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INTERVIEW MATERIAL

FOR PERSONALITY TEST

UPSC CSE 2022

Content

HANDBOOK FOR PERSONALITY TEST UPSC CSE 2022

ART & CULTURE

01 CENTRAL VISTA AVENUE

News

- The Central Vista Avenue, will be thrown open to the public.

Details

- Central Vista Redevelopment Project refers to the ongoing redevelopment to revamp the Central Vista, India's central administrative area located near Raisina Hill, New Delhi.
- The area was **originally designed by Sir Edwin Lutyens and Sir Herbert Baker** during British colonial rule [when the capital of the British Raj was moved from Calcutta to Delhi].The Parliament building alone took six years to construct, from laying the foundation stone on 12 February 1921 to the **inauguration by then Viceroy Lord Irwin on 18 January 1927.**
- After Independence in 1947, it became the seat of the government of the new Republic.
- The **Central Vista Redevelopment Project was launched in 2019**.The project aims to revamp a **3 km long Kartvyapath between Rashtrapati Bhavan and India Gate**, convert North and South Blocks to publicly accessible museums by creating a new common Central Secretariat to house all ministries, a new Parliament building near the present one with increased seating capacity for future expansion, new residence and office for the Vice-President and the Prime Minister near the North Block and South Block and convert some of the older structures into museums.

Kartavya Path

- The entire stretch and the area from the Netaji statue under the Grand Canopy to the Rashtrapati Bhavan will be known as Kartavya Path.
- As per the NDMC resolution, Kartavya Path **includes the erstwhile "Rajpath and Central Vista lawns".**
- The Rashtrapati Bhavan was built by the British as the Vice-regal Palace where the Viceroy lived.
- Called Kingsway during British rule, the three-km stretch was built as a ceremonial boulevard by Edwin Lutyens and Herbert Baker, the architects of New Delhi, more than a hundred years ago.
- The capital of the Raj moved to New Delhi from Calcutta in 1911, and construction continued for several years thereafter.
- Lutyens conceptualized the modern imperial city centred around a "ceremonial axis", which was named Kingsway in honour of the then Emperor of India, George V, who visited Delhi during the Durbar of 1911, where he formally proclaimed the decision to move the capital.
- The nomenclature followed that of the Kingsway in London, an arterial road built in 1905, which was named in honour of King Edward VII, the father of George V.
- Following Independence, the road was given its Hindi name, Rajpath, on which the Republic Day parades took place over the decades that followed.
- During his address from the Red Fort on August 15, Modi Ji stressed on the abolition of symbols of colonialism. The new name and look of Rajpath, as well as the installation of the **28-foot statue of Netaji under the Grand Canopy** under which a statue of George V once stood, are meant to represent that spirit of the proud new India.
- It symbolises a shift from erstwhile Rajpath being an icon of power to Kartavya Path being an example of public ownership and empowerment.
- The statue of Bose iscrafted by Arun Yogiraj, the statue has been carved from a monolithic granite stone and weighs 65 tonnes.

02 RAMON MAGSAYSAY AWARD

Context

- The presentation ceremonies for the 64th Ramon Magsaysay Awards was held.

Who was Ramon Magsaysay?

- Ramon del Fierro Magsaysay Senior was the seventh president of the Philippines, from 1953 until his death in an air crash in 1957.
- The Hukbong Bayan Laban saHapon or the People's Army Against the Japanese, popularly known as the Hukbalahap (Huk), was a prominent guerrilla outfit that fought the Japanese.
- Huk leaders were viewed with suspicion over their declaration of commitment to communism and the demand for peasant rights.
- Magsaysay drew upon his own experience of guerrilla warfare to initiate a two-pronged system of reforms and military campaigns. It was under his administrative and military policies that the Huk threat was considered to be neutralised.

The Ramon Magsaysay Award

- In 1957, the Ramon Magsaysay award was set up by trustees of the Rockefeller Brothers Fund and the Philippine government to carry forward Magsaysay's legacy of service to the people, good governance, and pragmatic idealism.
- In the six decades since 1958 — the first year the Award was given out — over 300 organisations and individuals have been recognised for their developmental endeavours crucial to Asia, and, consequently, to the world.
- The award is given out every year on August 31, on Magsaysay's birth anniversary.
- Prominent Indians who have won the award include Vinoba Bhave in 1958, Mother Teresa in 1962, Kamaladevi Chattopadhyay in 1966, Satyajit Ray in 1967, Mahasweta Devi in 1997.
- In recent years, Arvind Kejriwal (2006), Anshu Gupta of Goonj (2015), human rights activist Bezwada Wilson (2016), and journalist Ravish Kumar (2019) have won the award.

04 NATIONAL MARITIME HERITAGE COMPLEX

Context

- The Prime Minister, Shri NarendraModi inaugurated 'Kashi Tamil Sangamam' - a month-long programme being organised in Varanasi, Uttar Pradesh.

Details

- Kashi Tamil Sangamam 2022' is an initiative by the Union Education Ministry as part of Azadi ka Amrit Mahotsav, to uphold the spirit of 'Ek Bharat Shreshta Bharat'.
- The objective of the programme is to celebrate, reaffirm and rediscover the age-old links between Tamil Nadu and Kashi – two of the country's most important and ancient seats of learning.
- Kashi is the cultural capital of India whereas Tamil Nadu and Tamil culture is the centre of India's antiquity and pride.
- The broader objective is to bring the two knowledge and cultural traditions (of the North and South) closer, create an understanding of our shared heritage and deepen the people-to-people bond between the regions.
- This is in sync with the National Education Policy, 2020 which emphasises "on nurturing a generation that is modern and in sync with the 21st-century mindset, while being rooted in the Indian culture and ethos.
- BHU and IIT-Madras are knowledge partners for the event, and the Ministries of Culture, Tourism, Railways, Textiles and Food Processing have been roped in as stakeholders, besides the government of Uttar Pradesh and the Varanasi administration.
- The connection between the two centres of knowledge (Kashi and Kanchi) is evident in the similar themes in literature, and the presence of the name Kashi in every village in Tamil Nadu.
- Besides the Kasi Viswanathar temple in Tenkasi, there are hundreds of Shiva temples in Tamil Nadu that bear the name of Kashi.

03 KASHI TAMIL SANGAMAM

Context

- Prime Minister Shri Narendra Modi will review the site work progress of the National Maritime Heritage Complex at Lothal, Gujarat on 18th October 2022 at around 5 PM via video conferencing.

National Maritime Heritage Complex

- **National Maritime Heritage Complex (NMHC) at Lothal is being developed as a one of its kind project to not only display India's rich and diverse maritime heritage and also help Lothal to emerge as a world class international tourist destination**
- The complex, work on which started in March 2022, is being developed at a cost of around Rs 3500 crore.
- It will have several innovative and unique features such as Lothal mini recreation to recreate Harappan architecture and lifestyle; four theme parks - Memorial theme park, Maritime and Navy theme park, Climate theme park and Adventure and Amusement theme park; world's tallest lighthouse museum; fourteen galleries highlighting India's maritime heritage starting from the Harappan times till now; Coastal states pavilion displaying diverse maritime heritage of states and UTs; among others.
- **It is one of the major projects under Sagarmala scheme of MoPSW which has an edutainment approach.**

About Lothal

- Lothal was one of the southernmost sites of the ancient Indus Valley civilization, located in the Bhil region of the modern state of Gujarat.
- Construction of the city is believed to have begun around 2200 BCE.
- The Archaeological Survey of India (ASI), discovered Lothal in 1954.

- It had the world's earliest known dock, which connected the city to an ancient course of the Sabarmati river on the trade route between Harappan cities in Sindh and the peninsula of Saurashtra.
- It was a vital and thriving trade Centre in ancient times, with its trade of beads, gems, and valuable ornaments reaching the far corners of West Asia and Africa.
- The techniques and tools they pioneered for bead-making and in metallurgy have stood the test of time for over 4000 years.

Lothal Findings
Dockyard, Port Town, Evidence of Rice, Fire Altar, Ivory weight balance, Copper dog.

Indus Valley Civilization

- Also known as Harappan Civilization that flourished around 2,500 BC, in the western part of South Asia, in contemporary Pakistan and Western India.
- **It was home to the largest of the four ancient urban civilizations of Egypt, Mesopotamia, India and China.**
- It was basically an urban civilization and the people lived in well-planned and well-built towns, which were also the centers for trade.
- They had wide roads and a well-developed drainage system.
- The houses were made of baked bricks and had two or more storeys.
- The highly civilized Harappans knew the art of growing cereals, and wheat and barley constituted their staple food.
- By 1500 BC, the Harappan culture came to an end. Among various causes ascribed to the decay of Indus Valley Civilization are the recurrent floods and other natural causes like earthquakes, etc.

05 MOHENJODARO

Context

- The recent spell of heavy rains and floods that ravaged large parts of Pakistan's Sindh province has also taken a heavy toll on the archaeological site of Mohenjo-daro.

Importance of Mohenjodaro

- **Mohenjodaro, a group of mounds and ruins, is a 5000-year-old archaeological site** located about 80-km off the city of Sukkur.
- **It comprises the remnants of one of two main centres of the ancient Indus Valley Civilisation, the other one being Harappa, located 640 km to the northwest, in Punjab province**.
- Mohenjo-daro, which **means 'mound of the dead'**, was one of the oldest cities of the world.
- It is located in Sindh, Pakistan, next to the Indus River.
- Here the **Great Bath, uniform buildings and weights, hidden drains** and other hallmarks of the civilization were discovered in the 1920's.
- At Mohenjo-Daro **the most unicorn seals** have been found.
- The Mohenjo-Daro also has **two mounds**. The western mound is lower which was a citadel with 200 m X 400 m and eastern is a bigger which was having the relics of a buried city of size 400×800 meters.
- Mohenjo-Daro was the **largest city of the Indus valley civilization. Both Harappa and Mohenjo-Daro can be called the capital cities of the civilization.**
- A **granary has been found** which the largest building of the Mohenjo-Daro is.
- A **square pillared hall** is another important building found at Mohenjo-Daro. The scholars agree that this pillared hall was a site for social gatherings.
- All houses have a courtyard , kitchen and a well. All houses at Mohenjo-Daro have proper arrangements of light air and drainage.
- Mohenjo-Daro has shown an **extensive usage of bricks.**
- A **piece of woven cotton** along with spindle whorls and needles has been found.

- A **bronze figurine of a dancing girl** has been found.
- Mohenjo-Daro has also given evidence of violence leading to death.
- A **seal representing the Mother Goddess a plant growing from her womb** has been found.
- A **figurine of a bearded man** has been found at Mohenjo-Daro
- **A seal with a picture suggesting Pashupati Mahadev** has been found at Mohenjo-Daro.
- A seal which shows a woman to be sacrificed by a man with a knife in hand has been found at Mohenjo-Daro.
- **Known to be a model planned city of the ancient civilisation, the houses here had bathrooms, toilets and drainage system.**
- The sheer size of the city, and its provision of public buildings and facilities, suggests a high level of social organisation.
- Though in ruins, the walls and brick pavements in the streets are still in a preserved condition.
- **The ruins of the city remained undocumented for around 3,700 years, until 1920, when archaeologist RD Banerji visited the site**. Its excavation started in 1921 and continued in phases till 1964-65. The site went to Pakistan during Partition.

Other Indus Valley sites

- The Indus Valley Civilisation spanned much of what is now Pakistan and the northern states of India (Gujarat, Haryana and Rajasthan), even extending towards the Iranian border.
- Its major urban centres included Harappa and Mohenjo-daro in Pakistan, and Lothal, Kalibangan, Dholavira and Rakhigarhi in India.
- Mohenjo-daro is considered the most advanced city of its time, with sophisticated civil engineering and urban planning. When the Indus Valley Civilisation went into sudden decline around 19th century BC, Mohenjo-Daro was abandoned.

Losing world heritage tag

- There are around 1,100 UNESCO listed sites across its 167 member countries.
- Last year, the World Heritage Committee, holding its 44th session in China, decided to delete the property 'Liverpool – Maritime Mercantile City' (UK) from the World Heritage List, due to "the irreversible loss of attributes conveying the outstanding universal value of the property," a UNESCO statement said.
- Liverpool was added to the World Heritage List in 2004 in recognition of its role as one of the world's major trading centres in the 18th and 19th centuries – and its pioneering dock technology, transport systems and port management.

- Before that, the first venue to be delisted by the UNESCO panel was the Arabian Oryx Sanctuary in Oman, in 2007, after concerns over poaching and habitat degradation.
- Another site to be removed from the World Heritage list in 2009 was Elbe Valley in Dresden, Germany, after the construction of the Waldschloesschen road bridge across the Elbe river.

07 MAHAKALESHWAR CORRIDOR

News

- The U.S. authorities formally handed over 307 antiquities, estimated to be worth nearly $4 million to Indian officials.

Details

- **Antiquities returned include** Vishnu and Lakshmi with Garuda, dating to the 11th century C.E., which was allegedly stolen from a temple in Central India.
- A Chola-era Sambandar bronze idol, a Chola-era Devi idol in stone, bronze idols of Vinayaga, Narasimha with Lakshmi, a wooden idol of Muruga and wooden chauri bearers are other items that had been taken from Tamil Nadu.
- "Antiquity" is an article or object that is at least 100 years old. It could be a coin, sculpture, painting or epigraph, or any object or article taken from a building or a cave, or anything that illustrates the science, art, crafts or customs or religion or literature of a bygone age, or anything of historical interest.
- If it is a manuscript or record of any scientific, historical, literary or aesthetic value, it should be at least 75 years' old.
- Antiquities in India are governed by **The Antiquities and Art Treasures Act, 1972 which falls within the purview of the Archaeological Survey of India ("ASI"), Union Ministry of Culture.**
- Possession of an unregistered antiquity is a punishable offence under law.
- **Section 14(3)**of the Act makes it mandatory for "every person who owns, controls or is in possession of any antiquity" to register it before a registering officer within 15 days of its coming into his control or possession and obtain a certificate of registration.
- Antiquities can be sold, but only by a licensed person. However, Section 3 of the Act prohibits export of an antiquity by anyone other than the Centre or its agencies.
- A jail term of **six months**, or with fine, or both. Besides, the antiquity is also liable to be confiscated.
- **Article 49 (Protection of monuments and places and objects of national importance)**: It shall be the obligation of the State to protect every monument or place or object of artistic or historic interest, declared by or under law made by Parliament to be of national importance, from spoliation, disfigurement, destruction, removal, disposal or export, as the case may be.
- To facilitate Custom Authorities in allowing non-antiquities to be exported, the Archaeological Survey of India (ASI) has established **Expert Advisory Committees to issue non-antiquity certificates.**
- An **Antique Cell**has been opened in Central Bureau of Investigation (CBI) for investigation into cases of thefts and losses of antique
- **National Mission on Monuments and Antiquities (2007)** aims to prepare a National Register on Antiquities by documenting antiquities from different sources in a uniform format.

06 ANTIQUITIES

News

- Prime Minister inaugurated the Mahakaleshwar Corridor, constructed in Madhya Pradesh's Ujjain at a cost of Rs 350 crore, on October 11.

Details

- **Mahakal Maharaj Mandir ParisarVistarYojna is a plan for the expansion, beautification, and decongestion of the Mahakaleshwar temple and its adjoining area in Ujjain district.**
- Under the plan, the Mahakaleshwar temple premises of around 2.82 hectares is being increased to 47 hectares, which will be **developed in two phases by the Ujjain district administration**.
- This will include the 17 hectares of Rudrasagar lake. The project is expected to increase annual footfall in the city from the current 1.50 crore to nearly three crore.
- One of the aspects of the VistarYojna's first phase is a visitor plaza with two entrances or Dwaars — the Nandi Dwaar and the Pinaki Dwaar.
- **The first phase is complete and will be inaugurated by PM Modi on October 11.**
- The second phase, pegged at Rs 310.22 crore, includes expansion of the eastern and northern fronts of the temple. It also includes development of various areas of Ujjain city, such as Maharajwada, Mahal Gate, Hari Phatak Bridge, Ramghat façade, and Begam Bagh Road.

About the temple

- Mahakaleshwar, which means the 'Lord of time', refers to Lord Shiva. **As per Hindy mythology, the temple was constructed by Lord Brahma and is presently located alongside the holy river Kshipra.**
- **Mahakaleshwar Jyotirlinga in Ujjain is one of the 12 jyotirlingas considered the most sacred abodes of Shiva.**
- As per records, the temple's Mahakal Lingam is believed to be Swayambhu (self-manifested)**.**
- The shrine is revered as **one the 18 MahaShaktiaPeeth in India.**
- The temple **in its present form was built by the Maratha general Ranoji Shinde in 1734 CE**.
- Before Independence, the Dev Sthan Trust used to look after the temple. This was replaced by the municipal corporation of Ujjain post-Independence**. The collectorate office of Ujjain district now manages the administration of the temple.**
- A local legend says that there once was a king called Chandrasena who ruled Ujjain and was a Shiva devotee. The Lord appeared in his Mahakal form and destroyed his enemies. Upon the request of his devotees, Shiva agreed to reside in the city and become its chief deity.
- In the early part of the Meghadutam (PurvaMegha) composed in the 4th century, Kalidasa gives a description of the Mahakal temple. It is described as one with a stone foundation, with the ceiling on wooden pillars. There would be no shikharas or spires on the temples prior to the Gupta period.

Jyotirlingas in India

- Puranas say that Lord Shiva pierced the world as an endless pillar of light, called the jyotirlinga.
- **There are 12 jyotirlinga sites in India, considered a manifestation of Shiva. Besides Mahakal, these include Somnath and Nageshwar in Gujarat, Mallikarjuna in Andhra Pradesh, Omkareshwar in Madhya Pradesh, Kedarnath in Uttarakhand, Bhimashankar, Triyambakeshwar and Grishneshwar in Maharashtra, Viswanath at Varanasi, Baidyanath in Jharkhand, and Rameshwar in Tamil Nadu.**
- **Mahakal is the only jyotirlinga facing the south, while all the other jyotirlingas face east.** This is because the direction of death is believed to be the south. In fact, people worship Mahakaleshwar to prevent an untimely death.
- In the 13th century, **the temple complex was destroyed by Turk ruler Shams-ud-din Iltutmish during his raid on Ujjain.**
- The present five-storeyed structure was built by the Maratha general Ranoji Shinde in1734, in the Bhumija, Chalukya and Maratha styles of architecture. A century later, its marble walkways were restored by the Scindias.

Ujjain-Historical significance

- **The city of Ujjain was also one of the primary centres of learning for Hindu scriptures, called Avantika in the 6th and 7th centuries BC.**
- **Later, astronomers and mathematicians such as Brahmagupta and Bhaskaracharya made Ujjain their home**.
- Also, as per the Surya Siddhanta, one of the earliest available texts on Indian astronomy dating back to the 4th

century, **Ujjain is geographically situated at a spot where the zero meridian of longitude and the Tropic of Cancer intersect**.

- In keeping with this theory, many of Ujjain temples are in some way connected to time and space, and the main Shiva temple is dedicated to Mahakal, the lord of time.
- **In the 18th century, an observatory was built here by Maharaja Jai Singh II, known as the Vedh Shala or Jantar Mantar, comprising 13 architectural instruments to measure astronomical phenomena.**

09 MODHERA SUN TEMPLE

News

- India should revive the Mausam Initiative. India has to offer its oceanic neighbours a deeper and more significant partnership in the revival of an Indian Ocean culture.

The Project

- Project Mausam is a cultural project by the **Ministry of Culture and Archaeological Survey of India (ASI)** with the Indira Gandhi National Centre for the Arts and the National Museum in New Delhi which **aims to connect countries on the Indian Ocean**.
- The term "mausam" means "weather" or "season" and is derived from regional dialects including the Arabic word mawsim, which refers to the season when boats can safely sail.
- Project Mausam aims to rebuild maritime cultural connections with the 39 countries bordering the Indian Ocean. The project also aims to bring together historical and archaeological researchers to record the diversity of economic, cultural, and religious interactions between countries in. There are two visions for Project Mausam: the first is to understand national cultures between countries and the second is to rebuild communications between countries.

Objectives

- The project has four main objectives to complete its vision. First, it aims to revive lost connections with countries. The nations in the Indian Ocean have been interconnected for many centuries. The project seeks to document and celebrate the common economic ties and cultural values of countries in the Indian Ocean world, beyond contemporary ethicand national boundaries, to strengthen the connections between countries in the Indian Ocean sphere and to set a precedent for future cooperation.
- Second, it plans to create connections and relationships to the existing World Heritage sites. The project would provide a platform to link the sites of cultural and natural World Heritage in the Indian Ocean world through a cross-national and cross-cultural narrative.
- Third, the project wishes to redefine cultural landscapes by identifying gaps in World Heritage sites and filling them through creating relationships between existing sites of cultural and natural heritage. It will also provide a multilayered and holistic perspective, which will allow for a fresh strategy to help understand past and contemporary relationships.
- Finally, it aims to achieve cross-national World Heritage nomination. The project would advocate for maritime routes of the Indian Ocean to achieve cross-national nomination with sustainable tourism, heritage development, research, visibility, and promotion of cultural conventions.

08 PROJECT MAUSAM

News

- Prime Minister Narendra Modi who is on visit to his home state of Gujarat ahead of the state assembly elections visited Modhera which is famous for its Sun Temple.

Details

- The Sun Temple of Modhera is a Hindu temple dedicated to the solar deity Surya located at Modhera village of Mehsana district, Gujarat, India.
- It is **situated on the bank of the river Pushpavati.**
- It was built after 1026-27 CE during the reign of **Bhima I of the Chaulukya dynasty.**
- No worship is offered now and is protected monument maintained by Archaeological Survey of India.
- The temple complex has three components: Gūḍhamaṇḍapa, the shrine hall; Sabhamaṇḍapa, the assembly hall and Kuṇḍa, the reservoir. The halls have intricately carved exterior and pillars. The reservoir has steps to reach the bottom and numerous small shrines.

Architecture

- The temple complex is built in **Māru-Gurjara style (Chaulukya style).** The temple complex has three axially aligned components; the shrine proper (garbhagriha) in a hall (gudhamandapa), the outer or assembly hall (**sabhamandapa or rangamandapa**) and a sacred reservoir (kunda).
- The Sabhamandapa is not in continuation with Gudhamandapa but is placed little away as a separate structure. Both are built on a paved platform.Their roofs have collapsed long ago leaving behind a few lower-most courses. Both roofs are 15' 9" in diameter but are constructed differently. The platform or plinth is inverted lotus-shaped.

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10 SWADESH DARSHAN

In News

- The Union Ministry of Tourism has identified several cities in 15 States to promote destination tourism under the 'Swadesh Darshan 2' programme (beginning from January 2023).
  - This is part of India's new domestic tourism policy.
  - The **main objective is to move away from theme-based tourist circuits and focuses on revving up destination tourism.**

Details

- Madhya Pradesh, Karnataka, Tamil Nadu, Uttar Pradesh, and Maharashtra are included in the list of 15 states.
  - 2 destinations from each State have been identified to promote them as tourist spots.
  - The destinations had been finalized after consultations with the State Tourism Departments.

Swadesh Darshan scheme

- The Swadesh Darshan Scheme was launched by the Union Government in 2015 for the integrated development of theme-based tourist circuits in India.
- Under the scheme, **the Ministry of Tourism provides financial assistance to State governments, Union Territory Administrations or Central Agencies for the development of tourism infrastructure in the country.**
- The Swadesh Darshan scheme is **100% centrally funded.**
- The entire scheme is based on theme-based tourism. Each theme is called a "circuit" and is composed of various tourist destinations.
- **Objectives of the Scheme are:**
  - Promote tourism to ensure the development of local economies.
  - To create jobs including self-employment for local communities.
  - To Promote the skill development of local youth in the tourism and hospitality sector.
  - To increase private sector investment in tourism and hospitality.
  - To preserve and enhance the local cultural and natural resources.

Significance of the Tourism Sector

- Tourism is a big **employment generator.**
- Foreign tourists' arrival brings Foreign Currency.
- Provide **livelihood to the local Population** and revenue to the Government.
- Bring **Positive Impact on Education, Culture, Textiles, Development of North-East India, and Rural Development.**
- Promote Sustainable Economic Growth, Social Inclusiveness, Employment, and Poverty Reduction.
- Promotes Inclusive Growth, Strengthens Rural Communities, Benefits Women, Resource Efficiency, and Environmental Protection.
- Protects Cultural Values, Diversity, and Heritage.
- Tourism plays an important **role in Cultural heritage management, Funding, and**
- Promote Mutual Understanding, Peace, and Security.
- Tourism Sector development often results in improvements in basic infrastructure.
- Countries with a more open and Sustainable tourism Sector tend to be more peaceful.

Concern

- Low awareness about e-visa facilities among foreign tourists.
- **Poor Infrastructure and Connectivity.**
- Limited online marketing/branding.

- Tourist information centres are poorly managed.
- A limited number of multi-lingual trained guides.

Steps taken by Government to promote tourism

- Introduction of online visa facility, extending e-visa facility for medical and business travellers, and increasing period of Stay.
- Launching of e-ticketing of Historical monuments like the Taj Mahal.
- Introduction of **dedicated tourist trains across India** and a **24x7 tourist helpline.**
- **The Union** Ministry of Tourism adopted a **Code of Conduct for Safe tourism.**
- **Ek Bharat Shreshtha Bharat**
- The tourism ministry has encouraged and developed a Chain of Bed and Breakfast homes.
- **Special Tourism Zone** in Partnership with the States.
- **Permitted 100% FDI**.
- **Swacch Bharat Abhiyan** under which the tourist destinations are kept Clean.
- **Adarsh Smaarak** Scheme by the Archaeological Survey of India to Promote basic tourist facilities in well-known historical Sites.
- **Swadesh Darshan Scheme** for integrated development of theme-based tourist Circuits.
- **PRASHAD Scheme** to beautify and improve amenities and infrastructure at Pilgrimage Sites.
- Launched Incredible India 2.0 Campaign

Steps need to be taken

- Conservation and development of all heritage/tourist Sites must be undertaken and Completed through funding from the government, NGOs, and Corporate Social Responsibility (CSR) activities.
- Developing new tourist Circuits.
- Fully utilize Swadesh Darshan and existing Schemes.
- **Connect local Communities to tourism.**
- Targeted Promotional Campaigns.
- Generating sufficient manpower to meet the requirements of the tourism and hospitality industry.
- **Launch a 24x7 toll-free Multi-Lingual Tourist Helpline**.
- Ensure Last mile Connectivity.
- Promote **'Home Stays' in rural and semi-urban areas**.
- Broadcast the diversity of India through Social media.
- Promote Conservation efforts of Rural Heritage will help promote Tourism and Development in Rural India.

Way Forward

- The travel and tourism sector holds strategic importance in the Indian economy. It provides several socio-economic benefits such as employment, income and foreign exchange earnings and also plays a part in the development or expansion of other industries such as agriculture, construction, handicrafts, etc. **Given the potential of tourism as a vehicle for job creation, growth and development, tourism has been recognized as an engine for economic growth.**
- Promote Tourism based on Inclusive Economic Growth, to generate decent Jobs for Local Communities, Conservation of Environment, Addressing Climate Change and respecting the unique Cultural identity of the People and Share the benefit of travel and tourism equitably with the local Communities.

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SCIENCE & TECHNOLOGY

01 5G

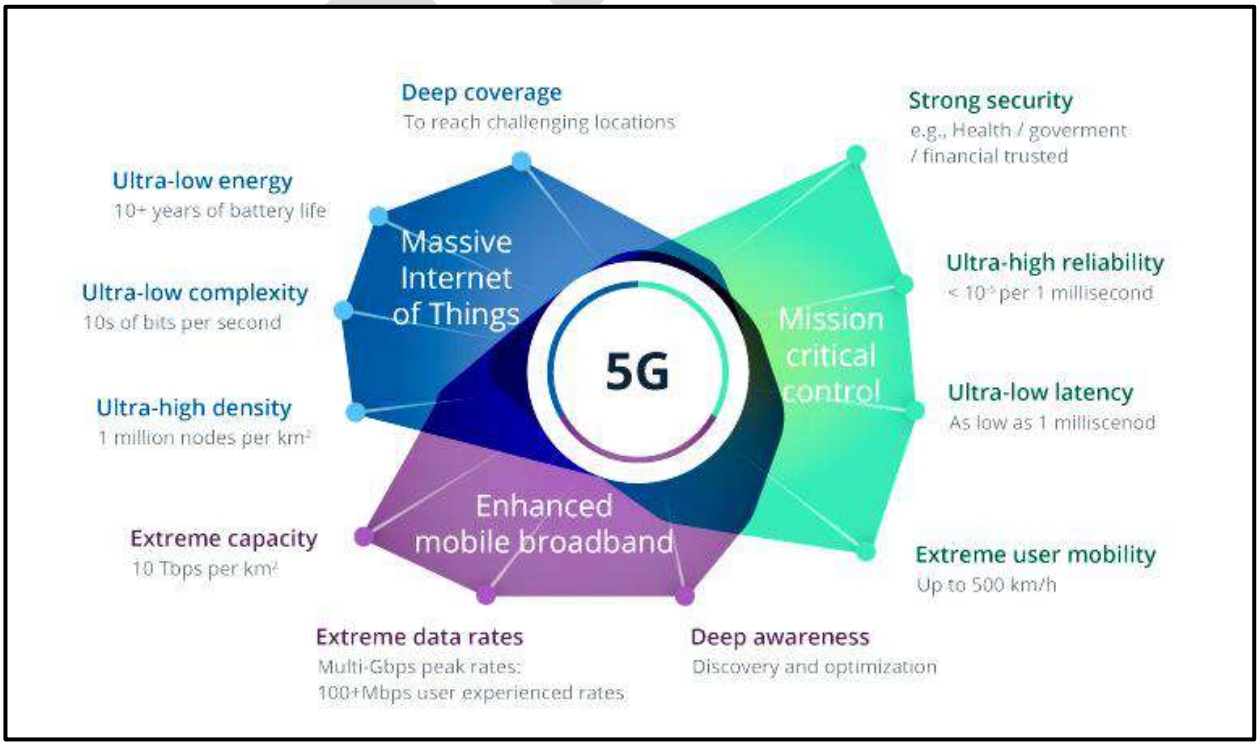
News

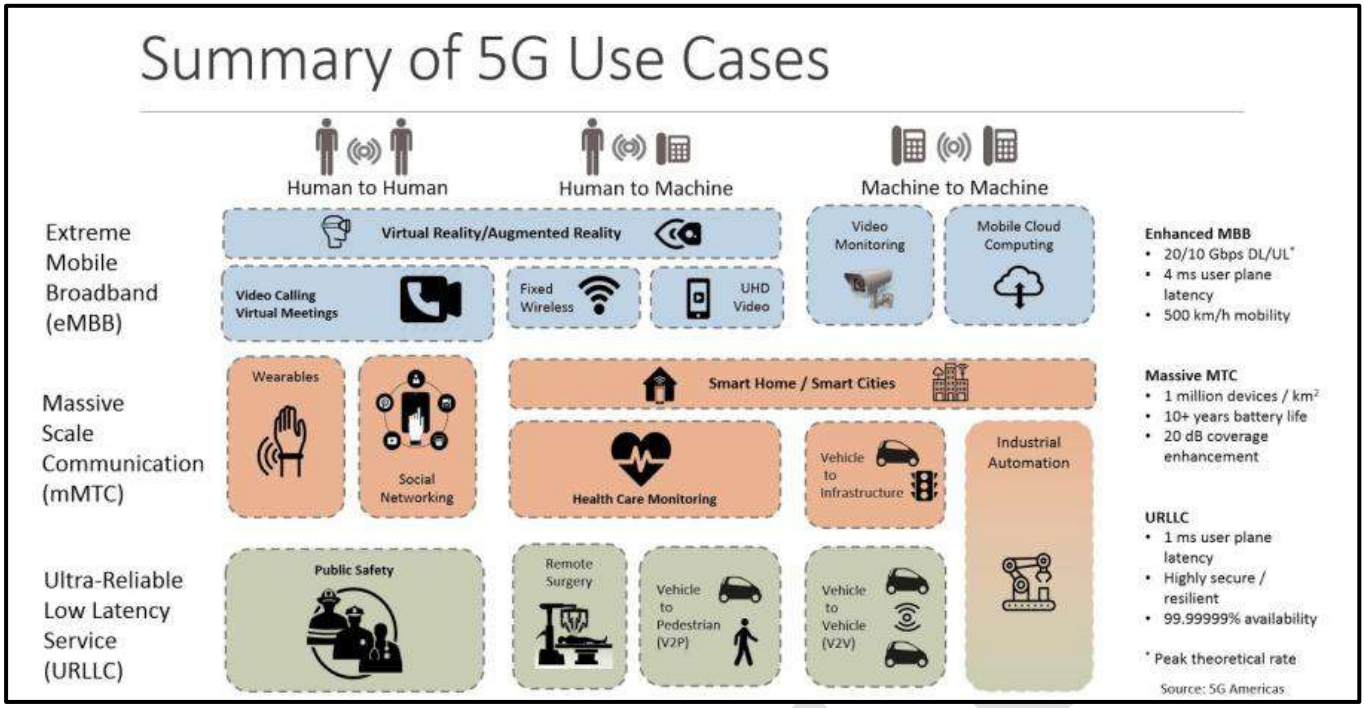
- Prime Minister Narendra Modi was speaking at a webinar to discuss Union Budget allocations for science and information technology and said the budget laid emphasis on "sunrise sectors" such as 5G.

