Q.2 With reference to 'Water Credit', consider the following statements: (2021)

1. It puts microfinance tools to work in the water and sanitation sector.
2. It is a global initiative launched under the aegis of the World Health Organization and the World Bank.
3. It aims to enable the poor people to meet their water needs without depending on subsidies.

Which of the statements given above are correct?

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

Ans: (c)

Mains:

Q. Bring out the causes for more frequent landslides in the Himalayas than in Western Ghats. **(2013)**

Q. Describe the various causes and the effects of landslides. Mention the important components of the National Landslide Risk Management Strategy. **(2021)**

Indian Schools of Philosophy (Part I)

INDIAN SCHOOLS OF PHILOSOPHY (ORTHODOX)

Indian Philosophy refers to traditions of philosophical thought, originated in the Indian subcontinent. It is divided into 2 schools of thought: Orthodox and Heterodox

Orthodox school believed that Vedas were the supreme revered scriptures that hold the secrets to salvation.

Samkhya School

- Founded by Kapil Muni.
- Oldest school of philosophy.
- Postulates that reality stems from purusha (self, soul or mind) and prakriti (matter, creative agency, energy).
- **It went through two phases of development:**
  - Original Samkhya (Materialistic Philosophy)
  - New Samkhya (Spiritual Philosophy)

Yoga School (Union of two major entities)

- Founded by Patanjali.
- Humans can achieve salvation by combining meditation and physical yogic techniques.

Means of Achieving Freedom	*Ways of Achieving*
Yama	Practicing self-control
Niyama	Observation of the rules governing one's life
Pratyahara	Choosing an object
Dharna	Fixing the mind (over the chosen object)
Dhyana	Concentrating on the (above-mentioned) chosen object
Samadhi	It is the merging of the mind and the object and that leads to the final dissolution of the self

Nyaya School

- Founded by Gautama rishi.
- Everything should be in accordance with reason and experience.
- **Means of Attaining Knowledge:** perception, inference, comparison, and verbal testimony.

Vaisheshika School

- Founded by Kanada rishi.
- Everything is created by fire, air, water, earth and ether (sky).
- Developed atomic theory (all material objects are made of atoms).
- **Reliance:**
  - God is the guiding principle.
  - Laws of Karma guide this universe.

Mimamsa School/ Purva Mimamsa

- Founded by Kanada rishi.
- Vedas are eternal and possess all knowledge.
- Religion means the fulfilment of duties prescribed by the Vedas.

Vedanta School (End of the Vedas/Upanishads)

- Philosophical teachings of the Upanishads (mystic/spiritual contemplations within Vedas).
- **Sub-schools:**
  - Advaita (Adi Shankara): Both the individual self (Atman) and Brahman are same.
  - Visishtadvaita (Ramanuja): All diversity is subsumed to a unified whole.
  - Dvaita (Madhvacharya): Brahman and Atman as 2 different entities.
    - Bhakti is route to salvation.
  - Dvaitadvaita (Nimbarka): Brahman is the highest reality.
  - Shuddhadvaita (Vallabhacharya): God and the individual self are the same.
  - Achintya Bheda Abheda (Chaitanya Mahaprabhu): Individual self (Jīvatman) is both different and not different from Brahman.

Drishti IAS

[Read More...]

Carbon Farming: A Path to Sustainable Agriculture

For Prelims:**Carbon farming**, **Carbon sequestration**, **Agricultural Emissions**, **GHG Emissions**, **UNFCCC**, **Carbon credits**, **Carbon Banks**, **Paris Climate Conference**, **4 per 1000 initiative**, **Net zero emissions**

For Mains: Agricultural emissions, **Carbon farming - significance,Measures that can be taken to encourage carbon farming, Carbon as a cash crop for farmers.**

Source: TH

Why in News?

Recently, **carbon farming** has emerged as a promising approach to sustainable agriculture.

