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## UPSC Syllabus: Polity and nation

### SC statement on Socialism and secularism in India and the Preamble Amendment

#### Why in news?

Recently, the Supreme Court recently gave statement on a challenge to the inclusion of the terms “socialist” and “secular” in the Constitution’s Preamble, added by the 42nd Amendment during the Emergency era. However, the final judgement is still awaited.

#### About the court’s observation

Chief Justice of India (CJI) Sanjiv Khanna emphasized that:

- i) Socialism in India signifies a welfare state ensuring equality of opportunity and is not akin to dictatorial ideologies.
- ii) It accommodates both individualism and private sector growth alongside public sector contributions, as reflected in various constitutional Articles.
- iii) Secularism is a fundamental aspect of the Constitution’s Basic Structure, alongside socialism and cannot be detached. The Preamble, amendable under Article 368 is an integral part of the Constitution and evolves to align with national welfare goals.
- iv) The judgment reaffirmed that secularism which is rooted in principles like equality and fraternity and is intrinsic to the Constitution’s ethos and cannot be compromised.
- v) In the previous judgements also, the court emphasized secularism is intrinsic to the Constitution’s Basic Structure with terms like ‘equality’ and ‘fraternity’ reflecting its essence.

#### Concept of socialism and secularism in Preamble

1. The concepts of socialism and secularism are explicitly mentioned in the Preamble of the Indian Constitution. Both principles emphasize the democratic and inclusive framework of the Constitution. These terms were added through the 42nd Amendment Act, 1976.
2. Socialism signifies the commitment to social and economic justice, aiming to reduce inequality in wealth, status, and opportunities.
3. Secularism ensures that the state treats all religions equally without favoring or discriminating against any faith.

#### Socialism and secularism in Indian Constitution

1. **Fundamental rights:** The Indian Constitution reflects its commitment to socialism and secularism through various provisions. Socialism is upheld via Fundamental Rights like Article 14 (equality before law), Article 21 (right to life and socio-economic rights), and Article 23 (prohibition of forced labor).
2. **Directive Principles of State Policy (DPSP):** It is also mentioned as Directive Principles of State Policy (DPSP) such as Article 38(1) (justice-based social order), Article 39 (equitable wealth distribution), Article 41 (right to work and education), and Article 46 (upliftment of weaker sections). Public sector undertakings and welfare schemes under Articles 39(b) and 39(c) further embody socialism.
3. **Fundamental rights:** Secularism is supported by Fundamental Rights like Article 15 (no religious discrimination), Article 25 (freedom of religion), Article 27 (no taxes for religious promotion), and Article 28 (restrictions on religious instruction in state institutions).



## **Supreme Court Allows Telcos to Claim CENVAT Credit for Mobile Towers and Shelters**

### **Why in news?**

The Supreme Court delivered a landmark judgment allowing telecom companies to claim CENVAT credit for mobile towers and pre-fabricated buildings (PFBs).

### **Key Highlights of the Judgment**

**1. Recognition of Mobile Towers and Shelters as Capital Goods:** Mobile towers and PFBs fall under the definition of “capital goods” or “inputs” as per CENVAT Rules. These structures provide critical support for efficient mobile signal transmission, enabling telecommunication services.

**2. Functional Utility Test:** The court applied the “functional utility test” to determine that:

i) Mobile towers and PFBs are indispensable for the provision of telecommunication services.

ii) These items are integral to the functioning of the Base Transceiver Station (BTS), antenna, and other components of the telecom system.

**3. Entitlement to CENVAT Credit:** As per Rule 3(1)(i) of the CENVAT Rules, MSPs can claim credit for excise duties paid on goods used to provide telecommunication services. Mobile towers and PFBs, as part of the telecom infrastructure, qualify as “goods” under Rule 2(k).

### **About CENVAT Credit (Central Value Added Tax Credit)**

**1. CENVAT credit (Central Value Added Tax Credit)** is a mechanism in Indian taxation that allows manufacturers and service providers to avail a credit of the taxes paid on inputs, input services, and capital goods used in the production of goods or provision of services.

**2. It aims to reduce the cascading effect of taxes, ensuring that only the value addition is taxed at each stage.**

**3. Applicability:** It applies to excise duties and service taxes (relevant before the introduction of GST in India). Manufacturers and service providers registered under the Central Excise or Service Tax laws could avail the credit.

## **‘Hamara Samvidhan – Hamara Samman’ Campaign**

### **Why in news?**

Recently, the third regional event of the ‘Hamara Samvidhan Hamara Samman’ campaign was held at IIT Guwahati. This regional event was organized as part of the Designing Innovative Solutions for Holistic Access to Justice (DISHA) scheme, implemented by the Department of Justice under the Ministry of Law and Justice, Government of India.