5G

- 5G is the **fifth generation of cellular technology**. It is a new global wireless standard after 1G, 2G, 3G, and 4G networks.
- 5G enables a new kind of network that is **designed to connect virtually everyone and everything together** including machines, objects, and devices.
- 5G wireless technology is meant to deliver higher **multi-Gbps peak data speeds, ultra low latency, more reliability, massive network capacity, increased availability, and a more uniform user experience** to more users.
- **Network Standard:** MIMO

Comparison	2G	3G	4G	5G
Introduced in year	1993	2001	2009	2018
Technology	GSM	WCDMA	LTE, WiMAX	MIMO, mm Waves
Access system	TDMA, CDMA	CDMA	CDMA	OFDM, BDMA
Switching type	Circuit switching for voice and packet switching for data	Packet switching except for air interference	Packet switching	Packet switching
Internet service	Narrowband	Broadband	Ultra broadband	Wireless World Wide Web
Bandwidth	25 MHz	25 MHz	100 MHz	30 GHz to 300 GHz
Advantage	Multimedia features (SMS, MMS), internet access and SIM introduced	High security, international roaming	Speed, high speed handoffs, global mobility	Extremely high speeds, low latency
Applications	Voice calls, short messages	Video conferencing, mobile TV, GPS	High speed applications, mobile TV, wearable devices	High resolution video streaming, remote control of vehicles, robots, and medical procedures





- The government of India will conduct a spectrum auction this year, which will facilitate the roll-out of 5G mobile services by private telecom operators during the financial year 2022-23.
- A scheme for design-led manufacturing will be launched to build a strong ecosystem for 5G **as part of the production-linked incentive scheme** – Budget 2022.

Potential Economic impact of 5G in India

Employment

- The telecommunications sector in general, and 5G, in particular, is poised to **enable growth and bolster employment opportunities.**

Industries

- 5G will bring hundreds of Megabits—even Gigabits—at low latency**, speeds that can potentially change the way most—if not all—industries work, today**. It will bring the country up-to-speed with the West.

Innovation

- 5G and the slew of "interconnected" devices the technology will enable, **will make the country "future-ready" and boost further innovation.**
- Bringing it under the PLI scheme for design-led manufacturing and build a strong ecosystem for 5G, will further boost local innovation in the domain.

Connections and Revenue potential

- Global telecom industry GSMA has forecast that **India will have about 70 million 5G connections by 2025.**
- 5G is expected to create a cumulative **economic impact of $1 trillion in India by 2035**, according to a report by a government-appointed panel.
- According to a report by Ericsson, **5G-enabled digitalisation revenue potential in India will be above $27 billion by 2026.**

Mobile market

- The 5G wireless technology is a multipurpose wireless network for mobile, fixed and enterprise wireless applications. It incorporates all type of advanced features that makes it powerful and in huge demand in near future. It has a bright future and will be a revolution in the mobile market.

Banking Sector

- The spectrum will provide faster and simpler payment options, which will make mobile and digital payments even more appealing to the masses and merchants alike, further boosting usage. This is **key to economic growth.**

Fraud prevention

- Processing data, verifying the nature of transactions, confirming transaction amounts and funds availability,

consulting multiple data instances in real-time, coupled with customer geo-location and merchant ID, will reduce fraud detection errors and false positives, thereby protecting consumers and the bank thereby **leading to a healthy economy.**

Boost to IT Sector

- The IT sector will invite lucrative offers in terms of innovation, manufacturing and employment opportunities.
- It will provide us the opportunity to mitigate any tech related inadequacies caused due to data speed and help us augment our product offerings by aiding comprehensive R&D in smaller pockets of the country.

Boost to rural economy

- Public 5G built and operated in a decentralised manner will also help us create more jobs in rural areas.

Final Thoughts

- Telecom companies have pointed out that the reserve price of the airwaves is very high.
- Telecom industry body Cellular Operators Association of India (COAI) has also expressed concerns about the financial health of the sector amid intense competition and recent phase of consolidation.
- The COAI has pointed out that **5G is overpriced by at least 30% to 40% compared to international standards** and auction in other markets such as South Korea and the U.S.
- 5G technology has significant transformative potential for the Indian economy. To unlock that potential, the Indian government **must encourage investment in the form of timely and affordable spectrum**.
- **Widespread high-quality networks** maximise access to mobile broadband services for a lower cost to users, including enterprises, which, in turn, drive a significant impact on the digital and the overall economy.

02 NON-FUNGIBLE TOKENS (NFTS)

News

- In January 2022, OpenSea's monthly volumes for Ethereum shot over $4.8 billion. OpenSea is said to be one of the largest NFT marketplaces.

What are NFTs?

- NFTs are digital assets whose ownership is verified through transaction records stored on blockchains. Art work, digital avatars and accessorised monkeys are some of the most commonly traded NFTs.
- In a nutshell, NFT means non-fungible tokens (NFTs), which are generally created using the same type of programming used for cryptocurrencies. In simple terms these cryptographic assets are based on blockchain technology. They cannot be exchanged or traded equivalently like other cryptographic assets.
- Like Bitcoin or Ethereum. The term NFT clearly represents it can neither be replaced nor interchanged because it has unique properties. Physical currency and cryptocurrency are fungible, which means that they can be traded or exchanged for one another.
- NFT stands for a non-fungible token, which means it can neither be replaced nor interchanged because it has unique properties.

Key Features of NFT

- **Digital Asset** - NFT is a digital asset that represents Internet collectibles like art, music, and games with an authentic certificate created by blockchain technology that underlies Cryptocurrency.
- **Unique** - It cannot be forged or otherwise manipulated.
- **Exchange -** NFT exchanges take place with cryptocurrencies such as Bitcoin on specialist sites.

How is an NFT Different from Other Cryptocurrencies?

- Although NFTs are created using the same kind of programming language as other cryptocurrencies, that's where the similarity ends.

Other Cryptocurrency	NFT
Cryptocurrencies are "fungible"; they can be traded or exchanged for one another. They're also equal in value. For example, one Bitcoin is always equal to another Bitcoin, or one Dollar is always equal to one Dollar.	Each NFT acts as a digital signature that makes it impossible for them to be exchanged for or equal to one another. For example, The Last Supper is a painting of a kind and cannot be exchanged with another painting.

03 BLOCKCHAIN

News

- Experts say that the need of the hour is to work on an indigenous solution of the people, for the people, and by the people — an India Blockchain Platform — even if it takes years to design and implement

What is Blockchain?

- Blockchain is a trustless, immutable distributed ledger of information. Let's break that into its components:
  1. **Trustless–** Every party has a complete copy of the ledger meaning they don't have to trust a central authority to ensure the data is correct.
  2. **Immutable–** Once data enters the ledger, it cannot be changed.
  3. **Distributed –** All data in the ledger are stored and replicated across many systems in many places.
  4. **Ledger–** This is simply a place to store information. Think of old-fashioned sales or accounting ledgers. A digital ledger is a flat representation of information, not relational in any way.
  5. **Information–** This can include nut just the data but also metadata of an object or action.
- Blockchain works by establishing a container or 'block' for a specific data set. Once a block is created, it can't be changed. Instead, as changes happen or a transaction progresses, new blocks are formed that are connected together in a chain. This provides a complete, accurate and virtually tamper-proof record of any transaction. For example, tracking a product as it passes through the supply chain from factory floor to retail shelf.

Blockchain Platform

- A blockchain platform allows users and developers to create novel uses on top of an existing blockchain

infrastructure. One example is Ethereum, which has a native cryptocurrency known as ether (ETH).

The benefits of deploying a Blockchain platform

- There are a number of key benefits that the you can expect from deploying a Blockchain platform in your business.

Greater Transparency

- Blockchain's greatest characteristic is the transparency it delivers by allowing everyone with secure access can view the entire ledger. This means the Blockchain platform provides an unprecedented layer of accountability, holding each part of the business responsible for its actions and ensuring they act in the best interests of the organization.

Increased efficiency

- Due to its decentralized nature, Blockchain removes the need for middlemen in many processes in fields such as the supply chain, payments and convincing. For example, in comparison to traditional financial services, a Blockchain platform can facilitate faster transactions by allowing cross-border transfers with a digital currency that take place in a fraction of the time.

Enhanced security

- Blockchain is far more secure than other record keeping systems because each new transaction is encrypted and linked to the previous transaction. The data within the Blockchain platform is immutable and incorruptible so its incredibly safe from falsification and hacks.

Improved traceability

- With the Blockchain platform, each time an exchange of goods is recorded, an audit trail is present to trace where the goods came from. This not only helps improve security, it can prevent fraud in exchange-related businesses. As the best Blockchain platforms can also help verify the authenticity of the traded goods and assets, this traceability lends itself to applications such as supply chain management.

Two popular use cases for the best Blockchain platforms

- While Blockchain is still in its infancy within most businesses, there are two areas where Blockchain platforms are beginning to generate a great deal of interest.

Blockchain platforms for the supply chain industry

- Blockchain helps organizations understand their supply chain and engage consumers with real, verifiable, and immutable data. Within the supply chain industry Blockchain platforms provide the transparency that builds trust between trading partners by capturing key data points and ensuring that all the parties can properly view all transactions. In addition, the best Blockchain platforms for the supply chain gives complete visibility and traceability of goods as they pass through increasingly global supply ecosystems.

Blockchain platforms for industrial Internet of Things (IIoT)

- As the amount of IoT devices explodes within manufacturing and process companies, the inherent weakness in much of the existing industrial IoT (IIoT) equipment is becoming apparent. Blockchain offers an effective means to guarantee the security of IIoT. As a result, organizations are increasingly examining the prospect of managing IoT devices using Blockchain platforms.

The move towards Blockchain platform as a service

- While Blockchain has developed to enable the creation of different distributed ledger solutions, the growth of Blockchain as a platform has seen Blockchain platform providers develop services around their solution. The industry is now witnessing the emergence of Blockchain as a service and Blockchain platform as a service offering. These solutions deliver key benefits as the Blockchain platform company can deliver the Blockchain skills and industry expertise that organizations would find challenging to replicate internally.

04 e-RUPEE

News

- The Reserve Bank of India (RBI) indicated that it will soon commence limited pilot launches of the much-awaited e-rupee, or central bank digital currency (CBDC), for specific use cases.

What is Digital Rupee?

- The Central Bank Digital Currency (CBDC) can be defined as the legal tender issued by the Reserve Bank of India, according to the concept note. Touted as Digital Rupee or e-Rupee, RBI's CBDC is the same as **a sovereign currency and is exchangeable one-to-one at par with the fiat currency.**

Features of Digital Rupee

1. CBDC is a sovereign currency issued by central banks in alignment with their monetary policy.
2. It appears as a liability on the central bank's balance sheet.
3. It must be accepted as a medium of payment, legal tender, and a safe store of value by all citizens, enterprises, and government agencies.
4. CBDC is freely convertible against commercial bank money and cash.
5. CBDC is a fungible legal tender for which holders need not have a bank account.
6. CBDC is expected to lower the cost of issuance of money and transactions.

How will e-RUPI work?

- e-RUPI is a **cashless and contactless** digital payments medium.
- This will essentially be **like a prepaid gift-voucher** that will be redeemable at specific accepting centres without any credit or debit card, a mobile app or internet banking.
- e-RUPI will connect the sponsors of the services with the beneficiaries and service providers in a digital manner without any physical interface.

How will these vouchers be issued?

- The system has been **built by NPCI on its UPI platform, and has onboarded banks that will be the issuing entities.**
- Any **corporate or government agency will have to approach the partner banks**, which are both private and public-sector lenders, with the details of specific persons and the purpose for which payments have to be made.
- The **beneficiaries will be identified using their mobile number and a voucher allocated by a bank to the service provider in the name of a given person would only be delivered to that person.**

Global examples of a voucher-based welfare system

- In the **US, there is the system of education vouchers or school vouchers**, which is a certificate of government funding for students selected for state-funded education to create a targeted delivery system.
- These are essentially subsidies given directly to parents of students for the specific purpose of educating their children.
- In addition to the US, the school voucher system has been **used in several other countries such as Colombia, Chile, Sweden, Hong Kong, etc.**

Types of CBDC that could be introduced

- The Central Bank Digital Currency can be classified into two types — **general purpose or retail (CBDC-R) and wholesale (CBDC-W).**

Retail CBDC:

- Retail CBDC can be used by all including the private sector, non-financial consumers, and businesses. Wholesale CBDC is designed for restricted access to select financial institutions.

- Retail CBDC can provide access to safe money for payment and settlement as it is a direct liability of the central bank.

Wholesale CBDC:

- While retail CBDC is an electronic version of cash primarily meant for retail transactions, the wholesale CBDC is designed for the settlement of interbank transfers and related wholesale transactions.
- Wholesale CBDC has the potential to transform settlement systems for financial transactions and make them more efficient and secure. Going by the potential offered by each of them, there may be merit in introducing both CBDC-W and CBDC-R.

How is Digital Rupee different from money in digital form?

- A CBDC would differ from existing digital money available to the public because a CBDC would be a liability of the Reserve Bank, and not of a commercial bank."

Why is RBI introducing CBDC?

- CBDC is **aimed to complement, rather than replace, current forms of money and is envisaged to provide an additional payment avenue to users, not to replace the existing payment systems.**
- RBI believes that the digital rupee system **will "bolster India's digital economy, enhance financial inclusion, and make the monetary and payment systems more efficient."**

Pointing out the motivations for India to consider issuing CBDC, RBI mentioned these reasons:

a) Reduction in cost associated with physical cash management
b) To further the cause of digitisation to achieve a less cash economy.
c) Supporting competition, efficiency, and innovation in payments
d) To explore the use of CBDC for improvement in cross-border transactions
e) Support financial inclusion
f) Safeguard the trust of the common man in the national currency vis-à-vis proliferation of crypto assets

- In May 2020, China started testing its Digital Yuan-- Digital Renminbi (RMB). Several other nations have also started research and pilot projects related to CBDC such as Canada, USA and Singapore. Also, China and USA are battling to gain the supremacy across markets with the introduction of new-age financial products and India may get caught up in this digital proxy war. Furthermore, there's a wide disconnect between the number of bank accounts and mobile phone connections in India, and CBDC can possibly bridge this gap.
- The Digital Rupee provides India with the opportunity to establish the dominance of Digital Rupee as a superior currency for trade with its strategic partners, thereby reducing its dependency on the dollar.
- It will also help India in addressing the malpractices such as tax evasion, terror funding, money laundering, etc., as the central bank can keep a check on every unit of the digital currency.
- CBDC will empower RBI to control monetary policies. These effects of monetary policies can be immediately reflected instead of relying on commercial banks to make changes when they deem fit.
- It will also empower RBI to monitor transactions and credit flow across the Indian economy, weeding out scams, frauds instantly, thereby protecting depositors' money.
- CBDC will also help in distracting the investors from investing in the current crypto assets that are highly risky.
- It will also turn every large technology company in a fintech company nullifying the need for permission or partnership with a bank. It will create incentives for the companies and provide financial assistance to those who have been at the mercy of banks.
- It will also make loans, insurance, stocks and other financial products a natural extension using programmable smart contracts.

Digital Proxy War

- The Dollar has been unchallenged as the world's reserve currency, giving the US an advantage over the world's financial system, enabling it to impose sanctions against other nations. In view of the recent trade war with the US, China is pushing for a more advanced financial system using Digital Renminbi (RMB).
- The Digital Rupee will help RBI in achieving financial inclusion, shift to a cashless society, reducing the cost of printing and handling cash. Thus, there's a need for the introduction of a Digital Rupee as it will not only

empower the citizens but will also enable them in expanding digital economy, putting an end to the current banking system.

What are the use cases of e-RUPI?

- e-RUPI is expected to **ensure a leak-proof delivery of welfare services**.
- It can also be **used for delivering services under schemes meant for providing drugs and nutritional support under Mother and Child welfare schemes, TB eradication programmes, drugs & diagnostics under schemes like Ayushman Bharat Pradhan Mantri Jan Arogya Yojana, fertiliser subsidies etc.**
- The government also said that even the **private sector can leverage these digital vouchers as part of their employee welfare and corporate social responsibility programmes**.

Final Thoughts

- The Digitized Money will **help RBI in achieving financial inclusion, shift to a cashless society, reducing the cost of printing and handling cash.** Thus, there's a need for the introduction of a Digital Rupee as it will not only **empower the citizens but will also enable them in expanding digital economy**, putting an end to the current banking system.
- Digitized money **will spur global trade since it will be more convenient and better risk mitigation due to the verifiable nature of transactions in block chain. This will lead to emergence of a new universal currency and newer markets**. A new segment of investment sources will arise such as game finance and decentralized finance.

05 NET NEUTRALITY

News

- Top telcos Reliance Jio and Bharti Airtel want policymakers to revisit the net neutrality rules.

What is net neutrality?

- Net neutrality is the concept of an open, equal internet for everyone, regardless of device, application or platform used and content consumed. Proponents of the idea believe all corporations, including internet service providers (ISPs), should treat internet data and users equally. They should not restrict access, slow down access speeds or block content for some users to serve their own interests.
- ISPs should also not make special arrangemnts with any companies to give them improved network speeds or access.

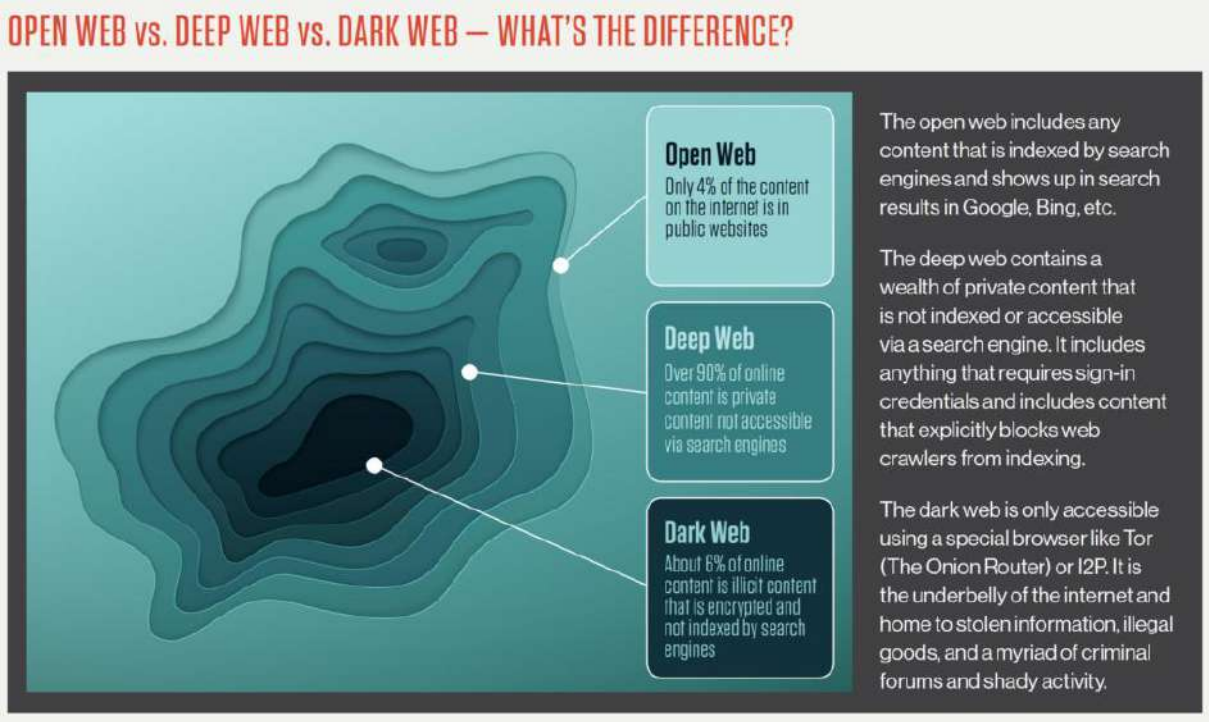
Net Neutrality in India

- Mechanisms for establishing rules ensuring Net neutrality in India, are at present mainly enforced by the Telecom Regulatory Authority of India (TRAI). At present, there are no specific legislation regarding Net Neutrality in India.
- TRAI released its regulation "Prohibition of discriminatory tariffs for data services, Regulations, 2016" on 8th Feb, 2016 which, inter alia, prohibits any service provider from offering or charging discriminatory tariffs for data services on the basis of content. Subsequently, TRAI provided to DoT its recommendations on 'Net Neutrality' dated 28.11.2017
- On 12 July 2018, The Department of Telecommunications made rules, approving the recommendations from TRAI, which heavily favoured net neutrality in India. These rules barred any form of data discrimination. Internet service providers which violate these rules may have their licenses cancelled. The rules make an exception for "critical IoT services" or "specialized services" such as autonomous vehicles and remote surgery operations.
- Government is committed to the fundamental principles and concepts of Net Neutrality i.e. keep the Internet accessible and available to all without discrimination. Internet Access Services, therefore, need to be governed by a principle that restricts any form of discrimination, restriction or interference in the treatment of content,

including practices like blocking, degrading, slowing down or granting preferential speeds or treatment to any content. To ensure that the regulatory framework on Net Neutrality adheres to the fundamental principles and concepts of Net Neutrality, the policy directives on Net Neutrality have been issued.

06 DARKWEB

- The dark web is a part of the world wide web that is not accessible through standard search engines such as Google, Bing, Baidu, etc. **The dark web** is the part of the internet where users can access unindexed web content anonymously through special web browsers like TOR. While the dark web is popularly associated with illegal activities, it is also used by the intelligence community, whistleblowers, members of the media and ordinary citizens whose communication may be monitored or restricted by the government.



- While the terms dark web and deep web are often used interchangeably, they are two very distinct concepts. The open web is the public counterpoint to the deep and dark web.

Open Web

- The **open web**, also called the surface web, includes any public web content that is indexed by search engines. Web pages on the open web will show up in search results on sites like Google and Bing. While a large volume of traffic visits on the open web every day, it only represents 4% of the content on the internet.

Deep Web

- The **deep web** refers to any web content that is not indexed – or pages that can't be found with a search engine. Examples of the deep web include any websites that are behind a paywall or require log-in credentials. Most internet users access the deep web several times a day to perform common tasks, such as checking email, accessing a bank account or reviewing health or school records. Items you would not be able to simply access by clicking on a link from a search engine. The deep web constitutes over 90% of online content and is inaccessible via search engines.

Risks of the Dark Web

- Automatic download of unsolicited files when visiting certain websites. These unwanted files can cause harm

as they may contain spyware and malware. Some come injected with ransomware, which takes control of computers and asks for ransom in exchange for handing back commands.

- User identity, such as location and computer configuration, can be revealed when using unsecured tools to access the dark web. Always use Tor with PGP or a multi-hop VPN to be sure of hiding any information related to the user.
- Users can be exposed to prohibited material banned in the residing country. They can land in hot waters with the authorities for mere accidental exposure.
- Hackers and other nefarious actors can misuse the entered email for illegal online activities such as financial fraud, identity theft, and social media ad campaigns.

Using Tor or visiting the Dark Web are not unlawful in themselves.

07 GEOSPATIAL SECTOR

Context

- India's geospatial economy is **expected to cross Rs 63,000 crore by 2025 at a growth rate of 12.8%** and to provide employment to more than 10 lakh people mainly through Geospatial Start-Ups. This was stated here today by Union Minister for Science and Technology and Ministry of Earth Sciences, Dr Jitendra Singh while addressing the Second United Nations World Geospatial Information Congress (UN-WGIC) 2022.

What is geo-spatial data?

- Geospatial data is **data about objects, events, or phenomena**that have a location on the surface of the earth.
- The location may be **static in the short-term**, like the location of a road, an earthquake event, malnutrition among children, or dynamic like a moving vehicle or pedestrian, the spread of an infectious disease.
- Geospatial data **combines location information, attribute information**(the characteristics of the object, event, or phenomena concerned), and often also **temporal information or the time at which the location and attributes exist**.
- Geo-spatial data usually **involves information of public interest**such as roads, localities, rail lines, water bodies, and public amenities.

What was the previous policy on geo-spatial data?

- There were strict restrictions on the **collection, storage, use, sale, dissemination of geo-spatial data and mapping** under the current regime.
- The policy had **not been renewed in decades**and has been **driven by internal as well as external security concerns**.
- The sector was **dominated by the Indian government as well as government-run agencies**such as the Survey of India and private companies need to navigate a system of permissions from different departments of the government (depending on the kind of data to be created) as well as the defence and Home Ministries, to be able to collect, create or disseminate geo-spatial data.
- GIS mapping was also rudimentary, with the **government investing heavily in it after the Kargil war** highlighted the dependence on foreign data and the need for indigenous sources of data.

The government has deregulated geo-spatial data

- This system of acquiring licenses or permission, and the red tape involved, can take months, delaying projects, especially those that are in mission mode – for both Indian companies as well as government agencies.
- The **deregulation eliminates the requirement of permissions** as well as scrutiny, even for security concerns.
- Indian companies now can **self-attest, conforming to government guidelines**without actually having to be monitored by a government agency- these guidelines therefore place a great deal of trust in Indian entities.
- There is also a huge **lack of data in the country** which impedes planning for infrastructure, development and businesses which are data-based. The**mapping of the entire country**, that too with high accuracy, by the Indian government alone could take decades.
- The government therefore felt an **urgent need to incentivise the geo-spatial sector**for Indian companies and increased investment from private players in the sector.
- There has also been a **global push for open access to geo-spatia**l as it affects the lives of ordinary citizens, and the **new guidelines has ensured such an open access,**with the exception of sensitive defence or security-related data.

Significance

- By liberalising the system, the government will ensure **more players in the field, competitiveness of Indian companies in the global market**, and more accurate data available to both the government to formulate plans and administer, but also for individual Indians.
- **Startups and businesses** can now also use this data in setting up their concerns, especially in the sector of e-commerce or geo-spatial based apps – which in turn will increase employment in these sectors.
- Indian companies will be able to **develop indigenous apps**, for example an Indian version of google maps.
- There is also likely to be an **increase in public-private partnerships**with the opening of this sector with data collection companies working with the Indian government on various sectoral projects.
- The government also expects an **increase in investment in the geo-spatial sector by companies**, and also an increase in export of data to foreign companies and countries, which in turn will boost the economy.

The recent United Nations World Geospatial Information Congress (UN-WGIC) 2022

Inauguration

- Recently, Prime Minister Narendra Modi inaugurated the **United Nations World Geospatial Congress (UNWGIC) 2022** in Hyderabad.

Host and Organizer

- The United Nations Global Geospatial Information Management (UN-GGIM) convened the conference on UNWGIC 2022 .
- It was **organised by the United Nations Department of Economic and Social Affairs**.
- It was **hosted by the ministry of science and technology of the government of India.**

Goal

- The goal of this year's UNWGIC is **to promote a broad dialogue on global geospatial information management with all relevant governments, non-governmental organisations, academia, and the private**

sector.

Theme

- The theme of UNWGIC 2022 is **'Geo-Enabling the Global Village: No one should be left behind'.** This focuses on building a community for human data and geography against the three pillars of sustainable development for a shared future and a better world, leaving no one behind within an inclusive and equitable global society

Broader Objective

- The move aims to **provide high-quality and trustworthy geospatial data to support global and national policy agendas**.
- It also stresses international cooperation and coordination in the development of human data linked to geography.
- It promotes societal development and well-being, addresses environmental and climate challenges, and embraces digital transformation and technological advancement.

Applications of Geospatial Technology

- Geospatial technology can be used to create intelligent maps and models which help to collect geographically referenced data.
- Intelligent maps and models can be created using geospatial technology. It **can be used to reveal spatial patterns hidden in large amounts of data that are complex to access collectively through mapping.**
- The scope of geospatial data use is vast: it embraces every sphere or industry where geographical position matters. The list includes geography proper, **ecology, tourism, marine sciences, agriculture, forestry, marketing and advertising, military forces, navy, aircraft, law enforcement, logistics and transportation, astronomy, demography, healthcare, meteorology, and many others.**

Here are some typical examples of how geospatial technology is applied:

- Tracking goods and ensuring their quality.
- Identifying location and time of arrival, route making, and navigation.
- Referring weather forecasts to particular territories.
- Detecting forest fires and deforestation & preventing large-scale wildfires (example: satellite monitoring of forest fires and deforestation).
- Assessing vegetation state on a selected terrain.
- **Healthcare**. Monitoring areas of epidemic outbreaks.
- Tracing species populations in certain areas, preventing and addressing calamities.
- **Marketing and advertising.** Targeting ads to relevant regions.
- **Real estate.** Visualizing and analyzing real estate objects remotely.
- Managing risks in questioned areas (e.g., via historical georeferenced data analysis).\

Future of Geospatial technologies

- Geospatial technologies **enhance the performance of artificial intelligence and smart machinery in multiple spheres** and agriculture in particular. Remotely controlled equipment completes numerous tasks via GPS and digital dashboards. **Robots and smart machinery in the fields seem futuristic no longer, and it is not the limit.**
- Expansion and new application solutions are expected in **biosecurity, education, construction, engineering, ecology, food supplies, precision agriculture, financial market, statistics, transportation,** to mention a few.
- Basically, geospatial data enhances performance in each sphere, outlining specific needs or issues in selected regions. Example: Employment of GPS in the automobile and aircraft industries enables frequent use of driverless vehicles and UAVs as a matter of fact.
- New achievements in this branch mean the corresponding upgrade of related industries. So, the improvement process will be ensuring even **greater precision, credibility, performance, quality, and security.**

India's efforts in this direction

- The government, industry, researchers, academia, and civil society are coming together to establish quality

geospatial ecosystem to build key solutions.

- The Government of India released the **new geospatial data guidelines in 2021**, where it acknowledged the benefits of availability of comprehensive, highly accurate, granular and constantly updated representation of Geospatial Data in diverse sectors of the economy
- National organizations like Survey of India, Geological Survey of India, National Atlas and Thematic Mapping Organization (NATMO), Indian Space Research Organisation (ISRO) and National Informatics Centre implemented several GIS-based pilot projects across a range of domains like waste resource management, forestry, urban planning, etc. to demonstrate the applications of Geospatial Technology.
- To meet the growing needs of skilled geospatial manpower, several universities introduced **Geospatial Science and Technology based courses** to build human resource capacity and **to develop the availability of trained Geospatial manpower.**

Final Thoughts

- Democratization of Indian geospatial ecosystem will spur domestic innovation and enable Indian companies to compete in the global mapping ecosystem by leveraging modern geospatial technologies and realising the dream of **"Atmanirbhar Bharat" or "Self-sufficient India" fully.**

08 GAGANYAAN MISSION

News

- India's maiden human space-flight mission 'Gaganyaan' is **expected to be launched in 2024.**

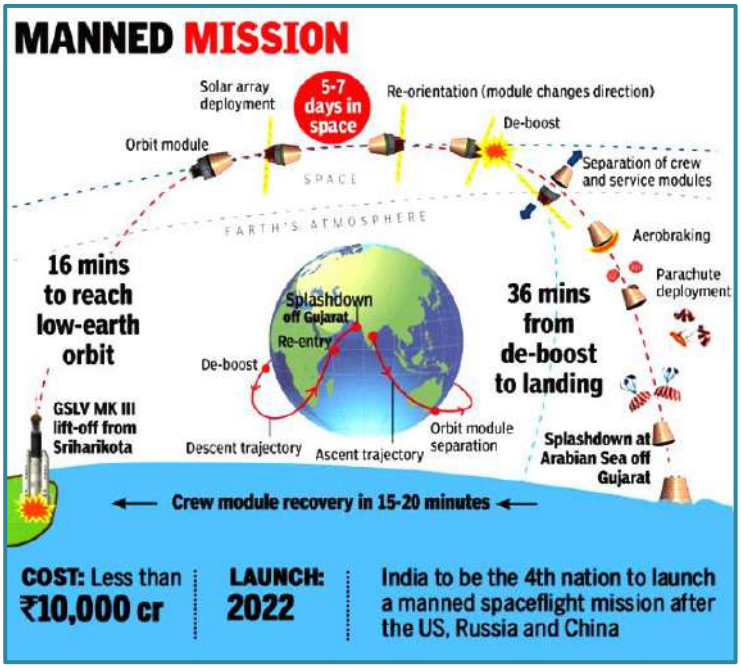
Gaganyaan

About

- Gaganyaan is an Indian crewed orbital spacecraft that is intended to send 3 astronauts to space for a minimum of seven days by 2023, as part of the Indian Human Spaceflight Programme.
- The spacecraft, which is being developed by the Indian Space Research Organisation (ISRO), consists of a service module and a crew module, collectively **known as the Orbital Module.**
- It will be for the **first time that India** will launch its manned mission to space, **making the country fourth in line** to have sent a human to space.