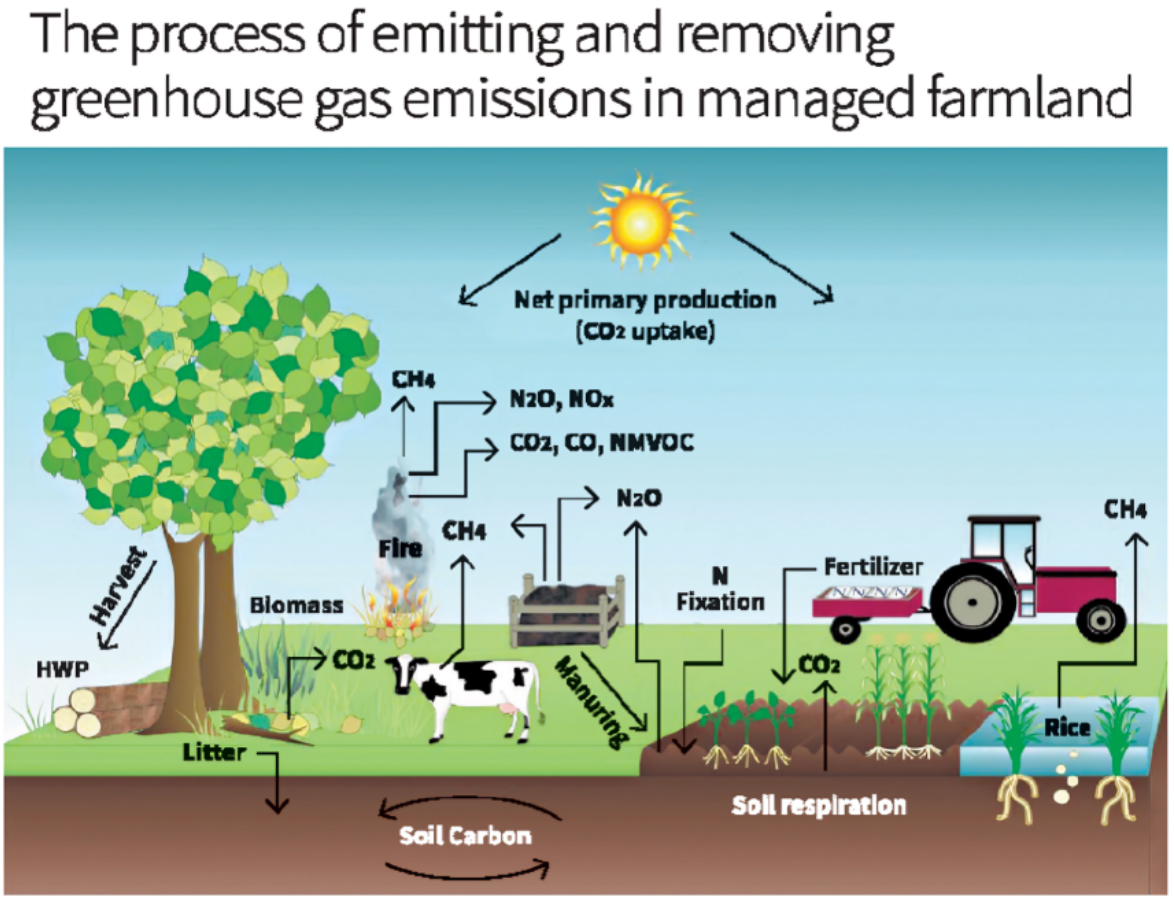
- It **integrates regenerative farming methods** aimed at enhancing soil health and agricultural yield while also **addressing the challenges of climate change**.

What is Carbon Farming?

- **About:**
    - Carbon farming is an approach to agriculture that focuses on **managing agricultural and forestry practices** to increase **carbon sequestration** (the capture and storage of atmospheric carbon dioxide) and reduce greenhouse **gas emissions**.
        - It aims to **mitigate climate change** by enhancing carbon storage in soil and vegetation, improving soil health, and reducing the **carbon footprint** of agricultural activities.
- **Need for Carbon Farming:**
    - **Atmospheric CO_2 Buildup:** There is an alarming rise in atmospheric **carbon dioxide levels**, a major driver of climate change.
        - Carbon farming practices can help in drawing CO_2 out of the atmosphere and storing it for long periods.
    - **Carbon Sequestration Potential:** Research published in Nature Climate Change emphasises the potential of agricultural soils to act as significant carbon sinks, effectively removing CO_2 from the atmosphere.
        - Carbon farming practices directly enhance this potential by **creating ideal conditions** for increased **carbon sequestration**.
    - **Soil Degradation**: There is a critical issue of soil degradation due to conventional farming practices. This degradation reduces the ability of soil to store carbon.
        - Carbon farming practices, such as **cover cropping and reduced** tillage, promote healthy soil biology and organic matter content, which significantly **increases the soil's capacity** to capture and store carbon.
    - **Regenerative Practices:** Carbon farming practices like compost application can improve soil health, fertility, and overall agricultural productivity.
        - These practices address soil degradation and create a **natural system** that actively pulls down atmospheric CO_2, contributing to climate change mitigation.
- **Types of Carbon Farming Practices:** These practice help in improved soil health, increased biodiversity, reduced need for chemicals, reduces methane emissions, increases carbon storage in

pastures etc.

Practice	Description
Rotational Grazing	Planned movement of livestock between pastures
Agroforestry	Integrating trees and shrubs into agriculture
Conservation Agriculture	Practices like zero tillage, crop rotation, cover cropping
Integrated Nutrient Management	Focuses on organic fertilizers and compost
Agro-ecology	Integrates ecological principles into agriculture
Livestock Management	Strategies like rotational grazing and improved feed quality
Land Restoration	Practices like reforestation and wetland restoration



Best Practices Worldwide

- Efforts such as the **Chicago Climate Exchange** and **Australia's Carbon Farming Initiative** incentivize **carbon mitigation** in agriculture through practices like **no-till farming**, reforestation, and pollution reduction.
- **Kenya's Agricultural Carbon Project**, backed by the World Bank, showcases how carbon farming can help economically developing nations tackle climate change, enhance food security, and adapt to its impacts.
- The initiation of the **'4 per 1000' initiative** during the **2015 COP21** climate talks in Paris underscores the specific importance of sinks in reducing greenhouse gas emissions.

What are the Challenges Associated with Carbon Farming?

- **Standardisation and Certification:** A report by the **Food and Agriculture Organization (FAO)** highlights the **lack of standardised methodologies** for measuring carbon sequestration in agricultural soils.
    - This makes it difficult **to verify** carbon credits generated through carbon farming practices.
- **Lack of Awareness and Extension Services:** A report by the Government of India's **NITI Aayog** highlights the **limited awareness** among Indian farmers about carbon farming practices and their benefits.
- **Small Landholdings and Short-Term Focus:** There is the dominance of **small and fragmented landholdings** in India. This can make large-scale implementation of carbon farming practices more challenging.
- **Policy and Regulatory Frameworks:** A report by the **Confederation of Indian Industry (CII)** emphasises the **need for robust policy and regulatory frameworks** to incentivize carbon farming practices in India.

