

CLIMATE CHANGE

❖ **Tipping points of global warming**

❖ **CONTEXT: A study has found that even at the current levels of warming in the world, several climate 'tipping points' could be crossed, setting off irreversible, catastrophic, and self-perpetuating changes.**

- While the world is worried about restricting global warming to within 1.5 degree or 2 degree Celsius, a new study has found that even the current level of average global temperatures — about 1.1 degree Celsius higher than preindustrial times — is enough to trigger catastrophic changes in several climatic systems.
- The study, published recently in Science journal, has warned that the thresholds for many of these systems could be crossed at the current levels of warming, setting off self-perpetuating changes that could put living beings at serious risk.
- The research is an updated assessment of important climate tipping points, or the thresholds beyond which changes in the earth's systems become uncontrollable and irreversible. Its findings could lead to a reassessment of global efforts to fight climate change, and are being widely discussed in scientific circles.

❖ **Tipping points**

- The discussion on climate tipping points is not new, and several studies in the past 15 years have identified different tipping points such as the disintegration of Greenland ice sheet, a spontaneous reduction in Amazon forest cover, melting of glaciers, or softening of the permanently frozen grounds in the polar regions that have large amounts of carbon trapped in them.
- Over the years, researchers have identified at least 15 tipping points, each correlated with different levels of temperature rise. The latest study has identified nine global and seven regional tipping points, and has reassessed their dynamics and correlation with global warming.

❖ **Tipping points at work**

- Rising temperatures are causing largescale changes in these climatic systems. Glacial melt, thinning of Arctic ice, rise in sea-levels are all well-documented and visible changes.
- However, it is still possible, at least theoretically, to arrest these changes, or even reverse them over time. But once the tipping points are crossed, this possibility no longer exists. It is like the dam burst moment.
- The process of change becomes self-perpetuating. It feeds into itself and accelerates the process. What is worse, it also feeds into and accelerates other linked processes.
- The Greenland ice sheet, which is already melting, is a good example to illustrate this process. As it melts, the height of the ice sheet gradually reduces. In the process, a larger part of it gets exposed to warmer air. That is because air is warmer at lower altitudes than at higher altitudes. The exposure to warmer air expedites the process of melting. Once the tipping point is crossed, this becomes a self-sustaining and cyclic system. The system does not reverse even if the global temperatures stop rising.
- Similar is the case with Amazon forests. These play a very important role in causing rains in the region. If deforestation continues unabated, there would be fewer and fewer trees, which would reduce rainfall, causing further stress on the trees. Once again, it develops into a self-perpetuating process.
- Several areas of the world remain frozen throughout the year. These are known as permafrost. Because they have remained in this state for centuries, they hold large amounts of carbon — from plants and animals that died and decomposed over the years — trapped in them. It is estimated that the permafrost layers hold as much as 1,700 billion tonnes of carbon, mainly in the form of carbon dioxide and methane. In comparison, the global emissions of carbon in a year are in the range of 40 billion tonnes.
- The softening or melting of permafrost layers is already releasing some carbon into the atmosphere. This release of carbon is adding to the warming, which in turn is expediting the process of softening of permafrost layers. This too has a tipping point beyond which it would become a self-perpetuating cycle.

❖ **New findings**

- When the discussion on tipping points had first emerged about two decades ago, most of these were considered plausible only in warming scenarios exceeding 5 degree Celsius. But more recent information, including those presented by the Intergovernmental Panel on Climate Change (IPCC), suggest that most of these tipping points would be crossed between 1 and 2 degree Celsius temperature rise.
- The latest study has presented evidence to suggest that some of these tipping points could be met even at the current levels of warming. It has shown that the present 1.1 degree Celsius warming was within the lower end of temperature ranges for at least five tipping points. It means that these self-perpetuating changes could possibly have already begun. For warming between 1.5 degree and 2 degree Celsius, six tipping points become “likely” and four more become “possible”.
- It shows that even the Paris Agreement goal of limiting warming to well below 2°C and preferably 1.5°C is not safe as 1.5°C and above risks crossing multiple tipping points. Crossing these CTPs (climate tipping points) can generate positive feedbacks that increase the likelihood of crossing other CTPs.

❖ **Policy response**

- The findings of this study are expected to further amplify the voices asking for increase in efforts to restrict global warming.
- The sixth assessment report of the IPCC released earlier 2022 had said that global emissions of greenhouse gases needed to peak by 2025, and reduce by 43 per cent from current levels by 2030, if the 1.5 degree Celsius target was to be achieved. With the current level of efforts, the world is on the path to become more than 2 degree warmer by the year 2100.
- However, it is unlikely that countries would significantly increase the ambition of their climate action in the next few years. If anything, the progress is only likely to slow down because of the impacts of the Ukraine war on the energy supply chains across the world.