### **About the ‘Hamara Samvidhan – Hamara Samman’ Campaign**



- 1. About:** The 'Hamara Samvidhan – Hamara Samman' campaign commemorates the 75th anniversary of the adoption of the Indian Constitution and India's establishment as a Republic.
- 2. Launched on:** It was officially launched on January 24, 2024 by the Hon'ble Vice President of India at the Dr. B.R. Ambedkar International Centre, New Delhi.
- 3. Aim:** The campaign aims to promote awareness and understanding of the Indian Constitution and encourage citizens to recognize and exercise their legal rights.
- 4. The initiative seeks to highlight the Constitution's significance as the supreme legal authority that defines India's governance framework and safeguards citizens' rights.**

#### **Highlights of the event**

- 1. A symbolic gesture of planting saplings was conducted as a tribute to the 15 women members of the Constituent Assembly under the 'Ek Ped Maa Ke Nam' campaign. This act symbolized the roots of the Constitution and the values of justice, equality, and freedom.**
- 2. The Samvidhan Katta Magazine featuring 75 real-life stories about the impact of the Constitution in daily life, was launched during the event.**
- 3. A Comic Book highlighting the stories of 10 beneficiaries of the Tele Law and Nyaya Bandhu programs was also unveiled, aiming to make constitutional rights more relatable and accessible.**
- 4. Eight podcasts were released, providing insights into how citizens can use the Constitution to safeguard their rights through Tele Law and Nyaya Bandhu initiatives.**
- 5. Tribute was paid to the contributions of women in the Constituent Assembly, including Late Smt. Leela Roy. Homage was also given to Syed Muhammad Saadulla, Assam's sole member in the Drafting Committee, and Dr. B.R. Ambedkar for his pivotal role in crafting the Constitution.**

### **International Cooperative Alliance (ICA)**

#### **Why in news?**

**India will host the ICA General Assembly and Global Cooperative Conference for the first time.**

### About Global Conference of the International Cooperative Alliance (ICA)



Figure 1. Source: ICA official page

1. About: The Global Conference of the International Cooperative Alliance (ICA) will take place in New Delhi, India, from November

25-30, 2024.

2. Hosted by: It is being hosted by IFFCO with support from 18 ICA member organizations.

3. Focus: It is focused on cooperative-driven growth and prosperity, its theme is "Cooperatives Build Prosperity for All" with subthemes addressing policy, leadership, and the cooperative identity in the 21st century.

### About International Cooperative Alliance (ICA)

1. About: It is the leading nonprofit organization representing cooperatives. It is serving as a unified voice and platform for knowledge-sharing, expertise, and coordinated efforts focused on cooperatives worldwide.

2. Purpose: It was founded in 1895 to promote the cooperative model as a viable and sustainable alternative to traditional business practices.

3. Headquarter: The organization is headquartered in Brussels, Belgium and has four regional offices for Africa, the Americas, Asia-Pacific and Europe.

3. Membership: Its members include national and international cooperative organizations from various sectors such as agriculture, banking, consumer goods, health, housing, and insurance. It includes over 306 organizations representing 105 countries among its members.

4. Structure: The ICA operates through a structured framework involving General Assembly, Board of Directors and Sectoral Organizations and Committees.

4. Objectives: The ICA's primary mission is to advance the cooperative movement by:

1. Promoting Cooperative Principles: The ICA upholds the seven cooperative principles, which guide cooperatives worldwide.

2. Advocating for Cooperative Interests: It represents the interests of cooperatives to international institutions like the United Nations and other global entities.

3. Providing Resources and Support: The ICA offers research, training, and networking opportunities to help cooperatives thrive and expand their influence.

## UPSC Syllabus: International organisation

### Global Alliance Against Hunger and Poverty

#### Why in news?

#### About Global Alliance Against Hunger and Poverty

1. The Global Alliance Against Hunger and Poverty was officially launched on November 18, 2024, during the G20 Leaders' Summit in Rio de Janeiro, Brazil.

2. Aim: This initiative aims to accelerate global efforts to eradicate hunger and poverty, aligning with the United Nations' Sustainable Development Goals (SDGs).

3. Objective:

i) It provides a platform where countries can share and adopt evidence-based public policies targeting hunger and poverty eradication.

ii) It connects countries in need with technical and financial support from willing partners.

4. Participants: 81 countries, including India are member of the alliance. 26 international organizations, 9 financial institutions, 31 philanthropic foundations, and NGOs.

5. Funding: Annual operational costs of \$2-3 million, supported by member countries and institutions like FAO, UNICEF, and the World Bank.

6. Headquarters: It is likely based in Brasília, Brazil, or another Global South country, with an office at FAO headquarters in Rome.

7. Main pillars: The initiative is structured around three main pillars:

1. National Pillar: Engages national governments to implement and scale up effective policies and programs.

2. Financial Pillar: Involves international organizations, multilateral development banks, and philanthropies to mobilize financial resources.

3. Knowledge Pillar: Connects knowledge centers and institutions to share best practices and research.

## UAE Launches Global Energy Efficiency Alliance at COP29

Why in news?

Recently, During COP29 in Azerbaijan, the UAE launched an ambitious initiative to create the 'Global Energy Efficiency Alliance.'

About Global Energy Efficiency Alliance at COP29



Figure 2. Source: Akashwani

1. The UAE announced the Global Energy Efficiency Alliance during COP29, hosted in Azerbaijan.

2. Aim: It aims to double global energy efficiency rates by 2030 and achieve substantial reductions in carbon emissions.

3. The alliance builds upon the 'UAE Consensus' introduced at COP28 which united nations, organizations, and corporations in their commitment to reducing

carbon emissions and promoting sustainable resource management.

#### 4. Objectives of the Alliance

i) The alliance aims to enhance global energy efficiency by doubling efficiency rates by 2030 and addressing energy-related challenges worldwide.

ii) It seeks to reduce carbon emissions significantly, aligning with international climate goals.