- **Financial Incentives and Market Access:** A research paper published by the Indian Council for Research on International Economic Relations (ICRIER) underlines the importance of **providing financial incentives** like subsidies or carbon credit schemes to encourage farmer adoption of carbon farming practices.
    - Limited access to carbon markets also poses a challenge.
- **Other Challenges:**
    - **Hot and Dry Areas:** Limited water availability **restricts plant growth** and carbon sequestration potential.
    - **Water Prioritization:** Water scarcity for drinking and washing needs limits agricultural practices.
    - **Challenges with Cover Cropping:** Additional water demand may make practices like **cover cropping unviable**.
    - **Plant Selection:** Not all plant species are **equally effective at trapping** and storing carbon, especially in arid environments.

Way Forward

- **Climate Change and Agriculture:** Climate-resilient and emission-reducing agricultural practices can benefit from adaptation strategies.
    - Agriculture plays a crucial role in mitigating climate change.
- **Viability of Organic Farming in India:** Grassroots initiatives and agrarian research in India demonstrate the viability of **organic farming** for carbon sequestration.
- **Economic Potential of Agro-ecological Practices:** Agro-ecological practices in India have the potential to generate USD 63 billion from about 170 million hectares of arable land.
    - Farmers could receive an annual payment of around ₹5,000-6,000 per acre for providing climate services through sustainable agricultural practices.
- **Regional Suitability for Carbon Farming:** Regions like the **Indo-Gangetic plains** and the Deccan Plateau are well-suited for carbon farming.
    - The mountainous terrain of the Himalayan region and coastal areas face challenges like **salinisation** and limited resources, limiting the adoption of traditional farming practices. Therefore, these areas can be **utilised for carbon farming** after **capacity building**.
- **Role of Carbon Credit Systems:** Carbon credit systems can incentivise farmers by providing additional income through environmental services.
    - Agricultural soils have the capacity to absorb 3-8 billion tonnes of CO_2-equivalent annually over 20-30 years, bridging the gap between feasible emissions reductions and climate stabilization.

Drishti Mains Question:

Q. Explain the concept of carbon farming and discuss its potential in mitigating climate change. How can carbon farming be integrated into agricultural practices in India? What are the challenges and opportunities associated with promoting carbon farming?

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims:

Q. What is blue carbon? (2021)

(a) Carbon captured by oceans and coastal ecosystems

(b) Carton sequestered in forest biomass and agricultural soils

(c) Carbon contained in petroleum and natural gas

(d) Carbon present in atmosphere

Ans: (a)

Q. Which of the following statements best describes "carbon fertilisation"? (2018)

(a) Increased plant growth due to increased concentration of carbon dioxide in the atmosphere.

(b) Increased temperature of Earth due to increased concentration of carbon dioxide in the atmosphere.

(c) Increased acidity of oceans as a result of increased concentration of carbon dioxide in the atmosphere.

(d) Adaptation of all living beings on Earth to the climate change brought about by the increased concentration of carbon dioxide in the atmosphere.

Ans: (a)

Q. Which one of the following statements best the term 'Social Cost of Carbon'? (2020)

It is a measure, in monetary value, of the -

(a) long-term damage done by a tonne of CO_2 emissions in a given year.

(b) requirement of fossil fuels for a country to provide goods and services to its citizens, based on the burning of those fuels.

(c) efforts put in by a climate refugee to adapt to live in a new place.

(d) contribution of an individual person to the carbon footprint on the planet Earth.

Ans: (a)

Mains:

Q. What are the present challenges before crop diversification? How do emerging technologies provide an opportunity for crop diversification. **(2021)**

Chocolate Industry Meltdown

For Prelims: El Niño, Heat waves, Climate change, **Cocoa Cultivation , International Cocoa Organisation (ICCO)**

For Mains: Impact of Climate change on Chocolate Industry, Significance of Policy Development for Cocoa Production in India

Source: IE

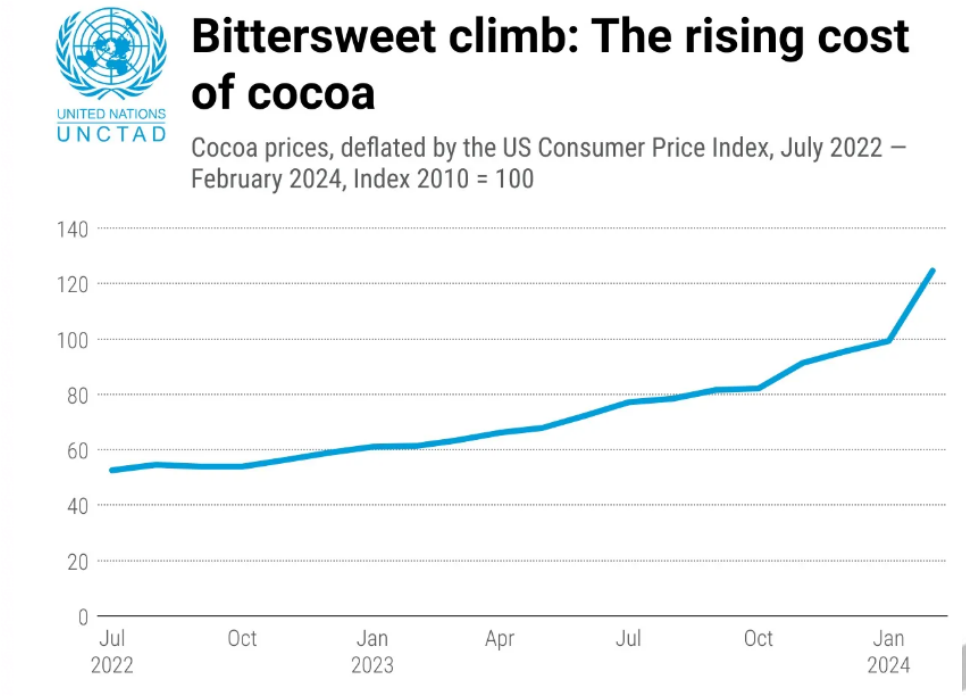
Why in News?