Launch Vehicle

- **GSLV Mk-lll (Geosynchronous Satellite Launch Vehicle) the three-stage heavy-lift launch vehicle** will be used for carrying the orbital module.
- Note: This three-stage heavy lift launch vehicle, named GSLV MkIII-M1, was used for launching Chandrayaan-2.
- GSLV Mk III is designed to carry 4 ton class of satellites into Geosynchronous Transfer Orbit (GTO) or about 10 tons to Low Earth Orbit (LEO). The powerful cryogenic stage of GSLV Mk III enables it to place heavy payloads into LEO's of 600 km altitude.
- The launcher uses two S200 solid rocket boosters to provide the huge amount of thrust required for lift off.



Placement

- The spacecraft will be placed in a low earth orbit of 300-400 km.

- The human spaceflight will take 16 minutes to reach the orbit where it will stay for five to seven days.
- The capsule will rotate around the Earth every 90 minutes, and astronauts will be able to witness sunrise and sunset. The three astronauts will be able to see India from space every 24 hours, while they conduct experiments on micro-gravity.

Suit

- With the ability to hold one oxygen cylinder, the suit will allow the astronaut to breathe in space for 60 minutes.

Return

- For its return, the capsule will take 36 hours, and will land in the Arabian Sea, just off the coast of Gujarat.

Vyommitra

- ISRO has also developed a **female half humanoid robot named Vyommitra**, a combination of two Sanskrit words Vyoma (space) and Mitra (friend), which will be sent on the first unmanned Gaganyaan flight.
- Vyommitra will help in simulating human functions in space and will also interact with the environment control life support system.
- Vyommitra has been designed to speak in Hindi and English, can act as a companion to the astronauts, converse with them, and also respond to their queries.

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Significance

- If the maiden human spaceflight Gaganyaan mission is a success, India will become the **fourth country** to have conducted human spaceflights after the US, Russia, and China.
- The programme would **spur research and development within the country in niche science and technology**
- ISRO has developed some critical technologies like re-entry mission capability, crew escape system, crew

module configuration, thermal protection system, deceleration and flotation system, sub-systems of life support system required for Mission Gaganyaan.

- The human spaceflight programme will provide **a unique micro-gravity platform in space for conducting experiments** and a test bed for future technologies.
- It has potential for **technology spinoffs** in several areas such as **medicine, agriculture, industrial safety, pollution, waste management, water and food resource management through this programme.**
- The maiden spaceflight is also aiming to achieve economic activities such as **employment generation, human resource development, and enhanced industrial capabilities.**

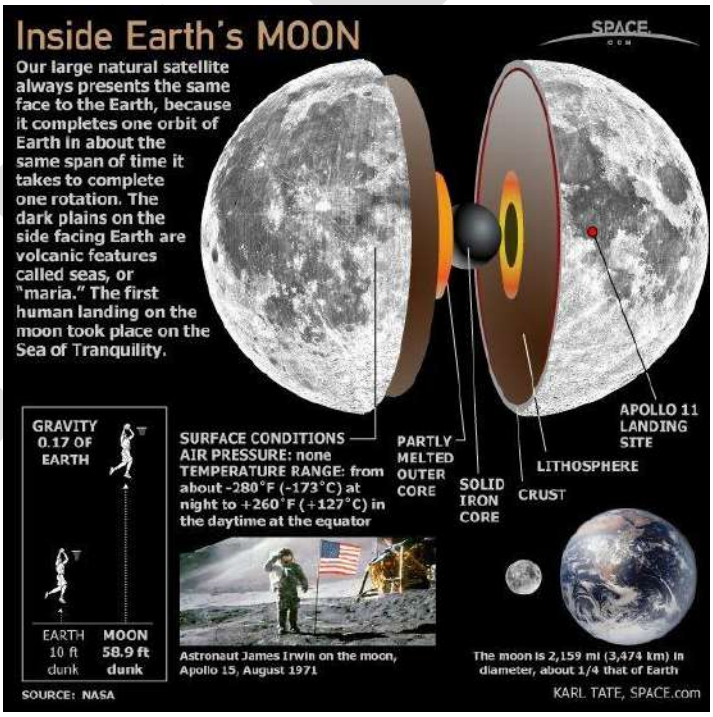
09 CHANDRAYAAN-3

News

- Indian Space Research Organisation (ISRO) is likely to launch India's third lunar mission 'Chandrayaan-3' in the third quarter of 2022.

About

- Chandrayaan-3 is a **lander-and rover-specific mission,** which will demonstrate India's capability of soft landing on a celestial body, with the rover.
- It will then communicate with Earth via the existing orbiter from Chandrayaan-2 and take images 100 km from Moon's orbit. The orbiter has an estimated lifespan of seven years.
- The unique exploration of Chandrayaan-3 aims at studying not just one area of the Moon but all the areas combining the exosphere, the surface as well as the sub-surface in a single mission.
- With Chandrayaan-1, ISRO achieved immense success as the 'Moon Impact Probe' by Chandrayaan-1 lunar remote sensing orbiter detected water in vapor form in trace amounts.
- With Chandrayaan-3, India aims to further the study of the lunar surface, **focussing on the South Pole or dark side of the Moon that has not seen sunlight in billions of years, which is believed to have ice and vast mineral reserves.**



Why exploring the Moon is imperative?

- The Moon is the closest cosmic body at which space discovery can be attempted and documented.
- Further, Moon is a promising testbed to showcase technologies required for deep-space missions.
- Exploring the Moon will enhance our understanding of the celestial body clearly, stimulating the advancement of technology, promoting global alliances and inspiring future generations of explorers and scientists.

Why Lunar South Pole of the Moon is targeted for exploration?

- The Moon provides the best linkage to Earth's early history and civilization.
- The exploration will offer an undisturbed historical record of the inner Solar system environment.
- The Lunar South pole is especially interesting because the lunar surface area that remains in shadow is much larger than that at the North Pole.

- Further, there could be a possibility of the presence of water in permanently shadowed areas around it.
- In addition, the South Pole region has craters that are cold traps and contain a fossil record of the early Solar System.

10 SPACE DEBRIS

Context

- The Australian Space Agency is investigating space debris found in farmland in the Snowy Mountains in southern NSW, after being notified by an astrophysicist who believes it to be from a SpaceX mission.
- Also, the debris from a large Chinese rocket – the Long March 5B — crashed to earth over the Pacific and the Indian oceans.

Space Debris

- Space junk is any piece of machinery or debris left by humans in space—principally in Earth orbit.
- These include dead satellites, fragments of rocket bodies and spacecraft etc.

Concerns

- Currently, an estimated 20,000 objects—including satellites and space debris—are crowding low-Earth orbit. It can be a hazard to active satellites and spacecraft.
- At orbital velocities, even the tiniest pieces of debris can disable an operational satellite.
- Potential collision threat to the space station.
- Earth orbit could even become impassable if the risk of collision grows too high.
- It could hinder our ability to use weather satellites, and hence to monitor weather changes.

Kessler syndrome

- This is an idea proposed by NASA scientist Donald Kessler in 1978.
- It says if there is too much space junk in orbit, it could result in a chain reaction where more and more objects will collide and create new space junk in the process, to the point where Earth's orbit became unusable – a Domino Effect.
- 12 fragmentation events have already taken place every year for the past two decades.

Mitigation Measures

- Developing Reusable spacecrafts.
- Designing and building spacecraft that can better withstand the harsh environment of space without disintegrating.
- Releasing stored energy and fuel so that defunct spacecraft don't explode.
- Once a spacecraft's mission is over, moving it to a safer orbit. That is - A **"graveyard orbit"**high above the low-Earth space.
- Bringing it down using laser into Earth's atmosphere to burn up on re-entry as a neat disposal system.
- Capture debris or de-orbit old satellites.
- Charge operators **"orbital-use fees"**for every satellite put into orbit.
- Careful choice of orbits.
- Performing **'collision avoidance manoeuvres'.**
- Orbital lifetime reduction (accelerating the natural decay of space objects to reduce the time that they remain in orbit).
- International cooperation in the debris mitigation measures.
- Contributing to the efforts of the **Inter-Agency Space Debris Coordination Committee (IADC)**and **United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).**

Initiatives taken to tackle the problem

Inter-Agency Space Debris Coordination Committee

- IADC is an inter-governmental forum whose aim is to co-ordinate efforts to deal with debris in orbit around the Earth founded in 1993.

NORAD

- North American Aerospace Defense Command, is an initiative of the U.S. and Canada that shares selective debris data with many countries.

ClearSpace-1 Mission

- In this a "chaser" with its four robotic arms will grab the leftover of 2013 craft known as VESPA (Vega Secondary Payload Adapter) and drag it down to Earth's atmosphere where both will burn up. To be launched in 2025.

ELSA-d, Mission

- ELSA-d (End-of-Life Services b), will test technologies to capture an object in low-Earth orbit and move it to a lower altitude, where it will eventually burn up harmlessly in Earth's atmosphere.

Starship

- Space X Starship – the passenger-carrying spacecraft once ready can collect and de-orbit space junk apart as well.

NEO-01'

- China launched a low Earth orbit robot prototype called 'NEO-01'.
- It can scoop up space debris left behind by other spacecraft with a big net.
- NEO-01, was launched on Long March 6 rocket.
- NEO-01 will use a net to capture space debris and then burn it with its electric propulsion system.
- The NEO-01, will also peer into deep space to observe small celestial bodies.
- The 30kg robot will pave the way for future technologies capable of mining on asteroids.

Space Liability Convention of 1972

- Space Liability Convention of 1972 defines responsibility in case a space object causes harm. The treaty says that "a launching State shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the earth or to aircraft, and liable for damage due to its faults in space. The Convention also provides for procedures for the settlement of claims for damages."
- However, there is no law against space junk crashing back to earth.

ISRO's Efforts

'Project NETRA'

- It is an early warning system in space to detect debris and other hazards to Indian satellites.

Other

- ISRO's GSLV employs passivation of the Cryogenic Upper Stage at the end of its useful mission.
- ISRO's communication satellites are designed with adequate propellant margins for re-orbiting at the end of their useful life to a higher graveyard orbit.
- Successful example: INSAT-2C

Closing Thoughts

- Such multilateral efforts, alongside technological innovation, can ensure that the great space cleanup is well underway.

11 DART MISSION

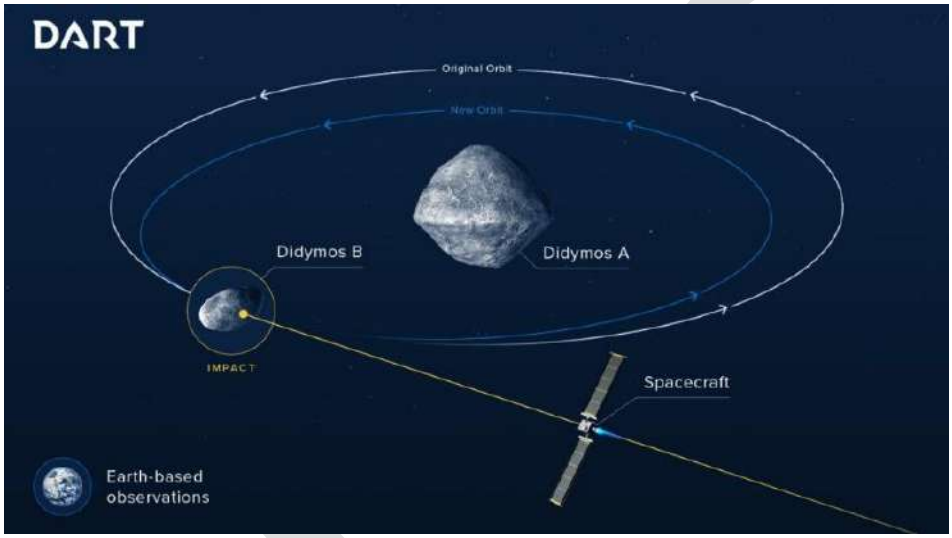
Context

- NASA Confirms **DART Mission Impact Changed Asteroid's Motion in Space**.

About

- DART is a spacecraft designed to impact an asteroid as a test of technology.
- DART is a planetary defense-driven test of technologies **for preventing an impact of Earth by a hazardous asteroid.**
- DART will be the **first demonstration of the kinetic impactor technique** to change the motion of an asteroid in space.
- The binary near-Earth asteroid (65803) **Didymos is the target for the DART demonstration**.

Didymos is the twin-asteroid system Didymos is a binary near-Earth asteroid.



- The DART spacecraft will achieve the kinetic impact deflection by deliberately crashing itself into the moonlet at **a speed of approximately 6.6 km/s,** with the aid of an onboard camera (named DRACO) and sophisticated autonomous navigation software.
- The collision will change the speed of the moonlet in its orbit around the main body by a fraction of one percent, but this will change the orbital period of the moonlet by several minutes - enough to be observed and measured using telescopes on Earth.
- Once launched, DART will deploy Roll Out Solar Arrays (ROSA) to provide the solar power needed for DART's electric propulsion system.
- The DART spacecraft will demonstrate the NASA Evolutionary Xenon Thruster – Commercial (NEXT-C)solar electric propulsion system as part of its in-space propulsion.
- NEXT-C is a next-generation system based on the Dawn spacecraft propulsion system, and was developed by NASA.
- By utilizing electric propulsion, DART could benefit from significant flexibility to the mission timeline while demonstrating the next generation of ion engine technology, with applications to potential future NASA missions.

Hera

- Hera will arrive at the Didymos system in 2027 to measure the impact crater produced by the DART collision and study the change in the asteroid's orbital trajectory.

12 PRIVATE SECTOR IN SPACE

Introduction

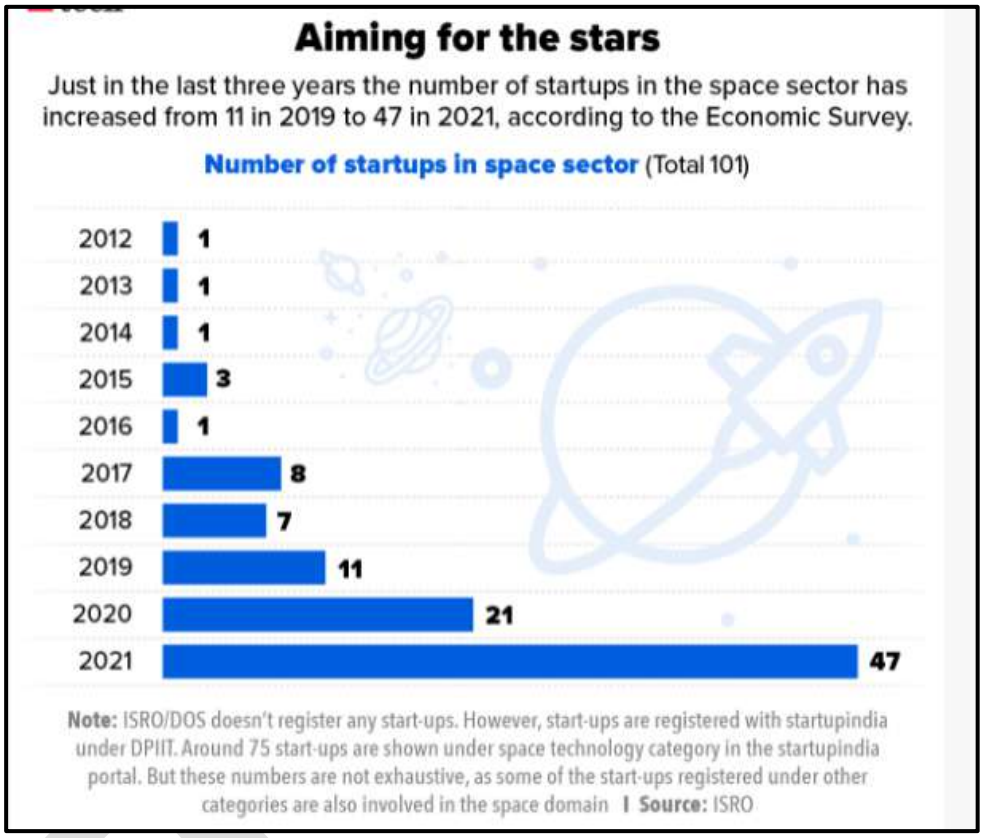
- Over the past two decades, private enterprises such as Virgin Galactic, SpaceX, Blue Origin and Arianespace have revolutionized the space sector by reducing costs and turnaround time in other spacefaring countries.
- However, in India, private enterprises have been limited to being merely suppliers to the government's space programme.
- Private sector's involvement in the long term, as with other commercial sectors, is believed to help spur investment and expertise in the realm which is capital-intensive and demands high technology.

- Being one of the few spacefaring countries, India is increasingly encouraging private sector participation through various reforms that are expected to help India achieve a market share of more than 10% in the global space sector by 2030.

Key reforms in the Indian space sector

Promoting and enabling private enterprises to carry out independent space activities:

- In 2020, the Government in a historical decision, approved participation of private enterprises across all phases of space activities.
- The government also **approved formation of the Indian National Space Promotion and Authorisation Centre (IN-SPACe)** – that would act as part of the Indian Space Research Organisation (ISRO) – to help private players become independent actors instead of being solely vendors or suppliers.



Increasing participation of private enterprises in the Indian space sector:

- Many Indian private companies and start-ups have been showing interest in space activities and services, as various government initiatives have been announced.
- As of 2021, India has 368 private space firms, making it fifth in the world after the US, the UK, Canada and Germany.
- With 368 private space firms, India is leading China (288), France (269), and Spain (206).
- The number of private company proposals in the space sector has increased by 30% in 2021 from 22 proposals in 2020- ISRO.
- In just three years, the number of startups in the space sector increased to 47 in 2021 from 11 in 2019, an indicator of the pace of growth in the space sector in India.

13 JAMES WEBB TELESCOPE

Context

- A team of astronomers used the James Webb Telescope (JWST) to identify the most distant globular clusters ever discovered.

About

- The James Webb Space Telescope (JWST or "Webb") is a joint **NASA–ESA–CSA space telescope** that is planned to succeed the Hubble Space Telescope as NASA's flagship astrophysics mission.

- JWST will study various phases in the history of the universe, from the formation of solar systems to the evolution of our own Solar System.
- The **telescope must be kept very cold** in order to observe in the infrared without interference, so it will be deployed in space near the Sun–Earth **L2 Lagrange point**.
- Also, a large sunshield made of silicon-coated and aluminium-coated Kapton will keep its mirror and instruments below 50 K (−223.2 °C).

Note

- A Lagrange point is a location in space where the combined gravitational forces of two large bodies, such as Earth and the sun or Earth and the moon, equal the centrifugal force felt by a much smaller third body.
- The interaction of the forces creates a point of equilibrium where a spacecraft may be "parked" without coming in the influence of gravitational field of any other body (example Earth or Sun).

14 GREEN HYDROGEN

Context

- India has just begun to generate green hydrogen with the objective of raising non-fossil energy capacity to 500 gigawatts by 2030. On April 20, India's first 99.99% pure green hydrogen pilot plant was set up in eastern Assam's Duliajan.

Plant in Duliajan

- The plant in Assam is also the **first in India to use the anion exchange membrane (AEM) technology.**
- Green hydrogen is being produced from the electricity generated by a 500-kW solar plant using a 100-kW AEM electrolyser array.

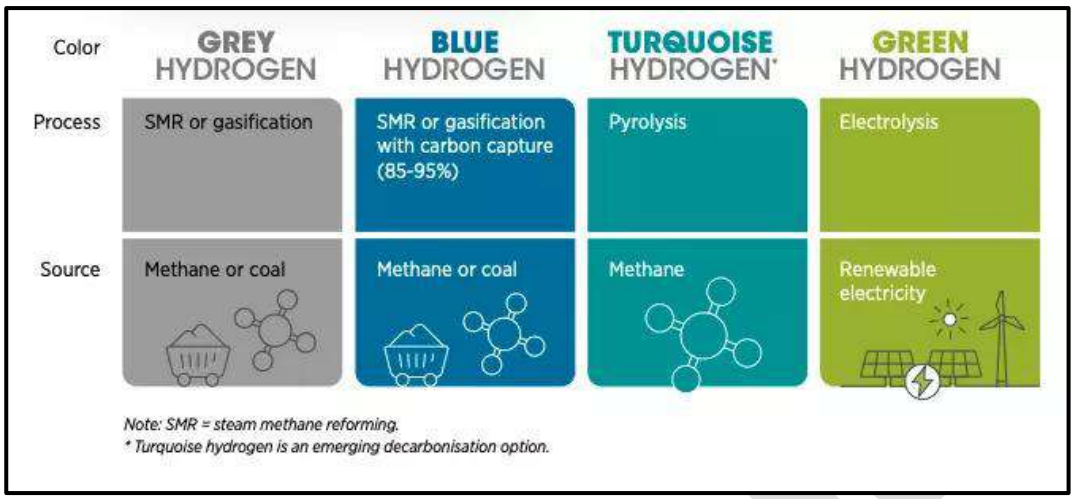
Anion Exchange Membrane (AEM) Technology

An anion exchange membrane (AEM) is **a semi-permeable membrane generally made from ionomers and designed to conduct anions but reject gases such as oxygen or hydrogen.**

Anion exchange membrane (AEM) water electrolysis is a hydrogen production method that is achieved with an AEM, using electricity. One of the major advantages of AEM water electrolysis is the **replacement of conventional noble metal electrocatalysts with low cost transition metal catalysts.**

Anion exchange membrane (AEM) electrolysis is a **promising solution for large-scale hydrogen production** from renewable energy resources. However, the performance of AEM electrolysis is still lower than what can be achieved with conventional technologies.

What is green hydrogen?



- A **colourless, odourless, tasteless, non-toxic and highly combustible gaseous substance**, hydrogen is the lightest, simplest and most abundant member of the family of chemical elements in the universe.
- But a colour — green — prefixed to it makes hydrogen the **"fuel of the future".** The 'green' depends on how the electricity is generated to obtain the hydrogen, which does not emit greenhouse gas when burned.
- Green hydrogen is **produced through electrolysis using renewable sources of energy such as solar, wind or hydel power**.
- Hydrogen gas **can be used as a fuel in transportation, power generation and industrial activities**. It does not release greenhouse gas emissions such as carbon dioxide when it is
- Green hydrogen, which has the potential to replace fossil fuels, is the name given to hydrogen gas produced using renewable energy such as wind or solar power that do not entail greenhouse gas emissions.

Making of Green Hydrogen

- With electrolysis, all that is required to produce large amounts of hydrogen is water, a big electrolyzer and plentiful supplies of electricity.

Usage of it

- Replace the industrial hydrogen that gets made every year from natural gas.
- Use it as a precursor for other energy carriers, from ammonia to synthetic hydrocarbons.
- Directly power fuel cells in cars and ships.
- Add it to natural gas and burn it in thermal power or district heating plants.

Green Hydrogen: The importance

- Green hydrogen is **one of several potential low-carbon fuels that could take the place of today's fossil hydrocarbons.**
- Other **low-carbon fuels require the production of green hydrogen as a precursor**, why not just stick with the original product?

- **Hydrogen is already widely used by industry**, so technical problems relating to storage and transport are not likely to be insurmountable.
- **The gas is potentially very versatile, with possible applications in areas ranging** from heating and long-term energy storage to transportation.
- The opportunity for green hydrogen to be applied across a wide range of sectors means there is a correspondingly large number of companies that could benefit from a burgeoning hydrogen fuel economy.

Green hydrogen current status

- At present, **less than 1 per cent of hydrogen produced is green hydroge**n, according to **IRENA's World Energy Transitions Outlook.**
- India consumes about six million tonnes of hydrogen every year. This could increase to 28 million tonnes by 2050.
- India has favorable geographic location and abundance of sunlight and wind for the production of green hydrogen.
- India will become a net exporter of green hydrogen by 2030 due to its cheap renewable energy tariffs, according to the **Global Hydrogen Council.**

Challenges in producing Green Hydrogen

- The challenge right now is that **big electrolyzers are in short supply, and plentiful supplies of renewable electricity still come at a significant**
- **Storing and transporting the highly flammable gas is not easy**; it takes up a lot of space and has a habit of making steel pipes and welds brittle and prone to failure.
- The **bulk transport of hydrogen will require dedicated pipelines**, which would be costly to build, pressurizing the gas, or cooling it to a liquid.
- **High Cost:** In a report published last year (using data from 2018), the International Energy Agency put the cost of green hydrogen at $3 to $7.50 per kilo, compared to $0.90 to $3.20 for production using steam methane reformation.
- **Loss of Efficiency in every process:** Electrolyzer efficiencies range from around 60 percent to 80 percent, according to Shell. The efficiency challenge is exacerbated by the fact that many applications may require green hydrogen to power a fuel cell, leading to further losses.

Why is India pursuing green hydrogen?

- Under the Paris Agreement (a legally binding international treaty on climate change with the goal of limiting global warming to below 2°C compared to pre-industrial levels) of 2015**, India is committed to reducing its greenhouse gas emissions by 33-35% from the 2005 levels.**
- At the 2021 Conference of Parties in Glasgow, **India reiterated its commitment to move from a fossil and import-dependent economy to a net-zero economy by 2070.**
- India's average annual energy import bill is more than $100 billion and the increased consumption of fossil fuel has made the country a high carbon dioxide (CO2) emitter, accounting for nearly 7% of the global CO2 burden.
- In order to become energy independent by 2047, the **government stressed the need to introduce green hydrogen as an alternative fuel that can make India the global hub and a major exporter of hydrogen.**
- The **National Hydrogen Mission** was launched on August 15, 2021, with a view to cutting down carbon emissions and increasing the use of renewable sources of energy.

Green Hydrogen Infrastructure in India

- Government has said that country **was focusing on producing blue and green hydrogen along with blended hydrogen in Compressed Natural Gas (CNG**) for various purposes, including transport.
- Through **technological advancements, India is blending hydrogen with compressed natural gas for**use as transportation fuel as well as an industrial input to refineries.
- **50 buses in Delhi are plying on blended hydrogen** in Compressed Natural Gas on a pilot basis.
- The **Indian Oil Corporation Limited announced it would set up the country's first green hydrogen.**

- Reliance Energy said that it would invest Rs 600 billion in building factories to produce green hydrogen among other carbon friendly technologies.

Why India should opt for Green Hydrogen?

- Adoption of Green hydrogen technology is **favorable in those sectors where direct electrification isn't feasible** for ex in Heavy duty, long-range transport and long-term storage in the power sector.
- With technological improvements, green hydrogen will become **more affordable and accessible**.
- It can be used in a wide range of existing applications such as **fertilisers, mobility, power, chemicals and shipping**.
- It **can be blended up to 10 per cent by city gas distribution networks** for wider acceptance.
- It is a cross-cutting solution that **may reduce emissions across a range of sectors.**

What can India do to build a global-scale green hydrogen industry?

- India should **announce ambitious national targets for green hydrogen** and electrolyser capacity by 2030.
- Launch an **incentive programme for the production of electrolysers.**
- Implementing **complementary solutions** that create virtuous cycles for ex. building the hydrogen infrastructure for refueling, heating and generating electricity at airports.
- **Optimising distribution networks** to decarbonise the gas grid.

15 ELECTRIC VEHICLES

News

- To make retrofitting of vehicles easy, transparent and accessible to the public, the **Delhi transport department is planning to make the entire process online — from applying for fuel conversion to details about manufacturers, products, cost, dealers and how to apply for kits.**

Electric Vehicles

- Electric vehicle uses electricity from extravehicular sources, or it can be powered by a battery (sometimes charged by solar panels).
- **Electric vehicles are vehicles that are either partially or fully powered on electricity.**
- Electric vehicles have **low running costs** as they have fewer moving parts for maintenance and also are very **environmentally friendly as they use little or no fossil fuels** (petrol or diesel).
- Electric Vehicles are **easy and cheaper to maintain** because of their simple structure and operations.
- Another benefit that an EV can deliver is the **silent functioning capability.**
- Switching to Electric Vehicles will **improve the overall energy security** situation as the country imports over 80% of its total crude oil requirements, and also save valuable foreign reserves. This will help India in achieving the goal of 'Atmanirbhar Bharat".
- Increasing demand for EVs is also expected **to boost the local EV manufacturing industry,** this will support the "Make in India" programme.

Present Status

- **Government efforts resulted in 2.5 times increase in charging stations in 9 mega cities in the last four months.**
- These 9 cities (Surat, Pune, Ahmedabad, Bengaluru, Hyderabad, Delhi, Kolkata, Mumbai, and Chennai) account for about 940 of India's 1640 public EV chargers.
- Oil Marketing Companies to set up 22,000 EV charging stations across the country in prominent cities and highways.
- In 2020-21, around 1.59 lakh EVs were sold in India, which is 0.8% of the Internal Combustion Engine (ICE) sales in the same period (1.79 crore).

Steps taken by Government to promote Electric Vehicles

- Government has taken various initiatives to promote the manufacturing and adoption of electric vehicles in the country.
- Government of India to expand Public Electric Vehicle Charging Infrastructure across the nation.
- Government is working with private and public agencies to increase public EV charging infrastructure.
- **Faster Adoption and Manufacturing of Hybrid and Electric Vehicles in India Scheme (FAME) was launched in 2015 to promote manufacturing of electric and hybrid vehicles.**
- The **Ministry of Power released guidelines about installing charging stations.**
- The efforts undertaken by the government through various implementing agencies have resulted in an increase in the number of public EV charging infrastructure.
- After ensuring adequate EV infrastructure in mega cities, the government is planning to expand the coverage to other cities.
- **Department of Heavy Industry has sanctioned Public Charging Stations for 25 Highways and Expressways, EV charging stations must be located within every 25 km of range on these expressways and highways.**
- Cabinet approved a Production-linked incentive scheme for the automotive sector to boost the manufacturing of electric vehicles.
- **NITI Aayog Released Handbook to Guide EV Charging Infrastructure in India.**
- **Goods and Services Council decided 5% GST on Electric vehicles.**
- **Government Launched 'e-AMRIT' portal: One-stop platform for information on electric vehicles.**

Challenges

- Many residents park their vehicles in open or uncovered parking slots as they have **no dedicated parking space.** So, how would they set up their own charging infrastructure
- In India, more than 90% Workers are engaged in the unorganised sector and even organisations in the organised sector lack dedicated parking infrastructure. **Organizations in both the Organised and unorganised sector who don't have dedicated parking spots will face the problem.**
- Lack of charging infrastructure, disruption in power supply, **inadequate dedicated service centers,** doubts over sustainability of Electric vehicles and charging infrastructure, **long charging hours**, etc are the key challenges, which need to be addressed.

Way Forward

- **Availability of adequate charging infrastructure is the key element for accelerating the adoption of electric vehicles in India**.

