PLUTUS IAS

PLUTUS IAS

UPSC/ PCS

Weekly Current Affairs

Weekly Current Affairs 06 May 2024 to 12 May 2024

THE HINDU

The Indian EXPRESS

PIB
पत्र सूचना कार्यालय
PRESS INFORMATION BUREAU
भारत सरकार

Corporate Office

Basement 8, Apsara Arcade, Karol Bagh Metro Station Gate No. 6, New Delhi 110005

17A/41, 1st Floor, WEA Karol Bagh, New Delhi 110005

706 1st Floor Dr. Mukherjee Nagar Near Batra Cinema Delhi – 110009

C 59 Noida Sector 2, Noida, Uttar Pradesh 201301

Phone: 08448440231

Email: info@plutusias.com

Web: www.plutusias.com

CONTENTS

POLITY AND GOVERNANCE

IMMUNITY PROVIDED TO THE GOVERNOR

This article covers 'Daily Current Affairs' and the topic details of ''Immunity provided to the governor". This topic is relevant in the "Polity and Governance" section of the UPSC CSE exam.

Why in the News?

A staff member working at the Raj Bhavan in Kolkata has claimed that she experienced sexual harassment by West Bengal Governor C.V. Ananda Bose. She filed a formal complaint at the Hare Street police station in Kolkata.

About Article 361 of the constitution

Article 361 of the Constitution addresses the immunity granted to the President and Governors.

- **Article 361(1):** The President, or the Governor or Rajpramukh of a State, shall not be answerable to any court for the exercise and performance of the powers and duties of his office or for any act done or purporting to be done by him in the exercise and performance of those powers and duties :

Provided that the conduct of the President may be brought under review by any court, tribunal or body appointed or designated by either House of Parliament for the investigation of a charge under Article 61 :

Provided further, nothing in this clause shall be construed as restricting the right of any person to bring appropriate proceedings against the Government of India or the Government of a State.

- **Article 361(2):** No criminal proceedings whatsoever shall be instituted or continued against the President, or the Governor of a State, in any court during his term of office.

- **Article 361(3):** No process for the arrest or imprisonment of the President or the Governor of a State shall be issued from any court during his term of office.

- **Article 361(4):** No civil proceedings in which relief is claimed against the President or the Governor of a State shall be instituted during his term of office in any court in respect of any act done or purporting to be done by him in his personal capacity, whether before or after he entered upon his office as President, or as Governor of such State, until the expiration of two months next after notice in writing has been delivered to the President or the Governor, as the case may be, or left at his office stating the nature of the proceedings, the cause of action therefore, the name, description and place of residence of the party by whom such proceedings are to be instituted and the relief which he claims.

Summary of the Article-361

- The President or Governor cannot be held accountable in any court for executing their official powers and duties. This means they cannot be summoned or interrogated in court for actions carried out in their official role.

- Throughout their term, neither the President nor the Governor can be subjected to criminal proceedings. They are shielded from facing criminal charges related to their official responsibilities.

- During their tenure, neither the President nor the Governor can be arrested or detained. This ensures they can fulfil their duties without the threat of legal repercussions.

- If there are civil actions seeking redress against the President or Governor for actions conducted in their personal capacity (before or after assuming office), a written notice must be served two months in advance. This provision aims to allow for resolution through dialogue before resorting to legal measures.

What purpose does Article 361 serve?

- By granting immunity from lawsuits, arrests, and criminal proceedings for actions taken while in office, Article 361 allows the President and Governors to perform their duties decisively without worrying about constant legal challenges. This fosters stability and efficient governance.

- While the President and Governors receive immunity, it's not absolute. Civil lawsuits for non-official actions are possible with notice, and impeachment processes exist for serious misconduct. This creates a balance between protecting effective governance and ensuring accountability.

- Article 361 aims to ensure that they can discharge their duties without fear of undue interference or harassment. Additionally, the provision for prior notice in civil proceedings allows for the resolution of personal

matters through communication before resorting to legal action, thus upholding the dignity and respect of these offices.

Related judgements and Case laws

- In the case of **Rameshwar Prasad v Union of India**, the Supreme Court affirmed the immunity bestowed upon Governors by Article 361 of the Constitution. It stressed that Governors cannot be held accountable in any court for the exercise of their powers and duties. This immunity is of a personal nature and does not absolve Governors from judicial scrutiny if their actions are found to be beyond their authority or malicious.
- In **Rajendra Singh Rana v. Swami Prasad Maurya (2007),** the Supreme Court declared that Governors cannot face prosecution while in office, regardless of actions taken prior to assuming their gubernatorial position. This decision upheld the protection provided under Article 361 of the Constitution.
- In the case of **Dr S.C. Barat And Anr. vs Hari Vinayak Pataskar And Ors. (1961),** a distinction was drawn between a Governor's official and personal conduct. While complete immunity is granted for official actions, civil proceedings can be initiated with prior notice of two months for a Governor's personal actions.
- In the **State of Rajasthan v. Union of India (1977),** the Supreme Court clarified that while Governors enjoy immunity from criminal prosecution during their term, this immunity does not extend to actions undertaken outside the scope of their official duties or to private matters unrelated to their role as Governor.

FUNDAMENTAL RIGHTS VS DIRECTIVE PRINCIPLES

Why in the news?

In the recent hearings before a nine-judge Bench of the Supreme Court of India in the case of **Property Owners Association vs State of Maharashtra**, two critical questions have emerged for consideration. Firstly, the interpretation of the term "material resources of the community" as enshrined in Article 39(b) of the Constitution is under scrutiny. This term holds significant implications for understanding the constitutional framework concerning resource allocation and societal welfare.

Secondly, the case raises the pertinent issue of whether laws crafted to advance the objectives outlined in Article 39(b), particularly those focusing on ensuring fair resource ownership and distribution for the collective welfare, enjoy immunity from legal challenges based on the fundamental rights to equality and freedom.

Debate regarding FRs vs DPSPs

The debate surrounding Fundamental Rights and Directive Principles of State Policy (DPSPs) in India is crucial in the Indian constitutional setup, embodying the **tension between individual liberties and state responsibilities towards socio-economic justice**. Enshrined in Part III and Part IV respectively of the Indian Constitution, these provisions reflect the framers' vision of a balanced society where rights are safeguarded alongside state action to promote welfare and social justice.

Fundamental Rights, articulated in Articles 12 to 35, guarantee civil liberties such as equality before law, freedom of speech and expression, and the right to life and personal liberty. These rights are justiciable, meaning they can be enforced by the courts against any encroachment by the state or private entities. They serve as the bedrock of democracy, ensuring the protection of citizens from arbitrary state action and fostering individual dignity and autonomy.

On the other hand, **DPSPs**, outlined in Articles 36 to 51, embody the socio-economic goals and directives that guide the state in policymaking. They include provisions for securing social and economic justice, promoting welfare measures, and striving towards a just and egalitarian society. Unlike Fundamental Rights, DPSPs are not enforceable in courts, and their implementation is subject to the discretion of the state.

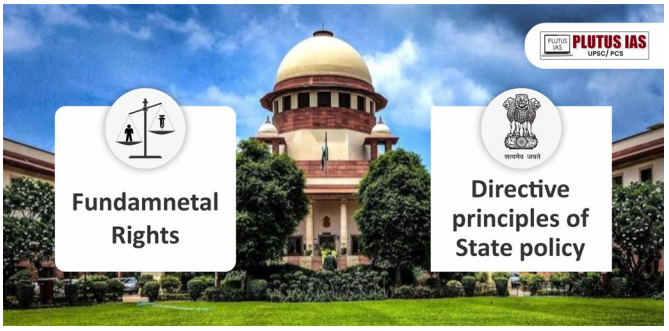
One key aspect of the debate is the hierarchy between Fundamental Rights and DPSPs. While both are integral parts of the Constitution, conflicts may arise when state action aimed at fulfilling DPSPs infringes upon Fundamental Rights. The **judiciary plays a crucial role in adjudicating such conflicts**, often employing the doctrine of harmonious construction to reconcile conflicting provisions and uphold the spirit of the Constitution.

Another dimension of the debate concerns the **justiciability of DPSPs**. Unlike Fundamental Rights, which can be directly enforced through judicial intervention, DPSPs lack enforceability in courts. This has led to criticisms regarding the efficacy of DPSPs as mere pious declarations without legal teeth. Proponents argue that while DPSPs may not be justiciable per se, they provide a guiding framework for legislative and executive action, influencing policy formulation and governance.

The debate also extends to the role of the state in balancing individual rights with social welfare objectives. Some argue for a more interventionist approach by the state to address socio-economic disparities and uplift marginalized communities, even if it entails limitations on individual freedoms. Others advocate for a minimalist state, emphasizing the primacy of individual liberties and market mech-

anisms in driving socio-economic progress.

Historically, the Indian judiciary has played a significant role in interpreting and reconciling the tensions between Fundamental Rights and DPSPs. Landmark cases such as Kesavananda Bharati v. State of Kerala (1973) and Minerva Mills Ltd. v. Union of India (1980) have shaped the constitutional jurisprudence, establishing the doctrine of basic structure and reaffirming the supremacy of Fundamental Rights while acknowledging the importance of DPSPs.



Evolution of the discourse

The evolution of the debate surrounding Fundamental Rights and Directive Principles of State Policy (DPSPs) in Supreme Court judgments reflects the **dynamic interpretation of constitutional principles and the changing socio-political landscape of India**.

The watershed moment in the evolution of this debate came with the case of **Golaknath v. State of Punjab** (1967). In this landmark judgment, the Supreme Court held that Parliament could not amend Fundamental Rights, including the right to property, through constitutional amendments. This decision underscored the Court's commitment to protecting Fundamental Rights as sacrosanct and immune from legislative encroachment.

Subsequently, the debate shifted towards defining the scope and limitations of state action in relation to Fundamental Rights and DPSPs. The case of **Kesavananda Bharati v. State of Kerala** (1973) marked a turning point, where the Supreme Court introduced the **doctrine of basic structure**, holding that while Parliament had the power to amend the Constitution, it could not alter its basic structure. This judgment affirmed the supremacy of Fundamental Rights while recognizing the importance of DPSPs in shaping state policy.