The **chocolate industry** is facing a **crisis as the price of cocoa beans surges**, reaching a record USD 12,000 per tonne in April 2024.

- This surge, nearly four times the price in 2023, has sparked concerns and drawn attention to the underlying causes behind the upheaval.

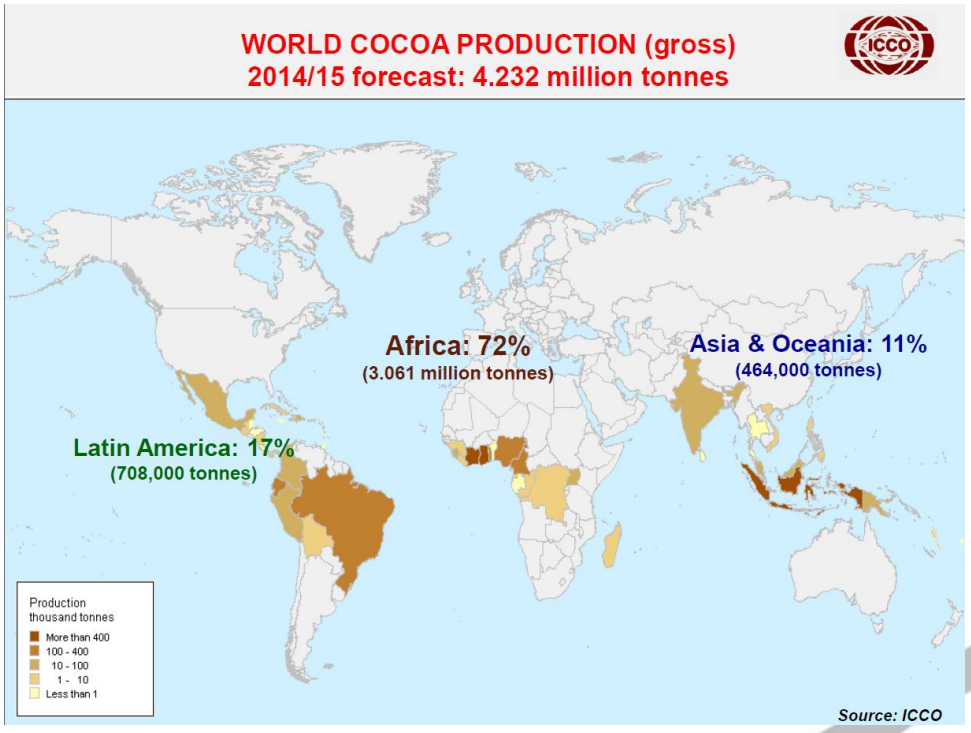
What are the Reasons Behind the Rising Prices of Cocoa?

- **El Nino and Climate Change:**
    - The immediate reason for the ongoing crisis is the **bad harvest season in** West African countries **Ghana and Ivory Coast**, where 60% of the world's cocoa beans come from.
    - The development of **El Niño,** a weather pattern that refers to an abnormal warming of surface waters in the **equatorial Pacific Ocean**, led to **heavier-than-usual rainfalls in West Africa**, creating an ideal ground for the spread of **black pod disease**, which causes cocoa pods to rot on the branches of cocoa trees.
- **Climate change** is also a driving factor, with Heat waves, droughts, and heavy rainfalls further threatening cocoa production, posing long-term challenges for farmers and chocolate manufacturers alike.
- **Low Income for Cocoa Farmers:**
    - The underlying issue is that the big chocolate companies **do not pay enough to the cocoa farmers in West Africa,** who earn on average as little as less than USD 1.25 a day, which is well below the United Nations' absolute poverty line of USD 2.15 per day**.**
    - Farmers are **not able to invest in land to increase yield or build resilience against climate change** due to the lack of funds, leading to the use of slave and child labour, and the selling off of land to illegal gold miners.
        - As a result, the farmers continue to live in poverty, unable to invest in their land or adopt sustainable practices, **leading to decline in production and price surge.**
    - Despite the **huge profits made by the chocolate companies, they have not done much to help raise farmers' income**, contributing to the long-term exploitation of farmers and potentially leading to **higher chocolate prices for consumers in the long run.**
- **Potential Consequences of the Ongoing Crisis:**
    - The **International Cocoa Organisation (ICCO)** predicts a global shortfall of about 374,000 tonnes for the 2023-2024 season, exacerbating the scarcity of cocoa beans and driving up chocolate prices.
        - ICCO is an **intergovernmental organisation established in 1973 under the** United Nations.
        - Based in **Abidjan, Ivory Coast**, ICCO was created to implement the **first International Cocoa Agreement negotiated in Geneva** at a **United Nations International Cocoa Conference**.
    - The scarcity of cocoa beans is likely to persist, leading to further exploitation of farmers and a rise in chocolate prices.
    - Experts believe that the prominent chocolate companies have the room to redistribute wealth down the supply chain, but unless they do so, the situation is unlikely to improve.