- Many states have notified dedicated EV policies, while many are in process of drafting their policies. The **Central Government needs to align the policies at the central and state level and create a national level policy for promoting EVs in the country**.
- Promote local manufacturing, provide adequate Support to the local manufacturing ecosystem to lower the price of EV vehicles.
- Improve the research and development to promote indigenous manufacturing and reduce dependency on imports.

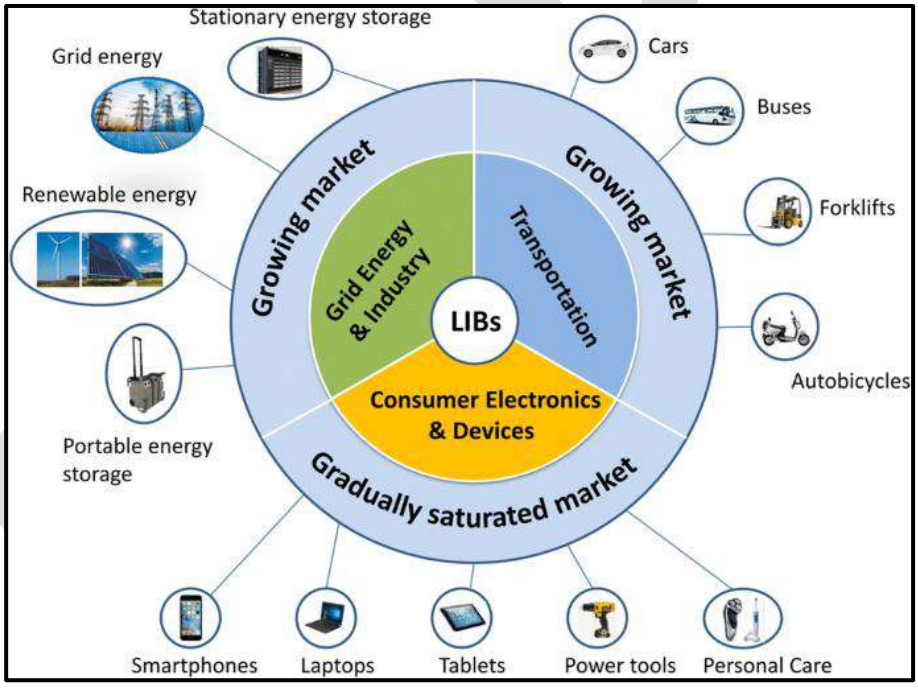
16 LITHIUM-ION BATTERIES

News

- Researchers have developed a new lithium-ion battery that can recharge within 10 minutes

Details

- Lithium-ion batteries, which came into commercial use in the early 1990s, have a very high energy density and are less likely than most batteries to lose their charge when not being used -- a property called self discharge.
- Because of their **light weight and low maintenance requirements**, lithium-ion batteries are widely used in electronic devices such as laptop computers.
- Some experts believe that lithium-ion batteries are about as close as science has yet come to developing a perfect rechargeable battery, and this type of battery is the **best candidate for powering the electric cars of the near future.** These batteries are also used in most portable electronics, including cell phones and computers.



- Lithium-ion batteries have a **high power-to-weight ratio, high energy efficiency and good high-temperature performance.**
- In practice, this means that the batteries **hold a lot of energy for their weight, which is vital for electric cars** – less weight means the car can travel further on a single charge.
- Lithium-ion batteries also have a **low "self-discharge" rate, which means that they are better than other batteries at maintaining the ability to hold a full charge over time.**
- Additionally, most lithium-ion battery parts are **recyclable making these batteries a good choice** for the environmentally conscious.
- The major advantage of lead-acid batteries is that, they are ***cheap to produce.*** However, they do produce dangerous gases while being used and **if the battery is overcharged there's a risk of explosion.**

A variation on lithium-ion batteries, called lithium-ion polymer batteries, may also prove valuable to the future of EVs. These batteries may eventually cost less to build than lithium-ion batteries; however, at the present time, lithium-ion polymer batteries are prohibitively expensive.

17 NOBEL PRIZE

Context

- Nobel prize was awarded.

Physics

- The Nobel Prize for Physics 2022 is being shared by three scientists, Alain Aspect, John F Clauser and Anton Zeilinger, for their work on quantum mechanics.
- The three conducted a series of experiments on something called entangled quantum states, where two separate particles behave like a single unit. Their pathbreaking results will have implications in the fields of quantum computers, quantum networks and secure quantum encrypted communication. Put simply, quantum computers use quantum mechanics to solve problems too complex for regular computers.

Chemistry

- This year's Nobel Prize in Chemistry has gone to three scientists who, through their work, have made a strong case for adopting an alternative approach to producing new complex molecules in the laboratory or industry, which minimises waste and increases overall efficiency.
- 'Click Chemistry' demonstrates its vast potential in the pharmaceutical and other industries.

Physiology

- Swedish scientist Svante Paabo won the 2022 Nobel Prize in Physiology or Medicine for discoveries "concerning the genomes of extinct hominins and human evolution.
- The winner has been credited with transforming the study of human origins after developing approaches to allow for the examination of DNA sequences from archaeological and paleontological remains.
- Key achievements include sequencing an entire Neanderthal genome to reveal the link between extinct people and modern humans.
- The winner also brought to light the existence of a previously unknown human species called the Denisovans, from a 40,000-year-old fragment of a finger bone discovered in Siberia.

18 TUBERCULOSIS (TB)

Context

- Only two-thirds of people living with tuberculosis benefitted from the Union government's sole nutrition support scheme - NikshayPoshan Yojana, highlighting bottlenecks in the fight against a major public health concern.

About Tuberculosis (TB)

- Tuberculosis (TB) is a potentially serious infectious disease that mainly affects the lungs.
- **The 'Mycobacterium tuberculosis' bacteria that cause TB are spread when an infected person coughs or sneezes.**
- Most people infected with the bacteria that cause tuberculosis don't have symptoms. When symptoms do occur, they usually include a cough (sometimes blood-tinged), weight loss, night sweats and fever.
- Treatment isn't always required for those without symptoms. Patients with active symptoms will require a long course of treatment involving multiple antibiotics.

Present Status of TB in India

- **Tuberculosis is one of India's major public health problems. According to World Health Organisation (WHO) estimates, India has the world's largest tuberculosis epidemic.**

- **In 2020, India accounted for 26% of the incident TB cases across the globe.**
- India has an incidence rate of 192 cases per 100,000 of population.
- India accounted for 38% of global TB deaths among HIV-negative people and for 34% of the combined total number of TB deaths in HIV-negative and HIV-positive people.
- Further in 2020, India accounted for 24% of the global gap between estimated TB incidence and the number of people newly diagnosed with TB and reported.

Steps taken by the Government

- **In 2020, the Indian government made statements to eliminate tuberculosis from the country by 2025 through its National TB Elimination Program.**
  - Interventions in this program include major investment in health care.
  - Providing supplemental nutrition credit through the NikshayPoshan Yojana.
  - Organizing a national epidemiological survey for tuberculosis.
  - Organizing a national campaign to tie together the Indian government and private health infrastructure for the goal of eliminating the disease.
- T**he ministry's commitment to eliminating tuberculosis in the country by 2025.**
  - As part of its efforts to eliminate tuberculosis, the Union Government changed the name of Revised National Tuberculosis Control Program (RNTCP) to National Tuberculosis Elimination Program (NTEP) in December 2019.

Details of NikshayPoshan Yojana

- The NikshayPoshan Yojana entitles every tuberculosis (TB) patient, seeking treatment in either the public or private sector, to a direct benefit transfer (DBT) of Rs 500 per month for nutritional needs. It was launched in April 2018 and until February 2022, around Rs 1,488 crore has been paid to 5.73 million notified beneficiaries.
- However, data from the latest India TB Report 2022, released by the Union Ministry of Health and Family Welfare in March 2022, shows that **only 62.1 per cent of 2.1 million notified cases across the country received at least one payment in 2021.**
- In Delhi, which has the highest burden of all forms of TB at 747 cases per 100,000 people, only 30.2 per cent of patients have got at least one DBT.
- Other poor performers are Punjab (31.8 per cent), Jharkhand (40.1 per cent), Maharashtra (46.6 per cent), Bihar (45.8 per cent), Rajasthan (55.9 per cent) and Uttar Pradesh (58.7 per cent). In the North East, Manipur (4.2 per cent) and Meghalaya (23.7 per cent) fared the worst.

Challenges in implementing the Scheme

- Studies on the scheme since its inception highlight several hurdles in the DBT process. One 2018 paper in the Indian Journal of Tuberculosis, found that **"non-availability of bank accounts and unlinked bank accounts were some challenges faced by both health providers and patients."**
- Another 2020 study published in the Journal of Family Medicine and Primary Care underlines **lack of communication, stigma, illiteracy and the multi-step approval process as key hurdles.**
- States have their own nutritional support schemes, but caveats remain here too; for instance, some schemes are only for patients showing resistance to TB drugs.

Concern

- **India has set a target to eliminate TB by 2025.** Experts believe that to reach this goal, the country must go beyond the medical aspects.
- **Undernutrition is a major risk factor that drives TB**, acknowledges the World Health Organization. The condition accounts for nearly 34 per cent of all cases.

Final thoughts

- The government needs to take stock of where the bottlenecks are. There is no point in pouring more money into a failing system.
- Any investment in diagnostic treatments is irrelevant if people fighting TB are living on an empty stomach. It

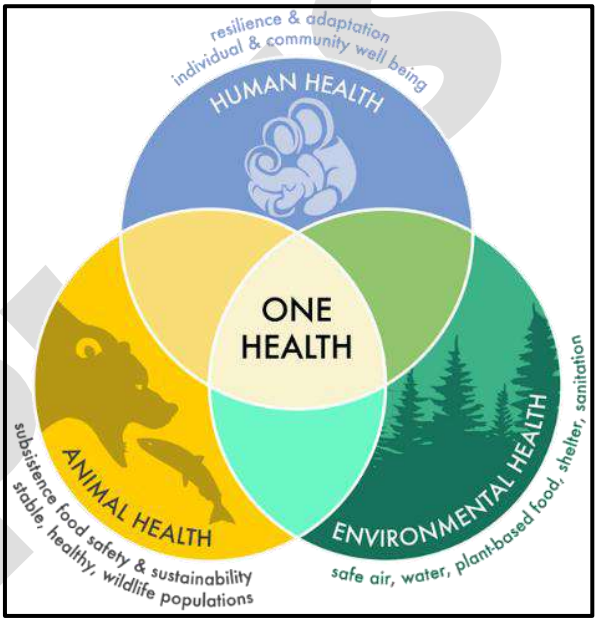
affects the poorest populations and almost every family is in financial distress due to medical costs and lost wages.

- This distress can worsen food insecurity. A **broader approach is needed to prevent TB**, and **it should include food support for those in close contact with the patient** as they are also at high risk of contracting the disease.

19 ONE HEALTH

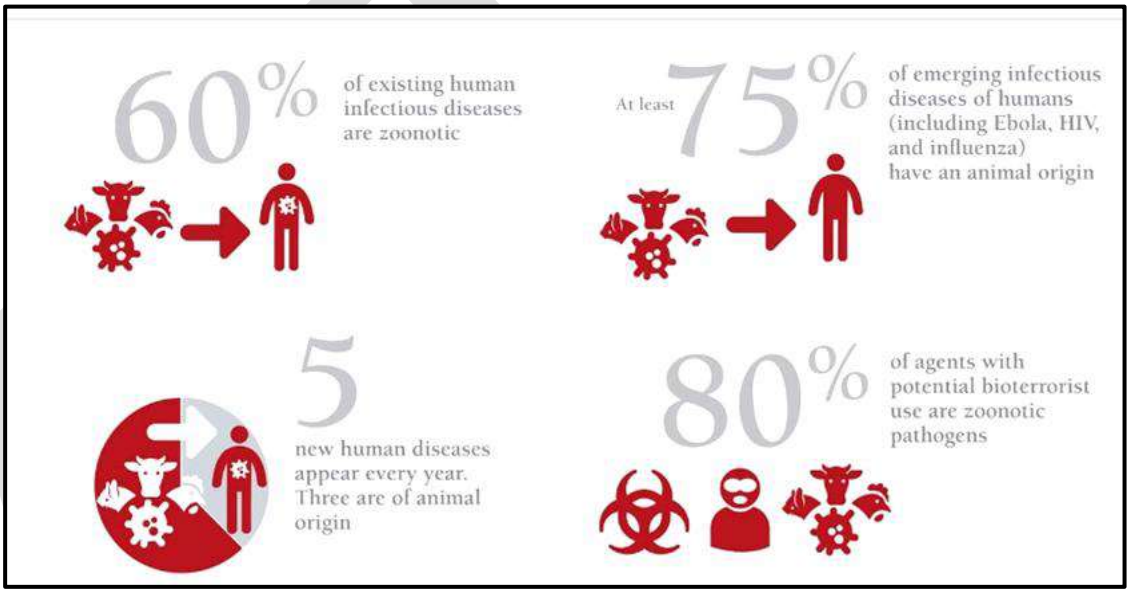
Context

- Recently, One Health Joint Plan of Action was launched by the Quadripartite – the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP), the World Health Organization (WHO), and the World Organisation for Animal Health (WOAH, founded as OIE).



One Health

- One Health is an integrated, unifying approach that aims to sustainably balance and optimise the health of humans, animals, plants and ecosystems.
- It is the primary approach for addressing the complex health challenges facing our society, such as ecosystem degradation, food system failures, infectious diseases and antimicrobial resistance (AMR).



India's Efforts

- In 2019 India launched **"One Health Initiative"** together with support from the Bill and Melinda Gates Foundation, United States Defense Threat Reduction Agency's Biological Threat Reduction Program and Penn State's Applied Biological and Biosecurity Research Laboratory (ABRL).
- India's One Health Initiative is an intersectoral approach to tackle the most urgent health threats in the region, **with a focus on low and middle-income countries across south and southeast Asia and sub-Saharan Africa.**

- Several Schemes have been launched by the **Department of Animal Husbandry and Dairying (DAHD)** to prevent animal diseases.
- Animal Health Diagnostic system such as **Assistance to States for Control of Animal Diseases (ASCAD)** are being upgraded.

One Health Joint Plan of Action

- One Health Joint Plan of Action aims to create a framework to integrate systems and capacity so that we can collectively better prevent, predict, detect, and respond to health threats. Ultimately, this initiative seeks to **improve the health of humans, animals, plants, and the environment, while contributing to sustainable development.**
- **The five-year plan (2022-2026) focuses on supporting and expanding capacities in six areas:**
  1. One Health capacities for health systems,
  2. Emerging and re-emerging zoonotic epidemics,
  3. Endemic zoonotic,
  4. Neglected tropical and vector-borne diseases,
  5. Food safety risks,
  6. Antimicrobial resistance and the environment.

20 DRONES

Context

- A training institute for drone pilots under the aegis of the Drone Imaging and Information Service of Haryana Limited (DRIISHYA) will be set up in Haryana to support capacity development.

Drones

- Drones or Unmanned aerial vehicles (UAVs) are aircraft with no on-board crew.
- The 'drones' can range from remotely piloted to fully automated, which means that **it relies on a system of sensors and LIDAR (Light Detection and Ranging) detectors to calculate its movement.** It can fly at a controlled level of height and speed for a long period of time.

India's history of drones

- Back in the 1990s, the Indian Army acquired unmanned aerial vehicles or UAVs from Israel, and the Indian Air Force and Navy followed suit. India first used military drones during the 1999 Kargil war against Pakistan for photo reconnaissance along the Line of Control (LOC).
- In India, the **use of all (manned or automated) aerial vehicles is governed by the Directorate General of Civil Aviation (DGCA).** Though UAVs were originally developed for the military and aerospace industries, drones have found their way into the mainstream because of the enhanced levels of safety and efficiency they bring.

New Drone Rules, 2021

- The Central Government on 25th August 2021 has promulgated liberalised **'The Drone Rules, 2021'** replacing the erstwhile **Unmanned Aircraft System Rules 2021 ("Prior Rules"),** to regulate the use and operation of Drones or Unmanned Aerial System ("UAS") in India.

Summary of provisions under New Drone Rules

Scope of Operation

- The Rules cover all persons **owning or possessing, or engaged in leasing, operating, transferring or maintaining a drone in India**.
- It covers **all drones that are registered in India or being operated for the time being, in or over India**.
- It seeks to regulate only the civilian usage of Drones and **does not apply to drones used by the naval,**

military or air forces of the Union.

Digital sky platform

- The Rules have established an online platform hosted by the Directorate General of Civil Aviation **("DGCA")**, for the management of various drone-related activities in India.
- The Platform **seeks to provide a single-window online system, where most of the permissions of Drones can be generated by individuals, without any human intervention.**

Definition and Classification of Drones

- Drone has been defined as an unmanned aircraft system[5]("UAS"), that can operate autonomously or can be operated remotely without a pilot on board. The **maximum all-up-weight for a drone is 500 Kilograms.**
- Drones have been classified based upon the maximum all-up weight (not more than 500 kilograms[7]) including payload as under
  1. **Nano drone:** Less than or equal to 250 grams;
  2. **Micro drone**: Greater than 250 grams and less than or equal to 2 kilograms;
  3. **Small drone:** Greater than 2 kilograms and less than or equal to 25 kilograms;
  4. **Medium drone:** Greater than 25 kilograms and less than or equal to 150 kilograms; and
  5. **Large drone:** Greater than 150 kilograms.

In case, the weight is more than 500 kilograms, the provisions of the Aircraft Rules, 1937 shall apply instead of the Drone Rules.

Drone Certification

- The Rules mandate the requirement of obtaining a type certificate, from the Director General**("DG")** or any entity authorised by DG, on the recommendation of the Quality Council of India or an authorised testing entity, to operate the drone.
- However, **a type certificate is not required for:**
  1. Manufacturing or importing a UAS.
  2. Operating a model remotely piloted aircraft system or a nano UAS.
- In order to obtain certification of Drone, a person needs to apply. The **proposal is then examined by the Quality Council of India ("QCI")or an authorized testing entity**. The test report is then submitted along with its **recommendations to the DG within sixty days from the date of receipt of the application**, who on being satisfied with the recommendations, shall issue to the applicant a type certificate for the specific type of drone within fifteen days of receiving such test report.
- The drone needs to comply with certain mandatory safety features.

(a) 'No Permission – No Takeoff' **("NPNT")** hardware and firmware;

(b) Real-time tracking beacon that communicates the drone's location, altitude, speed and unique identification number; and

(c) Geo-fencing capability.

Drone Registration

- In addition to Drone Certification, the Rules mandate the **registration of individual drones and obtaining a Unique Identification Number ("UIN").**
- Each **UIN of a drone shall be linked to the unique serial number provided by the manufacturer and the unique serial numbers of its flight control module and ground control station**. The Rules have also prescribed procedures for the transfer and Deregistration of Drones.

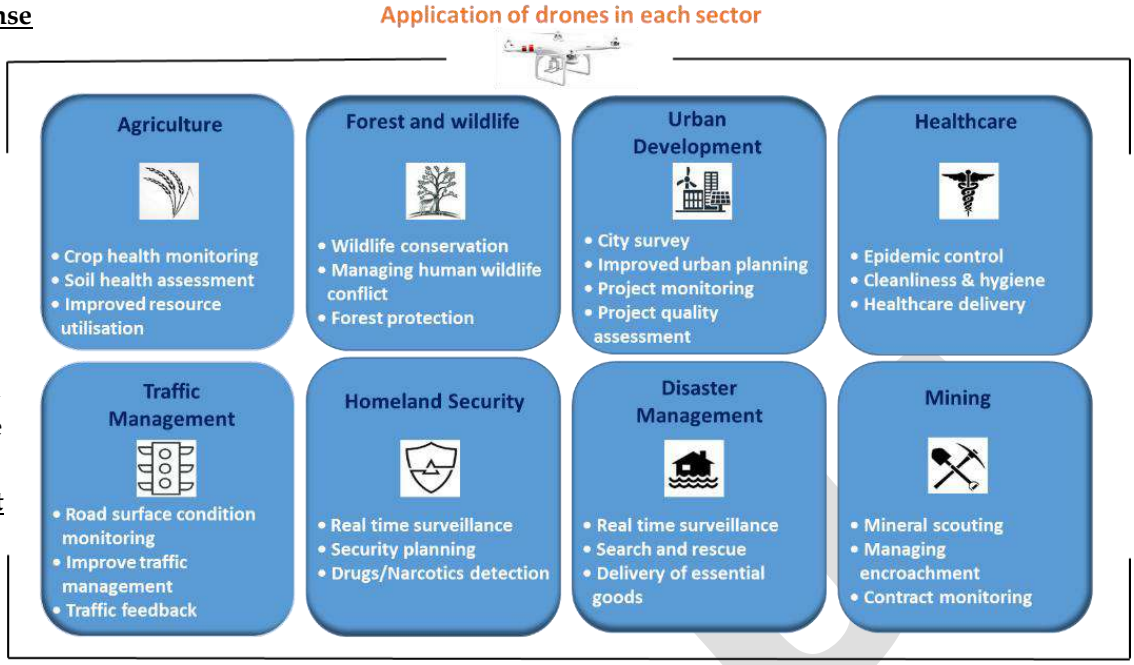
Drone Operations

- The Drone Rule 2021 draft also provides an interactive airspace map that includes the green, yellow, and red zones displayed on the Digital Sky Platform. The three zones have been defined as follows:

1. **Green Zone**: Airspace over land or territorial waters of India, or Vertical **distances of 400 feet or 120 meters and 200 feet or 60 meters** at a lateral distance of 12 from the perimeter of the operating airport.
2. **Yellow Zone**: Flying in this zone **requires the prior approval of your Air Traffic Control Authority**. This includes airspace above the vertical distance specified by the green zone.
3. **Red Zone**: The use of UAVs is prohibited unless only permitted by the central government.

The Rules prohibit the operation of a drone in a red zone or yellow zone without prior permission. However, no such provision is required in the Green Zone.

Remote Pilot License



- The Rules restrict the operation of a drone by any person other than a holder of a valid Remote Pilot Licence (RPL) enlisted on the Platform. **An RPL is not required for a person operating a nano drone or operating a micro drone for non-commercial purposes**.
- In order to be eligible for the RPL the following criteria need to be fulfilled:

(a) Not less than eighteen years of age and not more than sixty five years of age;
(b) Have passed class tenth or its equivalent examination from a recognised board;
(c) Have completed the training prescribed by the DG for the applicable class of remote pilot licence from an authorised remote pilot training organisation.

- If a person, fulfils the aforementioned criteria, he can obtain an RPL after completing the training specified by the DG.
- **The RPL shall be valid for a period of 10 years** after which it can be renewed again.

Insurance

- The Rules require third party insurance of drones for compensation in case of damage to life and/or property caused by a UAS/drone. **Insurance cover has to be taken in accordance with Motor Vehicles Act, 1988.**

Offences & Penalties

- Any contravention of the Rules may attract a **penalty of up to a maximum of one lakh rupees under Section 10A Aircraft Act, 1934**. Furthermore, the Rules also provide for cancellation or suspension of any licence, certificate, authorisation or approval granted under these Rules by the DG in case of contravention of the Rules.

21 Web3.0

Context

- India has a rapidly-growing Web3 ecosystem with more than 450 active start-ups in the space-Nasscom.

What is World Wide Web?

- World Wide Web, which is also known as a Web, is **a collection of websites or web pages stored in web servers and connected to local computers through the internet**.
- These websites contain text pages, digital images, audios, videos, etc. Users can access the content of these sites from any part of the world over the internet using their devices such as computers, laptops, cell phones, etc. The WWW, along with internet, enables the retrieval and display of text and media to a device.
- So, the web/www provides a communication platform for users to retrieve and exchange information over the internet.

Web 1.0

- Web 1.0 is the earliest form of the internet created by Tim Berners Lee in 1989 that existed between the years of 1991 to 2005.
- It is an era where content creators were fewer in number and the wide majority instead were consumers of data. Users were allowed to view the content placed on websites but were not able to collaborate, give feedback, or add their own content to these websites. So, people could just access facts, information, and content from the source.
- Web 1.0 made the **use of static HTML** and displayed content using tables and frames.
- Websites were mostly static and data was stored predominantly in filesystems.
- Web 1.0 can be thought of as a massive digital encyclopedia that lacked interactivity.

A few elements that define Web 1.0 can include:

- Static pages.
- HTML 3.2 elements such as frames and tables.
- HTML forms sent via email.
- Content from the server's filesystem, rather than a relational database management system.
- GIF buttons and graphics.

The primary technologies that comprised web 1.0 were:

- HTML (HyperText Markup Language)
- HTTP (HyperText Transfer Protocol)
- URL (Uniform Resource Locator)

Weaknesses in Web 1.0 led to the evolution of Web 2.0.

Web 2.0

- With Web 2.0, the focus moved away from a small amount of people making a large amount of content, to a large amount of people making even more content.
- Instead of static websites that simply pushed content, Web 2.0 **introduced the concept of blogging, and zooming, scrolling, and manipulating content such as in Google Maps.**
- This form of the internet emphasised UGC, ease of use, participation and interactivity, and compatibility with other devices and systems.
- Communities, collaborations, dialogue and social media popped up in Web 2.0. Web 2.0 is also the era that saw the rise of Software as a Service (SaaS) solutions and the use of technologies **like HTML5, CSS3, and JavaScript frameworks.**

A few elements that define Web 1.0 can include:

- Free sorting of information
- Developed APIs
- Self-usage
- Dynamic content
- Wide societal use, not just specific communities
- Ease of information sharing.
- Huge variety of information in a single click.

Basically, to summarise Web 2.0: the user has become the product.

Web 2.0, or the 'social web', involves a number of tools and platforms where people can share their opinions, day-to-day, and perspectives, in a hyper interactive way. So, this can involve:

- Podcasting
- Social media
- Tagging
- Blogging
- Commenting
- Voting

Issue

- The issue with Web 2.0 comes from the way the traditional Web 2.0 application works. A user will make a request to the server, which will then be sent to the webpage as a response. The only thing is **whoever controls the data on the centralised server has access to a hell of a lot of data.**
- Facebook, Google and Twitter began storing this data in their servers, in order to make better content using algorithms. Our data was then sold to advertisers.

Web 2 weaknesses:

- Risk of virus, fraud, and spam attacks.
- Risk of getting wrong information since the variety, veracity, and volume of information is too large.
- **Compromised security** since Web 2 users are at the mercy of the Big Tech companies (Alphabet (Google), Amazon, Meta (Facebook), Apple, and Microsoft) which store almost all their data.

- **Information censoring by the Big Tech companies** who can censor the information users are trying to access.
- Economic benefits are only limited to the Big Tech companies even though the content being introduced in the WWW is generated mainly by users.
- A **centralized financial system** whereby the financial system is centrally managed by a few central banks and financial institutions that have access to users' data.

The dependence of Web 2.0 on the Big Tech companies is not acceptable to general users, and is thus revolutionizing how people use the web. This is giving rise to a new era of the WWW called the Web 3.0.

Web 3.0

- Web 3.0 is also known as the **read-write-execute web** and introduces the **concept of machine learning, artificial intelligence, and blockchain systems.** It is built upon the core concepts of **decentralization, openness and and token-based economics.**
- The term "Web3" was coined by Polkadot founder and Ethereum co-founder Gavin Wood in 2014, referring to a "decentralized online ecosystem based on blockchain."

Elements

- **Decentralized:** It is the concept that believes that content and data must be owned and controlled by decentralized autonomous bodies, thus reducing the censorship and centralized control exercised by the Big Tech companies. Payments in Web 3.0 use token-based authentication, thus personal data does not need to be shared with third-party intermediaries. Once smart contracts are deployed, they execute as written without the need for an intermediary.
- **Artificial Intelligence and Machine Learning:** Web 3.0 is based on Natural Language Processing (NLP) which allows the web to analyze and derive the meaning of spoken and written words. Thus, web tech is improved to create, share, and **connect content through search and analysis, based on comprehension not key words.**
- **Ubiquity:** Web 3.0 envisions that systems are available anywhere and everywhere because of the use of decentralized servers, thus reducing the dependency on Big Tech that exists with Web 2.0.
- **3D graphics and spatial web:** Web 3.0 is also set to transition from 2D to 3D systems coupled with NLP and machine learning. Web 3.0 will see the merging of reality with virtual worlds using sensors, smart glasses, and AR/VR technologies.
- **Open –** It's 'open' in the sense that it's made with open-source software developed by an open and available community of developers and accomplished in full view of the public.
- **Trustless –** The network offers freedom to users to interact publicly and privately without an intermediary exposing them to risks, hence "trustless" data.
- **Permissionless –** Anyone, including users and providers, can engage without the need for permission from a controlling organization.
- **Artificial Intelligence & Machine Learning -** Artificial intelligence and machine learning algorithms have advanced to make valuable, and sometimes life-saving, predictions and acts.
- When built on top of emerging decentralized data structures that provide access to a plethora of data that today's tech titans desire, the possible applications extend far beyond targeted advertising into areas such as:
  1. Precision materials
  2. Medication creation
  3. Climate modeling

Although Web 2.0 has similar capabilities, it is still primarily human-based, allowing for corrupt behaviors such as biased product evaluations, rigged ratings, human errors, etc.

Web 3.0 strengths

- Since information can be accessed from all ends of the web spectrum, it makes data interoperable across different platforms and IoT devices.
- Use of permissionless blockchains thus reducing limitations that exist due to wealth, geographic location, gender, or other demographics.
- Removal of a central authority leading to self-governance and distributed ownership.
- Improved security because of the distribution, decentralization, and use of blockchain technologies.
- Reduced dependence on the Big Tech companies.
- No need to share personal information with third parties when making payments.

22 SUPERCOMUTING

Context

- Recently, PARAM ANANTA, a state-of the art Supercomputer at IIT Gandhinagar was dedicated to the nation under National Supercomputing Mission (NSM).

Details

- **PARAM ANANTA** system is **based on Direct Contact Liquid Cooling technology** to obtain a high power usage effectiveness and thereby reducing the operational cost.
- Multiple applications from various scientific domains such as **Weather and Climate, Bioinformatics, Computational Chemistry, Molecular Dynamics, Material Sciences, Computational Fluid Dynamics etc**. have been installed on the system for the benefit of researchers. This high end computing system will be a great value addition for the research community.

Brief History of Supercomputers in India

- Supercomputing in India **began in 1980** when the Indian government set up an indigenous development programme as there were several issues to procure supercomputers from abroad.
- The **National Aerospace Laboratories started the project "Flosolver MK1",** a parallel processing system operating in December 1986. Following this, multiple projects were commissioned from different organisations, including C-DAC, C-DOT, NAL, BARC, and ANURAG.
- C-DOT created "CHIPPS", the C-DOT High-Performance Parallel Processing System, and BARC created the Anupam series of supercomputers. ANURAG created the PACE series of supercomputers.
- Although the C-DAC mission released the "PARAM" series of the supercomputer, it was only in 2015 that the **launch of the National Super Computing Mission boosted the Indian supercomputers**. NSM announced a seven-year programme worth Rs 4,500 crore to install 73 indigenous supercomputers by 2022.

About Supercomputer

- A supercomputer is a computer with a high level of performance as compared to a general-purpose computer because its architectural and operational model depends on the parallel and grid processing.
- Primary motive to design of supercomputer was to be used in large scale organizations where need more computing power.

- Supercomputer has a power to execute many processes simultaneously on thousand of processors, because these types of processors can execute billions and trillion of instructions per seconds, so its computing performance matrix is FLOPS (that is floating-point operations per second).
- The performance of a supercomputer is commonly measured in floating-point operations per second (FLOPS) instead of million instructions per second (MIPS). Supercomputers were started in 1960s.

The first supercomputer was designed by Seymour Cray in 1960 in Control Data Corporation (CDC)

Petaflop

- A petaflop is the ability of a computer to do one quadrillion floating point operations per second (FLOPS).
- Floating-point numbers have decimal points in them. The number 2.0 is a floating-point number because it has a decimal in it. The number 2 (without a decimal point) is a binary integer.
- Specific to floating-point numbers, a floating-point operation is any mathematical operation (such as +, -, *, /) or assignment that involves floating-point numbers (as opposed to binary integer operations).

Petascale

- Petascale computing refers to computing systems capable of calculating at least 1015 floating point operations per second (1 petaFLOPS).
- Petascale computing allowed faster processing of traditional supercomputer applications. The first system to reach this milestone was the IBM Roadrunner in 2008.