In **Minnerva mills case**, the Supreme Court struck down several provisions of the 42nd Amendment Act, including those related to the restrictions on judicial review. The Court reaffirmed the primacy of the basic structure doctrine and held that Parliament could not abrogate or alter the basic features of the Constitution, including the independence of the judiciary and the separation of powers between the executive, legislative, and judicial branches.

An opportunity

The Supreme Court has yet to provide a definitive analysis on the constitutionality of Article 31C, as introduced by the 25th Amendment, and its compatibility with the basic structure of the Constitution. This lack of clarity has perpetuated a perpetual conflict between Fundamental Rights and Directive Principles of State Policy (DPSPs). Despite subsequent judgments like Sanjeev Coke vs Bharat Coking Coal (1982) building upon the precedent set by Waman Rao, there remains an unresolved tension between the two constitutional provisions.

The ongoing case of Property Owners presents an opportunity for the Court to address this long standing clash and potentially offer clarity on the relationship between Fundamental Rights and DPSPs. By providing a comprehensive analysis and resolution in this case, the Supreme Court has the chance to reaffirm the supremacy of the Constitution's most cherished guarantees while also harmonizing the objectives of individual liberties and collective welfare. This could significantly enhance the integrity and coherence of the constitutional framework, ensuring a more equitable and just society in line with the principles enshrined in the Constitution.

PRELIMS QUESTION

Q1. Consider the following statements:

1. The governor is provided immunity against both the Criminal proceedings and the civil proceedings
2. Governors are not immune from actions outside their official duties.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Q2. Which of the following statements is INCORRECT regarding Article 361?

(a) Governors have absolute immunity from criminal prosecution.

(b) Governors can be prosecuted for personal matters.

()c Governors are immune from civil proceedings.

(d) Governors are not immune from actions outside their official duties.

ANSWERS

S. No.	Answers
1.	B
2.	D

MAINS QUESTION

Q1. Critically analyse the implications of the immunity granted to the President and Governors under Article 361. How does this immunity impact the principles of democracy and the rule of law in India?

Q2. Examine the need for reforms or amendments to Article 361 in light of evolving societal norms, judicial interpretations, and governance requirements. Propose potential changes to enhance accountability while preserving the functional autonomy of the President and Governors.

SCIENCE AND TECHNOLOGY

FOOT ROT DISEASE OF BASMATI RICE

THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS OF **"Foot Rot Disease of Basmati Rice".** THIS TOPIC IS RELEVANT IN THE " **SCIENCE AND TECHNOLOGY**" SECTION OF THE UPSC CSE EXAM.

Why in the News?

The Punjab Agricultural University (PAU) has achieved a notable accomplishment by officially registering the bio-control agent **Trichoderma asperellum 2% WP** with the Central Insecticides Board and Registration Committee (CIBRC). This registration targets the control of **Foot Rot or Bakane disease in Basmati rice**, a long-standing issue in the area that has led to substantial losses for farmers and jeopardized the state's export potential.

What is Foot Rot Disease of Rice?

- Foot rot or bakanae disease represents a severe **fungal infection** that targets Basmati rice cultivation, resulting in notable reductions in yield and compromising the quality of grains.
- Under field conditions, Bakanae disease has the potential to lead to a substantial reduction in Basmati rice yield, reaching up to 70%. This issue has become a significant worry for Basmati rice cultivation in India, particularly for the widely grown Pusa Basmati 1121 variety, which accounts for more than 65% of the Basmati-growing area.

Symptoms in crops

- Infected seedlings appear elongated and taller compared to healthy plants, featuring pale yellowish leaves.
- Surviving seedlings often display increased height and a wider flag leaf angle during the field stage, ultimately succumbing before grain formation.
- Symptoms in underground parts involve rotting and blackening of roots, along with the emergence of adventitious roots.

Transmission of Disease

- **Seed Transmission:** The primary mode of transmission for Bakanae disease is through contaminated seeds from the preceding growing season. Infected seeds carry the pathogen into fresh fields, initiating disease development in subsequent crop cycles.
- **Soil Transmission:** Fusarium fujikuroi, the causative agent of Bakanae disease, can endure in overwintering plant remains or soil, acting as a reservoir of infection for new rice plants. Soil-borne pathogens contribute to the dissemination of the disease within agricultural fields.

Contemporary management strategies

- Contemporary strategies for managing bakanae disease in Basmati rice cultivation involve multiple approaches, such as **treating seeds with fungicides, employing biocontrol agents, and implementing integrated management tactics** that encompass seed and seedling treatment, as well as foliar sprays.
- These methods are designed to curtail disease dissemination, lessen its impact, and promote the sustainable production of high-quality rice grains.
- Furthermore, the utilization of antagonistic bacteria, biological control agents like Trichoderma-S7, and the assessment of resistant rice varieties are pivotal in the management of bakanae disease.
- Effective management of the nursery phase is essential, with specialists advising the planting of seeds in the initial two weeks of June and transplantation in July to circumvent the disease's peak occurrence during hot months such as May.

New Solution by Punjab Agriculture university

- The innovation by PAU in utilizing Trichoderma asperellum marks a substantial progress in addressing foot rot. This biocontrol agent has received registration from the Central Insecticides Board and Registration Committee (CIBRC), guaranteeing its effectiveness and safety.

- Trichoderma asperellum is environmentally friendly, emphasizing its contribution as a non-chemical substitute to conventional pesticides, thereby reducing environmental impact.

Impact of Foot Rot Disease

Environmental impact:

- **Chemical Usage:** Disease control frequently relies on fungicides such as carbendazim, which may leave behind detrimental residues and have adverse repercussions on soil health and biodiversity, thereby impacting the overall ecosystem.
- **Soil Health:** The presence of the foot rot pathogen in soil can instigate soil-borne diseases, jeopardizing soil health and potentially diminishing its fertility and productivity over time.
- **Environmental Sustainability:** Dependence on chemical interventions for disease management can present obstacles to environmental sustainability.

Economic Impacts:

- Foot rot disease in Basmati rice cultivation can exert a substantial influence on the export of Basmati rice. It can cause diminished yields and compromise the quality of rice grains, potentially resulting in reduced availability of high-quality Basmati rice for export.
- This decline in both yield and quality attributable to foot rot disease can directly impede the export potential of Basmati rice, as it may result in a decrease in the volume of rice meeting the stringent quality criteria necessary for export markets.
- **India holds the top position as the primary exporter of Basmati Rice** worldwide. In the fiscal year 2022-23, the country exported 4558972.23 metric tons of Basmati Rice, valued at Rs. 38524.11 Crores (or 4787.50 million US dollars).
- **Major export destinations** during this period included **Saudi Arabia, Iran, Iraq, the United Arab Emirates, and Yemen Republic.**
- Basmati Rice is predominantly cultivated in several states across India, including **Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Uttarakhand, and western Uttar Pradesh.**

How does Trichoderma asperellum hold Significance?

- **Strategic Significance:** This advancement holds strategic importance for Punjab and Haryana, the primary Basmati rice-producing states in India, by offering an eco-friendly alternative to conventional pesticides while mitigating environmental damage.
- **Potential for Extensive Adoption:** The introduction of Trichoderma asperellum has received approval from the **Central Insecticides Board and Registration Committee (CIBRC),** ensuring its effectiveness and safety. Moreover, an agreement between PAU and a private firm for large-scale production and distribution of **Trichoderma asperellum** aims to make it easily accessible to farmers in Punjab and beyond, starting from the upcoming growing season.
- **Holistic Management:** The biocontrol agent presents a comprehensive approach to combating foot rot disease, encompassing seed and seedling treatments. This approach empowers farmers to effectively manage the disease and minimize crop losses.
- **Future Prospects:** The introduction of **Trichoderma asperellum** opens up new avenues for research and development in the realm of biocontrol agents, potentially paving the way for more innovative and sustainable solutions in crop disease management.

AUTONOMOUS WEAPONS SYSTEMS

Context

The surge in AI development has increased significant investment in military research and development, particularly in Autonomous Weapons Systems (AWS). This has ignited a pressing worldwide dialogue surrounding the ethical dilemmas that accompany such advancements.

More about the news

The emergence of Generative Artificial Intelligence (AI) has sparked a surge in interest regarding its potential applications, leading nations to heavily invest in AI Research and Development (R&D), particularly within the military sector.

However, a concerning outcome of this trend is the notable progress in the development of **Autonomous Weapons Systems (AWS).** Although fully autonomous weapons have yet to materialize, ongoing advancements in AI for military purposes suggest their realization may be imminent.

This raises **ethical questions** and underscores the necessity for thorough debate before any concrete steps are taken towards their deployment. Despite the urgency, the growing strides by countries such as the United States (US) and China in this arena emphasize the pressing need for prompt action.

Ethical questions related to Autonomous warfare systems

- **Autonomous Decision Making:** With the development

of AI-powered autonomous systems, there's a concern about the delegation of life-and-death decisions to machines without direct human oversight. This raises questions about accountability, responsibility, and the potential for unintended consequences or errors.

- **Lethal Autonomous Weapons Systems (LAWS):** The development and deployment of LAWS, which can identify, target, and attack without human intervention, raise profound moral questions about the nature of warfare, the principles of proportionality and discrimination, and the risk of escalation and proliferation.
- **Bias and Discrimination:** AI systems can inherit biases present in their training data or algorithms, leading to discriminatory outcomes, such as targeting certain groups disproportionately or reinforcing existing societal inequalities.
- **Privacy and Surveillance:** The use of AI in defense often involves extensive data collection and analysis, raising concerns about privacy, civil liberties, and the potential for mass surveillance or infringement of individual rights.
- **Dual-Use Technology:** AI developed for military purposes can have dual-use applications, meaning it can be repurposed for civilian surveillance or control, blurring the lines between military and civilian spheres and potentially leading to misuse or abuse of technology.
- **International Security and Arms Race:** The proliferation of AI in defense raises concerns about international security dynamics, arms races, and the potential for destabilization if certain nations gain significant advantages or if there's a lack of transparency and cooperation in AI development.
- **Human-Machine Interaction:** As AI systems become more integrated into military operations, questions arise about the appropriate roles for humans in decision-making processes, the potential for overreliance on technology, and the erosion of human agency and accountability.