Cocoa Cultivation Requirements

- **Altitude and Rainfall:** Cocoa can be grown up to **300 m above mean sea level**. It requires a **minimum of 90-100 mm rainfall per month** with an annual rainfall of 1500-2000 mm.
- **Temperature and Soil Conditions:** Cocoa prefers **warm and consistent temperatures**, the temperature range of 15°- 39°C with an optimum of 25°C is considered ideal.
    - Cocoa requires deep and well-drained soils. Poorly drained soil affects the growth of plants. The majority of the area under Cocoa cultivation is on **clay loam and sandy loam soil. It grows well in the pH range of 6.5 to 7.0.**
- **Agroforestry:** Cocoa trees **thrive under shade and are often grown under the canopy of taller trees**. This agroforestry practice not only helps in maintaining the required microclimate but also supports biodiversity.
- **Cocoa Production in India:**
    - Cocoa is best cultivated in coconut and **areca nut** gardens in India, where **30-50% of sunlight can be intercepted by cocoa under the areca nut canopy**.
    - In India, it is mainly cultivated in **Andhra Pradesh, Karnataka, Kerala and Tamil Nadu** mainly as intercrop with Arecanut and Coconut.
    - **National Horticulture Mission** provides a subsidy of Rs 20,000 per hectare to cocoa farmers in Andhra Pradesh for the first three years.
    - **Central Plantation Crops Research Institute** Conducts systematic cocoa improvement programs with germplasm introductions.



Drishti Mains Question:

How does climate change exacerbate challenges for cocoa farmers, and what are the implications on the chocolate industry?

UPSC Civil Services Examination Previous Year Questions (PYQs)

Prelims:

Q. Aspartame is an artificial sweetener sold in the market. It consists of amino acids and provides calories like other amino acids. Yet, it is used as a low-calorie sweetening agent in food items. What is the basis of this use? (2011)

(a) Aspartame is as sweet as table sugar, but unlike table sugar, it is not readily oxidized in human body due to lack of requisite enzymes

(b) When aspartame is used in food processing, the sweet taste remains, but it becomes resistant to oxidation

(c) Aspartame is as sweet as sugar, but after ingestion into the body, it is converted into metabolites that yield no calories

(d) Aspartame is several times sweeter than table sugar, hence food items made with small quantities of aspartame yield fewer calories on oxidation

Ans: (d)

Failure of Market-Based Approaches to Forest Conservation

For Prelims: Forest conservation, Payments for Ecosystem Services (PES), carbon emissions, Greenwashing

For Mains: Analysis of Market-Based Approaches to Forest Conservation.

Source: BT

Why in News?

Recently, a major scientific review by the **International Union of Forest Research Organizations (IUFRO)** found that **market-based approaches to** forest conservation, such as carbon offsets and deforestation-free certification schemes, have largely failed to protect trees or alleviate poverty.

What are the Key Findings of Recent Study?

- The global study, done in 120 countries, concluded that **trade and finance-driven initiatives** had made "**limited" progress** in **halting** deforestation and in some cases worsened economic inequality.
- The report suggests a **"radical rethink"** of **market-based approaches as** poverty and forest loss persist across different regions globally where market mechanisms have been the main policy option for decades.
- It also provides examples from the **Democratic Republic of Congo, Malaysia, and Ghana** where **market-based projects failed to benefit local communities** or halt deforestation.
- There is a **rise in complex and overlapping market-based schemes** "with financial actors and shareholders more often interested in short-term profits than long-term just and sustainable forest governance".
- Study raises **concerns** about **wealthy nations' green trade policies,** arguing they might have **negative consequences for developing countries** without proper implementation.
- The report is planned to be presented at a high-level UN forum, emphasising the significance of its findings and recommendations for policymakers and stakeholders in the field of forest conservation.

What are the Market-Based Approaches to Forest Conservation?

- **About:**
  - Traditionally, forest conservation relied on regulations and government intervention.
  - **Market-based approaches** put a value on the environmental benefits of forests and create mechanisms for people to profit from protecting them.
  - It aims to **create a market** where **sustainable practices** become more attractive than deforestation.
- **Examples of Market-Based Approaches:**
  - **Carbon Offsets**: Companies that produce carbon emissions can invest in projects that protect forests, which absorb carbon dioxide. This allows them to offset their emissions footprint.
  - Payments for Ecosystem Services (PES): Landowners who manage their forests in a sustainable way can receive payments from governments, NGOs, or businesses for the environmental services their forests provide, such as clean water or biodiversity habitat.
  - **Deforestation-Free Certification**: This involves independent verification that products come from sustainably managed forests, allowing consumers to choose forest-friendly options.

What are the Impacts of Market-Based Approaches (MBAs) to Forest Conservation?