Applications

- Supercomputers have a wide variety of applications such as **weather forecasting, aerospace engineering, automobile crash and safety modeling, quantum physics, physical simulations, molecular modeling, oil and gas exploration, defense applications and many more.**
- Other applications include **virtual reality, computational chemistry, finance, transportation**, etc.

There are many **application areas where to use of supercomputer** such as

Biology Areas

- Mostly, supercomputer used to diagnose for various diseases, and provide the assistance for producing good result in strokes, brain injuries and other blood flow issues in your body

Military and Defense Missions

- Supercomputing help to provide virtual testing for nuclear explosion and weapon ballistics

Climate Patterns

- Supercomputer application is able to study and understand climate patterns.

Airlines Industry

- With the help of supercomputer, designed the flight simulators for newbie pilots and this simulator help to training for new pilots.

Weather Forecasting

- To gather the information related to weather forecasting, supercomputer run in the NOAA's system, means National Oceanic and Atmospheric Administration. NOAA system is able to execute all types of simple and logically instructions.

Scientific Research areas

- In the weather and science research areas depend on the supercomputer because for analyzing data from the exploring solar system, satellites that rounding earth, and other area such as nuclear research.

Advance database (Data Mining)

- Some large scale companies need the supercomputer for extracting useful information from data storage house or in the cloud system. Such as insurance companies.

Financial Market Place

- Supercomputer plays vital role in the real financial success in the emerging online currency world such as bit coin and stock market

Simulated Environment in Automobile

- Supercomputer provides the help to people for buying vehicle because before purchasing the vehicle customer can test through simulation environment that is created by supercomputer.

Smog Control System

- Scientists use supercomputers in own laboratory for predicting the fog and other pollution level on the particular areas, and then take final step to prevent them.

India's National Supercomputing Mission

Launch

- The National Supercomputing Mission was **launched in 2015 for over a period of seven years.**

Development and Implementation

- The Mission is being **jointly steered by the Department of Science and Technology (DST) and the Ministry of Electronics and Information Technology (MeitY).**
- It is being **implemented by the Centre for Development of Advanced Computing (C-DAC),** Pune, and the **Indian Institute of Science (IISc),**

Objectives

- To make India one of the world leaders in Supercomputing and to enhance India's capability in solving grand challenge problems of national and global relevance
- To empower our scientists and researchers with state-of-the-art supercomputing facilities and enable them to carry out cutting-edge research in their respective domains
- To minimize redundancies and duplication of efforts, and optimize investments in supercomputing
- To attain global competitiveness and ensure self-reliance in the strategic area of supercomputing technology

Supercomputers in India

- India's fastest supercomputer Param Parvega sports a supercomputing capacity of 3.3 petaflops.
- Some other supercomputers of India are: Param Siddhi, Cray XC40-based Pratyush, Mihir, Param Shivay etc.
- By 2022, the government aims to install 73 indigenous supercomputers across the country.

The Fugaku supercomputer located at RIKEN Centre for Computational Science in Kobe, Japan is the world's fastest supercomputer.

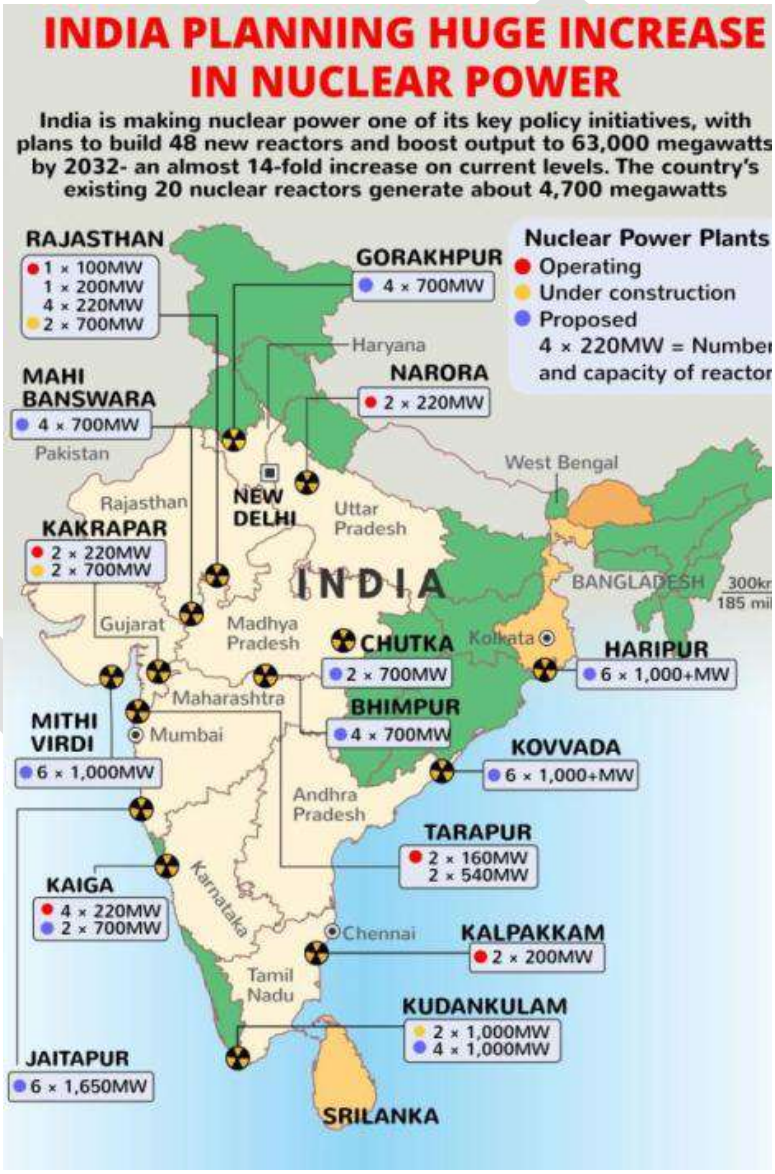
23 NUCLEAR POWER IN INDIA

Context

- Union Minister of Atomic Energy said, the Government has accorded 'In-Principle' approval of the site at Jaitapur in Maharashtra for setting up six nuclear power reactors of 1650 MW each in technical cooperation with France.

About

- This would make it the largest nuclear power generating site with a **total capacity of 9900 MW.**
- Jaitapur would be the **world's most powerful nuclear power plant.**
- There would be six state-of-the-art reactors with an installed capacity of 9.6 GWe **that will produce low carbon electricity.**
- It would provide electricity to seven crore households.



Nuclear Power in India

- **Genesis:** India's nuclear programme can trace its origins to 1944 and its efforts in 3 stage technology were established by Homi Jehangir Bhabha when he founded the nuclear research centre, the Tata Institute of Fundamental Research.
- Today, India has 23 nuclear reactors in operation in 7 nuclear power plants, with a total installed capacity of 7,480 MW.
- Kudankulam Nuclear Power Plant is the largest nuclear power station in India, situated in Tamil Nadu.

India's Nuclear Share

- The present installed nuclear power capacity in the country is 6780 MW.
- The share of nuclear power in the total electricity generation in the country is about **1% in the year 2020-21.**
- The present nuclear power capacity of 6780 MW is **planned to be increased to 22480 MW by 2031** on progressive completion of projects.

Importance of Nuclear Energy

- **Thorium and Uranium reserves:** India has vast reserves of Thorium that can fuel India's nuclear energy provided appropriate technology. India's thorium deposits, estimated at 360,000 tonnes, and natural uranium deposits at 70,000 tonnes. The country's thorium reserves make up 25% of the global reserves.
- **Energy poverty:** Although India is the 3rd largest producer of electricity, about 20 % of the population of the country does not have access to electricity today. The per capita consumption of electricity is very low at about 1,181 kWh per annum, about half of the world average and way below that of advanced countries. There exist shortages in energy and peak power in the range 10-15%.

- **Energy demand:** Nuclear energy is a critical part for India's future energy security. As we know India's annual energy demand is expected to rise to 800 GW by 2032, it is very important to consider every source of energy in the optimum energy mix.
- **Energy efficiency:** Quantities of nuclear fuel needed are considerably less than thermal power plants. For instance, 10000 MW generation by coal will need 30-35 million tons of coal, but nuclear fuel needed will be only 300-350 tons.
- **Economic growth:** Rapid economic growth is also critical to achieve developmental objectives and poverty alleviation. A sustained economic growth of about 8 to 10% is needed over the next few decades. As electricity is a key driver for economic growth, it is necessary that there is a massive augmentation in electricity capacity, apart from transmissions and distribution systems.
- **Decrease in Energy Supply:** Energy supply has been negatively affected by changing weather patterns. As water reservoirs decreases due to lower precipitation and increased evaporation, capacity for electricity production from hydropower and other water-intensive generation technologies may decline.
- **Climate change:** Due to its emission-free nature, nuclear energy can contribute to global efforts under the Paris Agreement. India's Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) has outlined goals to reduce the carbon emissions intensity of its economy by 33-35% by 2030 as well as increase the clean energy electricity capacity to 40% of the total installed capacity in the same period.

Challenges

- **Public Awareness:** Commercial nuclear power is sometimes viewed by the general public as a dangerous or unstable process. This perception is often based on three global nuclear accidents, its false association with nuclear weapons,
- **Used Fuel Transportation, Storage and Disposal:** Many people view used fuel as a growing problem and are apprehensive about its transportation, storage, and disposal.
- **Constructing New Power Plants:** Building a nuclear power plant can be discouraging for stakeholders. Conventional reactor designs are considered multi-billion dollar infrastructure projects. High capital costs, licensing and regulation approvals, coupled with long lead times and construction delays, have also deterred public interest.
- **High Operating Costs:** Challenging market conditions have left the nuclear industry struggling to compete. Strict regulations on maintenance, staffing levels, operator training, and plant inspections have become a financial burden for the industry.

Is nuclear power a zero-emissions energy source?

- Nuclear energy is also responsible for greenhouse gas emissions.
- Uranium extraction, transport and processing produces emissions.
- The long and complex construction process of nuclear power plants also releases CO2, as does the demolition of decommissioned sites. Nuclear waste transport and storage.
- **At COP26,** environmental initiative Scientists for Future (S4F) presented a paper on nuclear energy and the climate. Which stated that **"Taking into account the current overall energy system, nuclear energy is by no means CO2 neutral,"**
- **World Information Service on Energy (WISE)** calculated that nuclear plants produce 117 grams of CO2 emissions per kilowatt-hour.
- Combination of excessive costs, environmental consequences and lack of public support are all arguments against nuclear power.

Final Words

- If the entire life cycle of a nuclear plant is included in the calculation, **nuclear energy certainly comes out ahead of fossil fuels like coal or natural gas.**
- **Atomic Energy Commission**, said that India's energy future depended on its rapid growth of nuclear power.
- Nuclear waste is a major concern globally and dissuades many countries from relying on this technology.
- Reprocessing of this waste helps reduce the quantum of waste generated in the reactor that needs to be

disposed of through safe storage.

- **The solution to various challenges is not to shun the technology altogether, but to use technology to counter the problems caused by technology.**
- **For example:** India has invested large resources in its recycle programme through the **Integrated Nuclear Recycle Plant (INRP).**
- To our advantage, when it comes to nuclear power, India has established a good safety culture.
- Thus, India has a lot going in its favour when it comes to replying on nuclear power generation.

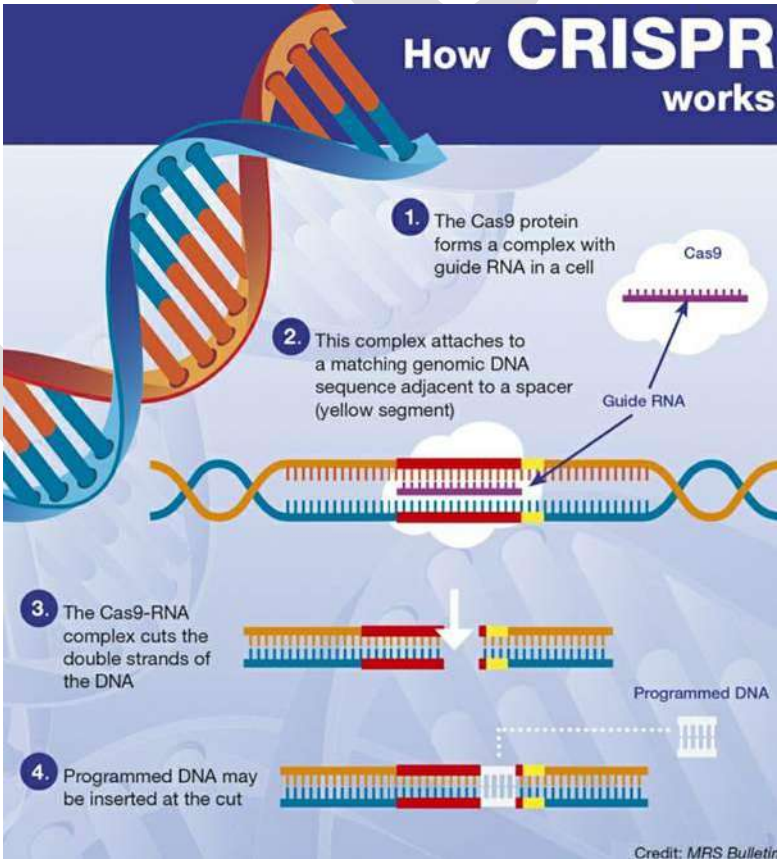
24 CRISPR TECHNOLOGY

Context

- Scientists have, for the first time, used CRISPR technology to insert genes that allow immune cells to attack cancer cells, potentially leaving normal cells unharmed and increasing the effectiveness of immunotherapy.

CRISPR Technology

- Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) is a reference to the clustered and repetitive sequences of DNA found in bacteria, whose natural mechanism to fight some viral diseases is replicated in this gene-editing tool.
- **It helps in Editing, or modification, of gene sequences to eliminate — or introduce — specific properties in an organism**.
- Gene editing technology happening for several decades now, particularly in the field of agriculture, where genetically modified variants, with specific desirable traits, are regularly developed.
- CRISPR technology is different. **It is simple, and it does not involve the introduction of any new gene from the outside.**
- Its tool **is usually compared to the 'cut-copy-paste', or 'find-replace' functionalities in common computer programmes.**



- A **bad stretch in the DNA sequence, which is the cause of disease or disorder, is located, cut, and removed — and then replaced with a 'correct' sequence**.
- And the tools used to achieve this are not mechanical, but biochemical — specific protein and RNA molecules.
- The entire process is programmable, and has remarkable efficiency, though chances of error are not entirely ruled out.
- The technology replicates a natural defense mechanism in some bacteria that use a similar method to protect themselves from virus attacks.

Wrapping up

- Several diseases and disorders are genetic— that is, they are caused by unwanted changes or mutations in

genes. These include common blood disorders like sickle cell anaemia, eye diseases including colour blindness, several types of cancer, diabetes, HIV, and liver and heart diseases. Many of these are hereditary.
  - **CRISPR technology opens up the possibility of finding a permanent cure to many of these diseases.**
- It could also **correct the deformities arising out of abnormalities in gene sequences, like stunted or slow growth, speech disorders, or inability to stand or walk**.
- Japan has already approved the commercial cultivation of a tomato variety that has been improved using CRISPR-based intervention.
  - In India, several research groups are working on CRISPR-based enhancements for various crops including rice and banana.
- There are several concerns **related to the potential misuse of the technology, such as creating a 'designer baby', and the possibility of being inherited by successive generations,** these concerns need to be addressed by engaging in **further ground-level tests and trials and formulating strict guidelines and laws to curb the potential misuse of the technology.**

25 NATIONAL ANTI-DOPING ACT

In News

- The Lok Sabha has passed the **National Anti-Doping Bill to strengthen India's fight against doping in sports.**
  - Doping is the use of banned drugs by athletic to enhance their performance.

Background

- A 2019 report by **the World Anti-Doping Agency has placed India at 3rd among the nations with the most anti-doping rule violations.**
  - Only Russia and Italy were worse off.
- Doping charges hurt India's image and news of doping violations by Indian players in the Birmingham Commonwealth Games. Therefore it was felt to introduce a strong legal framework to curb doping in India.

Features of the National Anti-Doping Act 2021:

Prohibition of doping

- National anti-doping bill 2021 prohibits any doping in an athlete and the prohibition of doping in coach, trainers and support person of the player. If any person takes drugs due to medical complications, they must apply to the national anti-doping agency for the allowance.

Consequences of violations

- If any anti-doping rule gets violated by the athlete or the athlete's support personnel, it may disqualify a player. Ineligibility to participate in the competitive financial sections or any other consequence for the violation as per the national anti-doping disciplinary panel.

Establishment of a board to stop doping in sports

- According to the bill, a national board will be established for anti-doping in sports. The board will also recommend some anti-doping regulations while dealing with the cases. This board will also keep an eye on the National Anti-Doping Agency's (NADA) activities and will guide it.

Introduction to the panel:

- The National Board for Anti-Doping in Sports will set up a national anti-doping disciplinary panel to determine the consequences of any violation of NADA rules. This panel will consist of a chairperson and four other vice chairpersons. Along with that, ten other members who will be medical experts will be constituted.

Importance of the National Anti-Doping Bill 2021

Transparency in the game

- Implementing the rules and regulations of the national anti-doping bill in 2021 will create an unbiased and independent situation. The game will be free from any involvement of ill practices. There will be transparency

in the game, as the game will be free and fair.

Establishment of committees and bills

- Under the bill, there will be an appropriate committee and panels. The National Anti-Doping Agency and the National Dope Testing Laboratory (NDTL) are these committees and panels. These agencies will be responsible for the justice of the game.

Justice for athletes

- The agency's responsibility is to organise the free and fair game. Any player caught violating the rules and regulations will be penalised and punished, and the opponent, who is considered innocent, will be provided with justice.

Enhanced cooperation with the agencies

- Due to this bill, relations between India's agencies will have enhanced cooperation nationally and internationally. These relations and cooperation will result at the end of the concept of doping.

Other Steps were taken to curb doping

- The government is running anti-doping education awareness workshops and campaigns.
- The government is collaborating with IIT, National Institute for Pharmaceutical Education and Research, CSIR, National Forensic Science University and all other scientific agencies in the country to curb doping in sports.

26 AMR

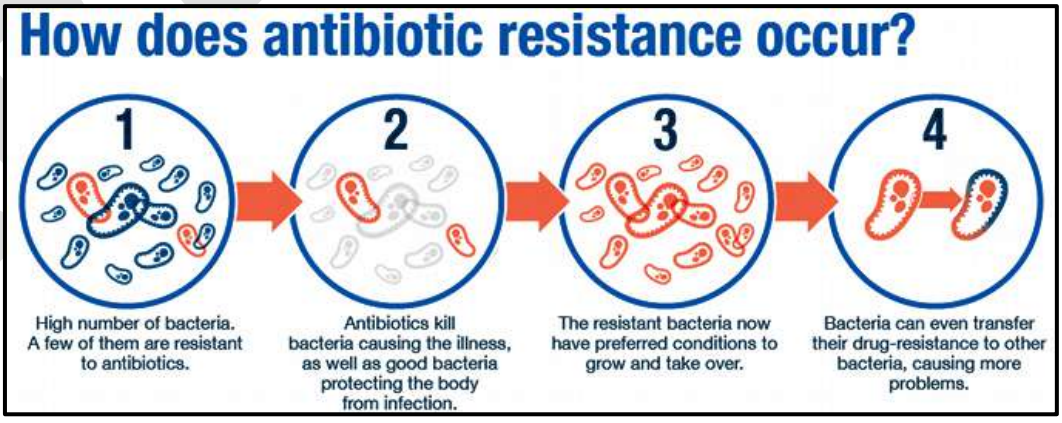
Context

- 27 million people died in 2019 as a direct result of AMR, which is now a leading cause of death worldwide, higher than HIV/AIDS or malaria - **Global Research on Antimicrobial Resistance (GRAM) report.**

What are antimicrobials?

- Antimicrobials – including antibiotics, antivirals, antifungals and antiparasitics – are medicines used to prevent and treat infections in humans, animals and plants.

What is antimicrobial resistance?



- AMR happens when microorganisms (such as bacteria, fungi, viruses, and parasites) change and are still able to grow, even when they are exposed to antimicrobial medicines that are meant to kill or limit their growth (such as antibiotics, antifungals, antivirals, antimalarials, and anthelmintics).
- As a result, the medicines become ineffective and infections persist in the body, increasing the risk of spread to others.

Factors leading to AMR

- The main drivers of antimicrobial resistance include the
- Misuse and overuse of antimicrobials;
- Lack of access to clean water,

- Sanitation and hygiene (wash) for both humans and animals;
- Poor infection and disease prevention and control in health-care facilities and farms;
- Poor access to quality, Affordable medicines, Vaccines and diagnostics;

Economic impact	Extra healthcare costs: diagnostics, use of second-line drugs, increase of time in care, and prolonged hospital stay
	Indirect costs such as loss of productivity and costs of not doing interventions because of AMR
	Societal costs to address the problem of AMR: costs of surveillance, conservation programs, and support for R&D
	Loss of productivity in animal health
Societal impact	Lack of trust in the healthcare system, fear of medical procedures, and barriers to poverty eradication
Abbreviations: AMR, antimicrobial resistance; CSF, cerebrospinal fluid; R&D, research and development.	

- Lack of awareness and knowledge; and Lack of enforcement of legislation.
- Lack of access to timely and appropriate treatments for infections,
- Self-medication, prescription sharing, over-the counter sale of antimicrobials,
- Non-compliance with the prescribed treatment.
- genetic mutation of bacteria.
- By one species acquiring resistance from another.

Statistics

- India is one of the largest consumers of antibiotics in the world.
- Antibiotic use in India has risen sharply, with about a 30% increase in their per capita use during the past decade, according to the State of the World's Antibiotics 2021 report.
- 5 lakh people die annually due to AMR worldwide.

Steps taken to curb AMR in India

Red Line Campaign

- It urges people not to use medicines marked with a red vertical line, including antibiotics, without a doctor's prescription. These medicines are called as the 'Medicines with the Red Line'.

National Action Plan on Antimicrobial Resistance

- India has a National Action Plan on Antimicrobial Resistance in place

Delhi Declaration on Antimicrobial Resistance

- Delhi Declaration on Antimicrobial Resistance, was endorsed at the Inter-Ministerial Consultation on Antimicrobial Resistance in 2017.

AMR Surveillance Network

- ICMR has established AMR surveillance and research network (AMRSN) in 2013, to generate evidence and capture trends and patterns of drug resistant infections in the country.
- This network comprises of 30 tertiary care hospitals, both private and government.

AMR Research & International Collaboration

- ICMR has taken initiatives to develop new drugs /medicines through international collaborations in order to strengthen medical research in AMR.
  1. ICMR along with Research Council of Norway (RCN) initiated a joint call for research in antimicrobial resistance in 2017.
  2. ICMR along with Federal Ministry of Education and Research (BMBF), Germany has a joint Indo-German collaboration for research on AMR.

Initiatives to control overuse or misuse of antibiotics

- ICMR has initiated **antibiotic stewardship program (AMSP)** on a pilot project basis in 20 tertiary care hospitals across India to control misuse and overuse of antibiotics in hospital wards and ICUs.
- On the recommendations of ICMR, DCGI has banned 40 fixed dose combinations (FDCs) which were found inappropriate.
- ICMR worked in collaboration with Indian Council of Agriculture Research, Department of Animal Husbandry, Dairy and Fisheries and the DCGI to ban use of Colistin as growth promoter in animal feed in poultry.

Guidelines issued

- National Guidelines for Infection Prevention and Control in Healthcare Facilitie shave been released by MoHFW in Jan 2020.
- ICMR has developed evidence based treatment guidelines for treatment of ten syndromes of infections. It aims to rationalize the usage of antibiotics on Essential Medicines Formulary (EMF) and to establish consistency in the treatment of various infectious conditions.
- Further, ICMR has also issued the Treatment Guidelines for Antimicrobial Use in Common Syndromes" in 2019.

Way Ahead

- Lowering of antibiotic consumption is not sufficient because the spread of resistant strains and resistance genes are the dominant contributing factor.
- Providing sanitation, clean water and good governance, increasing public health expenditure and better regulating the private health sector are all necessary to reduce antimicrobial resistance.

27 ISRO's SSLV

Context

- The Indian Space Research Organisation (ISRO) launched Small Satellite Launch Vehicle (SSLV).

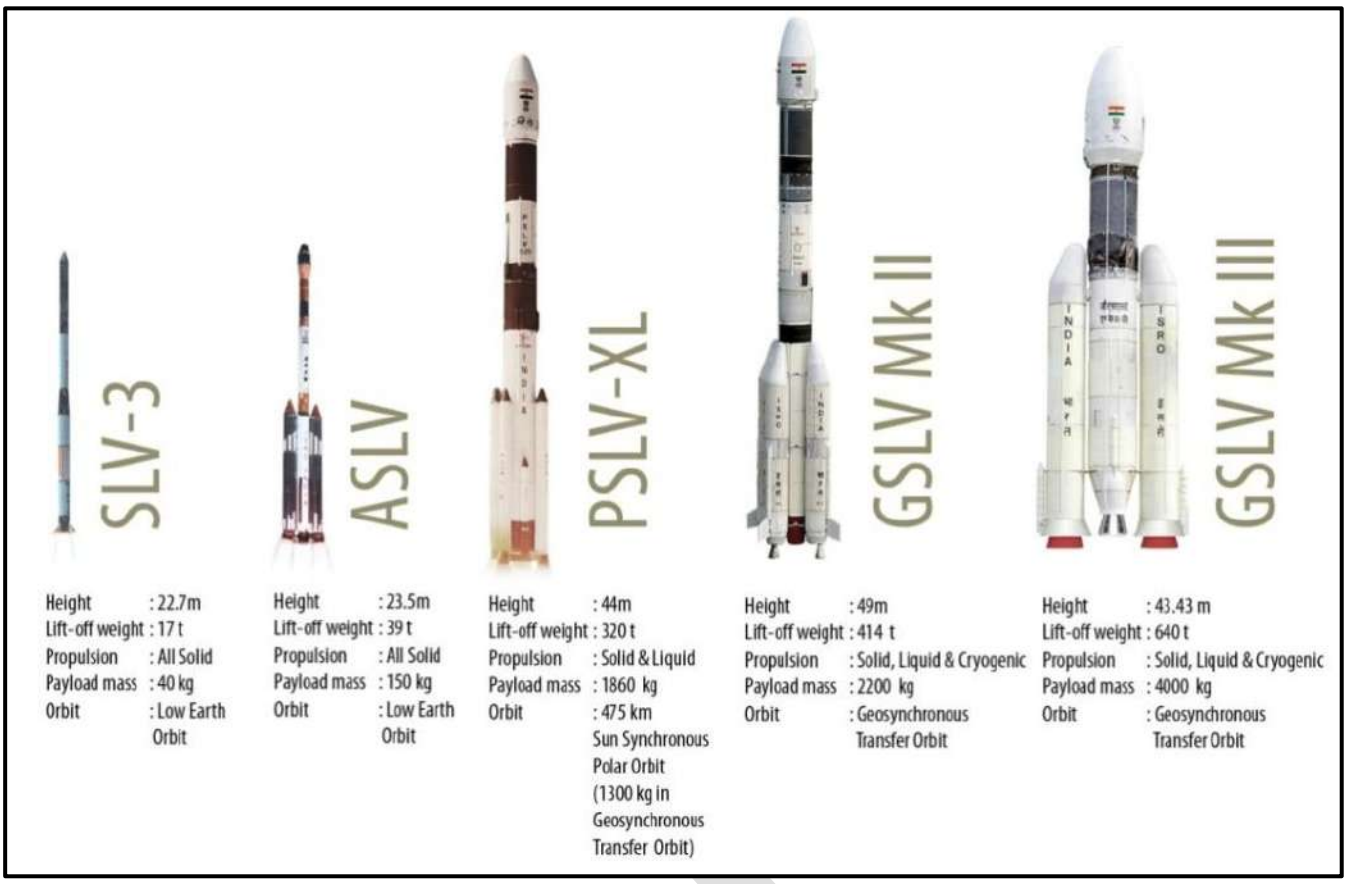
Launch vehicle

- A launch vehicle or carrier rocket is a rocket-propelled vehicle used to carry a payload from Earth's surface to space, usually to Earth orbit or beyond.

SSLV

- **About:** The Small Satellite Launch Vehicle (or SSLV) is a **small-lift launch vehicle** being developed by the Indian Space Research Organisation (ISRO).
- **Aim:** The SSLV was developed with the aim of launching small satellites commercially at drastically reduced price and higher launch rate as compared to Polar Satellite Launch Vehicle (PSLV).
- **Capacity and Features:** It has a payload **capacity to deliver 600 kg**. SSLV is a three-stage, all-solid launch vehicle that can carry a payload weighing 500 kilograms to the polar orbit, 500 kilometers above Earth's surface and a 300-kilogram payload into Sun Synchronous Polar Orbit. It has the **capability to support multiple orbital drop-offs.** The SSLV is the smallest vehicle at 110-ton mass at ISRO. It can carry satellites weighing up to 500 kg to a low earth orbit while the tried and tested PSLV can launch satellites weighing in the range of 1000 kg.

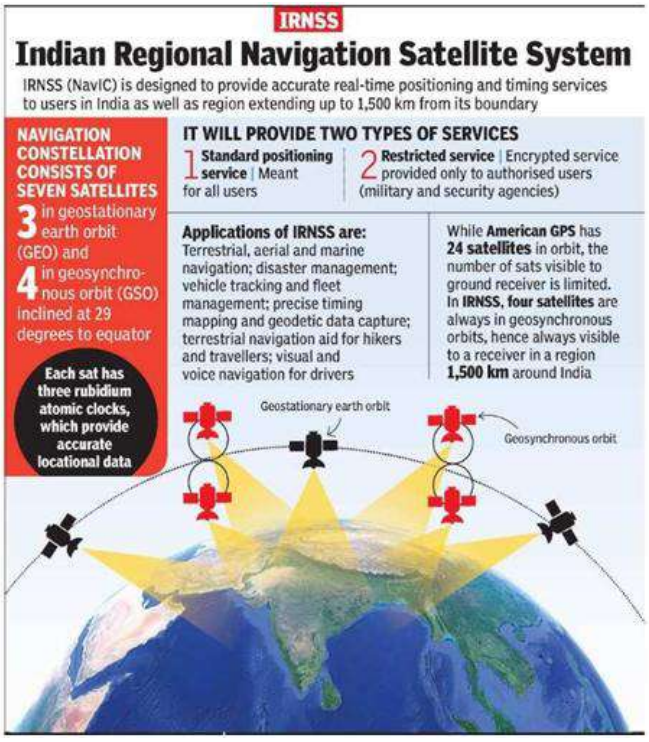
Evolution of India's Launch Vehicles



28 NaviC

Context

- India is pushing tech giants to make smartphones compatible with its home-grown navigation system-NavIC within months. This is worrying Samsung, Xiaomi and Apple who fear elevated costs and disruptions as the move requires hardware changes.



NaviC

- NavIC (Navigation with Indian Constellation) is an **autonomous regional satellite navigation system** established and maintained by ISRO.

Coverage

- It covers India and a region extending up to **1,500 km beyond Indian mainland (primary coverage area) with plans of extension.**
- An extended service area lies between the primary service area and a rectangle area enclosed by the 30th parallel south to the 50th parallel north and the 30th meridian east to the 130th meridian east.

Satellites

- The system currently consists of a **constellation of eight satellites**.

- Three satellites in constellation are located in **geostationary orbit (GEO)** and four in inclined **geosynchronous orbit (IGSO).**

Accuracy

- The system is intended to provide an absolute position accuracy of better than 10 metres throughout Indian landmass and better than 20 metres in the Indian Ocean.
- In short, it provides position **accuracy better than 20 m and timing accuracy better than 50 nanoseconds(20).**

Applications

- NavIC will provide two levels of service, the **"standard positioning service",** which will be open for civilian use, and a **"restricted service"** (an encrypted one) for authorised users (including the military).
- NavIC based applications are being used in various **civilian sectors, including, transport, map applications, and timekeeping.**
- NavIC based trackers are **compulsory on commercial vehicles in India.**
- Today major mobile chipset manufacturers like Qualcomm, MediaTek and Broadcom already support NavIC across various chipset platforms.
- A few mobile handsets have been released which can be enabled to receive NavIC.**Examples Redmi Note 9 series from Xiaomi, the Realme 6 series, the OnePlus Nord, etc.**
- NavIC is an indigenous positioning system that is under Indian control.
- There is no risk of the service being withdrawn or denied in a given situation.