The threat of Non- state actors

The advancement of military research in Autonomous Weapons Systems (AWS) presents the threat of granting access to devastating weaponry to non-state actors. Historically, technological progress in the military realm has often empowered non-state groups, particularly when the barriers to entry are low.

AWS, with their potential to mitigate or eliminate physical risks associated with terrorism and offer **increased anonymity**, could fundamentally change the landscape of security threats. Unlike manual drones currently utilized by groups like **Yemen's Houthi Rebels**.

AWS possesses unique features such as **resistance to traditional countermeasures** like jamming and the potential for force multiplication, as seen in swarm drone tactics. While non-state actors may lack the present engineering capabilities for sophisticated AWS, even basic autonomous drones operating collectively could yield catastrophic consequences.

The problem of attribution

The issue of attribution poses a significant challenge in the realm of drone warfare, as evidenced by the tragic incident in Tudun Biri, Nigeria, in December 2023. Despite President Bola Ahmed Tinubu's characterization of the event as a "bombing mishap," the Nigerian military's drone strike resulted in the loss of over 85 civilian lives. While the Nigerian Air Force attributed the incident to an intelligence failure and issued personal apologies from top officials, the incident highlights a troubling trend.

As the prospect of autonomous weapons systems (AWS) looms larger, there arises a troubling scenario where perpetrators could deflect responsibility by attributing the actions to "errantly operating AI." This raises serious concerns about accountability and the ability to ascertain culpability in the event of civilian casualties or other violations of international humanitarian law.

Alarmingly, reports suggest that Ukraine may already be employing autonomous attack drones in its conflict with Russia, potentially targeting combatants without direct human over-

sight. This development underscores the urgency of addressing the ethical and legal implications of AI-driven warfare, as the ability to accurately attribute responsibility becomes increasingly elusive in an era of advancing technology.

The way ahead

- **International Cooperation and Diplomacy:** There is a pressing need for nations to engage in open dialogue and cooperation to establish international norms, regulations, and treaties governing the development and use of AWS. Diplomatic efforts should aim to foster transparency, accountability, and consensus on ethical principles and legal frameworks.
- **Ethical Guidelines and Standards:** Policymakers, military leaders, and technologists should collaborate to develop clear ethical guidelines and standards for the design, deployment, and use of AWS. These guidelines should prioritize the protection of civilians, adherence to international humanitarian law, and respect for human rights.
- **Transparency and Accountability:** Governments and military organizations must ensure transparency and accountability in the development and deployment of AWS. This includes robust mechanisms for oversight, review, and accountability in cases of misuse or violations of ethical and legal standards.
- **Risk Assessment and Mitigation:** Efforts should be made to comprehensively assess the risks associated with the use of AWS, including the potential for unintended harm, escalation of conflict, and erosion of human control. Strategies for risk mitigation should be developed and integrated into decision-making processes.
- **Engagement with Civil Society:** Civil society organizations, including human rights groups, academia, and advocacy organizations, should be actively engaged in discussions and policymaking related to AWS. Their expertise and perspectives can help ensure that ethical considerations and humanitarian concerns are adequately addressed.
- **Education and Awareness:** Efforts should be made to raise public awareness and understanding of the ethical, legal, and security implications of AWS. Education and outreach initiatives can help foster informed public discourse and support for policies that prioritize human well-being and global security.

RIGHT TO PALLIATIVE CARE

Why in the news?

On March 7, 2024, in response to a public interest litigation, a three-member Bench of the Supreme Court chaired by the Chief Justice of India D.Y. Chandrachud observed that the right to health includes the right to palliative care.

More about the news

Palliative care is a specialized medical care that focuses on **providing relief from the symptoms and stress of a serious illness.** Its goal is to improve the quality of life for both the patient and their family. Palliative care **addresses physical, emotional, and spiritual needs, aiming to alleviate pain, manage symptoms**, and offer support throughout the course of an illness, particularly for individuals with chronic or life-threatening conditions. It can be provided alongside curative treatment or as the main form of care, depending on the patient's needs and preferences.

Ronald Reagan, the 40th President of the United States, passed away in 2004 at the age of 93, succumbing to dementia after a nine-year battle. His wife, Nancy Reagan, described his peaceful passing as the "greatest gift" he could have given her. In contrast, India's former Prime Minister Atal Bihari Vajpayee died in 2018, nine years after a stroke left him wheelchair-bound. The final 35 days of his life were spent in the All India Institute of Medical Sciences in New Delhi, where he relied on artificial life support systems before his eventual demise.

These two contrasting incidents highlight the importance of Living will which was highlighted by the Supreme court.

Challenges of palliative care in India

- **Limited Access:** Palliative care services are often concentrated in urban areas, leaving rural and remote areas underserved. This geographic disparity in access to palliative care means that many patients, particularly those in rural areas, do not receive the care and support they need.
- **Lack of Awareness:** There is a lack of awareness and understanding about palliative care among the general public, healthcare providers, and policymakers in India. This results in misconceptions about palliative care, leading to underutilization of services and delayed referrals.
- **Inadequate Training:** Healthcare providers, including doctors, nurses, and other allied healthcare professionals, often receive inadequate training in palliative care. This lack of training limits their ability to effectively manage symptoms, provide psychosocial support, and engage in end-of-life discussions with patients and their families.
- **Limited Integration:** Palliative care is not fully integrated into the healthcare system in India. Many hospitals and healthcare facilities do not have dedicated pallia-

tive care teams or protocols in place for the provision of palliative care services. This lack of integration results in missed opportunities to address the palliative care needs of patients with serious illnesses.

- **Resource Constraints:** There is a shortage of essential resources for palliative care, including medications, medical equipment, and trained personnel. This shortage limits the ability of healthcare providers to deliver high-quality palliative care services and meet the growing demand for such care.
- **Cultural and Social Stigma:** There are cultural and social stigmas associated with serious illness, end-of-life care, and death in India, which can impact the acceptance and utilization of palliative care services. Fear, shame, and misconceptions about death and dying may prevent patients and their families from seeking palliative care support.

Living will

A living will, also known as an advance directive, is a legal document that allows individuals to specify their preferences regarding medical treatment and end-of-life care in the event that they become unable to communicate their wishes due to illness or incapacity. The concept of a living will is based on the principle of autonomy and the right of individuals to make decisions about their own healthcare.

In a living will, individuals can outline their preferences regarding the use of life-sustaining treatments such as CPR (cardiopulmonary resuscitation), mechanical ventilation, artificial nutrition and hydration, and other medical interventions. They can specify under what circumstances they would want these treatments to be administered or withheld, based on their values, beliefs, and quality-of-life considerations.

Living wills are legally binding documents when executed according to the laws of the jurisdiction in which they are created. They typically require witnesses or notarization to validate the document. Healthcare providers are obligated to honor the directives outlined in a living will to the extent permitted by law and in accordance with medical standards and ethical guidelines.

Living wills serve several important purposes:

- **Ensuring Autonomy:** Living wills allow individuals to retain control over their medical care even if they are unable to communicate their wishes. By specifying their preferences in advance, individuals can ensure that their healthcare decisions align with their values and preferences.
- **Relieving Burden on Family:** Living wills can help alleviate the burden on family members and loved ones who may otherwise be tasked with making difficult medical decisions on behalf of the individual. Having clear directives in a living will can reduce uncertainty and conflict among family members during times of crisis.
- **Promoting Dignity:** Living wills enable individuals to express their desires regarding end-of-life care and the preservation of their dignity. By outlining their preferences for medical treatment, individuals can ensure that their wishes are respected and that they receive care that is consistent with their values and beliefs.
- **Facilitating Communication:** Living wills encourage discussions about healthcare preferences and end-of-life care between individuals, their loved ones, and healthcare providers. These discussions can help clarify values, preferences, and expectations, fostering shared understanding and informed decision-making.

Overall, living wills are valuable tools for individuals to assert their autonomy and ensure that their healthcare preferences are respected, even in situations where they are unable to advocate for themselves. They provide peace of mind and guidance for both individuals and their loved ones during challenging times.

Evolution of living will

- **Legal Recognition:** Living wills were formally recognized in India with the passage of the landmark judgment by the Supreme Court in the case of Common Cause v. Union of India in March 2018. In this judgment, the Supreme Court recognized the right to make an advance directive for medical treatment and upheld the legality of passive euthanasia (withdrawal or withholding of life-sustaining treatment) under certain circumstances.
- **Legislative Framework:** Following the Supreme Court judgment, the Government of India introduced the "The Terminally Ill Patients (Protection of Patients and Medical Practitioners) Bill, 2016," commonly known as the "Living Will Bill." This bill proposed a legislative framework for the creation and implementation of living wills, outlining the procedures and safeguards for their validity and enforcement. However, the bill lapsed with the dissolution of the 16th Lok Sabha in 2019.
- **Subsequent Legal Developments:** In subsequent years, various state governments and medical bodies in India have taken steps to provide guidance and frameworks for the implementation of living wills. For example, the Indian Council of Medical Research (ICMR) released guidelines on advance directives and end-of-life care in 2018, providing recommendations for healthcare providers and patients regarding the

creation and utilization of living wills.

CYBER SECURITY THREAT POSED BY ARTIFICIAL INTELLIGENCE

Context

The widespread integration of generative AI across various sectors like education, finance, healthcare, and manufacturing has indeed revolutionized our operations. However, it has also ushered in a new era of cyber risks and safety concerns. With the generative AI industry poised to boost the global GDP by a substantial $7 to $10 trillion, the proliferation of AI solutions (such as ChatGPT introduced in November 2022) has set off a complex interplay of benefits and drawbacks.

As per a study conducted by Deep Instinct, around **75% of professionals witnessed an upsurge in cyberattacks** in the past year alone, while 85% of the surveyed respondents have attributed the increased risk to generative AI.