- **Positives:**

    - **Incentivise Conservation**: It **creates economic value** for keeping forests standing. This can motivate landowners who might otherwise see profit in logging and forest conservation.
        - **Example: Carbon offsets** provide **income for communities** protecting forests that absorb carbon dioxide, a valuable service in combating climate change.
    - **Market Efficiency:** It is **more efficient** than traditional regulations. They allow the market to find the most cost-effective ways to achieve conservation goals.
        - **Example:** Payments for Ecosystem Services (PES) programs can direct resources towards landowners who can demonstrably provide the most significant ecological benefits.
    - **Promote Sustainable Practices**: It encourages long-term forest management by rewarding sustainable practices over deforestation.
        - **Example: Deforestation-free certification schemes** give **consumers the power to choose products** that promote responsible forestry, creating market pressure for sustainable practices.
- **Negatives :**
    - **Unequal Benefits:** It can **increase existing inequalities.** Wealthy companies or landowners might benefit more readily, while poorer communities struggle to participate effectively.
        - **For example: Complexities in carbon offset markets** can leave some local communities out of the loop, limiting their ability to profit from forest conservation.
    - **Monitoring Challenges:** Ensuring projects deliver real conservation benefits **requires robust monitoring**. Weak monitoring can lead to "greenwashing" where projects appear beneficial but have little actual impact.
        - **Example: PES programs need clear baselines** to measure improvements in forest health and effective verification to prevent fraudulent claims of conservation efforts.
    - **Uncertain Long-Term Impact:** The long-term effectiveness of MBAs is still being evaluated.
        - Recent study by **International Union of Forest Research Organizations (IUFRO)** found that market-based approaches to forest conservation, such as carbon offsets and deforestation-free certification schemes, have largely failed to protect trees or alleviate poverty.

Greenwashing:

- Greenwashing is a **deceptive practice** where companies or even governments exaggerate their actions and their **impact on mitigating climate change, often providing misleading information** or making unverifiable claims.
- It is an attempt to **capitalise on the growing demand** for environmentally sound products.
- It is fairly widespread, and **entities often label various activities** as climate-friendly without verifiable evidence, undermining genuine efforts against climate change.

Way Forward

- **Empowering local communities** through **land tenure rights, capacity building,** and ensuring their participation in decision-making processes can create a strong foundation for sustainable forest management.
- **Clear regulations and robust enforcement** alongside MBAs can help prevent deforestation and ensure sustainable practices.
- Designing market-based approaches to forest conservation with **equitable benefit-sharing mechanisms** that prioritise local communities and alleviate poverty is crucial.
- Investing in effective monitoring systems and **ensuring transparency in project implementation** can prevent greenwashing and ensure genuine conservation outcomes.

Conclusion

Market-based approaches can be a valuable tool in forest conservation, but they must be implemented with caution and alongside other strategies. The IUFRO study serves as a wake-up call to prioritize community-driven solutions, strengthen regulations, and promote equity. By adopting a more holistic approach, we can ensure the long-term protection of our vital forests and the well-being of the communities who depend on them.

Drishti Mains Question:

Q. Analyze the market-based approaches to forest conservation in the context of recent studies.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims:

Q. Regarding "carbon credits", which one of the following statements is not correct? (2011)

(a) The carbon credit system was ratified in conjunction with the Kyoto Protocol

(b) Carbon credits are awarded to countries or groups that have reduced greenhouse gases below their emission quota

(c) The goal of the carbon credit system is to limit the increase of carbon dioxide emission

(d) Carbon credits are traded at a price fixed from time to time by the United Nations Environment Programme.

Ans: (d)

Mains:

Q. Should the pursuit of carbon credits and clean development mechanisms set up under UNFCCC be maintained even though there has been a massive slide in the value of a carbon credit? Discuss with respect to India's energy needs for economic growth. **(2014)**

West Nile Fever

Source: TH

Why in News?

The detection of West Nile fever in 3 Kerala districts has prompted health authorities to issue alerts and intensify preventive measures.

What is West Nile Fever?

- **About:**
  - It is caused by the **West Nile virus (WNV),** a single-stranded RNA virus that is

transmitted to humans through the bite of an infected mosquito (*Mosquitoes of the genus Culex* are generally considered the principal vectors of WNV) and Birds serve as reservoir hosts.
        - The virus is a member of the **Flaviviridae family and the flavivirus genus.**
    - The virus is commonly found in Africa, Europe, the Middle East, North America, and West Asia.
    - It was first isolated in a woman in the West Nile district of Uganda in 1937. It was identified in birds in the **Nile Delta region in 1953,** according to the World Health Organization.
- **Transmission:**
    - Mosquitoes become infected when they feed on infected birds, subsequently transmitting the **virus to humans and animals through bites.**
    - The virus may also be transmitted through **contact with other infected animals, their blood, or other tissues.**
    - Rare cases of transmission through organ transplant, blood transfusions, and transplacental transmission.
    - **No human-to-human transmission of WNV through casual contact has been documented.**
- **Symptoms:**
    - Asymptomatic in about 80% of cases.
    - Symptoms of West Nile fever include **fever, headache, tiredness, body aches, nausea, vomiting, and skin rash.**
    - Severe cases may lead to neurological symptoms such as **neck stiffness, stupor, coma, tremors, convulsions, muscle weakness, and paralysis.**
- **Treatment**
    - Supportive care for neuro-invasive cases involves hospitalization, intravenous fluids, and respiratory support.
    - **No vaccine is available for humans.**
- **India's Initiatives:**
    - National Vector-Borne Disease Control Programme.
    - Integrated Vector Management (IVM).
    - National Framework for Malaria Elimination.