GPS VS NAVIC

- The GPS, has a position accuracy of 20–30 m.
- Unlike **GPS which is dependent only on L-band**, **NavIC has dual frequency (S and L band frequencies).**
- When low frequency signal travels through atmosphere, its velocity changes due to atmospheric disturbances.
- US banks on atmospheric model to assess frequency error and it has to update this model from time to time to assess the exact error.
- In India's case, the actual delay is assessed by measuring the difference in delay of dual frequency (S and L bands).
- Therefore, NavIC is not dependent on any model to find the frequency error and is more accurate than GPS.
- The main difference is the serviceable area covered by these systems. GPS caters to users across the globe and its satellites circle the earth twice a day, while NavIC is currently for use in India and adjacent areas.
- Like GPS, there are three more navigation systems that have global coverage - Galileo from the European Union, Russia-owned GLONASS and China's Beidou. QZSS, operated by Japan, is another regional navigation system covering Asia-Oceania region, with a focus on Japan.

Significance of NaVIC

- Currently, NavIC's use is limited. It is being used in public vehicle tracking in India, for providing emergency warning alerts to fishermen venturing into the deep sea where there is no terrestrial network connectivity, and for tracking and providing information related to natural disasters. Enabling it in smartphones is the next step India is pushing for. NavIC is conceived with the aim of removing dependence on foreign satellite systems for navigation service requirements, particularly for "strategic sectors."

HANDBOOK FOR PERSONALITY TEST UPSC CSE 2022

DEFENSE & SECURITY

01 INS ARIHANT

News

- India successfully tested a nuclear-capable ballistic missile from its solitary nuclear-powered submarine INS Arihant, and promptly declared that having an 'assured retaliatory capability' was in tune with the country's `credible minimum deterrence' against the first-use of nuclear weapons by an adversary.

Details

About the test:

- A brief statement by the defence ministrydid not identify the submarine-launched ballistic missile (SLBM) tested from the 6,000-tonne INS Arihant, which became fully operational in 2018
- **SLBM tested was the B-O5 or K-15 missile with a strike range of 750-km.**
- INS Arihant is armed with the short-range K-15 missiles. Developmental trials of the K-4 SLBM (with a 3,500-km range) have been completed but it is yet to be fully inducted.
- This is the first time the launch of an SLBM from INS Arihant has been announced by the government.

Significance:

- **The successful user training launch of the SLBM by INS Arihant is significant to prove crew competency and validate the SSBN (naval parlance for nuclear-propelled submarines armed with nuclear-tipped ballistic missiles) programme, a key element of India's nuclear deterrence capability.**
- A robust, survivable and assured retaliatory capability is in keeping with India's policy to have 'credible minimum deterrence' that underpins its 'no-first use' commitment.

Nuclear Triad

- INS Arihant does give some teeth to the weakest leg of **India's existing nuclear triad – the capability to fire nukes from land, air and sea –** but much larger SSBNs that can carry longer range missiles are required to make it more credible.
- The other two legs of the triad are, of course, **much more robust with the induction of the land-based Agni series of ballistic missiles as well as fighters like Sukhoi-30MKIs, Mirage-2000s and Rafales that are capable of dropping nuclear gravity bombs.**
- Under the Rs 90,000 crore top-secret advanced technology vessel (ATV) project, India is currently building three more SSBNs to follow INS Arihant, which is propelled by an 83 MW pressurized light-water reactor at its core.
- **The second such submarine, INS Arighat, is slated to become fully operational next year after some delay**. The vessel will be followed by two 7,000-tonne SSBNs, currently called S-4 and S-4*, under the ATV project. There is also the plan to build 13,500-tonne SSBNs with much more powerful 190 MW reactors.
- **Concurrently, the K-4 SLBM is to be followed by the K-5 and K-6 missiles in the 5,000 to 6,000-km class.** All this will decidedly narrow the gap with countries like the US, Russia and China, which have much larger SSBNs with over 5,000-km range missiles.
- Much more capable SSBNs will give India's deterrence posture greater credibility because they are considered the most secure, survivable and potent platforms for retaliatory strikes after a surprise first-strike by an adversary.

About Arihant

- INS Arihant, **a 6,000-tonne submarine is the lead ship of India's Arihant class of nuclear-powered ballistic missile submarines built under the Advanced Technology Vessel (ATV) project.**
- INS Arihant is propelled by an 83 MW pressurised light-water reactor at its core with enriched uranium fuel.
- It's India's **first indigenously built nuclear submarine.**
- It is a 'Ship Submersible Ballistic Nuclear Submarine' (SSBN). SSBN's are those class of submarines which can go deep beneath the ocean making them virtually undetectable for months, they also carry nuclear-tipped ballistic missiles.

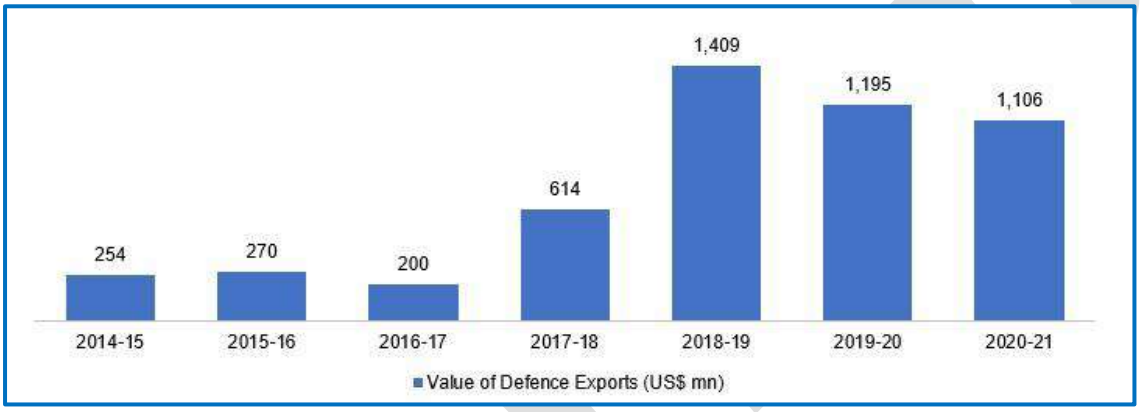
- It is capable of carrying ballistic missiles with nuclear warheads.
- **It is presently armed with the K-15 Sagarika missiles with a range of 750 km.**
- Later, it will also be armed with K-4 missiles, being developed by the DRDO, which are capable of striking targets at a distance of up to 3,500 km. These 'K' series of missiles are named after former President APJ Abdul Kalam.

02 AATMANIRBHARTA IN DEFENCE

About Aatmanirbhar India

- The Atmanirbhar Bharat Abhiyaan, or Self-reliant India campaign, is a movement which was launched by the Prime Minister of India, Mr. Narendra Modi, in May 2020. Aatmanirbhar Bharat Abhiyaan aims to make the citizens of India self-reliant in all aspects

Value of Defence Exports



Source: The Mint

Aatmanirbharta in Defence

- India is one of the largest arms importers in the world, accounting for 11% of the total arms sales globally. Enhancing the defence technology, achieving customisation and uniqueness is important for India to develop a surprise element over its nemesis. For encouraging industries and start-ups, The Defence Minister of India, Mr Rajnath Singh, stated that research and development is crucial to achieving self-reliance in the defence sector. Researchers claim that self-reliance in the defence sector is the most important constituent of Aatmanirbharta. Domestic weapon production has economic, technological and philosophical linkages. To become a superpower in the world, Indian must achieve self-reliance in the production of defence equipment; Aatmanirbhar Bharat Abhiyan is expected to help India achieve self-reliance in defence manufacturing.

Benefits of Aatmanirbhar Bharat Abhiyan to the Defence Sector

- Self-reliance in the defence industry will enhance India's strategic independence and promote development in the country's domestic defence and aerospace industry.
- Private sector will benefit from the transformation due to export authorisation and the embargo imposed by the government on import of various products.
- India will be able to reduce its reliance on imports by increasing domestic production.
- India will be able to boost exports and achieve its 2025 export target of Rs. 36,500 crore (US$ 4.8 billion).

India's Roadmap to Self-reliance in Defence

- The Make in India movement in the defence sector will be a key towards Aatmanirbharta in Defence. India currently imports most of defence products it uses. Private sector participation in defence will encourage foreign producers to form strategic partnerships with various Indian businesses. This strategic collaboration will enhance the producers' exposure to the unexplored defence sector of India and generate numerous opportunities for the Indian companies by strengthening production and upgrading equipment.

Accommodative government rules will help in achieving self-reliance, besides promoting indigenisation and technology modernisation. The guidelines proposed by the government of India will also help attain economies of scale and improve export capabilities of the country. India has wide-ranging transformation plans which are expected to expand its focus on security and help it become a defence sourcing hub. India's ability to develop and sell indigenous missiles, radar systems, and other defence equipment has enabled it to become a modern defence partner to many Asian countries.

- The Make in India movement has been effective in supplying various equipment which are being extensively used by the armed forces of India. From 2018 to 2021, the government of India granted Acceptance of Necessity to over 150 proposals worth Rs. 2,47,515 crore (US$ 32.4 billion) under various categories of capital procurement, which is expected to enhance local manufacturing as per The Defence Acquisition Procedure (DAP- 2020). Additionally, from 2018 to January 2022, of the total 191 capital acquisitions made, almost 121 were inked with Indian suppliers for procuring defence equipment for the armed forces. The Make in India movement will help enhance clarity, trust, expertise, value, and consistency by opening doors to innovation, besides creating jobs and opportunities to integrate the right skills.

Government Initiatives

- Favourable government policies will have a huge impact on Aatmanirbharta. The government aims to make India a global defence manufacturing hub. The Defence Minister announced the following steps to bolster the industry and start-ups:
- The government would approve at least five projects under Make-I during 2022-23 for boosting industry-backed R&D efforts.
- A mechanism under DG-Acquisition has been implemented to monitor the budget reserved, particularly for start-ups and private companies, to ensure it is entirely utilised.
- The government plans to modernise the QA procedure to ensure it is non-intrusive.
- iDEX-Prime aims to encourage projects that may necessitate support beyond Rs. 1.5 crore (US$ 0.2 million), up to Rs. 10 crore (US$ 1.3 million), to help developing start-ups in the defence sector.
- Around 68% of the capital procurement budget would be earmarked for the domestic industry.
- The industrial licensing process would be streamlined with longer authentication period.
- An indigenisation portal called SRIJAN would be launched to support indigenisation by Indian entities, including MSMEs.
- Two industrial defence corridors would be launched, one each in Uttar Pradesh and Tamil Nadu.

Road Ahead

- A robust government policy will help in achieving the objectives of the Aatmanirbhar Bharat Abhiyan. The Union Budget 2022–23 serves as a blueprint for enhancing and developing a vibrant ecosystem through research and development, indigenous manufacturing, modern technology, etc. Aatmanirbhar Bharat Abhiyan will create several opportunities for start-ups and private sector companies to showcase their domestic capabilities. The government's role as a mediator will help improve the processes and boost the sector. However, it is crucial that the industry works in tandem with the government to achieve self-reliance and the US$ 5 trillion economy target. India is significantly realising the need for self-reliance. The country is drastically reducing its import needs and promoting domestic defence capabilities.

03 PMLA

News

- Controversy over the series of raids and arrests of politicians, their relatives, and activists under Prevention of Money Laundering Act (PMLA).

Details

- The frequency and timings of these raids and arrests have raised concerns over the independence of PMLA and its agency, the Enforcement Directorate (ED),
- **According to Some activists, PMLA and ED are misused to attack opposition camps with political embarrassment.**

Prevention of Money Laundering Act

- **Money laundering is defined as the illegal process of converting money generated through criminal activities**, such as drug trafficking or terrorist funding, t**o appear to have come from a legitimate source. The money from the criminal activity is considered 'dirty', and the laundering process makes it look clean.**
- Prevention of Money Laundering Act was **enacted as a response to India's global commitment (including the Vienna Convention) to curb the menace of money laundering.**
- **Objectives of the Act -** PMLA was **enacted in 2002 and it came into force in 2005** , to curb money laundering (process of converting black money into white) and to provide for seizure of property derived from money-laundering. There are mainly **3 objectives of PMLA:**
  - To **prevent and control money laundering.**
  - To **confiscate and seize the property** obtained from the laundered money.
  - To deal with any other issue connected with money laundering in India.
- **Adjudication Authority -** The **Director or officer above the rank of Deputy Director can attach property believed to be "proceeds of crime" for 180 days. Such an order is required to be confirmed by an independent Adjudicating Authority.**
  - The Adjudicating Authority is **appointed by the central government**. It decides whether the property attached or seized is involved in money laundering.
  - The Adjudicating Authority shall **not be bound by the procedure laid down by the Code of Civil Procedure,1908, but shall be guided by the principles of natural justice and subject to the other provisions of PMLA.**
- **Punishment** - The Act prescribes that **any person found guilty of money-laundering shall be imprisoned for a minimum of 3 years and a maximum of 7 years**, and **If the crime of money laundering is involved with the Narcotic Drugs, the punishment can go up to 10 years**, along with fine.
- **Proof** - The **burden of proof lies with the accused,** who has to prove that the suspected property/assets have not been obtained through money laundering.
- **Appellate Tribunal -** An **Appellate Tribunal appointed by the Government is given the power to hear appeals against the orders of the Adjudicating Authority**. **Orders of the tribunal can be appealed in the appropriate High Court** .

- **Special Court** - Provision for establishing **special court** by the Union government under Prevention of Money Laundering Act, 2002 (PMLA) .
- **Financial Intelligence Unit – India (FIU-IND) -** It was set by the Government as the central national agency responsible for receiving, processing, analyzing and disseminating information relating to suspect financial transactions.
    - **FIU-IND is also responsible for coordinating and strengthening efforts of national and international intelligence,** investigation and enforcement agencies.
    - FIU-IND is an independent body **reporting directly to the Economic Intelligence Council (EIC) under the Finance Minister.**

Enforcement Directorate

- It is r**esponsible for enforcing economic laws and fighting economic crime in India.**
- It is **part of the Department of Revenue, Ministry of Finance.**
- The **prime objective of the Enforcement Directorate is to enforce the provisions of; Foreign Exchange Management Act, 1999 (FEMA) and Prevention of Money Laundering Act, 2002 (PMLA).**

04 FCRA

In News

- The **Union Ministry of Home Affairs has cancelled the Foreign Contribution Regulation Act (FCRA) licence** of the Rajiv Gandhi Foundation (RGF) and Rajiv Gandhi Charitable Trust (RGCT) for alleged violations of the provisions of the FCRA Act.

Foreign Contribution Regulation Act

- The **FCRA was enacted in 1976 to regulate foreign money into the country through independent organizations.**
- The Foreign Contribution Regulation Act was amended by the Indian Parliament in 2010.
    - To effectively regulate **the foreign contribution by individuals or associations or companies.**
- The Union Minister of Home Affairs introduced the Foreign Contribution (Regulation) Amendment Bill in 2020, which made several changes.

Foreign Contribution (Regulation) Amendment Act, 2020

- The Act regulates the acceptance and utilization of foreign contributions by individuals, associations and companies.
    - **Foreign contribution is the donation or transfer of any currency, security or article (of beyond a specified value) by a foreign source**.
- **Prohibition to accept foreign Contributions**: Certain persons are prohibited to accept any foreign contribution. These include:
    - **Election candidates, editors or publishers of a newspaper, judges, government servants, members of any legislature, and political parties, among others.**
    - The Bill adds public servants (as defined under the Indian Penal Code) to this list. A public servant includes any person who is in service or paid by the government or remunerated by the government for the performance of any public duty.
- **Transfer of foreign Contributions**
    - Foreign contributions **cannot be transferred to any other person unless such person is also registered to accept foreign contributions (or has obtained prior permission under the Act to obtain foreign contributions).**
    - The Act prohibited the transfer of foreign contributions to any other person. The term 'person' under the Act includes an individual, an association, or a registered company.
- **Aadhar for registration**

- Any person seeking registration (or renewal of such registration) or prior permission for receiving a foreign contribution must make an application to the central government in the prescribed manner.
- The Act adds that **any person seeking prior permission, registration or renewal of registration must provide the Aadhar number of all its office bearers,** directors or key functionaries, as an identification document.
- **In the case of a foreigner, they must provide a copy of their passport** or the Overseas Citizen of India card for identification.

- **FCRA Account**
  - **Foreign contributions must be received only in an account designated by the bank as an "FCRA account"** in such a branch of the State Bank of India, New Delhi, as notified by the central government.
  - No funds other than the foreign contribution should be received or deposited in this account.
  - The person may open another FCRA account in any scheduled bank of their choice for keeping or utilizing the received contribution.
- **Restriction in the utilization of foreign contribution**
  - The Government may restrict the usage of unutilized foreign contributions for persons who have been granted prior permission to receive such contributions.
- **Renewal of licence**
  - **Every person who has been given a certificate of registration must renew the certificate within 6 months of expiration**.
  - The Act provides that the government may conduct an inquiry before renewing the certificate.
- **Reduction in the use of foreign contributions for administrative purposes**
  - A person who receives a foreign contribution must use it only for the purpose for which the contribution is received.
  - **They must not use more than 20% of the contribution for meeting administrative expenses (earlier it was 50%).**
- **Suspension of Registration**
  - Earlier governments may suspend the registration of a person for a period not exceeding 180 days.
  - **The Act adds that such suspension may be extended up to an additional 180 days.**
- The Union government reserves the right to cancel the FCRA registration of any NGO if it finds it to violate the Act.
  - Registration of the NGO can be cancelled for a range of reasons. Once the registration is cancelled, it is not eligible for re-registration for three years.
  - All orders of the government can be challenged in the High Court.

05 AGNIPATH SCHEME

In News

- The Union government has announced the 'Agnipath Scheme' with the **aim to transform the process of recruitment of soldiers, sailors and airmen into the Defence Services.**
- The scheme has created controversies and protests in several parts of the country.

AGNIPATH Scheme

Agnipath Scheme

- Age 17.5-21 years
- Duration of service is four years, including training period
- 1st year salary package of Rs. 4.76 lakh (approx..) with upgradation of up to Rs. 6.92 lakh (approx.) in 4th year
- Post release: Seva Nidhi package of approx. Rs. 11.71 lakh, including interest (tax free)
- Non-contributory insurance cover of Rs. 48 lakh
- Agniveer skill certificate will assist in post release job opportunities
- 46,000 Agniveers to be recruited this year

- **The objective of the AGNIPATH Scheme** is to **encourage youth to serve in the Armed Forces for 4 years**.
- The youth **selected under the scheme will be known as Agniveers.**
- They will get an attractive monthly package with Risk and Hardship allowances.
- They will be paid a **one-time Seva Nidhi package after the engagement of four years**.
  - It will be exempt from Income Tax.
- Agnipath Scheme will positively impact the Human Resources Management of the Armed Forces.
- They will get a salary of Rs 30,000 to Rs 40,000 per month and an allowance as applicable.
- There shall be no entitlement to gratuity and pensionary benefits.
- They will get a Life Insurance Cover of Rs 48 lakh during their service in the Indian Armed Forces.
- **About 25% of Agniveers will be selected in the Armed Forces as regular cadres.**
- The **eligibility age limit will be in the range of 17.5 to 21 years**, and they will be selected based on all India-level competitions.

Arguments in Support of the Scheme

- It will **provide a younger military**; the average age will go down from 32 to 26 years.
- It will **attract technologically smart people** and they will be more talented in handling new kinds of modern equipment.
- It will **attract people from the Industrial Training Institutes** (ITIs) and other technical institutes.
- It will help to **reduce the salary and pension budgets**.

Arguments against the Scheme

- 4-year limitations will **discourage people** from joining defense forces.
- It will **mentally and psychologically affect** the youth as they could fail to maintain the same levels of morale and motivation that permanent soldiers have in the military.
- The shortened training period **will affect the skill and capabilities** of the new soldiers.
- It **will impact the operational effectiveness** of the defense forces.

Way Forward

- It will be too early to judge the outcome of the scheme. It should be **adopted first at a small level to observe how it works**, and then after proper observation and making adjustments according to the ground realities,

06 THEATRE COMMANDS

News

- Days after Chief of Defence Staff (CDS) General Anil Chauhan directed the Army, Navy, and Air Force to press forward with the development of integrated theatre commands, Air Chief Marshal VR Chaudhari on said the Indian Air Force was not against it but their proposed structures should not compromise doctrinal aspects of the force
- India's first Chief of Defence Staff, late General Bipin Rawat was instrumental in laying down the foundation for joint theatre commands in India.
- His successor, Lt. General Anil Chauhan has now spelt it as his priority area.
- **In his maiden communication with the three defence forces, the new CDS asked the Army, the Navy and the Air Force to make a move ahead toward the creation of integrated theatre commands.**
- Defence Minister Rajnath Singh announced the setting up of "joint theatre commands" so as to have an enhanced coordination among all three services of the country's armed forces.

What are integrated theatre commands?

- **The idea behind the 'Theatre Command System' is to bring synergy coordination between the three wings of the armed forces… at the same time streamline costs, and have a leaner fighting force with optimal utilisation of resources.**
- It's a concept that has its origins in the 1st world war, but became much more prominent during the second one with battles being fought across continents.
- Today, almost all major countries like China, Russia, the US, the UK and France work on a theatre command concept.
- It is a **unified command** under which all the resources of the Army, the Navy and the Air Force are pooled, depending on the threat perception.
- The commands could be **geographical**— like looking at a border with a particular country — or **thematic,** like a command for all maritime threats.
- Several nations in the world have theatre commands, including the United States and China.

Is theatre commands a new idea?

- The idea of creating an integrated tri-Services command in India is not new — it had been recommended at various levels after the Kargil conflict.
- When Gen Rawat was appointed Chief of Defence Staff in January 2020 with a mandate to raise such commands within his three-year tenure, the idea was finally brought to the design table.

What other countries have a theatre command system?

- **More than 32 countries in the world** already have some form of theatre or joint command in place for better integration among the branches of the military.
- **Notable among such countries are the US and China.**
- According to a report, the US was the first to come up with a theatre command system and "presently possesses six geographical and four functional commands".
- Russia is said to have commenced with the restructuring of its armed forces in 2008 and "has now created four theatre commands".
- China's theatre command system is said to be based on the US model and has "five peacetime geographical commands".
- It is the Chinese Western Theatre Command that covers India.

What is the proposal under discussion?

- A model with four to five integrated tri-Services theatre commands is under discussion, with each command headed by a three-star officer.

- This officer, the theatre commander, will report to the Chiefs of Staff Committee (COSC), which, as the name suggests, includes the three Service chiefs, and is headed by the CDS as its permanent chairman.
- This brings in a major change — the Service chiefs currently have all the operational control over their forces; operational powers will now move to the COSC.
- Each of these commands will have the needed assets from all the three forces. Operational control over all of those assets, regardless of the force, will lie with the commander of that theatre.

The proposed commands are:

- **A Maritime Theatre Command,** which will take care of all the maritime security needs of the country on both the eastern and the western seaboards, and will include air strike assets and amphibian forces of the Army.
- **An Air Defence Command**, which will be mandated with air defence across the country and beyond. The fighter jets will have reconnaissance and surveillance assets as well.
- **Two or three land-based commands** are proposed. If there are two commands, there will be one each for India's borders with China and Pakistan.
- But there is also a proposal to have another command looking at India's borders with Pakistan and China in Jammu and Kashmir, and Ladakh, given the unique territory and security needs of the country in that region.
- Apart from these theatre commands, there will be two functional tri-Services commands as well.
- There will be a **Logistics Command**, which will have the logistics of all the Services under one person; and there will be a **Training and Doctrine Command**, so that all Services work under a common doctrine and have some basic common training.

What will be the role of the Services, if not operational?

- As of now, the Services have to speak to each other in times of need and urgency to request their assets to conduct a particular operation.
- The proposal is to have a theatre commander who will have operational control of the assets under his command, thus enhancing jointness among the forces, and also reducing duplication of resources.
- However, this would leave the Service chiefs with no direct control over their assets operationally.
- This does not mean their roles will be made redundant. Now the Services will have the core tasks to Raise, Train and Sustain their respective forces.
- Also, as each chief will be a member of the COSC, and an expert of his/her domain, his or her inputs will be necessary for all operational decisions.

How many commands are there now; are any of them tri-Service commands?

- As of now, the three forces have 17 commands between them.
- The Army has **seven commands**: Northern, Eastern, Southern, Western, Central, Southwestern and Army Training Command (ARTRAC).
- The Air Force has seven as well: Western, Eastern, Southern, Southwestern, Central, Training, and Maintenance commands.
- The Navy has three: Western, Eastern and Southern, of which Southern is largely about training.
- Even if these commands operate in the same region, they are not co-located, and their areas of operational responsibility are not necessarily the same.
- There are **two existing tri-Service commands**as well — the **Andaman and Nicobar Command (ANC),** which is headed by rotation by officers from the three Services, and the **Strategic Force Command**, which is responsible for India's nuclear assets.

How will system help?

- The theatre command system is intended to bring better synergy between the three branches of the armed forces.
- Instead of separate commands for the army, navy, air force, a unified command will be set up to be led by a single commander.
- **Which means that that the military assets that are now split under separate centres of command will be fused into one single command under one operational head who will be responsible for directing and**

controlling their activities in a given situation.

- But apart from operational synergies, experts point out that a theatre command system will also contribute to **more streamlined costs and a leaner fighting force**.
- A big chunk of the annual defence budget goes into paying salaries and pensions while outlays do not always grow in line with the actual needs of the armed forces.
- **Supporters say that the theatre command system will help remove redundancies and bring greater focus in the allocation of resources.**

07 CDS

News

- **The government appointed Lt. Gen. Anil Chauhan (retd.), former General Office Commanding-in-Chief, Eastern Army Commander, as the Chief of Defence Staff (CDS).** The post has been vacant since the death of the country's first CDS, Gen. Bipin Rawat, in a helicopter crash in December 2021.

Details

- In a career spanning nearly 40 years, Lt. Gen Anil Chauhan had held several command, staff and instrumental appointments and had extensive experience in counter-insurgency operations in Jammu and Kashmir and Northeast India, the statement said.
- **In June, the government amended the Service Rules of the Army, Navy and Air Force allowing retired Service Chiefs and three-star rank officers eligible for consideration for the country's top military post.**
- **However, with an age limit of 62 years on the date of appointment, retired Service Chiefs were largely ruled out especially so for the present consideration.**
- Post-retirement, Lt. Gen. Chauhan took over as the Military Adviser in the National Security Council Secretariat (NSCS) from Lt. Gen. Vinod G. Khandare who stepped down from the post in October 2021.
- **In December 2019, the government approved the creation of the post of CDS who would also function as the Principal Military Adviser to the Defence Minister and Permanent Chairman Chiefs of Staff Committee (COSC).**
- **In addition, the DMA was created as the fifth department in the Ministry of Defence (MoD) with the CDS functioning as its Secretary.**

More on the news

- **Any serving or retired Lieutenant General, Air Marshal and Vice Admiral under the age of 62 years will be eligible for the post of Chief of Defence Staff.**
- This essentially opens the doors for the second-highest active rank officers of the tri-services to possibly supersede their seniors -- the chief of the army, air force, or navy -- to take on the role and widens the pool from which a CDS can be appointed.
- **Another change in eligibility criteria is that recently retired service chiefs and vice chiefs will also be eligible for the post, though there's an age ceiling of 62 years.**
- The move paves the way for India to have a new CDS after General Bipin Rawat, India's first Chief of Defence Staff died last year. India has been without a CDS since then.
- The government has issued separate notifications as part of the Air Force Act, the Army Act and the Navy Act to make the provisions to make any serving or retired Lt General, Air Marshal or Vice Admiral eligible to be appointed as the CDS.
- **Government may extend the service of the Chief of Defence Staff for such a period as it may deem necessary subject to a maximum age of 65 years.**
- Identical notifications were issued under the Army Act 1950 and the Navy Act 1957.
- **The tenure of three service chiefs is three years of service or when they turn 62, whichever is earlier.**

About

- The Chief of Defence Staff runs the Department of Military Affairs in the Ministry of Defence and is principally responsible for getting the armed forces better integrated rather than operating in silos as has been the case for decades.
- This includes the creation of new military commands which integrate the Army, Air Force, and Navy to fight together.
- **A high-level committee set up to examine the gaps in India's security system in the wake of the Kargil war in 1999 had recommended the appointment of the CDS as a single-point military adviser to the defence minister.**
- The Chief of Defence Staff (CDS) is a post that will act as the single-point advisor to the Government of India. The officer concerned will be in a position to advise on matters related to all the three services -- Army, Navy and Air Force -- thus making India's armed forces integrated.

- **Download links for Statewise Interview Material**

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Need for CDS

- Will strengthen coordination between the three forces: Army, Navy and Air Force.
- Facilitate 'jointmanship' and render single-point military advice to the government on matters of national security
- Reconcile possible differences" in service-specific opinions to enable the government to arrive at considered military decisions.
- CDS would play a critical role in fostering inter-services jointness in terms of budgeting, equipment purchases, training, joint doctrines and planning of military operations-an imperative of modern warfare.
- India may be the only country in world where, a generalist, civil servant occupies defense secretary post to

advise government on defense requirements and preparation of operational plans.
- It will do away with duplications occurring in the functioning of three forces.

08 BrahMos

News
- The Indian Navy successfully demonstrated the accuracy of an extended-range land attack Brahmos supersonic cruise missile from the stealth destroyer INS Chennai.
- Both **Brahmos missile and INS Chennai** are **indigenously built** and highlight the cutting-edge of Indian missile and ship-building prowess.

About BrahMos
- It is a medium-range **ramjet supersonic cruise missile** that can be launched from submarine, ships, aircraft, or land.
- **Developed by:** It is a joint venture between the **Russian Federation's NPO Mashinostroyeniya** and India's Defence Research and Development Organisation (**DRDO**), who together have formed BrahMos Aerospace.
- It is the **world's fastest anti-ship cruise missile** in operation.
- **Version in use:** land-launched and ship-launched versions.
- **Recent development**: In 2016, India became a member of the **Missile Technology Control Regime**(MTCR), India and Russia are now jointly developing a new generation of Brahmos missiles with **600 km-plus range**.
- In 2019, India upgraded the missile with a new range of 500 km.

Missile Technology Control Regime (MTCR)

- It is a **multilateral export control regime.**
- It is an **informal political understanding** among 35 member states that seek to limit the proliferation of missiles and missile technology.
- The regime was formed in **1987 by the G-7 industrialized countries.**
- **Aim:**
  - to curb the spread of unmanned delivery systems for nuclear weapons, specifically delivery systems that could carry a payload of **500 kg for a distance of 300 km.**
  - to limit the risks of proliferation of weapons of mass destruction (WMD) by controlling exports of goods and technologies that could make a contribution to delivery systems (other than manned aircraft) for such weapons.
- The MTCR is **not a treaty** and **does not impose any legally binding obligations** on Partners (members).
- It seek to limit the proliferation of **missiles and missile technology.**

09 ARMED FORCES SPECIAL POWERS ACT (AFSPA)

News
- The Prime Minister highlighted that the efforts are being made to improve the law-and-order situation so that the Armed Forces (Special Powers) Act of 1958 could be completely lifted from the northeast.

Armed Forces Special Powers Act (AFSPA)
- The Armed Forces Special Powers Ordinance of 1942 was enacted by the British colonial government on 15 August 1942 to suppress the Quit India Movement.
  - After Independence, the Ordinance was imposed by the Indian government to deal with the internal security situation which emerged due to the Partition of India.
- **Article 355 of the Constitution of India confers power to the Central Government to protect every state**

from internal disturbance.

- **Armed Forces Special Powers Act (AFSPA) was enacted by the Parliament in 1958.**
- The Act Provides special powers to the Indian Armed Forces to preserve public order in "disturbed areas". AFSPA is to be enacted only when a state, or part of it, is declared as a 'disturbed area'.
- According to the act, once an area is declared as 'disturbed', it remains under the category for a minimum of 6 months.
- In the late 1960s, it was 1st made applicable to the Naga Hills, then part of Assam.
  - One by one, it expanded to the parts of Assam, Nagaland, Manipur, and Arunachal Pradesh.
- In 1983, the law was extended to Punjab and Chandigarh, but it was withdrawn in 1997.
- In 1990, it was applied to Jammu and Kashmir.