POLITY

❖ **Tussle in Kerala: Can Governor dismiss a state minister?**

❖ **CONTEXT: Kerala Governor Arif Mohammed Khan, who is locked in a standoff with the elected government on a range of issues including appointments to the state-run Kerala University, threatened to sack ministers who “lowered the dignity” of Governor office.**

- A statement on Khan’s official Twitter handle said: “The CM and Council of Ministers have every right to advise the Governor. But statements of individual ministers that lower the dignity of the office of the Governor, can invite action including withdrawal of pleasure.”
- The central leadership of the CPI-M, which leads the Left Democratic Front (LDF) government, said the Constitution does not give the Governor “dictatorial powers”, and Khan’s “political bias” against the government had been “exposed”.
- There has been no occasion so far of a Governor unilaterally removing a minister from the government.

❖ **What role does the Governor play in the parliamentary system?**

- The position, role, powers, and conditions of office of the Governor are described in Articles 153-161 of the Constitution. The position of Governor is similar to that of the President at the Union.
- He is at the head of the state’s executive power, and barring some matters, acts on the advice of the council of ministers, which is responsible, in accordance with the parliamentary system, to the state legislature.
- The Governor is appointed by the President (on the advice of the central government) and, therefore, acts as the vital link between the Union and the state governments.
- The post was envisaged as being apolitical; however, the role of Governors has been a contentious issue in Centre-state relations for decades.
- The Governor enjoys certain powers such as giving or withholding assent to a Bill passed by the state legislature or determining the time needed for a party to prove its majority — or which party must be called first to do so, generally after in a hung Assembly — which have been weaponised by successive central governments against the political opposition.

❖ **Article 164(1) says state “Ministers shall hold office during the pleasure of the Governor”. Does this mean the Governor can sack a minister?**

- Article 164(1) deals with the appointment of the Chief Minister and other ministers. While the Governor does not have to seek anyone’s advice while appointing the Chief Minister, he can appoint a minister only on the recommendation of the Chief Minister. The Governor has no power to pick anyone he chooses to make a minister. He can appoint a minister only on the advice of the Chief Minister.
- **In Shamsher Singh & Anr vs State Of Punjab (1974)**, a seven-judge Constitution Bench of the Supreme Court said: “the law of this branch of our Constitution to be that the President and Governor, custodians of all executive and other powers under various Articles, shall, by virtue of these provisions, exercise their formal constitutional powers only upon and in accordance with the advice of their Ministers save in a few well known exceptional situations.”
 - ✓ These situations could arise if the Prime Minister or Chief Minister cease to command majority in the House, the government loses majority but refuses to quit office, and for “the dissolution of the House where an appeal to the country is necessitous”.
 - ✓ But even in the third scenario, the Head of State (President or Governor) “should avoid getting involved in politics and must be advised by his Prime Minister (Chief Minister) who will eventually take the responsibility for the step,.
- **In Nabam Rebia And Etc. vs Deputy Speaker And Ors (2016)** the Supreme Court cited the observations of B R Ambedkar: “The Governor under the Constitution has no function which he can discharge by himself; no functions at all. While he has no functions, he has certain duties to perform, and I think the House will do well to bear in mind this distinction.”
- If indeed a minister lowers the dignity of the Governor or his office, as Khan’s office has alleged, Raj Bhavan can ask the Chief Minister to inquire. “If it is found that the minister has defamed or disrespected the Governor, he/ she can ask the Chief Minister to drop the minister.”