UPSC Civil Services Examination, Previous Year Question

Prelims

Q. Consider the following statements: (2017)

1. In tropical regions, Zika virus disease is transmitted by the same mosquito that transmits dengue.
2. Sexual transmission of Zika virus disease is possible.

Which of the statements given above is/are correct?

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans: (c)

Q. 'Wolbachia method' is sometimes talked about with reference to which one of the following? (2023)

(a) Controlling the viral diseases spread by mosquitoes
(b) Converting crop residues into packing material
(c) Producing biodegradable plastics
(d) Producing biochar from thermo-chemical conversion of biomass

Ans: (a)

Booker Prize’s Link to Slavery

Why in News?

The **Booker Prize,** one of the most prestigious awards in the literary world, has recently come under criticism for the historical links to **slavery** of its original sponsor, Booker Group.

- It's claimed that during the **early 1800s, George and Josias Booker,** the founders of the company, reportedly **enslaved close to 200 individuals.**

What are the Key Facts About the Booker Prize?

- The prize was established in **1969** by **Tom Maschler** and **Graham C. Greene.**
- The Booker Prize is **awarded annually** to the author of the best eligible work of long-form fiction, written **originally in English** by an author of **any nationality,** and **published in the UK and/or Ireland.**
    - **The International Booker Prize** is a separate award for **translated works** into English.
- The winner of the Booker Prize receives a cash award of **50,000 Pounds**. Additionally, each of the shortlisted authors is awarded 2,500 Pounds.
    - Irish author **Paul Lynch** has won the 2023 Booker Prize for his novel ‘Prophet Song'.

How Booker is Linked to Slavery and Indentured Labour?

- **Britain** gained control of **Guyana** through the **Treaty of Paris in 1815.**
    - **Guyana** is a country in **South America** bordered by Suriname to the east, Brazil to the south, and Venezuela to the west.
    - Its economy was driven by the **sugar and cotton industries,** with **African slaves** providing labour in plantations.
    - The use o**f African slaves** in British Guyana reflects the history of slavery in the region during the 19th century.
- The **Booker Brothers Josias & George** were involved in the exploitative slave-based economy of British Guyana. In a cotton plantation, **they enslaved nearly 200 people**.
- After **slavery was abolished** in Guyana in **1834** and African slaves were emancipated, the **Booker brothers received compensation for 52 emancipated slaves, totalling 2,884 Pounds** (equivalent to 378,000 Pounds in 2020).
    - Bookers convinced the British government to finance voyages to collect replacement sugar workers from India.
    - This led to the **exploitation of Indian workers who faced debt and unemployment** due to the East India Company's policies and were sent to Guyana by the East India Company.
- **The indentured labour system** lasted till about the 1920s, leading to a significant migration of labourers from India to Guyana.
    - **People of Indian origin** are now the **single largest ethnic group in Guyana** due to the scale of migration.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Which one of the following pairs is correctly matched? (2013)

Geographical Feature	Region
(a) Abyssinian Plateau	Arabia
(b) Atlas Mountains	North-Western Africa
(c) Guiana Highlands	South-Western Africa
(d) Okavango Basin	Patagonia

Ans: (b)

Q. In which one of the following groups are all four countries members of G20? (2020)

(a) Argentina, Mexico, South Africa and Turkey

(b) Australia, Canada, Malaysia and New Zealand

(c) Brazil, Iran, Saudi Arabia and Vietnam

(d) Indonesia, Japan, Singapore and South Korea

Ans: (a)

India Emerges as Third-Largest Solar Power Producer in 2023

Source: TH

India's remarkable ascent as the **world's third-largest producer of** solar power **in 2023** underscores a significant shift towards renewable energy sources in the global energy landscape.

- **India surpassed Japan** in solar power production in 2023, generating 113 billion units (BU) compared to Japan's 110 BU.
- China remains the leading producer of solar power globally, generating 584 BU in 2024, more than the **next four countries combined** (the United States, Japan, Germany and India).
- **India ranks fifth globally in installed power capacity,** with 73 gigawatts (GW) of solar power capacity.
- **Global solar generation in 2023 was more than six times larger than in 2015, while in India it was 17 times higher.**
    - The share of solar generation increased from 0.5% of India's electricity in 2015 to 5.8% in 2023.
- Solar power constitutes **18% of India's total installed electricity but only 6.66% of the power produced**, highlighting a gap between capacity and actual output.
- Renewables, including **solar and** wind power, **accounted for 30% of global electricity production in 2023**, with **China being the main contributor.**