5. The initiative is designed to promote the sustainable use of natural resources, ensuring a balance between consumption and conservation.

#### Strategic Goals of the Alliance

1. The alliance will promote strategic partnerships between public entities and private organizations to accelerate energy efficiency solutions.

2. It aims to encourage investments by mobilizing funding for energy efficiency projects across various regions.

3. It will work towards developing global standards for energy efficiency practices and sharing best practices to inspire collective action.

4. Knowledge transfer is a key focus, with efforts to share successful case studies and practical solutions for energy efficiency implementation.

#### Special Focus on Africa

The alliance places a strong emphasis on supporting African nations, recognizing the continent's unique challenges in achieving energy sustainability.

It plans to develop innovative financing mechanisms to help African countries overcome financial barriers to energy efficiency. The UAE will support Africa in accessing technological solutions critical to advancing sustainable energy practices.

#### Key Outcomes Anticipated

1. The initiative aims to foster global collaboration to address energy inefficiency and promote sustainability.

2. It seeks to contribute to global sustainable development goals, reinforcing efforts to create a balanced energy landscape.

3. By implementing the alliance's strategies, the world can expect to achieve substantial reductions in carbon emissions, meeting critical climate objectives.

## Second India-CARICOM Summit 2024

### Why in news?

Recently, Prime Minister Narendra Modi arrived in Guyana marking the first visit by an Indian head of state to the country in over 50 years. The visit was part of his participation in the second India-CARICOM Summit held in Georgetown, Guyana.

### About the summit





Figure 3. Source: TH

1. The 2nd India-CARICOM Summit was co-chaired by Indian Prime Minister Narendra Modi and Grenadian Prime Minister Dickon Mitchell.

2. It took place on November 20, 2024, in Georgetown, Guyana.

3. This historic event marked the first time an Indian Prime Minister visited Guyana in over 50 years.

4. Discussions revisited the 2019 India-CARICOM agreement on renewable energy and climate

change, supported by a \$150 million credit line from India.

5. The summit highlighted the significant presence of the Indian diaspora in Guyana, with approximately 320,000 people of Indian origin residing there.

6. Focus Areas for Collaboration: Discussions during the summit centred on enhancing ties in key areas: Economic Cooperation, Agriculture and Food Security, Health and Pharmaceuticals and Science and Innovations

#### Seven Key Pillars Proposed

Prime Minister Modi outlined seven pillars to bolster India-CARICOM relations, emphasizing a multifaceted approach:

1. Trade – Increasing bilateral trade opportunities.
2. Technology – Promoting technological collaborations.
3. Tourism – Enhancing cultural and economic exchanges through tourism.
4. Talent – Leveraging skilled professionals for mutual benefit.
5. Tradition – Preserving and sharing cultural heritage.
6. SME Development – Implementing a \$1 million grant for SME sector growth, announced in a prior meeting.
7. Online Portal – Proposing a digital platform to connect private sectors and stakeholders across member nations.

#### Key Outcomes of the Summit:

1. Technological Collaboration: India committed to sharing its advancements in seaweed management technology to help Caribbean nations address the challenges posed by seaweed infestations.
2. Educational Initiatives: Over the next five years, India will offer more than 1,000 scholarships to students from CARICOM countries, aiming to enhance educational exchanges and capacity building.
3. Healthcare Support: India plans to provide mobile hospitals and drug-testing laboratories to improve healthcare infrastructure in the Caribbean region.

4. **Transportation Enhancements:** The introduction of river and sea ferries is intended to bolster marine transport and connectivity among Caribbean nations.

5. **Energy Security:** Recognizing Guyana's growing significance as an oil-producing nation, Prime Minister Modi emphasized its potential role in contributing to India's energy security.

## UPSC Syllabus: International Relations

### Biofloc Technology (BFT) and Recirculating Aquaculture Systems (RAS)

Why in news?

India's aquaculture sector has increasingly adopted Biofloc Technology (BFT) and Recirculating Aquaculture Systems (RAS). These technologies are supported by government subsidies and researched extensively by institutions like ICAR-CIFA and ICAR-CIBA.

About Biofloc Technology (BFT)

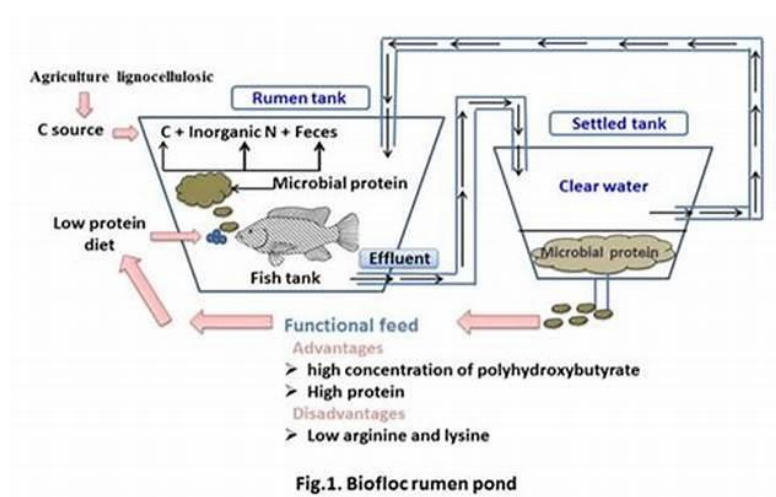


Figure 4. Source: ABESTA

1. About: Biofloc Technology is a closed tank-based fish farming method that uses beneficial bacteria to clean water and recycle organic waste into microbial biomass, which can then be consumed by fish.