- ❖ **So what does the “pleasure” of the Governor mean?**
 - This does not mean the Governor has the right to dismiss the Chief Minister or ministers at will. “The Governor can have his pleasure as long as the government enjoys majority in the House. The Governor can withdraw his pleasure only when the government loses majority but refuses to quit. Then he withdraws the pleasure and dismisses it.
 - Without the advice of the Chief Minister, a Governor can neither appoint nor dismiss a minister. That’s the constitutional position.
- ❖ **What attempts have been made to address concerns over the alleged partisan role played by Governors?**
 - The National Commission To Review the Working of the Constitution appointed in 2000 recommended significant changes in the selection of Governors. The Commission suggested that the “Governor of a State should be appointed by the President, after consultation with the Chief Minister of that State.
 - Normally the five year term should be adhered to and removal or transfer of the Governor should be by following a similar procedure as for appointment i.e., after consultation with the Chief Minister of the concerned State.”
 - The Sarkaria Commission, set up in 1983 to look into Centre-state relations, proposed that the Vice President of India and Speaker of Lok Sabha should be consulted by the Prime Minister in the selection of Governors.
 - The Justice Madan Mohan Pundhi Committee, constituted in 2007 on Centre-state relations, proposed in its report submitted in March 2010 that a committee comprising the Prime Minister, Home Minister, Vice President, Speaker, and the concerned Chief Minister should choose the Governor.
 - The Pundhi Committee recommended deleting the “Doctrine of Pleasure” from the Constitution, but backed the right of the Governor to sanction the prosecution of ministers against the advice of the state government. It also argued for a provision for impeachment of the Governor by the state legislature.

PRELIMS

1. Grazing animals key to long-term soil carbon stability: IISc study

❖ **CONTEXT: A study carried out by researchers at the Centre for Ecological Sciences (CES) and the Divecha Centre for Climate Change (DCCC), IISc, has revealed that grazing animals hold the key to long-term soil carbon stability.**

- The 16-year-long study carried out by CES and DCCC researchers states that large mammalian herbivores like the Yak and Ibex play a crucial role in stabilising the pool of soil carbon in grazing ecosystems such as the Spiti region in the Himalayas.
- Experimental removal of grazing by herbivores from such ecosystems was found to increase the fluctuations in the level of soil carbon, which can have negative consequences for the global carbon cycle.
- According to the study, since soil contains more carbon than all plants and the atmosphere combined, it is important to ensure its persistence. When plants and animals die, dead organic matter remains in the soil for a long duration before microbes break it down and release carbon into the atmosphere as carbon dioxide.
- The soil pool is a reliable sink for trapping carbon. Maintaining stable levels of carbon in the soil is therefore key to offsetting the effects of climate change.
- According to stated IISc a key factor underlying the carbon level fluctuations was nitrogen. Depending on the soil conditions, nitrogen can either stabilise or destabilise the carbon pool. Grazing by herbivores, however, changes their interactions in ways that tip the balance in favour of the former.

2. Six spider species discovered across the country

❖ **CONTEXT: Arachnologists from the Centre for Animal Taxonomy and Ecology (CATE), Christ College, Irinjalakuda in Kerala have discovered six new species of spiders from across the country.**

- The new species of spiders were found from the Garo hills in Meghalaya, the Thar desert of Rajasthan, Wayanad Wildlife Sanctuary, Kottappara hills near Kothamangalam, Thumboormuzhi butterfly garden near Athirappilly, and the University of Calicut campus.
- Studies conducted on the Garo hills of Meghalaya resulted in the first spotting of the genus Siamspinops from India with a new species Siamspinops garoensis. This belongs to the family of flat spiders, Selenopidae. This spider lives in the crevices of rocks on hills. The yellowish brown spider measures about 10 mm in length. There is a black circle around its eyes and black patches on the abdomen.
- Two new species of spiders coming under the family of jumping spiders (Salticidae) were discovered from the Thar desert of Rajasthan and the Kurichiyad forest ranges of the Wayanad Wildlife Sanctuary. *Afraflacilla miajlarensis*, the Thar species, is characterised by white fine hairs on a black head and black horizontal lines on the abdomen. This spider stays among dry leaf blades.
- *Afraflacilla kurichiadensis*, the Wayanad species, is characterised by red patches around the eyes and white hairs on the abdomen. The bulged first pair of legs are also a special feature of this species. This spider lives in the moist deciduous forest of Kurichiyad.

- The next spider species lacks a venom gland and belongs to the family of feather-legged spiders (Uloboridae). This new species has been named as Philoponella rostralis, due to the presence of a beak like structure on the male reproductive organ.
- Two new species of spiders belonging to the family of spiny-legged spiders (Oxyopidae) have been discovered from the Thumboormuzhi butterfly garden, near the Athirappilly waterfalls, and on the Calicut University campus.