A case in US

In the recent past, there was a disturbing incident involving a distressed mother who received a terrifying call from individuals claiming to be kidnappers holding her daughter hostage. This event triggered significant concern within the U.S. Senate regarding the negative consequences of artificial intelligence. The nation was shaken as it became evident that the purported kidnappers and the voice of the daughter were actually the work of hackers employing generative AI to carry out their extortion tactics. As these types of occurrences become more frequent, there is a growing erosion of human perception distinguishing between genuine reality and content generated by AI.

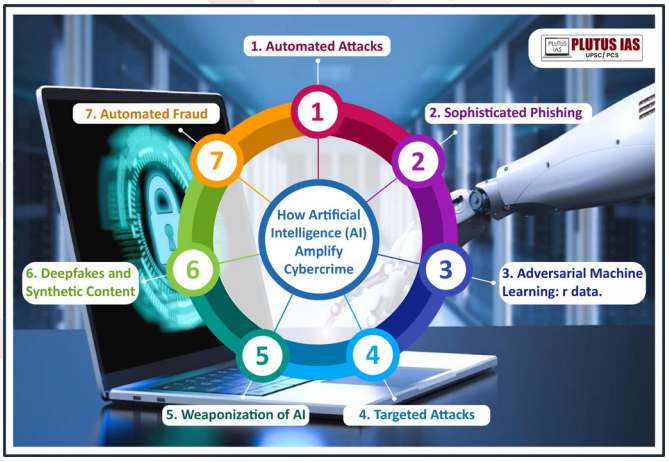
What is generative AI?

Generative AI is a subset of artificial intelligence focused on creating or generating new content, such as images, text, audio, or video, that is indistinguishable from content created by humans. Unlike traditional AI systems that are designed for specific tasks or objectives, generative AI models are capable of generating diverse and original outputs based on the data they have been trained on.

Generative AI relies on advanced machine learning techniques, particularly deep learning, to understand and replicate patterns in data. These models can then generate new content by predicting and synthesizing patterns learned from the training data.

Some common examples of generative AI include:

- **Text Generation:** Models like OpenAI's GPT (Generative Pre-trained Transformer) series can generate coherent and contextually relevant text based on a given prompt or input.
- **Image Generation:** Generative Adversarial Networks (GANs) are a popular technique for generating realistic images. GANs consist of two neural networks, a generator and a discriminator, which are trained together in a competitive manner to produce high-quality images.
- **Audio Generation:** Generative AI models can also generate realistic-sounding audio, including music, speech, or sound effects. These models are trained on large datasets of audio recordings to learn the nuances of human speech and music composition.
- **Video Generation:** Similar to image generation, generative AI techniques can be used to create synthetic videos. These models can generate realistic video sequences based on input parameters or generate entirely new video content.



How AI can amplify cybercrimes

Artificial intelligence (AI) has the potential to amplify cybercrime in several ways:

- **Automated Attacks:** AI can be used to automate various stages of cyber attacks, from reconnaissance and scanning for vulnerabilities to launching exploits and spreading malware. This automation allows cybercriminals to scale their operations and target a larger number of victims more efficiently.
- **Sophisticated Phishing:** AI-powered algorithms can analyze vast amounts of data to create highly personalized and convincing phishing emails or messages. These messages can mimic the writing style of the target individual or appear to come from trusted sources, making them more likely to deceive recipients and facilitate successful attacks.
- **Adversarial Machine Learning:** Cybercriminals can exploit weaknesses in AI systems themselves. Through

techniques like adversarial machine learning, attackers can manipulate AI models to produce incorrect outputs or evade detection, enabling them to bypass security measures and gain unauthorized access to systems or data.

- **Targeted Attacks:** AI can be leveraged to analyze massive datasets and identify potential targets for cyber attacks with greater precision. This targeted approach allows cybercriminals to tailor their attacks to specific individuals, organizations, or industries, increasing the likelihood of success and maximizing the impact of their efforts.
- **Weaponization of AI:** AI technologies such as machine learning algorithms can be weaponized to enhance the capabilities of malware and other malicious tools. For example, AI can be used to develop malware that can adapt its behavior in real-time to evade detection by traditional security solutions, making it more challenging to defend against.
- **Deep Fakes and Synthetic Content:** AI-generated deep fakes and synthetic media can be used to create convincing but entirely fabricated images, audio, and video content. Cybercriminals can use this technology to impersonate individuals or manipulate media to spread disinformation, discredit individuals or organizations, or coerce victims into taking certain actions.
- **Automated Fraud:** AI-powered fraud detection systems can also be exploited by cybercriminals. By understanding how these systems operate, attackers can design fraudulent activities to evade detection or manipulate the algorithms to approve malicious transactions.

What should be the way forward

- **Develop Advanced Detection Techniques:** Invest in research and development of advanced detection methods specifically tailored to identify AI-generated content and distinguish it from genuine human-created content. This may involve leveraging AI itself, such as developing counter-AI algorithms capable of detecting and flagging suspicious or manipulated content.
- **Enhance Education and Awareness:** Educate individuals and organizations about the existence and potential dangers of AI-generated content, including deepfakes and synthetic media. Increasing awareness can help people recognize and critically evaluate potentially deceptive content, reducing the likelihood of falling victim to AI-driven cyber threats.
- **Strengthen Regulations and Standards:** Implement and enforce regulations and standards governing the use of generative AI technologies in cybersecurity and other domains. This may involve requiring transparency and accountability from AI developers, establishing guidelines for ethical AI usage, and imposing penalties for malicious activities involving AI-generated content.
- **Promote Responsible AI Development:** Encourage responsible development and deployment of generative AI technologies by AI developers, researchers, and companies. This includes prioritizing ethical considerations, conducting thorough risk assessments, and implementing safeguards to prevent misuse or abuse of AI systems.
- **Foster Collaboration and Information Sharing:** Facilitate collaboration and information sharing among government agencies, cybersecurity experts, AI developers, and other stakeholders to collectively address the challenges posed by AI-driven cyber threats. Sharing best practices, threat intelligence, and resources can help develop effective countermeasures and responses to emerging threats.
- **Invest in AI Security Solutions:** Allocate resources towards developing and deploying AI-driven security solutions capable of detecting and mitigating AI-generated cyber threats in real-time. This may involve integrating AI into existing cybersecurity tools and systems to enhance their effectiveness against evolving threats.
- **Promote digital Literacy and Critical Thinking:** Educate the public about media literacy and critical thinking skills to help individuals identify and evaluate the authenticity of information, regardless of whether it is generated by AI or created by humans. Encouraging skepticism and promoting fact-checking can empower individuals to navigate an increasingly complex media landscape.

Overall, while AI offers numerous benefits, its increasing sophistication also presents significant challenges for cybersecurity. As cybercriminals continue to leverage AI-driven techniques and tools, organizations and security professionals must remain vigilant and continuously adapt their defenses to mitigate evolving threats.

ALPHA FOLD 3

What is Alpha Fold?

AlphaFold is an advanced AI system developed by DeepMind, a subsidiary of Alphabet Inc. AlphaFold is designed for protein folding prediction, which is a fundamental problem in biology. The primary goal of protein folding prediction is to determine the three-dimensional structure of a protein from its amino acid sequence.

Understanding the 3D structure of proteins is crucial for deciphering their functions, interactions with other molecules, and implications in diseases. Experimental methods for determining protein structures, such as X-ray crystallography and cryo-electron microscopy, can be time-consuming and expensive. Therefore, computational methods, such as those based on AI, offer a promising alternative for predicting protein structures quickly and accurately.

AlphaFold gained significant attention in the scientific community due to its remarkable performance in the Critical Assessment of Structure Prediction (CASP) competition. CASP is a biennial competition where research groups worldwide compete to predict the structures of proteins whose experimental structures have not yet been determined. In CASP14, held in 2020, AlphaFold achieved unprecedented accuracy, outperforming other methods by a significant margin.

AlphaFold's success is attributed to its novel deep learning architecture, which combines deep neural networks with novel attention mechanisms and advanced training strategies. These techniques allow AlphaFold to accurately predict the complex 3D structures of proteins based solely on their amino acid sequences, rivaling the accuracy of experimental methods in many cases.

The release of AlphaFold has the potential to revolutionize structural biology by accelerating the pace of protein structure determination and facilitating research in various fields, including drug discovery, enzyme engineering, and understanding the molecular basis of diseases.

How proteins are formed in nucleus of a cell

The process of protein formation, also known as protein synthesis or translation, primarily occurs in the cytoplasm of the cell, not the nucleus. However, the nucleus plays a crucial role in the initial steps of protein synthesis, which involve transcription. Here are the steps involved in protein formation, with a focus on the role of the nucleus:

- **Transcription in the Nucleus:**
  - The process begins with the transcription of a gene from DNA to RNA within the cell nucleus.
  - RNA polymerase, along with other transcription factors, binds to the promoter region of the gene.
  - The DNA double helix unwinds, and RNA polymerase catalyzes the synthesis of a complementary RNA strand, using one of the DNA strands as a template.
  - The newly synthesized RNA molecule, called messenger RNA (mRNA), is complementary to the DNA template and carries the genetic information from the nucleus to the cytoplasm.
- **Processing of mRNA:**
  - In eukaryotic cells, the newly synthesized mRNA undergoes processing before it can leave the nucleus.
  - This processing involves the addition of a 5' cap and a poly(A) tail to the mRNA molecule.
  - Additionally, introns (non-coding regions) are removed from the pre-mRNA through a process called splicing, leaving only the exons (coding regions) to form the mature mRNA.
- **Export of mRNA to the Cytoplasm:**
  - Once processed, the mature mRNA molecule is transported out of the nucleus and into the cytoplasm through nuclear pores.
  - The mRNA carries the genetic information encoded in the DNA from the nucleus to the cytoplasm, where protein synthesis will occur.
- **Translation in the Cytoplasm:**
  - In the cytoplasm, ribosomes, along with transfer RNA (tRNA) molecules and various protein factors, catalyze the synthesis of proteins from the mRNA template.
  - During translation, the ribosome reads the mRNA sequence in codons (groups of three nucleotides) and matches each codon to the corresponding amino acid carried by tRNA molecules.
  - The ribosome catalyzes the formation of peptide bonds between adjacent amino acids, resulting in the synthesis of a polypeptide chain.
  - The process continues until a stop codon is reached, at which point translation terminates, and the newly synthesized protein is released.