Special Powers under AFSPA

- According to the Armed Forces Special Powers Act (AFSPA), in an **area that is announced as "disturbed", an officer of the armed forces has powers to:**
  - **Arrest anyone without a warrant** and may use force if needed for the arrest**.**
  - If a person acts against law or order in the disturbed area, then **army personnel are allowed to Fire after giving a warning or use other kinds of force even if it causes death.**
  - Enter and search any area or shelter to make arrests, they also have the power to destroy that area or shelter.
  - Power to stop and search any vehicle or vessel.
  - **Any person arrested and taken into custody shall be handed over to the officer in charge of the nearest police station.**
  - **Army officers have legal immunity for their actions**. There can be no prosecution or any other legal proceeding against anyone acting under that law.
  - **The Government's Power to declare an area as a 'disturbed area' is not under judicial review.**

Present Status

- The Act was amended in 1972 and the powers to declare an area as a "disturbed area" were granted to the Central government along with the States.
- **For only Nagaland and Arunachal Pradesh, the Union Home Ministry issues a "disturbed area" notification to extend AFSPA.**
- **The notification for Manipur and Assam is issued by the State governments.**
- Tripura revoked the Act in 2015 and Meghalaya revoked it in 2018.
- Jammu and Kashmir have had a separate Armed Forces (Special Powers) Act 1990.
- In 2016, the Supreme Court of India ended the immunity of the armed forces from prosecution under AFSPA.

Arguments in the support of AFSPA

- Neither the soldiers nor their superiors have any training in civilian law or policing procedures. That is why a special law like AFSPA needed to legitimize the presence and acts of armed forces in extraordinary situations.
- **Repealing the act will encourage insurgency and militancy and also threaten the peace and unity of the nation.**
- The Army needs such powers because the army is only deployed when national security is at serious risk**. "Extraordinary circumstances demand extraordinary measures".**

Arguments against AFSPA

- The act has been **criticized for human rights** violations in the regions of its enforcement. It provides immunity from human rights abuses and fuels cycles of violence.
- **This law started a Vicious cycle of Violence in the North East**: The use of the AFSPA drives the demand for more autonomy, giving the people of the North East more reason to secede from a state which enacted such powers and these agitations justify the use of the AFSPA from the point of view of the Indian Government.
- The Second Administrative Reforms Commission (ARC) recommended the repeal of the Armed Forces Special Powers Act, 1958. It commented that its **scrapping would remove sentiments of discrimination and**

alienation among the people of North-East India.

Way Forward

- The Supreme Court ruled that any encounter carried out by **armed forces under AFSPA should be subjected to thorough inquiry.**
- Supreme Court stated that "It does not matter whether the victim was a common person or a militant or a terrorist, nor does it matter whether the aggressor was a common person or the state. The law is identical for both and is equally applicable to both. This is the necessity of democracy and there is a requirement of protection of the rule of law and protecting individual liberties".
- In 2013, the Supreme Court created a committee under Santosh Hegde, the committee suggested **making the Armed Forces Special Powers Act (AFSPA) more humane, and the security forces more accountable.**

10 MILITARY AGREEMENTS

Four foundational agreements between India and USA

1. **GSOMIA (General Security of Military Information Agreement):**It **guaranteed that the two countries would protect any classified information or technology that they shared.** It was aimed at promoting interoperability and laid the foundation for future US arms sales to the country.
2. **LEMOA (Logistics Exchange Memorandum of Agreement):**LEMOA **allows the militaries of the US and India to replenish from each other's bases, and access supplies, spare parts and services from each other's land facilities, air bases, and ports, which can then be reimbursed.**
3. **COMCASA (Communications Compatibility and Security Agreement):**The pact **allows the US to provide India with its encrypted communications equipment and systems so that Indian and US military commanders, aircraft and ships, can communicate through secure networks during both peace and war.**
4. **BECA (Basic Exchange and Cooperation Agreement):**facilitates the provision of targeting and navigation information from US systems.

11 MARITIME SECURITY

India's Maritime Security concerns

Recent issues

- **COVID-19** has highlighted the fragility of the global logistic supply chain, and India too has been affected. India's exports have been hit by the pandemic-induced scarcity of shipping containers, so much so that the country has now decided to make its own containers.
- The **recent Suez thrombosis** caused by the grounding of MV Ever Given in the Suez Canal has lessons for our economy and energy security.

Control of Choke Points

- Access to the Indian Ocean is geographically controlled by a number of choke points leading to and from the Arabian Sea and the Bay of Bengal, and from the Southern Indian Ocean, which are critical for safeguarding the Indian maritime interests.
- Examples: **Straits of Hormuz, Straits of Bab-el-Mandeb, Gulf of Aden, Malacca Strait**.

Regional Instability

- The Indian Ocean littoral has been **witness to large areas of political instability** in the recent past. Examples: Yemen, Indonesia, Somalia, Iran-Iraq, Sri Lanka and Myanmar
- Indian maritime security forces then had to conduct dedicated operations to combat this menace, like the Indian intervention in the Maldives in 1988 to foil a coup d'état.

Piracy

- India has not only escorted numerous merchant ships of all countries but concerted efforts of its maritime security forces has ensured that this piracy has been controlled
- Statistics have shown an **increase in piracy, off the coast of Bangladesh, Malaysia, and Indonesia.**

Trafficking

- The Indian Ocean Region is regrettably home to the world's most notorious areas of **drug production, the Golden Crescent and the Golden Triangle.**
- The trans-national networks established by the drug smugglers also serve as conduits for other destabilising activities like **gunrunning and human trafficking.**

Maritime Terrorism

- India's huge coastline, a thriving maritime commercial community along its coast with nearly **200,000 fishing boats and a fishermen population of 4 million** make the job of monitoring maritime activity an unenviable task.
- The ability of adversarial interests to exploit this vast maritime activity for launching attacks on land is therefore quite high, as was witnessed in the **26/11 terrorist acts.**

Extra Regional Military Presence

- It is intended to **further strategic interests of various nations**.
- The ongoing international naval effort has also benefited nations in terms of **operational intelligence gained and an expanded military maritime footprint.**

Illegal Unreported and Unregulated (IUU) Fishing

- A World Wildlife Fund report on illegal fishing has found that **87 percent of the fish stocks surveyed in the Western and Eastern Indian Ocean were experiencing high levels of IUU fishing.**
- **Maritime Territory:** India's coasts are characterised by a **diverse range of topography such as creeks, small bays, back waters, rivulets, lagoons, swamps, beaches, small islands (inhabited as well as uninhabited) etc.**

Maritime security management

- The challenge of maritime security management today is the **multiplicity of maritime stakeholders,** who often work at cross-purposes.
- Narrow organisational loyalties, turf wars and reluctance to share information characterise most of them.
- **Decision makers of the civilian generalist bureaucracy lack maritime domain knowledge** and may never have stepped on to a ship, let alone have spent a day in heavy seas.
- Most of their **solutions therefore often tend to adapt a land-centric approach** and are often too little and too late.
- Further, the country has nine coastal states and four Union territories, most of whom believe that maritime and coastal security is the Centre's responsibility.
- In fact, some **states are yet to set up 'maritime boards'**, despite the Centre's advice to do so.
- Absence of physical barriers on the coast and presence of vital industrial and defence installations on it enhances the vulnerability of the coasts to illegal cross border activities.
- **Shortage of manpower, Inadequate training for marine police, Lack of a cooperative mechanism between different agencies, below par state-level monitoring mechanisms**.

'Non-traditional' security challenges

- Such as **climate change, haphazard urbanisation of coastal regions, natural disasters and pandemics.**
- Weak oceanic governance has meant high degree of pollution, depletion of fishing stocks and damage to environment.
- Other challenges include **technology capacity build up** to leverage on the resource base of Indian Ocean
- Oceans have become **dumping grounds for waste and issues like oil spills.**

Regional security architecture

- India has always espoused a cooperative approach and participation of all states in promoting maritime security as enunciated by PM Narendra Modi in his vision of SAGAR – Security And Growth for All in the Region.
- **Indian Ocean Rim Association (IORA):** launched in 1997 for promoting intra-regional economic cooperation and development.
- **Indian Ocean Naval Symposium (IONS):** is a voluntary initiative formed in 2008 that seeks to increase maritime co-operation among navies of the littoral states of the Indian Ocean Region.
- **Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP):** is a regional government-to-government agreement, brought into force in September 2006 to promote and enhance cooperation against piracy and armed robbery in Asia.
- **ASEAN Regional Forum (ARF):** objectives are to foster dialogue and consultation on political and security issues of common interest and make efforts towards confidence-building and preventive diplomacy in the Asia-Pacific region.
- At the multilateral level, India has played a key role in shaping BIMSTEC and Mekong-Ganga Cooperation.
- In south-east Asia, it has played an important and supportive role in **ADMM Plus and Expanded ASEAN Maritime Forum and East Asia Summit** as regards maritime security issues there.
- In the western Pacific, it participates in **US-led Western Pacific Naval Symposium**. It is also an Observer at the **Arctic Council**.

Indian maritime agencies

- **Indian Navy:** aims to be the 'net security provider' in the maritime neighbourhood, including deployments for anti-piracy, maritime security, Non-combatant Evacuation Operations and HADR (Humanitarian Assistance and Disaster Relief) operations.
- **Coast Guard**: protects India's EEZ from criminals, pirates, smugglers, poachers, human-traffickers and foreign subversion. It also carries out rescue missions in India's search and rescue zone. It is also engaged in developing bilateral and multilateral cooperation.
- **Coastal police**: confining its activities to largely coastal waters up to 24 nautical miles, with the help of other agencies, it has a surveillance network comprising coastal villagers, CISF personnel and data from radar chain and sensors installed on sailing vessels.
- **Maritime shipping and shipbuilding**: A major task for the government is to enhance its capacity for Indian commercial shipping as well as infrastructure.
- **Ocean affairs**: Ministry of Earth sciences (2006) is responsible for development of technology for exploitation and exploration of marine resources, weather services, climate change and geo-hazards, including tsunamis and vulnerability mapping for the purpose.
- **Customs Marine Organisation:** created following the recommendations of the Nag Chaudhari Committee.
- **Multi-layered Surveillance System:** Under the system, the outer layer (beyond 200 nautical) was patrolled by the Indian naval ships and aircraft; the intermediate layers (12-200 nautical miles) was patrolled by Indian Coast Guard; and the inner layer i.e. the territorial waters (shoreline to 12 nautical miles), was patrolled by the marine police.
- **National Committee for Strengthening Maritime and Coastal Security:** coordinates all matters related to Maritime and Coastal Security and periodically reviews coastal security against threats from the sea with all stakeholders.
- **Coastal Surveillance Network:** comprising of static sensors along coasts, **automatic identification systems** (AIS), long range tracking, day-night cameras and communication devices has been put in place.
- **Vessel Traffic Management System** (VTMS) radars are installed on all major & minor ports to facilitate surveillance.
- Commissioning of **Information Management & Analysis Centre** (IMAC) in Gurugram for easy collection and dissemination of shipping data for increased awareness.
- The Navy established **the Information Fusion Centre for the Indian Ocean Region** (IFC-IOR) at IMAC for 24/7 regional information sharing on commercial shipping.
- **Central Industrial Security Force** (CISF) now guards ports. Moreover, **Sagar Prahari Bal** was constituted as a

special force from navy for protection of naval bases.

Other initiatives undertaken by the government

- To leverage the potential of being present on the oceanic trade route, Indian Government has called for the blue economy development, modernization of its ports, **Sagarmala programme**, Industrial parks and logistic parks. This will provide the port led development in the Indian coastal states thus fuel the Indian economy.
- **Operation Sagar Kavach** was put in operation post 26/11 to improve coordination between security agencies including Indian Navy, Coast Guard and the local police.
- **Indian Maritime Security Strategy (IMSS) 2015** of Indian Navy: envisages greater coordination between different maritime agencies; securing SLOCs; Maritime Security Operations for contemporary assessments of maritime terrorism, piracy etc.; multilateral maritime engagement, local capacity building, technical cooperation etc.
- **Coastal Security Scheme** to strengthen security infrastructure of Marine Police Force in coastal states/UTs.
- Enhance Maritime Domain Awareness through **National Command Control Communication and Intelligence Network (NC3I),** an over-arching coastal security network which collates and disseminates data about all ships, dhows, fishing boats and all other vessels operating near our coast.

Way forward

- **State police agencies may be integrated** leveraging their unique access to fishermen and local communities, facilitating the flow of vital human intelligence.
- **Comprehensive legislations** must be enacted to place systems and processes for the protection of India's maritime infrastructure.
- The government must promulgate a **National Commercial Maritime Security Policy Document**, to articulate its strategic vision for maritime security.
- Given India's geostrategic location, it could sherpa a cluster of Indo-Pacific nations into a **"sagar panchayat"** and uphold the rule of law at sea.
- Given India's stakes in Indian ocean, it is very significant for India to **develop blue-water naval capabilities.**
- India should **develop sea-denial capability** mainly at choke points in Indian ocean such as Strait of Hormuz, Bab-el-Mandeb, Strait of Malacca.

12 NATIONAL CYBER SECURITY STRATEGY

News

- Amid a surge in cyberattacks on India's networks, the Centre is yet to implement the **National Cyber Security Strategy which has been in the works since 2020.**

What is the National Cyber Security Strategy?

- It was conceptualised by the Data Security Council of India (DSCI), headed by Lt **General Rajesh Pant** report that focuses on 21 areas **to ensure a safe, secure, trusted, resilient, and vibrant cyberspace for India.**
- The main sectors of focus of the report are:
- **Large scale digitisation of public services** that focus on security in the early stages of design in all digitisation initiatives, developing institutional capability for assessment, evaluation, certification, and rating of the core devices and timely reporting of vulnerabilities and incidents.
- **Supply chain security**: Monitoring and mapping of the supply chain of the Integrated circuits (ICT) and electronics products, scaling up product testing and certification.
- **Critical information infrastructure protection**: Integrating Supervisory control and data acquisition (SCADA) security with enterprise security, monitoring digitisation of devices, evaluating security devices, maintaining a repository of vulnerabilities
- **Digital payments**: Mapping and modeling of devices and platform deployed, supply chain, transacting entities, payment flows, interfaces and data exchange, timely disclosure of vulnerabilities

- **State-level cyber security**: Developing state-level cybersecurity policies, allocation of dedicated funds, critical scrutiny of digitization plans, guidelines for security architecture, operations, and governance
- **Security of small and medium businesses**: Policy intervention in cybersecurity granting incentives for higher level of cybersecurity preparedness, developing security standards, frameworks, and architectures for the adoption of Internet of Things (IoT) and industrialisation

What steps does the report suggest?

- **Budgetary provisions:** A minimum allocation of 0.25% of the annual budget, which can be raised upto 1% has been recommended to be set aside for cyber security. Setting up a **Fund of Funds for cybersecurity** and provide Central funding to States to build capabilities in the same field.
- **Research, innovation, skill-building and technology development:** The report suggests investing in modernisation and digitisation of Integrated Circuits (ICT), set up a short and long term agenda for cyber security via outcome-based programs and provide investments deep-tech cyber security innovation.
- **A national framework** should be set in collaboration with institutions like National Skill Development Corporation (NSDC) and ISEA (Information Security Education and Awareness) to provide global professional certifications in security.
- **Crisis management**: For adequate preparation to handle crisis, holding cybersecurity drills which include real-life scenarios with their ramifications. To identify possible weakness and exploitations in systems, DSCI recommend sharing of threat information between government departments.
- **Cyber insurance**: To address cybersecurity risks in business and technology scenarios as well as calculate threat exposures DSCI recommends developing cyber insurance products for critical information infrastructure and quantify the risks involving them.
- **Cyber diplomacy:** Cyber diplomacy plays a huge role in shaping India's global relations. Hence cyber security preparedness of key regional blocks like BIMSTEC and SCO must be ensured via programs, exchanges and industrial support.
- **Cybercrime investigation**: With the increase in cybercrime across the world, the report recommends unburdening the judicial system by creating laws to resolve spamming and fake news.
- DSCI suggests **advanced forensic training for agencies** to keep up in the age of AI/ML, Blockchain, IoT, Cloud, Automation. The report also suggests creating a special cadre of Cybercrime investigators.

Why does India need a cybersecurity strategy?

- As per American cybersecurity firm Palo Alto Networks' 2021 report, **Maharashtra was the most targeted state in India — facing 42% of all ransomware attacks**.
- The report stated that **India is among the more economically profitable regions for hacker groups** and hence these hackers ask Indian firms to pay a ransom, usually using cryptocurrencies, in order to regain access to the data.
- **One in four Indian organisations suffered a ransomware attack in 2021 — higher than the global average of 21%.**
- Software and services (26%), capital goods (14%) and the public sector (9%) were among the most targeted sectors. An increase in such attacks has brought to light the urgent need for strengthening India's cybersecurity.

13 NAXALISM IN INDIA

Context

- Four BSF personnel were killed and 2 injured in an encounter with Naxals in the Kanker district of Chhattisgarh recently.

Naxalism in India

- Naxalism have its origin from Naxalbari village in west Bengal where the movement originated in 1967 under

the leadership of Charu Majumdar and Kanu Sanyal.

- It refers to the use of violence to destabilize the state through various communist guerrilla groups.
- Naxalites are far-left radical communists who derive their political ideology from the teachings of Mao Zedong, a Chinese revolutionary leader.
- In India it is prevalent in Red Corridor which spread from Andhra Pradesh to Nepal Border.
- In 2006 the then PM Dr. Manmohan Singh said "it is worst and most serious internal security threat which our country is facing."

The objective of Naxalism

- The core objective of the Naxalism movement is the establishment of People's Revolutionary State, which is supposed to be achieved by establishing a 'Red Corridor', stretching from the Nepal border through Central India till Karnataka in the South.
- It lay emphasis on the advancement of people's social and economic life by establishing classless society through armed revolution.
- This objective is to be achieved by using armed struggle as the prime tool to garner the support of the oppressed and the exploited.
- Naxal leaders support various issues like protecting people's rights of Jal (water), Jungle (Forest) and Jamin (Land) (JJJ).

Causes of Naxalism

Displacement and Forced Evictions of tribal:

- Tribal life revolves around Jal (water), Jamin (land) and Jungle (forest) – they have been evicted from all three.
- Large scale land acquisition for 'public purposes' without appropriate compensation or rehabilitation.

Lack of Economic Development:

- Disruption of traditional occupations and lack of alternative work opportunities.
- Deprivation of traditional rights in common property resources and forest.
- Unemployment- development activities cost them hugely but they didn't get fruits of development.

Social Exclusion

- High illiteracy, high MMR and IMR
- Lack of better educational opportunities and health facilities.
- Poor implementation of special laws on prevention of atrocities, protection of civil rights and abolition of bonded labor etc.

Governance Related Factors

- Corruption and poor provision/non-provision of essential public services.
- Incompetent, ill-trained and poorly motivated public personnel who are mostly absent from their place of posting.
- Misuse of powers by the police and violations of the norms of law.
- Perversion of electoral politics and unsatisfactory working of local government institutions

Lack of political representation:

- Negligible representation of tribal in legislation, administration etc.
- PESA is not implemented in letter and spirit.
- Government's four pronged strategy to deal with Naxalism:

Security Front related intervention:

- Due to misuse of ceasefire strategy by Naxals government changed the strategy. Instead of offering ceasefire, it focused on (surgical) strikes based on hard intelligence. It's more effective in arresting or eliminating key leader of Naxals.
- Government's surrender schemes for Maoists is also dwindling their manpower
- Centre has deployed COBRA (Commando Battalion for Resolute Action) a specialized unit of the Central Reserve Police Force of India proficient in guerrilla tactics and jungle warfare.
- Greyhound of Andhra Pradesh to fight against Naxalism.
- Recruitment of surrendered extremists in the CRPF to fight against Naxalism.

Development related intervention:

- Vanbandhu Kalyan Yojana: launched by Ministry of Tribal Affairs for holistic development of the tribal people by targeting their education, employment, healthcare, infrastructure and connectivity.
- Training to state officials: for better implementation of Forest Rights act and PESA Act.
- Integrated Action Plan: for 82 Naxal affected tribal and backward districts to provide public infrastructure and services.
- Special infrastructure scheme for Naxal affected region.
- Schemes like UDAAN, Nai Manzil.

Rights and entitlements of forest dwellers:

- It recognized their rights for example Forest Right Act, 2006 was enacted.
- Panchayats (Extension to the Scheduled Areas)
- Proper compensation for land acquisition.

Better public perception management:

- Civic action programme: Each CAPF Company is given Rs.3 lakh for holding medical camps, sanitation drives, sports meets, distribution of study material to children, minor repairs of school building, road, and bridges to build confidence among the locals.
- Media management: to showcase government effort to provide them development.

Declining Naxalism

- Decrease in deaths and attacks over the years.
- Now they are confined to only 5 states from earlier 10 states
- Decrease in mass base and recruitment.
- Increasing Maoist surrender and rehabilitation.
- Greater electoral turn out.

Present presence of Naxalism

- Few state like Chhattisgarh still have half of their state under Naxalism.
- Focused, targeted striking on security forces instilling heavy causalities (& boosting their morale).
- Managed to penetrate into NE & South East India as well as few urban areas where they were not traditionally present.
- Increased use of technology by them.

Way Forward

- Government needs innovative solutions for locating armed groups in the thick forests of the Naxalism-affected regions.
- Local Police knows the language and topography of a region, it can fight Naxalism better than the armed forces.
- Government needs to ensure two things; security of the peace-loving people and the development of the Naxalism-affected regions.

- State governments need to understand that Naxalism is their problem also and only they can tackle it effectively. They can take help from central government if required.
- Conclusion:
- We need to hasten the social and economic changes in an all-inclusive growth, may be even sacrifice growth for equitability. A line from the Tupamaro Manifesto, "If the country does not belong to everyone, it will belong to no one", can be aptly quoted here.

14 UAPA

What is the origin of the UAPA?

- The Union government was considering a stringent law against calls for secession in the mid-1960s. In March 1967, a peasant uprising in Naxalbari imparted a sense of urgency. On June 17, 1966, the President had promulgated the Unlawful Activities (Prevention) Ordinance "to provide for the more effective prevention of unlawful activities of individuals and associations".
- Its stringency created a furore in Parliament when it was tabled, leading to the government dropping it. Instead, the Unlawful Activities (Prevention) Act, 1967, which was not identical to the ordinance, was passed.

What is its scope and how has it been expanded over the years?

- The Act provided for declaring an association or a body of individuals "unlawful" if they indulged in any activity that included acts and words, spoken or written, or any sign or representation, that supported any claim to bring about "the cession of a part of the territory of India", or its "secession", or which questions or disclaims the country's sovereignty and territorial integrity.
- Prior to the UAPA's enactment, associations were being declared unlawful under the Criminal Law (Amendment) Act, 1952. However, the Supreme Court held that the provision on bans was unlawful because there was no judicial mechanism to scrutinise the validity of any ban. Therefore, the UAPA included provisions for a Tribunal which has to confirm within six months the notification declaring an outfit unlawful.
- In its present form, the Act, after the amendments in 2004 and 2013, covers the declaration of associations as unlawful, punishment for terrorist acts and activities, acts threatening the country's security, including its economic security (a term that covers fiscal and monetary security, food, livelihood, energy ecological and environmental security), and provisions to prevent the use of funds for terrorist purposes, including money laundering.
- The ban on organisations was initially for two years, but from 2013, the period of proscription has been extended to five years.
- After the Prevention of Terrorism Act (POTA), 2002, was repealed, the UAPA was expanded to include what would have been terrorist acts in earlier laws. The 2004 amendments were also aimed at giving effect to various anti-terrorism resolutions of the United Nations Security Council.
- In 2012, there was a set of amendments, which was notified from early 2013, seeking to bring the UAPA in line with various requirements of the Financial Action Task Force, an inter-governmental body, to combat money laundering and terrorism financing. In 2019, the Act was amended to empower the government to designate individuals as terrorists.

How do UAPA provisions differ from regular criminal law?

- Just like other special laws dealing with narcotic drugs and the now-defunct laws on terrorism, the UAPA also modifies the Code of Criminal Procedure (CrPC) to give it more teeth. A remand order can be for 30 days instead of the usual 15, and the maximum period of judicial custody before the filing of a chargesheet is extendable from the usual 90 days to 180 days. This extension, however, depends on the Public Prosecutor filing a report on the progress in the investigation and giving reasons for seeking another 90 days to complete it. The law also makes it more difficult to obtain bail.

What is the controversy about its bail provisions?

- Under Section 43D(5) of the Act, bail cannot be granted to a suspect if the court is of the opinion that there are reasonable grounds to believe that the charges are prima facie true. A Supreme Court judgment on this has clarified that this meant that the court considering bail should not examine the evidence too deeply, but must go by the prosecution version based on broad probabilities. This means that the onus is on the accused to show that the case is false but without inviting the court to evaluate the available evidence. This is why human rights defenders feel that the provision is draconian, virtually rendering it impossible for anyone to obtain bail until the completion of the trial.

Unlawful Activities (Prevention) Amendment Bill, 2019

- The Unlawful Activities (Prevention) Amendment Bill, 2019 was introduced in Lok Sabha by the Minister of Home Affairs, Mr. Amit Shah, on July 8, 2019. The Bill amends the Unlawful Activities (Prevention) Act, 1967. The Act provides special procedures to deal with terrorist activities, among other things.
- **Who may commit terrorism:** Under the Act, the central government may designate an organisation as a terrorist organisation if it: (i) commits or participates in acts of terrorism, (ii) prepares for terrorism, (iii) promotes terrorism, or (iv) is otherwise involved in terrorism. The Bill additionally empowers the government to designate individuals as terrorists on the same grounds.
- **Approval for seizure of property by NIA:** Under the Act, an investigating officer is required to obtain the prior approval of the Director General of Police to seize properties that may be connected with terrorism. The Bill adds that if the investigation is conducted by an officer of the National Investigation Agency (NIA), the approval of the Director General of NIA would be required for seizure of such property.
- **Investigation by NIA**: Under the Act, investigation of cases may be conducted by officers of the rank of Deputy Superintendent or Assistant Commissioner of Police or above. The Bill additionally empowers the officers of the NIA, of the rank of Inspector or above, to investigate cases.
- **Insertion to schedule of treaties**: The Act defines terrorist acts to include acts committed within the scope of any of the treaties listed in a schedule to the Act. The Schedule lists nine treaties, including the Convention for the Suppression of Terrorist Bombings (1997), and the Convention against Taking of Hostages (1979). The Bill adds another treaty to the list. This is the International Convention for Suppression of Acts of Nuclear Terrorism (2005).

Lone Wolf Terrorism

Understanding Lone Wolf Terrorism

- There exists no universally accepted definition of lone wolf terrorism but definitions by scholars like Edwin Baker and R. Spaaji indicate certain common features. These attacks are carried out by individuals or small groups, not belonging to any organised terrorist group or network but may sympathise with their ideologies. They receive no direct support in the planning, preparation and execution of the attack and their decision to act are not directed by any group or other individuals. These lone wolf attacks are different in nature from the organised or networked terror attacks like the 9/11 attack in US or the 26/11 Mumbai terror attack. While the latter entails several years of planning, communications, money transfers; the former is usually a small-scale attack, easy to be carried out by individuals with no assistance.[iv]
- Even though they are not members of any terrorist organisations in the traditional way, still the lone wolves showcase a degree of ideological attachment and affiliation to these. This is a direct result of the process of self-radicalisation they undergo before finally turning to terrorist activities. Internet plays a key role in this process of self-radicalisation as it is used by individuals as a platform to interact with like-minded people and a global community of extremists. A prolonged grievance, a deemed injustice or lack of social and economic obligations among other things provide an enabling environment for this process. Internet exposes them to extremist literature and propaganda of terrorist groups, helping them in justifying their beliefs and actions. Terrorist organisations like the Islamic State (IS) and Al-Qaeda leverage this by tracking the vulnerable minds, by studying their online activities and targeting them though online video games like 'Clang of Swords' by IS or the Al-Qaeda's 'Quest for Bush'. It has been noted that apart from the violent content offered, these games provide visuals of attacking the streets of major cities of the United States (US) or Europe, helping the 'lone wolves' plan their attacks.

- The severity of the role of internet can be observed in the statement made by Garry Reid, the Deputy Assistant Secretary for Defence for Special Operations and Combating Terrorism during a hearing to the Senate Committee for Armed Forces. He says, "Enabled by 21st century technology, extremists have optimised the use of internet chat rooms, web sites and email chains to spread their virulent messages and reach a global audience of potential recruits. What was once a lengthy process of establishing contact, exchange ideas, arranging meetings, providing training and developing attack plans can now be condensed into a much shorter timeline, across multiple international boundaries and beyond the reach of any single law enforcement agency or military task force.

A Challenge to India

- While addressing the National Security Guards in 2018, India's former Union Home Minister Rajnath Singh asserted that with the widespread use of social media, the 'do it yourself (DIY)' and 'lone wolf' terror attacks are a major challenge for the Indian security forcTime and again, warnings of possible 'lone wolf' attacks have been issued by various security and law enforcement agencies. Though India has been free of lone wolf terrorism till now, still it is important that it takes proactive measures to counter this peril.
- The year 2019 witnessed a weakening position of the IS in their bastions of Iraq and Syria. With its territorial defeat, there are fewer chances of a traditional regrouping of the terrorist organisation. Hence, the group prefers 'lone wolf' attacks by their members, sympathisers, would-be militants and foreign fighters in different countries. This shift from well-planned, sophisticated attacks to direct attacks by 'lone wolves' can already be noticed in Europe and the US. In India, the IS by exploiting the perceived religious grievances is trying to provoke individuals to carry out terror attacks. In the recent edition of its magazine, Sawt-ul-Hind, the IS has made attempts to call on the Indian Muslims to turn against the country and join the path of jihadist violence. This is of great concern as it shows the interest of IS in India and its attempts to brainwash the young minds in India to perpetrate terror in the country.
- Again, India must acknowledge the danger posed by the threat especially keeping in mind the possibility of Pakistan using it as a tool to advance its state-sponsored terrorism against India. Terrorists like Masood Azhar, based out of Pakistan, have already issued a clarion call to the youngsters to carry out lone wolf attacks in Jammu and Kashmir in the aftermath of the abrogation of Article 370.[ix] By sponsoring a widespread circulation of extremist literature and propaganda across India, both online and offline, Pakistan may resort to influencing the 'lone wolves' to carry out terror attacks in India. In fact, such attacks are becoming logistically simple. On observing certain lone wolf terror attacks in Europe and the US, many of these essentially involve stabbing innocent people on the streets or ramming a vehicle into a crowded area. In a hugely and densely populated country like India, such modus operandi can be a major challenge for the security forces.
- Lone wolf terror attacks also pose a major challenge to the intelligence structures. Intelligence and law enforcement agencies have formulated robust schemas to counter the traditional well-networked terror outfits and to disrupt their sophisticated plots. Traditionally, intelligence services seek information about possible terror activities from informers or by intercepting the communications between the attackers and the plotters. In case of lone-wolf terrorists, it is difficult to the gain information about their activities. The motive or impact of these attacks also differs. A well-organised terror attack seeks to cause a large-scale casualty through the attack while today the lone wolf attacks are always mostly conducted to spread a psychological fear or terror amongst the public regarding their safety.
- Nevertheless, despite the attempts made by IS or other terrorist organisations to encourage lone wolf terror attacks in India, the same has not received traction due to multiple factors. First, gaining access to explosives, light weapons and other ammunitions in India is immensely difficult due to the strict laws in the country. This is an obvious countermeasure against 'lone wolves.' Second, India has the third largest Muslim population in the world, only a minuscule fragment of the population has expressed interest in joining or sympathises with the IS. Hence, the aversion of the Indian Muslims to the extremist ideology of IS can be attributed to the cultural pluralism and democratic values prevailing in the country. Third, the strong security apparatus in the country along with the reforms in the counter-terrorism structure in the aftermath of 2008 Mumbai terror attacks is a major deterrent to the 'lone wolves.' In fact, due to the proactive measures by the authorities, spread of domestic terrorism like operations of the Indian Mujahideen or the SIMI, in the country

has been successfully curbed.