2. Advantages:

i) BFT reduces the need for frequent water changes and minimizes the use of antibiotics.

ii) The system is cost-effective and environmentally friendly, as it recycles nutrients from waste.

It is particularly suitable for small farmers with limited land and can even be set up in small areas or backyards.

iii) The technology promotes sustainability by reducing environmental impact while enabling intensified production.

3. Challenges:

i) The initial cost of setting up a BFT system can range from ₹4-5 lakh, making it expensive for small-scale farmers.

ii) Constant monitoring is required to maintain water quality and the carbon-to-nitrogen ratio, which is crucial for microbial growth.

iii) Certain fish species, such as Indian major carps like rohu and catla, are less successful in BFT systems, limiting its adoption in some regions.

iv) Seasonal variations, such as cold winters, require additional investments like heating rods to maintain optimal conditions.

About Recirculating Aquaculture Systems (RAS)

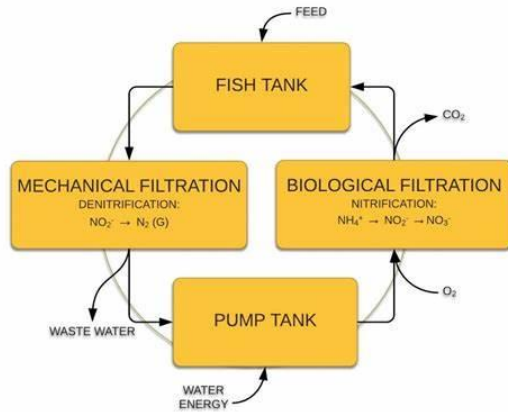


Figure 5. Source: Aquaculture ID

1. About: Recirculating Aquaculture Systems use a closed-loop setup to filter and recycle water, creating a controlled environment for fish farming.

2. Advantages:

i) RAS systems ensure high levels of biosecurity by filtering out pathogens and reducing the risk of diseases.

ii) They require minimal intervention for water monitoring and disease control, making management efficient.

iii) The systems provide optimal conditions for fish growth by controlling temperature, oxygen levels,

and cleanliness.

iv) RAS can be set up in areas without natural water sources and close to urban markets, allowing for proximity to high-demand areas.

v) Water recycling within the system conserves freshwater resources.

3. Challenges:

i) RAS systems involve higher initial investment and operational costs compared to BFT systems.

ii) Continuous power supply and backup systems are necessary, adding to the operational expenses.

iii) Farmers need extensive training to manage the complex components of RAS, such as filtration systems and water quality monitoring.

## UPSC Syllabus: Environment

### Bhu-Neer" Portal

Why in news?

The "Bhu-Neer" portal was officially launched during the concluding ceremony of India Water Week 2024.

About the Portal



Source:PIB

1. About: The “Bhu-Neer” portal is an initiative to regulate and manage groundwater resources effectively.
2. Developed by: The Central Ground Water Authority (CGWA) under the Ministry of Jal Shakti, in collaboration with the National Informatics Centre (NIC).
3. Goal: The primary goal of the portal is to enhance groundwater management and regulation across the country.
4. The “Bhu-Neer” portal is now live and available for public access. Project proponents can visit the portal for groundwater-related applications, clarifications, tracking the status of their requests, and making necessary statutory payments.

#### *Key Features of the “Bhu-Neer” Portal*

1. Comprehensive Groundwater Resource Management: The portal offers a centralized database that provides access to the legal frameworks governing groundwater extraction. It also includes detailed information on regulations at both state and national levels. This feature promotes transparency and sustainability in groundwater resource management.
2. User-Friendly Design: The portal has been designed with a simplified and informative interface to ensure a smooth user experience. It offers an efficient and streamlined process for obtaining groundwater withdrawal permits.
3. Innovative Functionalities: The “Bhu-Neer” portal incorporates several advanced features, such as a PAN-based single ID system that simplifies user identification. Additionally, the portal generates No Objection Certificates (NOCs) with integrated QR codes, enhancing convenience and traceability.
4. Enhanced Accessibility: Users of the portal can track the status of their applications, make statutory payments, and seek clarifications or assistance regarding groundwater withdrawal.
5. The “Bhu-Neer” portal represents a significant improvement over the previous NOCAP system. It has been designed to make groundwater regulation a more efficient, transparent, and user-friendly process. This aligns with the government’s broader goal of promoting the ease of doing business.

#### *Significance of the Portal*

The launch of “Bhu-Neer” is an important step toward realizing the Hon’ble Prime Minister’s vision of “Ease of Doing Business.” The portal makes groundwater regulation a seamless and faceless process. It also emphasizes sustainable practices, ensuring responsible groundwater usage across industries and individuals.

## UPSC Syllabus: Government initiative and schemes, Environment



### Global Soil Conference 2024

#### Why in news?

Recently, the Global Soil Conference 2024 was organised by the Indian Society of Soil Science, New Delhi.