What is protein folding problem

The protein folding problem is one of the most important

and challenging questions in molecular biology. It refers to the task of predicting the three-dimensional structure of a protein from its amino acid sequence.

Proteins are large, complex molecules made up of long chains of amino acids. The sequence of these amino acids dictates how the protein will fold into a specific three-dimensional shape. This shape, in turn, determines the protein's function. Proteins can perform a wide variety of functions in living organisms, including catalyzing biochemical reactions, serving as structural components, and acting as signaling molecules.

The protein folding problem arises from the fact that the number of possible ways in which a protein can fold into its native structure is astronomically large. Even a relatively small protein consisting of just a few dozen amino acids can have an enormous number of possible conformations. Finding the correct, biologically relevant conformation among this vast number of possibilities is a formidable computational challenge.

How AI can help in studying protein prediction

AI can play a significant role in studying protein prediction from DNA sequences. Here's how:

- **Sequence Analysis:** AI algorithms can analyze DNA sequences to identify potential protein-coding regions. This involves identifying open reading frames (ORFs) and predicting where genes start and stop.
- **Gene Prediction:** AI models can predict genes within DNA sequences by recognizing patterns such as start and stop codons, splice sites, and regulatory elements. This helps in understanding the genetic code and locating genes responsible for specific traits or diseases.
- **Protein Structure Prediction:** AI-powered algorithms can predict the three-dimensional structure of proteins based on their amino acid sequences. This is crucial for understanding protein function, interactions, and designing drugs targeting specific proteins.
- **Function Annotation:** AI can help annotate proteins with known or predicted functions based on similarities to other proteins with known functions. This can provide insights into the role of proteins in biological processes and pathways.
- **Variant Analysis:** AI algorithms can analyze DNA variations (mutations, SNPs) and predict their impact on protein structure and function. This is important for understanding the genetic basis of diseases and designing personalized treatments.
- **Protein-Protein Interaction Prediction:** AI can predict protein-protein interactions by analyzing protein sequences and structures. This helps in understanding cellular processes and pathways, as well as in drug discovery by identifying potential targets and off-target effects.
- **Drug Discovery**: AI can accelerate drug discovery by predicting how potential drug molecules interact with target proteins. This includes predicting binding affinity, specificity, and potential side effects, leading to the identification of promising drug candidates.
- **Data Integration and Analysis:** AI algorithms can integrate and analyze large-scale genomic, transcriptomic, proteomic, and clinical data to identify patterns, correlations, and biomarkers associated with diseases or biological processes.

PRELIMS QUESTION

Q1. Consider the following statements regarding Foot Rot disease of Rice:

1. Foot Rot disease is a Fungal disease that affects the root of the crops.

2. India is the largest exporter of Basmati Rice worldwide.

Choose the correct answer using the codes given below:

(a). 1 Only

(b). 2 Only

(c). Both 1 and 2

(d). Neither 1 nor 2

ANSWERS

S. No.	Answers
1.	C

MAINS QUESTION

Q1. How does the prevalence of foot rot disease in Basmati rice cultivation impact India's position as the leading exporter of Basmati Rice? What are the potential economic consequences of reduced yield and quality due to foot rot disease on India's export potential in the global market?

ECONOMY

CENTRAL BANK DIGITAL CURRENCY

THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS OF **"Central Bank Digital Currency".** THIS TOPIC IS RELEVANT IN THE " **ECONOMICS**" SECTION OF THE UPSC CSE EXAM.

Why in the News?

Speaking at the BIS Innovation Summit 2024 in Basel, Switzerland, Governor Das expressed the RBI's intentions to conduct pilot trials involving the usage of Central Bank Digital Currency (CBDC) in commercial papers and certificates of deposits. He emphasized the transformative potential of the e-Rupee and highlighted the significant opportunities for the digitization of payments.

About the Digital Currency

A central bank digital currency (CBDC) refers to a type of digital currency issued by a nation's central bank. It shares similarities with cryptocurrencies, but unlike them, its worth is determined and guaranteed by the central bank, aligning with the value of the country's traditional fiat currency.

What is Fiat Currency?

- Fiat currency denotes a government-issued form of money that lacks tangible backing such as gold or silver. It holds status as legal tender, enabling its exchange for goods and services.
- Historically, fiat currency primarily comprised banknotes and coins, but advancements in technology have enabled governments and financial entities to complement physical fiat currency with a credit-based system, facilitating digital recording of balances and transactions.

Type of Central Bank Digital Currency

There are typically three classifications of Central Bank Digital Currencies (CBDCs): retail, wholesale, and hybrid.

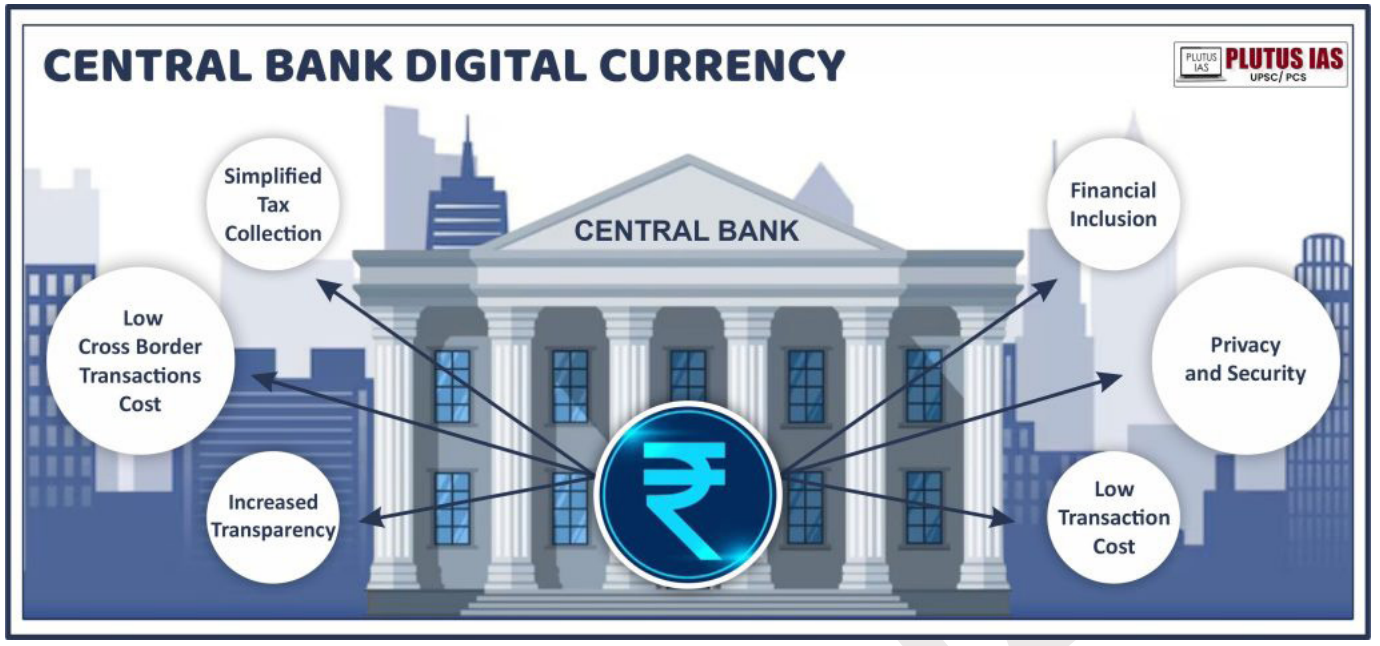
- **Retail CBDCs:** Retail CBDCs are tailored for use by the general public, enabling individuals to conduct everyday transactions and payments. They are accessible to the public through digital wallets, smartphone applications, or other payment platforms. Designed to function akin to physical cash, retail CBDCs offer a secure and digital method for conducting transactions.
- **Wholesale CBDCs:** Wholesale CBDCs are designed for utilization among financial institutions, such as banks, and are not directly accessible to the general public. They serve to facilitate high-volume and high-value transactions, such as interbank transfers and securities settlements.
- **Hybrid CBDCs**: Hybrid CBDCs amalgamate features from both retail and wholesale CBDCs. They offer greater flexibility compared to the other two categories as they can be employed by both the general public and financial institutions. Depending on the requirements of the user, hybrid CBDCs can accommodate everyday transactions as well as large-scale purchases.

Purpose of Central Bank Digital Currency

- CBDCs could potentially reduce the expenses associated with maintaining a complex financial system, diminish cross-border transaction costs, and furnish individuals currently using alternative methods of money transfer with more economical alternatives.
- CBDCs also present the opportunity to mitigate the risks linked with utilizing digital currencies or cryptocurrencies in their current state.
- Reinforcing the implementation and oversight of monetary policy by central banks while also enhancing the capacity to identify and prevent illicit activities through real-time monitoring and analysis of CBDC transactions.
- The primary aim of CBDCs is to offer businesses and individuals engaging in financial transactions with privacy, transferability, convenience, accessibility, and financial security.
- The main objective is to reduce risks and minimize expenses associated with managing physical currency, including costs related to replacing damaged notes, transportation, insurance, and logistical operations.

Why is the RBI promoting Digital Currency?

- **Reduced Central Bank Costs:** CBDCs may decrease the expenses associated with printing and circulating physical currency, as well as diminish the reliance on intermediaries in payment processes.
- **Enhanced Security and Privacy**: CBDCs ensure secure transactions and offer increased privacy, thereby mitigating the risks of fraud and identity theft.