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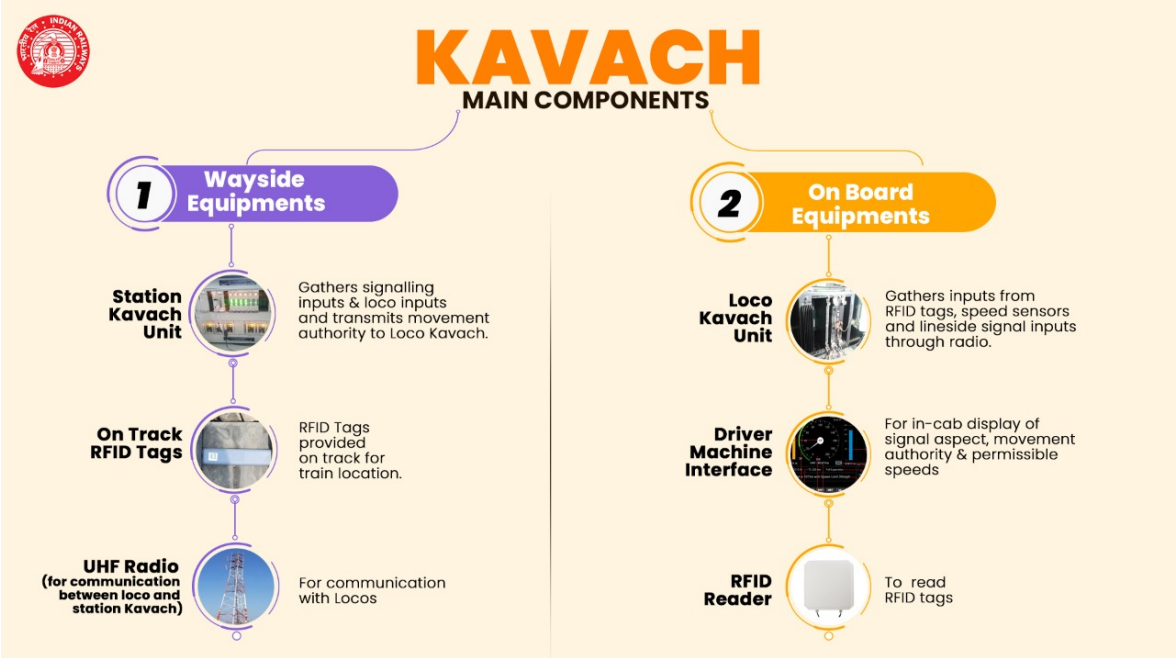
Kavach System

Source: FE

Recently, **Indian Railways** has finalised an agreement with **RailTel Corporation of India Limited and Quadrant Future Tek Limited** to expedite the rollout of the KAVACH train collision avoidance system, both domestically and internationally.

- Kavach was developed by the Research Design and Standards Organisation (RDSO) in association with three Indian vendors and serves as a cab signalling train control system with anti-collision capabilities
- It has been designated as India's **National Automatic Train Protection (ATP)** System and meets Safety Integrity Level-4 (SIL-4) standards.
    - ATP systems are safety mechanisms that monitor a train's speed to ensure it aligns with permitted speeds set by signals. If the train exceeds these limits, **ATP triggers emergency brakes** to halt the train.
- Additionally, the system transmits **emergency SoS messages** and offers centralised live monitoring of train movements through the Network Monitor System.
- The Indian Railways Institute of Signal Engineering & Telecommunications (IRISET) in Secunderabad, Telangana, serves as the '**Centre of Excellence**' for Kavach.



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Kalesar Wildlife Sanctuary

Source: Live Law

Recently, the Supreme Court **stayed the construction of four proposed dams inside** Kalesar Wildlife Sanctuary in Haryana's Yamunanagar district as the construction will not only negatively impact the **wildlife and local community but also harm the ecosystem.**

- It was established in 1988 to protect the local wildlife and biodiversity and was declared a National Park on 8th December 2003.
- It is situated in the foothills of the **Shiwalik ranges** of the Himalayas and is contiguous to Rajaji National Park (Uttarakhand) and **Simbalbara National Park (Himachal Pradesh).**
- It is spread across **13,209 acres** and is rich in biodiversity, featuring dense **sal and khair forests** and grassland patches supporting diverse plant and animal life.
- It is home to many species of animals, including **leopards, sambar deer, barking deer, hyenas, jackals, Indian porcupines, Indian pangolins, and langurs** and several species of birds, such as the red junglefowl, grey partridge, Indian peafowl, and white-throated kingfisher

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Atmosphere of a 55 Cancri e Exoplanet

Source: TOI

Scientists have recently detected a **dense atmosphere enveloping 55 Cancri e, a** super-Earth twice the size of our planet, shedding light on its unique characteristics and potential implications for

exoplanetary research.

- The atmosphere of 55 Cancri e is comprised of carbon dioxide and carbon monoxide, although exact amounts remain unclear.
    - Unlike Earth's atmosphere, which is a blend of nitrogen, oxygen, argon, and other gases, the atmosphere of 55 Cancri e is markedly different.
- The **boiling temperatures on 55 Cancri e, reaching up to 2,300°C**, make it inhospitable for life as we know it.
    - Despite its **uninhabitable conditions**, the discovery offers hope for finding other rocky planets with thick atmospheres that may be more conducive to life.
- The **55 Cancri e is an** exoplanet, located 41 light years away, has a mass eight **times that of Earth and is characterised by permanent day and night sides.**
    - It is a super-Earth, which is a unique class of planets that are **larger than Earth but lighter than ice giants like Neptune and Uranus.**
    - They can be composed of gas, rock, or a combination of both, and are typically between two to ten times the mass of Earth.
- The findings suggest that gases from **magma oceans on the planet's surface may contribute to maintaining its atmosphere.**
- Exploring **55 Cancri e could provide insights into the evolutionary processes** of Earth and Mars.

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