#### About the conference

1. Organised by: Indian Society of Soil Science, New Delhi under the aegis of the International Union of Soil Sciences, Italy.

2. It has been organised in collaboration with the Indian Council of Agricultural Research, National Academy of Agricultural Sciences, New Delhi

3. Theme: “Caring Soils Beyond Food Security: Climate change mitigation & Ecosystem Services”

4. Objective: Its objective involves:

i) Empowering Farmers: Providing education, support, and modern scientific tools to enhance agricultural sustainability

ii) Role of Youth and Women: Encouraging youth and women researchers to lead innovations addressing soil challenges.

iii) Global Partnerships: Collaboration among scientists, policymakers, NGOs, and stakeholders to develop actionable solutions.

#### 5. Focus Areas

i) Soil as a Global Concern: It recognized soil erosion and degradation as global challenges affecting sustainable development. It also emphasis on soil health as critical for human, animal, and plant well-being.

ii) Sustainable Land Management: It is to address the global need for sustainable agricultural practices to restore soil health and foster collaboration among nations to share innovations and implement scalable solutions.

iii) SDGs and Soil Health: It highlighted about soil conservation aligned with the United Nations Sustainable Development Goals (SDGs). Also stresses on achieving food security through resilient ecosystems.

6. Vision for the Future: India is supporting initiatives for sustainable and profitable agriculture. India is also advocating integrated nutrient and water management practices.

## UPSC Syllabus: Environment

### Discovery of the World's Largest Coral in the Solomon Islands

**Why in news?**

Recently, a massive coral structure has been discovered in the Solomon Islands, South Pacific. The discovery of this colossal coral underscores the ocean's vast mysteries and the urgent need to protect such ecosystems from environmental challenges.

**About Discovery of the World's Largest Coral in the Solomon Islands**



Figure 6. Source: TOI

It's the largest coral known to date. The coral is comparable in size to two basketball courts or five tennis courts.

It has been found as part of National Geographic's Pristine Seas Project, led by explorer Enric Sala.

**Physical Characteristics:**

1. It is lying at a depth of 40 feet below the surface. Its height (16 feet) indicates an estimated age of over 300 years. It is visible from space due to its sheer size and striking colors.
2. It measures approximately 111 feet wide, 104 feet long, and 18 feet high.
3. It belongs to the *Pavona clavus* species. It is predominantly brown but includes vibrant hues of yellow, blue, and red.
4. It provides habitat, shelter, and breeding grounds for various marine species, including shrimp, crabs, and fish. It has been compared to finding the world's tallest tree due to its ecological importance.

### Guru Ghasidas-Tamor Pingla Tiger Reserve

**Why in news?**

Recently, Guru Ghasidas-Tamor Pingla Tiger Reserve has been notified as the 56th Tiger Reserve of the country.

**About Guru Ghasidas-Tamor Pingla Tiger Reserve**



**1. Location:** It is located in Chhattisgarh. It is nested in the Chota Nagpur plateau and partly in Baghelkhand plateau.

The reserve spreads across four districts in Chhattisgarh: Manendragarh-Chirmiri-Bharatpur, Korea, Surajpur, and Balrampur.

**2. Area:** The Tiger Reserve spans a total area of 2,829.38 square kilometers, including a core or critical tiger habitat of

2,049.2 square kilometers that encompasses the Guru Ghasidas National Park and Tamor Pingla Wildlife Sanctuary.

**3.** It also has a buffer zone of 780.15 square kilometers, making it the third-largest tiger reserve in India.

**4. Adjacent preserved areas:** It also links with the Bandhavgarh Tiger Reserve (Madhya Pradesh) in the west and the Palamau Tiger Reserve (Jharkhand) in the east.

**5. Significance:** It forms a contiguous landscape with the Sanjay Dubri Tiger Reserve in Madhya Pradesh, creating a complex of nearly 4,500 sq. km.

**6. Flora:** It comprises of blend of sub-tropical and deciduous forests. The reserve boasts abundant flora, including sal, saja, dhavda, and kusum, representing a variety of vegetation types.

**7. Fauna:** The reserve is home to 753 documented species, including 365 invertebrates and 388 vertebrates. It shelters 230 bird species and 55 mammal species including several threatened species.

Its insect diversity, mainly from the class Insecta, contributes to a healthy ecosystem balance.

It hosts a diverse array of wildlife species, excluding tigers, such as elephants, sloth bears, vultures, peacocks, wolves, leopards, otters, chitals, jackals, nilgai, bison, hyenas, langurs, and cobras, among others.

### Implications of the New Reserve

**Ecological Impact:** The expansive area of the Guru Ghasidas-Tamor Pingla Tiger Reserve will bolster tiger population growth while also safeguarding other fauna and flora. Its connectivity with adjacent reserves enhances gene flow and strengthens regional biodiversity.

**Economic and Social Benefit:** Tiger reserves significantly contribute to ecotourism, benefiting local communities through sustainable livelihoods. Conservation programs often involve local participation, ensuring harmonious coexistence between humans and wildlife.

**Strengthening Global Commitments:** This milestone reinforces India's dedication to international conservation goals, such as the Global Tiger Initiative and the Global Tiger Recovery Program which aim to double tiger numbers worldwide.

## One Day One Genome' Initiative

Why in news?