- **Potential for Economic Growth:** CBDCs facilitate faster and more efficient payments, potentially stimulating economic activity and fostering growth.
- **Facilitation of Cross-Border Transactions:** CBDCs can simplify and lower the costs of international transactions, reducing the necessity for foreign exchange conversions and intermediaries.
- **Mitigation of Illicit Activities:** CBDCs hold the potential to decrease illegal activities such as money laundering and tax evasion by meticulously recording and tracing all transactions.
- **Simplified Tax Collection**: CBDCs could streamline tax collection procedures due to the comprehensive recording and tracking of transactions.
- **Increased Transaction Efficiency**: CBDCs have the capacity to streamline payment systems, shorten settlement times, and facilitate quicker and more convenient transactions.
- **Enhanced Financial Inclusion:** CBDCs can broaden access to financial services for individuals and businesses underserved by traditional banks, thus fostering financial inclusion.
- **Improved Monetary Policy Control:** CBDCs offer central banks improved tools for managing inflation, interest rates, and other macroeconomic indicators, thereby aiding in economic stabilization.

Challenges with Digital currency

- **Regulatory and Legal Considerations**: Current laws and regulations may require adjustments to accommodate the distinctive features and needs of CBDCs, such as programmability and controlled anonymity.
- **Technological Infrastructure and Security:** CBDCs must be equipped with robust security measures to safeguard against cyber threats, including encryption, multi-factor authentication, and secure data storage.
- **Privacy and Anonymity Concerns:** Balancing the imperative for privacy and anonymity with the necessities for anti-money laundering and counter-terrorism financing presents a delicate challenge.
- **Public Adoption and Awareness:** Encouraging the public to utilize and embrace a new CBDC system, particularly when contrasted with the flexibility and familiarity of physical cash, can pose a significant obstacle.
- **Competing with Private Banks:** CBDCs may pose a potential competition to private banks for attracting deposits, potentially influencing their capacity to lend and make investments.

Way Forward

- **Suitable Regulatory Frameworks**: Develop clear and adaptable legal and regulatory frameworks to govern the utilization of CBDCs and mitigate potential risks. Foster collaboration among central banks, financial institutions, and policymakers to create a conducive environment for CBDC adoption.
- **Promote Public Awareness:** Educate the public on the advantages and applications of CBDCs to foster trust and encourage widespread adoption. Encourage businesses and consumers to embrace CBDCs through various promotional initiatives and campaigns.

- **Cybersecurity and Privacy**: Implement robust security protocols to safeguard CBDCs from cyber threats and maintain the integrity of the system. Strike a balance between preserving privacy and anonymity while fulfilling obligations for anti-money laundering and counter-terrorism financing.
- **Integrate Emerging Technologies:** Integrate CBDCs with cutting-edge technologies such as blockchain, smart contracts, and offline payment capabilities to enhance their functionality and attractiveness.

PRELIMS QUESTION

Q1. Consider the following statements regarding Central Bank Digital Currency:

1. Bahamas was the first economy to launch CBDC nationwide.

2. CBDCs aim to reduce the cost of Financial transactions.

Choose the correct answer using the codes given below:

(a). 1 Only

(b). 2 Only

(c). Both 1 and 2

(d). Neither 1 nor 2

ANSWERS

S. No.	Answers
1.	C

MAINS QUESTION

Q1. What are CBDCs? How is it different from cryptocurrency? What are the key challenges and obstacles associated with the implementation and adoption of Central Bank Digital Currencies (CBDCs)?

ECOLOGY AND ENVIRONMENT

POLLUTED INDIAN RIVERS

This article covers 'Daily Current Affairs' and the topic details of ''Polluted rivers". This topic is relevant in the "Environment" section of the UPSC CSE exam.

Why in the News?

The pollution levels in the tributaries of the Ganga River in Uttarakhand have escalated significantly, particularly in Udham Singh Nagar district, where three out of the five most polluted rivers are located. Recent reports from the Uttarakhand Environment Protection and Pollution Control Board indicate concerning levels of contamination, underscoring a critical environmental issue in the area.

Reasons behind polluted rivers

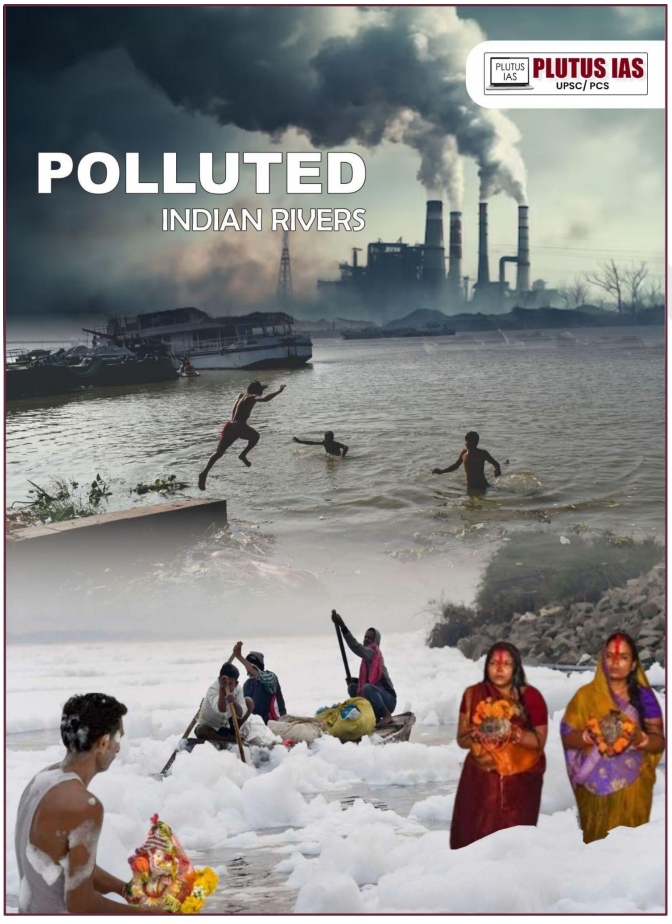
- **Industrial Waste:** Industries and manufacturing facilities worldwide play a significant role in water pollution by generating waste containing hazardous chemicals and pollutants. Inadequate waste management systems result in the release of industrial waste into nearby freshwater systems, leading to the contamination of rivers and streams.
- **Marine Dumping:** Various countries often dispose of household waste in oceans, contributing to marine pollution. These materials can take extensive periods to decompose fully, negatively impacting marine ecosystems and water quality.
- **Sewage and Wastewater:** Even after treatment, sewage and wastewater contain harmful chemicals, bacteria, and pathogens. Discharging sewage and wastewater into water bodies introduces disease-causing agents, posing risks to both human health and aquatic life.
- **Oil Leaks and Spills:** Oil leaks and spills, frequently stemming from oil drilling operations or ships transporting oil, represent significant sources of water pollution. Oil does not dissolve in water, leading to adverse effects on marine life and ecosystems.
- **Agricultural runoff:** The use of chemicals and pesticides in agriculture for crop protection can infiltrate groundwater, posing risks to animals, plants, and humans. During rainfall, these substances combine with rainwater, eventually flowing into rivers and streams, exacerbating water pollution.
- **Global Warming:** Increasing temperatures attributed to global warming present a challenge concerning water pollution. Elevated water temperatures can contribute to the decline of aquatic organisms, worsening pollution issues. Mitigating global warming can aid in reducing water pollution in rivers and other water bodies.
- **Deforestation and soil erosion:** Clearing of forests and soil erosion result in sedimentation and nutrient runoff into rivers, altering water quality and ecosystem health.
- **Urban runoff:** Stormwater runoff from urban areas can carry pollutants such as oil, heavy metals, and litter into rivers, increasing pollution levels.
- **Plastic pollution:** Plastic waste, including bags, bottles, and microplastics, can enter rivers through littering or improper disposal, harming wildlife and disrupting ecosystems.

Consequences of polluted rivers

- **Human Health Impact:** Water pollution poses significant health hazards to human beings, resulting in ailments such as gastrointestinal issues, skin disorders, malnutrition, and even cancer. Contaminated water reservoirs are responsible for waterborne diseases, leading to approximately 829,000 fatalities annually on a global scale.
- **Ecosystem Degradation:** Water pollution exerts a profound influence on various aquatic ecosystems, encompassing freshwater bodies, coastal regions, and oceanic environments. The introduction of diverse pollutants, including chemicals, pathogens, and alterations like increased temperatures, instigates the deterioration of aquatic ecosystems, disrupting biodiversity and upsetting the equilibrium of aquatic life forms.
- **Eutrophication:** The excessive influx of nutrients into water sources due to pollution can initiate eutrophication, a process characterised by the depletion of dissolved oxygen in water. This phenomenon often results in the demise of fish and other aquatic organisms, upsetting the natural equilibrium of aquatic ecosystems.
- **Industrial and Agricultural Contributions:** Industrial operations and contemporary agricultural techniques emerge as principal sources of water pollution. Industries discharge hazardous chemicals, organic substances, and pollutants into water bodies, while agricultural

practices introduce pesticides and germicides containing chemicals that infiltrate water reservoirs, leading to the eutrophication of freshwater lakes.

- **Global Impact:** Water pollution constitutes a pervasive global environmental concern, exacerbated by factors such as urbanisation, population expansion, industrial output, and climate change. Improper waste disposal, industrial effluent release, and urban runoff collectively contribute to the degradation of water quality, adversely impacting human health and ecosystems on a worldwide scale.
- **Social and Cultural Impacts:** Water pollution disproportionately affects marginalised communities and indigenous populations, exacerbating social inequalities and injustices. Indigenous cultures and traditions tied to waterways suffer when pollution damages sacred sites, disrupt traditional fishing practices, and threatens cultural heritage.



How is river pollution calculated?

Water pollution is often assessed and quantified through various parameters, with two common indicators being Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD).

- **Biological Oxygen Demand (BOD):**
  - BOD measures the amount of dissolved oxygen consumed by microorganisms while decomposing organic matter in water.
  - It indicates the level of organic pollution in water, as higher BOD values suggest a greater amount of organic material present that bacteria will decompose, consequently depleting oxygen levels.
  - BOD is typically expressed in milligrams of oxygen consumed per litre of water (mg/L) over a specified period, commonly 5 days (BOD_5).
- **Chemical Oxygen Demand (COD):**
  - COD measures the amount of oxygen required to chemically oxidise organic and inorganic matter in water.
  - Unlike BOD, which relies on microbial action, COD utilises chemical reactions to quantify both organic and inorganic pollutants.
  - COD results can provide a more rapid assessment of pollution levels compared to BOD, as it doesn't depend on microbial activity and can include a broader range of pollutants.
  - COD is also expressed in milligrams per litre (mg/L) of oxygen consumed, but the test typically takes less time to complete compared to BOD testing.