3. Japan seeks GI tag for nihonshu

❖ **CONTEXT: The Embassy of Japan, New Delhi, has filed an application seeking Geographical Indication (GI) tag for nihonshu/Japanese sake, an alcoholic beverage.**

- This is the first time a product from Japan has filed for a tag at the Geographical Indication Registry in Chennai.
- In Japan, nihonshu is regarded as a special and valuable beverage made from fermenting rice. People traditionally drink nihonshu on special occasions, such as festivals, weddings or funerals, but it is also consumed on a daily basis.
- Thus, it is an integral part of the lifestyle and culture in Japan. The sake market (almost all are nihonshu) is the second largest brewed liquor (such as beer) market in Japan.
- For making nihonshu three main raw materials – rice, koji-kin (a type of fungal spore) and water – are required.
- The production of nihonshu follows an alcoholic fermentation method called parallel multiple fermentation and involves raw material treatment, koji making, starter culture making, mash making, pressing, heat sterilisation and bottling. The rice and koji used should originate in Japan.
- The economy of Japan was based around rice, which was used as a sort of quasi-money before the establishment of a monetary economy in the Meiji period (1869-1912). As a result, nihonshu production was thoroughly under the government's control. As nihonshu's production became more industrialised in the Edo period (1603-1868), those who had special licences began hiring many farmers in the agricultural off-season. They gradually won a reputation as craftsmen, which resulted in the establishment of the hierarchical Toii system (Toii is the person responsible for sake brewing), likened to an apprenticeship or guild system.

4. Compressed Bio Gas (CBG)

❖ **CONTEXT: Union Minister of Petroleum & Natural Gas and Housing & Urban Affairs Shri Hardeep S. Puri inaugurated Asia's largest Compressed Bio Gas (CBG) plant in Lehragaga, Sangrur, Punjab**

- The Compressed Bio Gas (CBG) plant inaugurated in Sangrur is a step in achieving objectives of the Sustainable Alternative Towards Affordable Transportation (SATAT) scheme
- This scheme was launched by Government of India in October 2018 to establish an ecosystem for production of Compressed Bio Gas (CBG) from various waste/ biomass sources in the country.
- The scheme aims to empower and unleash the rural economy by supporting farmers, increase India's domestic energy production and self-sufficiency and also reduce the air pollution, and help India lead the world toward a clean energy transition.
- ❖ What is Compressed Bio Gas (CBG)?
- Compressed Bio Gas (CBG) means the mixture of hydrocarbon gases and vapours consisting mainly of Methane in gaseous form, which has been produced by the decomposition of animal and plant waste, purified and compressed for use as an automotive fuel and industrial application.
- Biogas can be compressed after removal of carbon dioxide and hydrogen sulphide, the same way as natural gas is compressed to CNG, and used to power motor vehicles.
- Irrespective of technology, producing CBG from biomass involves a two-pronged approach:
 - First, biogas is produced through anaerobic decomposition of biomass. Since biogas contains 55 to 60 per cent methane, 40 to 45 per cent carbon dioxide (CO₂) and trace amounts of hydrogen sulphide.
 - The second process involves purifying the gas to remove carbon dioxide and hydrogen sulphide gases to prepare CBG.
- Chemically, CBG is the same as CNG — both are compressed methane — and has the same calorific value.
- The difference is that while CNG is a by-product of petroleum, CBG can be produced from any biomass.
- This makes CBG a commercially viable option as it can be directly used to replace CNG in transportation fuel.
- Just like CNG, CBG too can be transported through cylinders or pipelines to retail outlets.
- Its solid by-products can be used as bio-manure.
- It is a rich source of silica that not only aids in the growth and yield of crops but also bestows immunity against many diseases and prevents toxic material uptake by plants such as arsenic, cadmium, lead and other heavy metals. It can thus help reduce the requirement of chemical fertilisers.

- The other by-product is CO₂. It can be tapped while purifying the biogas and used to produce liquid or solid CO₂, which have high demand for food preservation or to be used in fire extinguishers.
- CBG and its by-products hold the chance for a circular economic growth.

ANSWER WRITING

Q. Millets production comes with a lot of health, agricultural and nutritional benefits. Discuss.

Introduction

Millet is a collective term referring to a number of small-seeded annual grasses that are cultivated as grain crops, primarily on marginal lands in dry areas in temperate, subtropical and tropical regions.

Some of the common millets available in India are Ragi (Finger millet), Jowar (Sorghum), Sama (Little millet), Bajra (Pearl millet), and Variga (Proso millet).

India is the largest producer of millet in the world. It Accounts for 20% of global production and 80% of Asia's production.