Recently, the Department of Biotechnology (DBT) and the Biotechnology Research and Innovation Council (BRIC) have launched the 'One Day One Genome' initiative.

#### About the initiative



1. Launched by: The Department of Biotechnology (DBT) and the Biotechnology Research and Innovation Council (BRIC)

2. Purpose: To highlight India's unique microbial diversity and its role in environmental, agricultural, and human health.

3. Lead Organizations: Biotechnology Research and Innovation Council-National Institute of Biomedical Genomics (BRIC-NIBMG) under DBT.

#### 4. Key Objectives

1. Highlight India's Microbial Diversity: It showcases unique bacterial species found in India. It emphasizes their role in maintaining ecological balance, agriculture, and human health.

2. Promote Genome Sequencing: It enables visualization of microbial potential through genome sequencing. It also unlocks capacities for critical enzymes, antimicrobial resistance, and bioactive compounds.

3. Enhance Accessibility and Innovation: It provides publicly available annotated microbial genome data. It facilitates innovation and research in microbiology and its applications.

#### Significance of Microorganisms

1. Environmental Contributions: It drives biogeochemical cycles, soil formation, and organic waste degradation and aid in mineral purification and methane production, ensuring planetary homeostasis.

2. Agricultural Benefits: It facilitates nutrient cycling, nitrogen fixation, and soil fertility, control pests, weeds, and stress responses in crops and support plant growth through nutrient and water uptake.

3. Human Health Impact: It outnumbers human cells in the body, contributing to digestion, immunity, and mental health and serve as the foundation for combating infectious diseases through symbiotic relationships.

#### Benefits of Genome Sequencing



- 1. Unlocking Microbial Potential:** It deciphers hidden genetic capabilities for enzymes, antimicrobial, and bioactive compounds. It also advances research for environmental protection, agricultural development, and health improvement.
- 2. Public Data Accessibility:** It is fully annotated microbial genomes will be freely accessible and provide graphical summaries, infographics, and genome assembly/annotation details.
- 3. Stimulating Innovation:** It enhances public understanding of microbial applications and encourages research discussions and innovations benefiting society and ecosystems.

#### About Microbes

- 1. Definition:** Microbes are microscopic organisms, which include bacteria, viruses, fungi, archaea, and protists. They are too small to be seen with the naked eye.
- 2. Structure:** Microbes can be single-celled organisms like bacteria and archaea or multicellular like some fungi. They are classified into prokaryotes (organisms without a nucleus, such as bacteria and archaea) and eukaryotes (organisms with a nucleus, such as fungi and protists).
- 3. Functions:** Microbes play a critical role in ecosystems as decomposers, breaking down organic matter. They also participate in nitrogen fixation, which supports plant growth, and some act as pathogens causing diseases in humans, animals, and plants.

## UPSC Syllabus: Science and technology

### Nafithromycin Antibiotic

#### Why in news?

India's first indigenous antibiotic, Nafithromycin, was launched to address drug resistance challenges.

#### About the antibiotic



Source: PIB

**1. Developed By:** Created with support from Biotechnology Industry Research Assistance Council (BIRAC), a unit of the Department of Biotechnology.

2, Market Name: Introduced as “Miqnaf” by Wockhardt Pharmaceuticals.

3. Target Condition: Designed to combat Community-Acquired Bacterial Pneumonia (CABP), caused by drug-resistant bacteria.

#### Features of Nafithromycin

1. The first new antibiotic in its class developed worldwide in over three decades.

2. Enhanced Efficacy: It is 10 times more effective than azithromycin. It achieves comparable results with a three-day treatment regimen.

3. Wide Pathogen Coverage: It is effective against both typical and atypical bacteria and can overcome existing drug resistance mechanisms.

4. Safety and Tolerability: It has minimal gastrointestinal side effects, no significant drug interactions and is unaffected by food, enhancing patient convenience.

#### Significance of Nafithromycin

1. Tackling Antimicrobial Resistance (AMR): It offers a solution to combat multi-drug-resistant pathogens. It also addresses a critical global health challenge responsible for prolonged illnesses and increased healthcare costs.

2. Global Impact: Pneumonia causes over two million deaths annually, with India bearing 23% of the global burden. Nafithromycin provides hope for reducing mortality and healthcare strain.

## India's First Long-Range Hypersonic Missile

#### Why in news?

Recently, the Defence Research and Development Organisation (DRDO) successfully conducted a flight trial of India's first long-range hypersonic missile.

#### About the missile



Figure 7. Source: PIB

A long-range hypersonic missile is capable of travelling at speeds exceeding Mach 5 (five times the speed of sound) over extended distances, typically beyond 1,500 kilometres.

India's first long-range hypersonic missile is indigenously developed by DRDO laboratories, led by the Dr. APJ Abdul Kalam Missile Complex, Hyderabad.

#### Key Features of the Hypersonic Missile

1. Range & Payload: It is capable of carrying various payloads over distances exceeding 1,500 kilometers.

2. Tracking Systems: It is monitored by an array of advanced tracking systems deployed across multiple domains.

3. Performance Metrics: Terminal maneuvers and impact were confirmed with a high degree of accuracy through data from downrange ship stations.

4. Global Implications: This achievement underscores India's growing expertise in critical and advanced military technology, cementing its place among nations with hypersonic weapon capabilities.

### India's first 'Long-Range Hypersonic Missile'

Why in the News?