Initiatives taken by the government

- **National Water Policy (2012):** This policy seeks to recognize the current situation and propose a framework for establishing a system of laws and institutions, along with a coordinated national action plan.Initiated by the Ministry of Water Resources, it underscores the significance of water for human survival and economic development endeavours. It suggests strategies to conserve water resources through efficient, cost-effective, sustainable, and fair means.
- **National Water Mission (2010):** This mission strives for integrated water resource management to promote water conservation, minimise wastage, ensure fair distribution, and formulate improved policies.
- **National Mission for Clean Ganga (NMCG):** This initiative envisions a five-tier structure at the national, state, and district levels to implement measures for preventing, controlling, and mitigating environmental pollution in the Ganga River. Its objective is to maintain a consistent and sufficient flow of water to rejuvenate the Ganga River.

CARBON FARMING

THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS OF **"Carbon Farming".** THIS TOPIC IS RELEVANT IN THE " **ENVIRONMENT AND ECOLOGY**" SECTION OF THE UPSC CSE EXAM.

Why in the News?

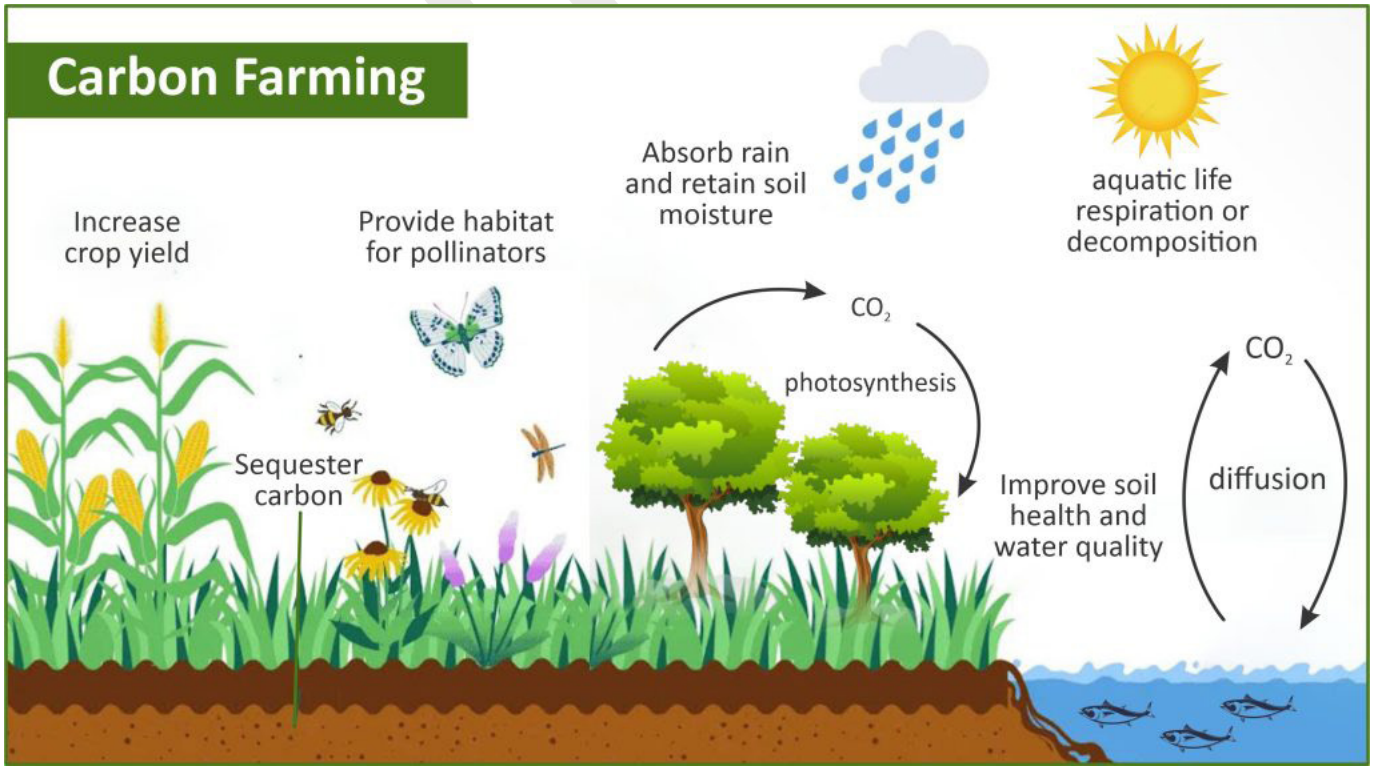
Recently, carbon trading within the agricultural domain has gained significance globally, with particular prominence observed in the United States, Australia, New Zealand, and Canada. These countries have witnessed the emergence of voluntary carbon markets, indicating a growing trend towards engaging in carbon trading activities within the agricultural sector.

About Carbon Farming

- Carbon farming refers to the adoption of agricultural methods aimed at storing carbon in the soil, consequently mitigating the release of carbon dioxide (CO2) into the atmosphere, a significant driver of climate change.
- This strategy employs a range of techniques, including the use of carbon-rich fertilizers, minimal or no-tillage practices, the cultivation of cover crops, diversified crop rotations, agroforestry, and other soil management approaches, all geared towards augmenting carbon sequestration in agricultural ecosystems.

Methods Employed for Carbon Farming

- **Crop diversification:** Rotating crops and diversifying crop species can improve soil health and increase carbon sequestration. Different crops have varying root structures and residue characteristics, which contribute to soil organic matter accumulation and carbon storage. Crop rotation also helps break pest and disease cycles, reducing the need for chemical inputs.
- **Livestock management:** Sustainable livestock management practices, such as rotational grazing, silvopasture, and managed intensive grazing, can enhance carbon sequestration in grasslands and pasturelands. These practices promote grass growth, root development, and soil carbon storage while improving forage quality and livestock productivity.
- **Biochar application:** Biochar, a form of charcoal produced from biomass, can be applied to soil as a soil amendment. Biochar enhances soil fertility, water retention, and microbial activity, leading to increased carbon sequestration.
- **No or low Soil Tillage:** Traditionally, tillage serves to loosen soil, improve aeration, and eradicate early-stage weeds. Nevertheless, tillage accelerates carbon mineralization, resulting in the release of CO2 from the soil. Minimising soil disturbance emerges as an effective strategy for safeguarding soil organic matter.



- **Agroforestry:** Agroforestry involves integrating trees into agricultural systems. Trees not only absorb CO2 from the atmosphere but also store carbon in their biomass, roots, and soil. Agroforestry systems can enhance carbon sequestration while providing additional benefits such as improved soil health, biodiversity, and water retention.

Importance of Carbon Farming

- Carbon farming is instrumental in combating climate change through the absorption of carbon from the atmosphere into soil and vegetation, thereby curbing greenhouse gas emissions and bolstering carbon storage in agricultural areas.
- Carbon farming promotes soil vitality, biodiversity, and the durability of ecosystems.
- Carbon farming improves agricultural output, soil richness, and the ability to retain water. It advocates for regenerative methods that diminish reliance on chemical substances, boost crop production, and encourage the buildup of organic matter in the soil.
- Carbon farming aids in food security by enabling farmers to embrace sustainable land management methods, which not only address climate change but also secure the long-term viability of agriculture.
- Carbon farming provides financial prospects for farmers through avenues like carbon credits, rewards, and engagement in carbon markets. By storing carbon in the soil, farmers can earn extra revenue, enhance farm profitability, and play a role in fostering a more sustainable agricultural industry.

Challenges associated with Carbon Farming

- **In Hot and Dry regions:** Carbon farming may present difficulties in regions characterised by high temperatures and low precipitation, where water resources are scarce and primarily allocated for essential purposes such as drinking and sanitation. Insufficient water availability can impede plant growth, limiting the capacity for carbon sequestration through photosynthesis.
- **Lack of financial resources:** The implementation of carbon farming techniques may necessitate financial support for farmers to offset the expenses associated with their adoption. Particularly in developing nations such as India, small-scale farmers might encounter challenges in accessing the resources required to engage in sustainable land management practices and environmental initiatives.
- **Measurement difficulties:** Assessing alterations in soil carbon levels is a complex and expensive task, posing difficulties in confirming the efficiency of carbon farming methods.
- **Economic and social challenges:** Carbon farming encounters economic and social obstacles, such as the requirement for substantial investment in infrastructure and the possibility of unequal distribution of advantages among farmers and communities.
- **Integrity of Carbon Markets:** Soil carbon sequestration runs the risk of being counted multiple times, resulting in potential inaccuracies in accounting and compromising the integrity of carbon markets.

Global Carbon Farming Practices

- The **Agricultural Carbon Project in Kenya**, backed by the World Bank, underscores the capacity of carbon farming to tackle climate mitigation and adaptation, as well as food security issues, particularly in economically developing nations.
- **France introduced the 4 per 1000 Initiative in 2015 at the 21st Conference of the Parties (COP21)** to the United Nations Framework Convention on Climate Change (UNFCCC). This initiative introduces a novel approach to combating climate change by advocating for an annual rise in soil organic carbon.
- **The European Parliament** launched the **Carbon Farming - Making Agriculture Fit for 2023 initiative.**

Opportunities For India

- **Abundant agricultural area:** Areas abundant in agricultural land, like the Indo-Gangetic plains and the Deccan Plateau, are highly conducive to embracing carbon farming practices.
- **Additional earnings to Farmers:** Carbon credit systems have the potential to motivate farmers by offering supplementary earnings through environmental services.
- **Food security:** Encouraging farmers via carbon credit systems, India can address climate change while simultaneously bolstering food security, enhancing soil health, and generating economic prospects for farmers.