Significance of Millet Production

- **Nutritionally Superior:**
 - Millets are less expensive and nutritionally superior to wheat & rice owing to their high protein, fibre, vitamins and minerals like iron content.
 - Millets are also rich in calcium and magnesium. For example, Ragi is known to have the highest calcium content among all the food grains.
 - Millets can provide nutritional security and act as a shield against nutritional deficiency, especially among children and women. Its high iron content can fight high prevalence of anaemia in India women of reproductive age and infants.
- **Gluten-free a low glycemic index:**
 - Millets can help tackle lifestyle problems and health challenges such as obesity and diabetes as they are gluten-free and have a low glycemic index (a relative ranking of carbohydrate in foods according to how they affect blood glucose levels).
- **Super Crop at Growing:**
 - Millets are Photo-insensitive (do not require a specific photoperiod for flowering) & resilient to climate change. Millets can grow on poor soils with little or no external inputs.
 - Millets are less water-consuming and are capable of growing under drought conditions, under non-irrigated conditions even in very low rainfall regimes.
 - Millets have low carbon and water footprint (rice plants need at least 3 times more water to grow in comparison to millets).

Conclusion

Millets have got a lot of advantages both from a health as well as from a climate change perspective. It is due to this reason the Government of India is emphasizing increasing millets production.

MCQs

1. "Momentum for Change: Climate Neutral Now" is an initiative launched by
 - a) The Intergovernmental Panel on Climate Change
 - b) The UNEP Secretariat
 - c) **The UNFCCC Secretariat**
 - d) The World Meteorological Organisation
2. In the context of mitigating the impending global warming due to anthropogenic emissions of carbon dioxide, which of the following can be the potential sites for carbon sequestration?
 1. Abandoned and uneconomic coal seams
 2. Depleted oil and gas reservoirs
 3. Subterranean deep saline formations

Select the correct answer using the code given below:

 - a) 1 and 2 only
 - b) 3 only
 - c) 1 and 3 only
 - d) **1, 2 and 3**
3. What is Greenhouse Gas Protocol?
 - a) **It is an international accounting tool for government and business leaders to understand, quantify and manage greenhouse gas emissions**
 - b) It is an initiative of the United Nations to offer financial incentives to developing countries to reduce greenhouse gas emissions and to adopt eco-friendly technologies
 - c) It is an inter-governmental agreement ratified by all the member countries of the United Nations to reduce greenhouse gas emissions to specified levels by the year 2022
 - d) It is one of the multilateral REDD+ initiatives hosted by the World Bank

4. Consider the following statements :
1. A Governor of a state has no discretionary power.
 2. The Governor of a state has only situational discretionary powers.

Which of the following is/are correct?

- a) Only 1
 - b) Only 2
 - c) Both 1 and 2
 - d) Neither 1 nor 2**
5. Which of the following commission or resolution recommended impeachment of the Governor by the state legislature?
- a) Rajamannar Committee
 - b) Anandpur Sahib Resolution
 - c) Sarkaria commission
 - d) MM Punchhi Commission**
6. Recently Sri Lankan writer Shehan Karunatilaka won the booker prize 2022 for which of the following book?
- a) Chinaman: The Legend of Pradeep Mathew
 - b) The Seven Moons of Maali Almeida**
 - c) Chats with the Dead
 - d) Please Don't Put That In Your Mouth
7. Government starts spraying bio-decomposer solution in fields as AQI remains 'poor', with reference to bio decomposers consider the following
1. It converts crop stubble into bio-manure.
 2. It is a bacteria-based formulation.

Which of the statement/s given above is/are correct?

- a) **1 only**
 - b) 2 only
 - c) Both 1 and 2
 - d) Neither 1 nor 2
8. Among the following organisms, which one does not belong to the class of other three?
- a) Crab**
 - b) Mite
 - c) Scorpion
 - d) Spider
9. With reference to Compressed Natural Gas (CNG) and Compressed Bio-Gas (CBG), consider the following statements:
1. CNG It is a mixture of hydrocarbons consisting of approximately 80 to 90 percent of methane in gaseous form.
 2. CNG is a by-product of petroleum, CBG can be produced from any biomass
 3. Both are lead-free and lighter than air.

Which of the statement/s given above is/are correct?

- a) 1 and 2 only
 - b) 2 and 3 only
 - c) 1 and 3 only
 - d) 1,2 and 3**
10. Consider the following statements about Global Carbon Cycle and choose how many statements are correct?
1. Atmosphere has 71% of total global carbon
 2. Decomposers contribute substantially to CO₂ pool by their processing of waste materials and dead organic matter of land or oceans
 3. No respiration input into atmosphere
 4. Carbon constitutes 49% of dry wt. of organisms

Choose the correct answer using the codes

- a) One
- b) Two**
- c) Three
- d) Four