Source- The Hindu

India successfully tested its first long-range hypersonic missile, marking a significant milestone in defense technology. This achievement **places India in a select group of nations with advanced hypersonic weapons.**

Specifications	Details
Genesis	<ol style="list-style-type: none"><li>1. It builds upon the <a href="#">DRDO's Hypersonic Technology Demonstrator Vehicle (HSTDV) programme</a> which successfully tested a Mach 6 scramjet in 2019 &amp; 2020.</li><li>2. This test showcased the <b>scramjet engine technology</b>. In a scramjet engine, air enters at supersonic speeds and exits at hypersonic speeds.</li></ol>
Developed by	Defence Research and Development Organisation (DRDO)
Features	<ol style="list-style-type: none"><li>1. Range- It has a range of over 1500 kms</li><li>2. Speed - Mach 6, Six times the speed of sound.</li><li>3. Mid-Flight Maneuverability- Merges the speed of a ballistic missile with the agility like Mid-Flight movements of a cruise missile to bypass defenses.</li><li>4. Advanced Tracking - Utilizes advanced multi-domain monitoring systems for precise targeting.</li><li>5. Multi-Payload Capability - Capable of carrying both conventional and nuclear warheads.</li></ol>

Applications	Uses across <b>the Army, Navy, and Air Force</b> ; the naval version (which is in developmental stage) is designed to precisely target and destroy enemy warships at long distances.
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### About India's first 'Long-Range Hypersonic Missile'

#### What are Hypersonic Missiles?

1. These missiles can fly at **speeds of at least Mach 5** (five times the speed of sound).
2. A **key feature** of hypersonic missiles is their Mid-Flight **maneuverability**, unlike ballistic missiles that follow a fixed path.
3. There are two types of hypersonic weapons:
  - a. Hypersonic Glide Vehicles (HGVs): Launched by a rocket and then glide to the target.
  - b. Hypersonic Cruise Missiles (HCMs): Powered by air-breathing engines or "scramjets" after locking onto the target.

### Sanyukt Vimochan 2024 Exercise

#### Why in news?

Recently, the Indian Army successfully conducted Sanyukt Vimochan 2024 Exercise.

#### About Sanyukt Vimochan 2024 Exercise

Aspects	Description
About	<ol style="list-style-type: none"> <li>1. The Indian Army successfully conducted its Annual Joint Humanitarian Assistance and Disaster Relief (HADR) Exercise, titled 'Sanyukt Vimochan 2024'.</li> <li>2. Held in: Ahmedabad and Porbandar, Gujarat.</li> <li>3. Conducted By: Konark Corps of Southern Command of Indian Army</li> <li>4. Participants: Included representatives from <b>nine Friendly Foreign Countries</b>, including nations from the Gulf Cooperation Council (GCC), Indian Ocean Region, and Southeast Asia.</li> </ol>
Objective	To strengthen India's disaster response capabilities, enhance coordination among multiple agencies during natural disasters, and foster international collaboration in disaster management.
Tabletop Exercise (TTX)	<ol style="list-style-type: none"> <li>1. The Tabletop Exercise (TTX) focused on the theme of a cyclone in the coastal region of Gujarat, specifically targeting the Okha-Porbandar coastline. The simulation addressed disaster scenarios.</li> <li>2. Aim: To strengthen interagency coordination by brainstorming effective disaster relief strategies.</li> <li>3. Key outcomes: Identification of gaps in current mechanisms and the development of more robust joint disaster response protocols.</li> </ol>
Multi-Agency Capability Demonstration	<ol style="list-style-type: none"> <li>1. The Multi-Agency Capability Demonstration simulated a cyclone scenario to showcase real-world disaster response efforts.</li> <li>2. The event featured reconnaissance and surveillance of affected areas, personnel insertion for rescue operations, casualty evacuation, and the rehabilitation of affected citizens.</li> </ol>

Significance	<ol style="list-style-type: none"><li>1. 'Sanyukt Vimochan 2024' marked a significant step in enhancing India's disaster response capabilities.</li><li>2. The exercise demonstrated the country's preparedness to handle natural calamities efficiently, strengthened international cooperation, and showcased innovations that contribute to a self-reliant and globally collaborative disaster management framework.</li></ol>
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## UPSC Syllabus: Exercise in news

### Poorvi Prahar Exercise

Why in news?

Recently, the Poorvi Prahar exercise was conducted in Arunachal Pradesh.

About Poorvi Prahar



Aspects	Description
About	<ol style="list-style-type: none"><li>1. Poorvi Prahar is a tri-service military drill held in the forward areas of Arunachal Pradesh.</li><li>2. The exercise spanned from November 10 to November 18, 2024.</li></ol>
Objective	The primary objective is to enhance combat effectiveness, inter-service coordination, and operational readiness in the challenging mountainous terrain of the region.
Key focus	<ol style="list-style-type: none"><li>1. <b>Integrated Joint Operations:</b> The exercise emphasized synchronized operations between the Army, Navy, and Air Force. It tested the capability of the armed forces to operate cohesively in a multi-domain, joint command environment.</li><li>2. <b>Technological Advancement:</b> Advanced military platforms and next-generation technologies were employed to simulate modern warfare scenarios. The focus was on leveraging cutting-edge tools to strengthen operational capabilities.</li><li>3. <b>Operational Readiness:</b> Forces were trained to handle real-world combat scenarios, particularly in the difficult topography of Arunachal Pradesh. The exercise sought to bolster India's defensive posture along its eastern frontier.</li></ol>