Government Policies and Initiatives

- **Farmer Producer Organizations (FPOs):** With the goal of establishing 10,000 FPOs by FY2027, the Indian government aims to empower smallholder and marginal farmers to benefit from economies of scale. Support schemes and tax incentives are provided to promote sustainable agricultural practices, including carbon farming.

- **Carbon Market Development:** India is in the process of developing a carbon market that values greenhouse gas emissions. This initiative creates opportunities for farmers to engage in carbon trading and earn revenue from carbon credits.
- **Green Credit Scheme:** The Indian government has initiated a Green Credit Scheme to bolster sustainable practices, including those in agriculture. This scheme incentivises farmers to embrace climate mitigation measures and earn additional income through carbon credits.
- **Research and Development Support:** Encouraging a research-oriented approach to address challenges in carbon farming, develop scalable technological solutions for measurement, reporting, and verification, and showcase best practices to illustrate the effectiveness of carbon credits in agriculture.

Way Forward

- **Awareness and Capacity Building:** Enhancing farmers' understanding of the advantages of carbon farming, offering instruction in sustainable agricultural methods, and fostering a conducive environment for adoption to encourage widespread utilisation of carbon farming techniques.
- **Scaling Up:** Expanding the implementation of carbon farming practices nationwide by addressing challenges such as limited awareness, insufficient policy backing, technological hurdles, and fostering a supportive adoption environment.
- **Diversification of Carbon Capture Methods**: Apart from afforestation, India should investigate and advocate for alternative carbon sequestration techniques like blue carbon sinks, algae-bacteria sequestration, and climate-smart agricultural practices to augment biological carbon capture and sequestration endeavors.

PRELIMS QUESTION

Q1. Consider the following statements:

1. Carbon Monoxide is responsible for acid rain.
2. Harmful algal blooms are the primary cause of "red tide" events in marine environments.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Q2. Which parameter is more suitable for quickly assessing pollution levels in water samples?

(a) BOD

(b) COD

(c) Both are equally suitable

(d) Neither is suitable for quick assessment

Q3. Consider the following statements regarding Carbon farming:

1. Regions with extensive agricultural land are well suited for Carbon Farming.

2. Carbon farming requires high tillage of soil.

Choose the correct answer using the codes given below:

A. 1 Only

B. 2 Only

C. Both 1 and 2

D. Neither 1 nor 2

ANSWERS

S. No.	Answers
1.	B
2.	B
3.	A

MAINS QUESTION

Q1. Discuss the social and cultural impacts of water pollution, emphasising how marginalised communities and indigenous populations are disproportionately affected.

Q2. Discuss the significance of carbon farming in mitigating climate change and its role in promoting sustainable agricultural practices. How does carbon farming contribute to soil health, biodiversity, and food security?

HISTORY

OLD TRADE ROUTE UNCOVERED BY INSCRIPTION AT HOYSALA'S TEMPLE

THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS OF "OLD TRADE ROUTE UNCOVERED BY INSCRIPTION AT HOYSALA'S TEMPLE". THIS TOPIC IS RELEVANT IN THE "HISTORY" SECTION OF THE UPSC CSE EXAM.

Why in the News?

Inscriptions uncovered at the Sri Madhava Perumal Temple reveal evidence of a significant trade pathway existing over a millennium ago, linking the Kongu area in the western part of Tamil Nadu with southern Karnataka and Kerala.

About the Madhava Perumal Temple

- The Sri Madhava Perumal Temple, **located in Mylapore, Chennai, Tamil Nadu**, is dedicated to the Hindu deity Vishnu, who is worshipped as Madhava Perumal. The temple, **constructed in the Dravidian style of architecture**, dates back to the Hoysala period and was built during the reign of King Veera Ballala III (1292-1343 CE).
- The Mylapore region came under the rule of the Hoysala dynasty, and the general of the Hoysala army, Dhandanayaka, constructed the Dandanayaka Fort 680 years ago, with the **temple built inside the Dandanayaka fort**. The area was later ruled by the Vijayanagara Empire and Tipu Sultan, and the Battle of Sathyamangalam (1790), during the Third Anglo-Mysore War (1790-1792), took place near the fort.
- The temple is believed to be the **birthplace of Peyalwar**, one of the first three of the twelve Alvar saints of the 6th-9th century CE. The **inscriptions found at the temple reveal the existence of a village named Thuravalur** and indicate that the area served as a crucial trade route, **allowing traders to cross the Bhavani and Moyar rivers** to reach Wayanad in Kerala and various places in Karnataka.
- The temple, largely **submerged in the water-spread area of the Bhavanisagar dam in Erode district**, became visible as the water level in the dam dipped. The construction of the Bhavanisagar dam in 1948 resulted in the relocation of nearby residents and the shifting of temple idols to new locations in 1953.
- The discovery of this **submerged temple and the associated trade route highlights the importance of preserving and studying such historical sites**, as they offer a window into the past and contribute to our understanding of the region's history and cultural heritage. The inscriptions found at the temple provide valuable insights into the trade activities and historical significance of the region during the Hoysala period and beyond.

About Hoysala Dynasty

- The Hoysala Empire emerged as a dominant force in southern India, originating from Kannadiga roots and governing a vast expanse of territory encompassing present-day Karnataka during the 10th to 14th centuries. Initially headquartered in Belur, the capital later shifted to Halebidu.
- Rooted in the Malenadu region of the Western Ghats, the Hoysala rulers strategically expanded their domain during the 12th century, capitalising on conflicts between the Western Chalukya Empire and the Kalachuris of Kalyani. They annexed territories in present-day Karnataka and fertile lands north of the Kaveri delta in Tamil Nadu.
- By the 13th century, their dominion extended across most of Karnataka, parts of northwestern Tamil Nadu, and sections of western Andhra Pradesh on the Deccan Plateau. Claiming descent from the Yadava lineage, the Hoysalas traced their legendary origins to Sala, also known as Poysala, who purportedly exhibited exceptional bravery by slaying a tiger, earning the moniker "Hoysala," meaning "the one who strikes."
- Although the legend of Sala's valour is more symbolic than historical, it became integral to the Hoysala identity. While scant documentation exists about their early history, the Hoysalas initially served as vassals to various larger South Indian empires like the Chalukyas and Cholas before gradually asserting their independence and establishing their kingdom.
- The apex of Hoysala's influence unfolded during the 12th and 13th centuries under the leadership of notable monarchs such as Vishnuvardhana, Ballala II, and Veera Ballala III. This era witnessed prolific temple construction, illustrating their patronage of art and culture. The distinctive Hoysala architectural style, characterised by intricate sculptures and finely detailed carvings, reached its pinnacle during this period,

leaving an enduring legacy of artistic splendour in the region.

About Hoysala temple architecture

- Hoysala temple architecture is renowned for its remarkable beauty, meticulous craftsmanship, and the skilful work of the artisans who constructed these temples. These architectural marvels, erected during the Hoysala era, hold profound cultural and historical importance in the southern regions of India.
- During their reign, the Hoysalas displayed a remarkable dedication to temple construction, erecting numerous temples devoted to Hindu deities such as Lord Shiva, Lord Vishnu, and various forms of the Goddess. Notably, many Hoysala temples feature a distinctive star-shaped ground plan, incorporating multiple symmetrically positioned shrines. Constructed primarily from soapstone, these temples allowed for intricate carvings and detailed embellishments.
- A defining characteristic of Hoysala architecture is the elaborate carvings that adorn virtually every surface of the temples. These carvings depict scenes from Hindu mythology, celestial entities, animals, intricate geometric patterns, and depictions of Lord Vishnu and Lord Shiva. Additionally, Hoysala temples boast unique architectural elements like the Makara Torana, ornate Mantapas, circular pillars adorned with sculpted figures, and sanctums categorised based on the number of shrines.
- Hoysala temples exhibit a fusion of architectural styles, drawing influences from Chola and Chalukya art traditions. Their distinguishing features include star-shaped layouts, abundant decorative carvings, and the prevalent use of soapstone as the primary construction material. These temples serve not only as architectural wonders but also as repositories of the Hoysala dynasty's cultural and historical legacy, showcasing minimal Indo-Aryan influence and a more pronounced impact of the Southern Indian architectural style.

Some notable examples of Hoysala temples

- **Chennakesava Temple, Belur:** Constructed in the 12th century during the reign of King Vishnuvardhana, the Chennakesava Temple in Belur is one of the most famous examples of Hoysala architecture. Known for its breathtakingly intricate carvings and sculptures, particularly the famous "Madanikas" or celestial nymphs, this temple is dedicated to Lord Vishnu.
- **Hoysaleswara Temple, Halebidu:** Built in the 12th century under the patronage of King Vishnuvardhana and his successors, the Hoysaleswara Temple is another iconic Hoysala temple. Dedicated to Lord Shiva, this temple is renowned for its exquisite sculptures, especially the friezes depicting scenes from the Hindu epics Ramayana and Mahabharata.
- **Kesava Temple, Somanathapura:** Constructed in the 13th century during the reign of King Narasimha III, the Kesava Temple in Somnathpur is a remarkable example of Hoysala temple architecture. Known for its intricate craftsmanship and well-preserved sculptures, this temple is dedicated to Lord Vishnu.
- **Lakshmi Devi Temple, Doddagaddavalli:** Dating back to the late 11th century, the Lakshmi Devi Temple in Doddagaddavalli is one of the earliest surviving examples of Hoysala architecture. This temple is notable for its compact yet elaborately decorated structure, featuring intricate carvings of deities and celestial beings.

PRELIMS QUESTIONS

Q1. What purpose does the Mandapa in a Dravida-style temple serve?

(a) Ritual bathing

(b) Offering prayers

(c) Community gatherings

(d) Housing priests

Q2. The Gopuram of a Dravida-style temple is usually adorned with:

(a) Stupas

(b) Minarets

(c) Depictions of deities and mythological scenes

(d) Buddhist symbols

ANSWERS

S. No.	Answers
1.	C
2.	C

MAINS QUESTION

Q1. Evaluate the role of the Hoysala dynasty in the development of temple architecture, focusing on their patronage of art and culture. How did the distinctive features of Hoysala temples contribute to the region's architectural legacy?