<b>Technology Integration</b>	<p><b>Advanced Systems and Communication:</b> The exercise featured the use of AI-driven analytics for better battlefield decision-making and satellite communication for seamless real-time information sharing.</p> <p>A Common Operating Picture (COP) was developed to ensure effective coordination.</p> <p><b>Innovative Tools:</b> The deployment of swarm and FPV drones enhanced situational awareness and operational flexibility.</p> <p>Loitering munitions were used to demonstrate their precision and adaptability in combat scenarios.</p> <p><b>Joint Command Structures:</b> Integrated command structures facilitated seamless cooperation between ground, air, and naval forces.</p> <p>Real-time data exchange allowed for agile and coordinated responses to dynamic challenges.</p>
<b>Strategic Significance</b>	<p><b>Adaptable Defence Posture:</b> Exercise Poorvi Prahar reinforced India's readiness to counter regional security challenges. It highlighted India's commitment to maintaining a robust defence along its eastern frontier.</p> <p><b>Military Excellence:</b> The exercise showcased exceptional collaboration across the three services. It also reflected the Indian Armed Forces' focus on adopting advanced technologies to remain at the forefront of modern warfare.</p> <p><b>Strategic Deterrence:</b> The capabilities demonstrated during the exercise underscored India's preparedness to execute multi-domain operations. The display of technological prowess and operational agility served to strengthen deterrence measures aimed at safeguarding national interests.</p>

## UPSC Syllabus: Art and culture

### Ustad Bismillah Khan Yuva Puraskar

#### Why in news?

The Union Minister of Culture and Tourism conferred the prestigious Ustad Bismillah Khan Yuva Puraskar for the years 2022 and 2023 to 82 young artists at a special ceremony.

#### About Ustad Bismillah Khan Yuva Puraskar

1. **Initiated by:** Sangeet Natak Akademi in 2006.
2. **Objective:** To honor and support young artists under 40 in music, dance, drama, folk/tribal arts, puppetry, and allied performing arts.
3. **Eligibility:** Artists below 40 years of age.
4. **Fields Recognized:** Music, Dance, Theatre, Traditional/Folk/Tribal Arts, Puppetry, and Scholarship in Performing Arts.
5. **Recognition:** Cash prize of ₹25,000, a plaque, and an angavastram.

6. **Significance:** Encourages young talents, preserving and promoting India's diverse cultural heritage.

#### **About Ustad Bismillah Khan**

1. He was a classical musician to popularize shehnai in Indian classical music.
2. He was born on March 21, 1916, in Dumraon, Bihar, into a family of court musicians.
3. He is known for his devotion to Indian classical music and his ability to blend Hindustani classical ragas with the unique tonal quality of the shehnai.
4. His music was characterized by its purity, spiritual depth, and emotional intensity, often evoking a sense of devotion and tranquility.
5. He represented the Ganga-Jamuni tehzeeb (the syncretic culture of Hindu-Muslim unity) through his music and persona.
6. He played at the All India Music Conference in Kolkata in 1937, earning wide recognition. He also played shehnai at the Red Fort on August 15, 1947, marking India's Independence and establishing a tradition. He performed there on every Independence Day until his death.

#### **Achievements and Honors**

1. He was awarded the Bharat Ratna in 2001, becoming the third classical musician to receive India's highest civilian honor.
2. **Other major awards:** He was also awarded with Padma Shri (1961), Padma Bhushan (1968) and Padma Vibhushan (1980).

## **Significant Archaeological Discovery at Kerala**

### **Why in news?**

A major archaeological discovery has been made at Kanhirapoil, located in the Madikkai grama panchayat of Kasaragod district, Kerala. The find provides fascinating insights into the prehistoric culture of the region.

### **Details of the Discovery**

1. A set of rock carvings was discovered on private property in Kanhirapoil, Kerala. These include 24 pairs of footprints carved into the rock and an intricately etched human figure surrounded by four circular pits.

2. **Key Features of the Carvings:** The carvings are believed to date back to the Megalithic period, approximately 2,000 years ago. They were created using iron tools.

The footprints range in size from 6 to 10 inches, indicating representations of both adults and children. All of the footprints are oriented westward.

3. Experts suggest that the footprints symbolize the souls of the deceased and were likely carved to honor them. However, local people believe that the footprints belong to a goddess.

4. The artistic style and symbolism of the carvings are similar to prehistoric rock art found in Avalakki Pera in Udupi district, Karnataka, and other sites in north Kerala.
5. **Historical Context:** The carvings offer valuable insights into the cultural and artistic practices of the region's prehistoric inhabitants.
6. Similar artefacts and carvings have been found in other parts of north Kerala, such as Erikulam Valiyapara, Cheemeni Ariyittapara, Ettukudukka, and the renowned Edakkal Caves in Wayanad. These discoveries point to a shared cultural heritage in prehistoric north Kerala.
7. **Implications:** This discovery highlights the historical importance of the region and reinforces the need for further archaeological exploration.
8. It sheds light on the artistic expressions and cultural traditions of Kerala's early inhabitants, inviting deeper studies into the ancient past of the area.