Conclusion

- It is true that today lone wolf terrorism is not an imminent threat to India but considering factors such as the downfall of terror groups like IS and Al-Qaeda, India must remain prepared for this threat. Given the easy access to materials that can be used for making explosives in the form of DIY kits and videos, a threat prevails in the form of the radicalised loners attempting terrorist attacks using these viable devices of varying yields. Proactive measures such as de-radicalisation and counter-radicalisation strategies, training and equipping the local police, contingency plans by the intelligence and counter-terrorism structures, and most importantly a robust national counter-terrorism doctrine addressing the different nuances of terrorism is strategically important to subdue any attempts of lone wolf terrorism in the country.

15 FATF

News

- **Four years after it was placed on the 'grey list' and penalised with severe financial strictures by the Financial Action Task Force (FATF), Pakistan won a major reprieve, as the international watchdog on terror financing and money laundering agreed to remove Pakistan's name from the list of countries under 'increased monitoring'.**
- Reacting to the decision, the Ministry of External Affairs said that Pakistan must continue to take "credible, verifiable, irreversible and sustainable" action against terror groups on its soil.
- FATF said Pakistan had completed two action plans comprising a 34-point tasklist since 2018.

What is the FATF?

- The Financial Action Task Force is an **international watchdog for financial crimes such as money laundering and terror financing**.

Establishment

- It **was established at the G7 Summit of 1989 in Paris** to address loopholes in the global financial system after member countries raised concerns about growing money laundering activities.
- **In the aftermath of the 9/11 terror attack on the U.S., FATF also added terror financing as a main focus area**. This was later broadened to include restricting the funding of weapons of mass destruction.

Members and meetings

- The FATF **currently has 39 members**. The decision-making body of the FATF, known as its plenary, **meets thrice a year**.
- Its meetings are attended by 206 countries of the global network, including members, and observer organizations, such as the World Bank, some offices of the United Nations, and regional development banks.

Mandate

- The FATF **sets standards or recommendations for countries** to achieve in order to plug the holes in their financial systems and make them less vulnerable to illegal financial activities.
- It **conducts regular peer-reviewed evaluations called Mutual Evaluations (ME) of countries** to check their performance on standards prescribed by it. The reviews are carried out by FATF and FATF-Style Regional Bodies (FSRBs), which then release Mutual Evaluation Reports (MERs).
- For the countries that don't perform well on certain standards, time-bound action plans are drawn up.
- Recommendations for countries range from **assessing risks of crimes to setting up legislative, investigative and judicial mechanisms to pursue cases of money laundering and terror funding.**

What are FATF's 'grey' and 'black' lists?

- While **the words 'grey' and 'black' list do not exist in the official FATF lexicon,** they designate countries that need to work on complying with FATF directives and those who are non-compliant, respectively.
- At the end of every plenary meeting, FATF comes out with two lists of countries.

Grey List

- The grey countries are designated as "jurisdictions under increased monitoring", working with the FATF to counter criminal financial activities. For such countries, the watchdog does not tell other members to carry out due-diligence measures vis-a-vis the listed country but does tell them to consider the risks such countries possess**. Currently, 23 countries including Pakistan are on the grey list.**

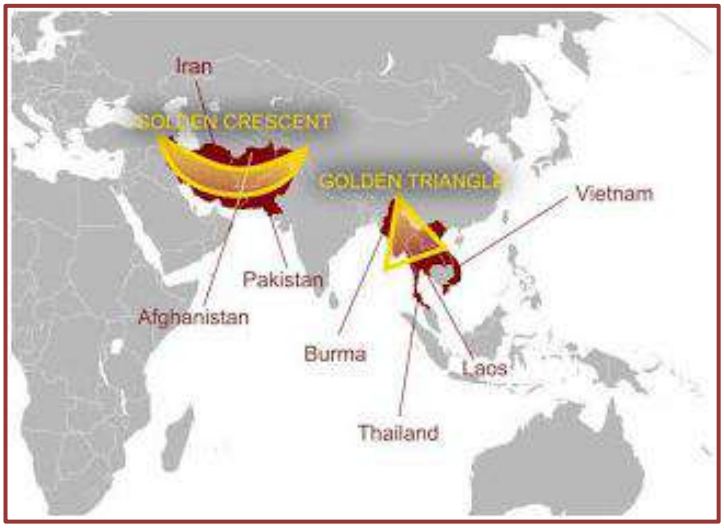
Black List

- For the black list, it means countries designated as **'high-risk jurisdictions subject to call for action'**.
- In this case, the countries have considerable deficiencies in their AML/CFT (anti-money laundering and counter terrorist financing) regimens. Thus, FATF calls on members and non-members to apply enhanced due diligence.
- In the most serious cases, **members are told to apply counter-measures such as sanctions on the listed countries**. **Currently, North Korea and Iran are on the black list.**
- Being listed under the FATF's lists **makes it hard for countries to get aid from organizations like the International Monetary Fund (IMF), Asian Development Bank (ADB), and the European Union.** It may also affect capital inflows, foreign direct investments, and portfolio flows.

16 DRUG MENACE IN INDIA

In News

- Recently the Union Home Minister has stated that the **states must work in partnership with the Union to fight the menace of drugs.**
- The Union Home Minister was **addressing a conference on 'Drug trafficking and national security**.
  - The conference was organized by the Narcotics Control Bureau (NCB) in Chandigarh.
- He suggested **adopting a zero-tolerance policy toward drugs.**



Drug Menace in India

- Drug addiction is **spreading fast among Indian**

youth. According to a survey by the Ministry of Social Justice and Empowerment, India has more than 70 million drug addicts**.**

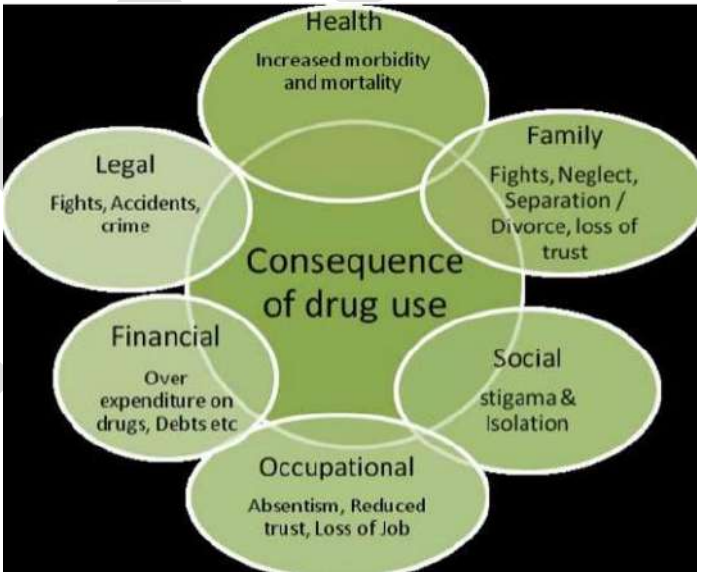
- It is a **serious health problem** which not only destroys the person involved but his entire family, the society and the nation.
  - **It promotes anti-social behavior** such as stealing, crime and violence.
- **It affects the economic growth of a country by generating unaccounted money** that are also used for terror funding and anti-national activities.
  - Therefore it is also **a serious threat to national security.**
- India is located between the **two largest Opium producing regions of the world**;
  - **Golden triangle on the eastern side:** Thailand, Myanmar, Vietnam and Laos.
  - **Golden crescent on the North-Western side**: Pakistan, Afghanistan and Iran**.**

As per the report released by the All India Institute Of Medical Science (AIIMS)

- More than 5 crore Indians have reported using cannabis and opioids.
- Nearly 8.5 lakh people inject drugs.
- More than half of the total registered cases are from Punjab, Assam, Delhi, Haryana, Manipur, Mizoram, Sikkim and Uttar Pradesh.

Steps taken by the Government

- The Indian government is Coordinating with Various International Organizations including BRICS, SAARC, ASIAN, etc, for sharing information and intelligence to combat transnational drug trafficking.
- Coordinating among Various Central and State Agencies:
- The Union Ministry of Home Affairs has launched the **SIMS (Seizure Information Management System) Portal for the digitization of pan-India drug seizure data.**
- **National Fund for Control of Drug Abuse** was constituted to meet the expenditure incurred in connection with combating illicit traffic in Narcotic Drugs; rehabilitating addicts, educating the public against drug abuse, etc.



- Project Sunrise was launched by the Ministry of Health and Family Welfare to tackle the rising HIV prevalence in north-eastern states in India, especially among people injecting drugs.
- 'NashaMukt Bharat' or Drug-Free India Campaign with a focus on community outreach programs.
- India is a **signatory of the following International treaties and conventions**;
  - United Nations (UN) Convention on Narcotic Drugs (1961).
  - UN Convention on Psychotropic Substances (1971).
  - UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances (1988).
  - UN Convention against Transnational Organized Crime (UNTOC) 2000.

Way Forward

- **Article 47 of the Directive Principles of State Policy** of the Constitution of India directs the state to improve public health and endeavour to bring about the prohibition of the consumption of intoxicating drinks and drugs which are injurious to health.
- Steps need to be taken to stop cross-border trafficking and improve the enforcement of law in India.
- The stigma associated with drug taking needs to be reduced.
  - Society needs to understand that drug addicts are victims and not criminals.
  - Proper Counseling is another alternative.

- **The education curriculum should include topics on drug addiction**, its impact and also on de-addiction.
- Enhancing skills of care providers.
- Funding for evidence-based interventions.
- Developing programmes for vulnerable groups like youth, street children, women, prisons, etc

16 CAPF REFORMS

News

- According to data available with the National Crime Records Bureau (NCRB), in the last 10 years 1,205 CAPF personnel have died by **suicide.** There have been more than 25 incidents of **fratricide** reported in the forces since 2019.

Reasons behind such incidents

- harsh working conditions coupled with family issues
- Domestic problems, illness and financial problems
- unavailability of leave when required.

Measures adopted

- In 2019, Home Minister had said that leaves available to CAPF personnel **would be increased to 100 days from the existing 75 days.** This is yet to be implemented.
- A task force was set up in October 2021 to **identify relevant risk factors** as well as relevant risk groups and suggest remedial measures for prevention of suicides in CAPFs and Assam Rifles (AR) personnel.
- Improvement in working conditions of (personnel from) CAPFs, Assam Rifles and National Security Guard (NSG) is a constant endeavour and government is taking many steps to take care of mental health of CAPF personnel.
- To reduce the stress level of CAPFs, '**Art of Living' courses** are being conducted for CAPFs personnel which have positive impacts on the force.
- Government had ushered in "**transparent policies pertaining to transfer and leave of CAPFs**", and "choice posting is considered to the extent possible after the personnel served in hard area."
- Hospitalisation period due to injuries while on duty is treated as on-duty even as regular interaction of officers with troops to find out and redress their grievances is organised.
- Government is ensuring adequate rest and relief by regulating their duty hours, improving living conditions for troops, providing adequate recreational/entertainment, sports, communication facilities, etc,
- Facility of retention of government accommodation at the place of last posting (for keeping the family) while posted in the Northeast, J&K and Left Wing Extremism-affected areas (except state capitals), providing better medical facilities as well as organising talks with specialists to address their personal and psychological concerns and organising meditation and yoga routinely for better stress management were some other measures.
- Ministry is also providing **adequate compensation to the troops** deployed in difficult areas.
- Recently, Government has approved the scheme - Modernisation Plan-IV for Central Armed Police Forces (CAPFs)

Modernisation Plan-IV

- **Total financial outlay**- Rs.1,523 crore.
- **Implemented by**: Ministry of Home Affairs
- **Aim:**to equip CAPFs with **modern state-of-the-art weapons and equipment** as per their operational requirement, keeping in view their deployment pattern in different theatres. Upgraded IT solutions **to improve overall operational efficiency/preparedness,** which will positively **impact the internal security scenario in the country.**
- **Timeline:**The Modernisation Plan-IV will run from **2022 to 31.03.2026.**

- **Significance:** Will**bolster the Government's ability to address the challenges being faced on the International Border/LoC/LAC** as well as in the different theatres, such as areas affected by Left Wing Extremism, Union Territories of Jammu and Kashmir, Ladakh and insurgency affected North Eastern States.

About Central Armed Police Forces (CAPFs)

- It refers to uniform nomenclature of seven central armed police organisations **of the India under the authority of the Ministry of Home Affairs.**
  - **Border Security Force (BSF)**
  - **Central Reserve Police Force (CRPF)**
  - **Central Industrial Security Force (CISF)**
  - **Indo-Tibetan Border Police (ITBP)**
  - **Sashastra Seema Bal (SSB)**
  - **National Security Guard (NSG) and**
  - **Special Protection Group (SPG)**
- Their **role** is **to defend the national interest mainly against the internal threats.**
- **BSF, ITBP, SSB** primary role is **border guarding.**
  - The primary role of the **Border Security Force is to guard the Indo-Pakistan and Indo-Bangladesh borders, it is deployed both on the international border and the LOC.**
  - The **Indo-Tibetan Border Police** is deployed for guarding duties on the **Indo-China border from Karakoram Pass in Ladakh to Diphu Pass in Arunachal Pradesh.**
  - The objective of the **Sashastra Seema Bal is to guard the Indo-Nepal and Indo-Bhutan borders.**
- **CISF** guarding **Security of sensitive establishments**
- **CRPF and NSG**: Assisting Police to tackle Law & Order, Counter-Terrorist Operations, Counter Naxal Operations.
- All CAPFs are involved in assisting Police in Law & Order situations and also Army in Counter-Terrorist Operations. BSF & CRPF have assisted the army during external aggression in the past.

17 NAGA PEACE TALKS

Context

- Naga groups seek early peace deal. Nagaland Government-led consultative committee meeting adopted

resolution for an early political solution.

Recent developments

- The Naga peace talks were also impacted by the incident on December 4, 2021 when six villagers returning from a coal mine were killed in an operation by para commandos of the Assam Rifles in Nagaland's Mon district.
- The dialogue between the Union Government and the NSCN-IM collapsed in 2020 when the largest Naga group refused to hold any further talks with government appointed interlocutor.

History of Naga struggle

About Naga Peace Talks

- The talks seek **to settle disputes that date back to colonial rule.**
- The Nagas are an ethnic community that comprises several tribes who live in the state of Nagaland and its neighbourhood.
- **Key demands of Naga groups:** Creation of **Greater Nagalim**, an extension of Nagaland's borders by including Naga-dominated areas in neighbouring **Assam, Manipur and Arunachal Pradesh** and **even of Myanmar** uniting 1.2 million Nagas.
- Assertion of Naga nationalism, gave rise to decades of insurgency that claimed thousands of lives.

What is the Naga peace process?

- It refers to ongoing talks between the Indian government and Naga insurgent groups, in particular the NSCN(IM), since 1997 with the **aim to sign a Naga Peace Accord.**
- The Naga insurgency, rooted in Naga nationalism, is one of the oldest insurgencies in the country.

What has happened since?

- In August 2015, the group signed a framework agreement with the Indian government for the Naga Peace Accord.
- Both the government and Naga groups successfully concluded talks on the government's deadline of October 31, 2019, no accord was signed.
- In January 2020, the government had IB special director Akshay Mishra step in and continue the engagement.

How did things go wrong?

- The NSCN(IM) and the Indian government differed in their understanding of the framework agreement.
- The NSCN(IM) insistent on a **Naga constitution**, and was pushing for a **Greater Nagalim stretching beyond the boundaries of the present Nagaland state.**
- Although IM had softened its stance on the demand for a separate flag and constitution, still a few bones of contention remained.
- In November 2017, Ravi signed an agreement with **seven groups who had come together under the banner of the Naga National Political Groups (NNPGs),** which did not include the NSCN (IM).
- The IM, accused Ravi of **attempting to "segregate the Naga civil society".**
- Ravi, meanwhile, continued to engage with the other Naga groups, and declared that the Accord would be signed with or without the NSCN(IM).

What are the real issues?

- The Naga issue is very complex, and is led by a Tangkhul from Manipur, for whom it is difficult to abandon the demand for a Greater Nagalim.
- There is no way the government would accept a separate constitution for Nagaland.

What is the way forward?

- It is important to understand that **there cannot be an accord without the NSCN(IM).**
- There is need **to delicately close the gap between the IM and NNPGs**.
- Some demands that need ironing out include
  - one for a **bicameral Assembly** with at least 40 nominated members representing different tribes;
  - **absorption of cadres** as local armed forces or in the Indian paramilitary;
  - **setting up of autonomous councils** in Naga-dominated areas of neighbouring states; and
  - **use of the Naga flag** for at least customary events.

18 ASSAM MEGHALAYA BORDER DISPUTE

In News

- Both Meghalaya and Assam State governments stated that they would ask for a probe from a central agency into the Assam Police firing that killed six people along the states' border.
- Recently, near the border district of Assam and Meghalaya, 6 people were killed and several others injured during an alleged clash between the Assam Police and a mob,
- 5 of the 6 people killed are from Meghalaya. The incident drew a sharp reaction from Meghalaya's Chief Minister, who termed the Assam Police's actions "inhuman" and said the state will set up a judicial commission and a Special Investigation Team to probe the shooting until a central agency takes over.
- The Assam Police has claimed they opened fire in self-defence after a mob surrounded them when they were trying to intercept a truck allegedly smuggling timber.
  - Assam has announced a one-man inquiry commission under a retired High Court judge.

Background of the Assam-Meghalaya conflict

- Meghalaya was carved out of Assam as a separate state in 1972 but the new state challenged the Assam Reorganisation Act, of 1971, leading to disputes in 12 locations in the border areas.

The major point of dispute

- **Meghalaya's Langpih district, bordering the Kamrup district of Assam, in West Garo Hills, is a major point of contention between the two neighbouring states.**
  - Langpih was part of the Kamrup district of Assam during the British colonial period but after India's Independence in 1947; it became part of the Garo Hills and Meghalaya.
- Another point of contention is the Mikir Hills, which Assam considers to be its part.
  - Meghalaya has questioned Blocks I and II of the Mikir Hills, now Karbi Anglong region, being part of Assam.
  - Meghalaya says these were parts of erstwhile United Khasi and Jaintia Hills districts.

Efforts made to resolve the border issue

- The two states have formed border dispute settlement committees.
- Recently, the Chief Minister of both states decided to set up two regional panels to resolve the border disputes in a phased manner.
- **The panel recommended 5 aspects to be considered in resolving the border dispute;**
  - Historical facts
  - Ethnicity
  - Administrative convenience
  - Mood and Sentiments of the people concerned.
  - The closeness of the land.
- In April 2022, In presence of the Union Home Minister Shri Amit Shah, **a historic agreement was signed in New Delhi by the Chief Minister of Assam and the Chief Minister of Meghalaya for the settlement of the interstate boundary between the States of Assam and Meghalaya, in respect of 6 out of 12 areas of difference.**

Key points of the Border Agreement

- Out of the 12 points of dispute between Assam and Meghalaya, the six areas with relatively less critical differences were taken up in the first phase.
- **Assam and Meghalaya have partially resolved a 50-year-old border dispute in 6 of the 12 sectors along their 885 km boundary**.
  - The 6 disputed sectors are Tarabari, Gizang, Hahim, Boklapara, Khanapara-Pillangkata and Ratacherra under the Kamrup, Kamrup (Metro) and Cachar districts of Assam and the West Khasi Hills, Ri-Bhoi and East Jaintia Hills districts of Meghalaya.
- The two States had in June 2021 adopted a "give-and-take" policy to start the process of resolving the boundary dispute by constituting three regional committees each.
  - The draft resolution prepared based on the recommendations of the regional panels, proposed dividing the disputed 36.79 sq. km of land into the six areas of difference between the two States.
  - **While Assam will get 18.51 sq. km of the disputed areas, Meghalaya will get the remaining 18.28 sq. km.**

Other Major Agreements of the Northeast

NLFT Tripura Agreement

- The agreement was signed on 10 August 2019 in the presence of the Home Minister.
- **As per the MoU, for the overall development of the tribes of Tripura, the Government of Tripura will be provided with a Special Economic Development Package (SEDP) of Rs. 100 crores by the Government of India during five years.**
  - Out of this amount of Rs. 100 crores, an amount of Rs. 40 crores has already been released to Tripura during the financial year 2020-21.

Bru Agreement

- A historic agreement was signed in the presence of the Home Minister on 16.01.2020 by the Government of India, Government of Tripura, and Government of Mizoram along with representatives of Bru migrants for the permanent settlement of 6959 Bru families in Tripura with a financial package of about Rs. 661 crores.
- **As per the agreement, each resettled Bru family would be given financial assistance** in the form of a fixed deposit of Rs.4 lakh, free ration, five thousand rupees per month for two years, housing assistance at the rate of Rs.1.5 lakh, and a land plot of 30x40 square feet.

Bodo Peace Accord

- In the presence of Home Minister Shri Amit Shah, a Memorandum of Understanding (MoU) was signed on 27.01.2020 by the Government of India, the Government of Assam, and representatives of Bodo groups to resolve the long-pending Bodo issue.
- Most of the demands of the Bodo groups have been met and the remaining demands would be met when as per the MoU, the committees constituted for this purpose would give their recommendations.
- **As per the agreement, a special development package of Rs 1,500 crore (750 crores by the Central Government and 750 crores by the Assam government) will be provided over three years for the all-around development of the Bodo region in Assam.**

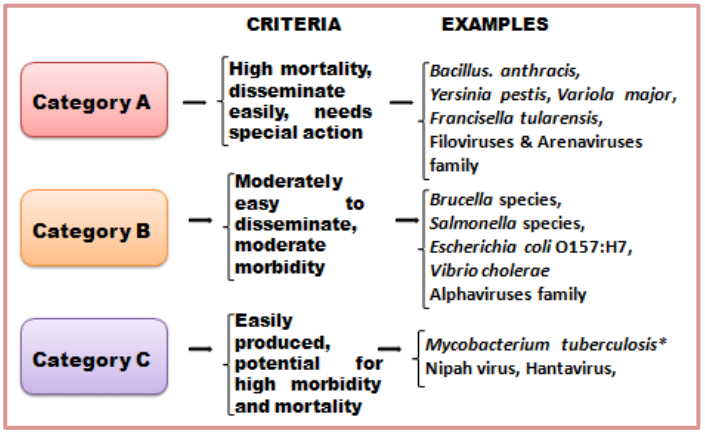
Karbi Anglong Agreement

- To end the decades-old crisis in the Karbi Anglong region of Assam, a Memorandum of Understanding (MoU) was signed on 04.09.2021 in the presence of the Home Minister between the Government of India, the Government of Assam and representatives of Karbi groups.
- As a result of this historic agreement, more than 1000 armed cadres renounced violence and joined the mainstream of society.
- **As per the agreement, a special development package of Rs 1,000 crore will be given over five years by the central government and the Assam government to take up special development projects in the Karbi areas.**
- This agreement will ensure the protection of the culture, identity, language, etc. of the Karbi people and the all-around development of the region.

19 BIOWEAPONS

Introduction

- A bioweapon is a **virus, protozoan, bacterium, parasite, or fungus** that can purposefully be turned into a weapon and deployed against fellow humans during war. Self-replicating toxins and pathogens can also be turned into bioweapons with devastating effects. To date, there exist an **estimated 1,200 different kinds of bioagents** that have already been weaponized or possess the potential to be turned into a bioweapon**. More than 500 million people have died of infectious diseases in the past century**, and most have been attributed to bioweapons.



The **first time pathogens and toxins were deployed in the war was 1763 when the British Army used smallpox against the Native American Indians during the French and Indian war.** Another occasion popped up during WWI when Germany attacked its enemies with biological weapons. The impact was not that great, but the act alone laid the groundwork for future use of bioweapons. Categories of Bioweapons:

Here are the most dangerous Bioweapons ever created by humans:

Anthrax

- The Bacillus anthracis bacterium is one of the deadliest agents ever to be weaponized in history. The American disease control arms of the government have categorized Bacillus anthracis as a **Category A threat**, a rank designated for dangerous elements that pose a hazard to national security. The spores that house Anthrax bacteria are naturally present in soils and can also be cultured in a laboratory. What makes them dangerous is their ability to spread quickly and survive for a long time even when exposed to harsh environmental conditions. Anthrax has been used for long as a weapon and was usually mixed with powder, water, and food. In 2001, letters containing powdered anthrax were sent to 22 people across the US, and five of these people later died. The Japanese army deliberately infected Chinese prisoners in Manchuria with anthrax which led to the death of 10,000 people during the WWI. The UK military tested a spore delivery system for anthrax on the island of Gruinard in Scotland, and these pores ended up surviving for a long time affecting people living close to the area.

Botulinum Toxin

- Botulinum is a toxin that is relatively easy to produce and can be distributed through aerosols, water contamination and food provisions. The Botulinum toxin is so hazardous that a mere gram of it is potent enough to wipe out a million people when they inhale. Botulinum paralyzes muscles and blurs vision. The bacterium behind Botulinum is called Clostridium. The toxin is naturally present in damp forest soils, lake beds, and shallow streams. Records show that the Japanese army experimented with prisoners in Manchuria by injecting them with Clostridium botulinum leading to grave consequences.

Smallpox

- Variola major is a virus responsible for causing smallpox. It is a highly infectious disease with no known treatment, and if it were not for the discovery of its vaccine, it was well on its way to wiping out humans off the face of the planet. Over 300 million humans died of smallpox in the twentieth century, the highest death toll by a disease ever recorded. The weaponization of smallpox was first attempted during the war against Native Americans by the British Army. In 1980, the then Soviet government started a program of developing the smallpox virus for use as a weapon at the height of the cold war. However, smallpox poses no threat of ever being weaponized thanks to the move by the World Health Organization in 1967 to launch a global immunization program.

Tularemia

- Caused by the Francisellatularensis bacterium, tularemia is another hazardous bio-weapon agent that has a wide range of effects on the human body like skin ulcers, cough, fever, diarrhoea, and vomiting. Infection occurs when humans come into contact with animals infected or killed by tularemia. Being bitten by an infected animal is another sure way of being affected by the disease. During the battle for Stalingrad in WWII, the then Soviet Army is believed to have deployed tularemia against the German forces. Francisellatularensis bacteria is a Category A threat.

Ebola

- The deadly disease is caused by the Ebola virus, which was first brought to the world's attention in 1976 when it was encountered in DRC. Transmission is through contact and has a fatality rate of 50%. Between 1986 and 1990, the Soviet Union started a program aimed at weaponizing Ebola. Evidence of that program ever coming to fruition or Ebola being used as a weapon anywhere on earth has never been found. Weaponizing Ebola is possible, but it is a costly endeavour since the disease mainly spreads through contact.

Pneumonic Plague

- The plague is caused by a bacterium, Yersinia pestis, which is another Category A organism. The plague carries the most significant potential of being weaponized as it is easy to mass-produce it in a laboratory with minimal cost. It is also one of the oldest bioweapons as there is evidence of it being first used in the 14th century when it started the great Black Death in Europe that claimed 50 million lives. The plague can be deployed by a simple aerosol. Once a human is infected, they can quickly spread it to others, making the

disease extremely dangerous and hard to control once it sets into motion. The Japanese army deployed fleas infected with plague over Manchuria during WWII. Russian scientists were also able to create a new strain of the plague that is resistant to antibiotics for weaponization in the 1980s.

The Marburg Virus

- It is a category A virus that causes the deadly Marburg Hemorrhagic Fever. The virus has been traced to the African fruit bat. It can quickly be developed in the laboratory and experiments were conducted by Soviet scientists in the 1980s. It was found that the Marburg virus was responsible for Q fever and was the most potent with a high fatality rate of 90%.

Others

- Other notable pathogens with the potential to be weaponized include the Bunyavirus which has three other strains, namely Nairovirus, Phlebovirus, and Hantavirus. Hantavirus causes the Korean hemorrhagic fever that killed more than 3,000 soldiers during the Korean War. Aflatoxins have also been used during the Gulf War by the Iraqi army although the impact was not widespread. Rice Blast Fungus is bioweapon that attacks food crops and is researched and developed by Russia and the United States during the cold war.

Dealing with Bioweapons

- The use of bioweapons is strictly forbidden under customary international humanitarian law. However, it has not stopped many governments from conducting covert research into bioweapons. As of 2018, about 17 countries had a bioweapon program, including America, the UK, Canada, France, Germany, Israel, and Russia, among many others. Bioterrorism groups like the Aum Shinrikyo from Japan have for long spread fear with the threat of unleashing bioweapons in Tokyo. The danger that bioweapons pose has been the force behind many international accords and pacts signed in the last 100 years in a bid to reign in on the use of bioweapons. The 1925 Geneva Protocol banned the use of bioweapons in wars. The Biological Weapons Convention of 1972 went a step further and banned the production, acquisition, and stockpiling of bioweapons. The 180 states that were party to the convention were required to destroy any existing bioweapon stockpiles that they had. Governments around the world are now on alert as more terrorist groups turn their attention towards the use of bioweapons. Strict regulations have been passed to stamp out the menace.

20 SPACE WEAPONIZATION

What does 'space weaponization' mean?

- Weaponizing space entails putting weapons in space or on celestial bodies, along with developing weaponry that can travel across space as well as from Earth to destroy targets in the outer spectrum.
- Locating orbital or suborbital satellites to strike opponent spacecraft, utilising ground-based specific ascent missiles to target space assets, jamming indicators sent out by opponent spacecrafts, using laser light to immobilise enemy satellites, plasma targets, orbital ballistic missiles, and satellite strikes on Earth aims are all such examples.
- These are divided into two types: direct-energy and kinetic-energy weaponry.
- The militarization of space is not anything like the space weaponsization. The militarization of space occurs when space assets are utilized to acquire relevant data to aid armies in conducting terrestrial, aerial, and marine activities. Using the space field against land objects or targeting weapons in orbital space, on the other hand, comes under the realm of weaponization, as does harming or destroying another province's space holdings.
- The programs to militarise and weaponize outer space are reportedly on the rise, with the goal of one nation gaining military control over another in space.
- Space militarization and weaponization are fundamentally incompatible with productive business and scientific endeavours. Experts fear that a space conflict might disrupt the inherent mutual trust required to sustain the peaceful equipment installed in space. Despite these realities, militarization and weaponization of outer space research initiatives have been on the rise.

Outer space geopolitics

- According to reports, in the commercial realm, the United States has always controlled outer space. Its armed contest with Russia established security requirements. However, the advent of China as a significant space power — both civilian and military — is changing astropolitics.
- Analysts believe that the extraordinary increase of Chinese space assets, and also China's aim to rule outer space, has heightened the need for democratic states to join together to protect their strategic objectives while also promoting long-term stability in the skies above.
- They believe that a slew of technology advancements over the last few years have resulted in a dramatic increase in the devastating capability of space warfare. In 2016, the then Russian Deputy Foreign Minister expressed his worries about the likelihood of weaponry being installed in space. His declaration came as a result of technology breakthroughs such as the Prompt Global Strike programme, under which the US began secretly constructing hypersonic glide vehicles in the mid-2000s.
- According to reports, as some other nations begin to see the US's weapons development initiatives as a threat – the US military space budget is believed to be 25 billion dollars, with the possibility of exceeding 40 billion dollars - they are preparing to guard themselves. Since hypersonic missiles depend on satellites to operate, both Russia and China are working to obtain the capability to strike US satellites.
- Russia conducted a Direct-Ascent Anti-Satellite (DA-ASAT) test on November 15, 2021, by trying to shoot down one of its ageing spacecraft.

What is an Anti-Satellite (ASAT) test?

- The ASAT is a satellite device designed to destroy hostile space assets, limiting the opponent's army capacity to function on the battleground. These missiles might be used to target human satellites, with disastrous ramifications in today's modern world, according to analysts.
- The experiment had an unanticipated but predictable result: a vast amount of space debris was created, posing a risk to astronauts aboard the International Space Station. A missile-attacked satellite falls away into microscopic fragments, adding to the space debris. Loose space debris poses a threat to functioning spacecraft, because hitting with it can render the satellites inoperable.
- Particles as small as one tenth of a millimetre in size can cause serious damage to satellites and spacecraft in

low orbit, where the pace is around 10 km/sec. Once junk from low-Earth orbit (LEO) re-enters the atmosphere, it poses a deadly danger to humans and property.

- Several countries, led by the United States, denounced Russia's ASAT test, calling it "absolutely reckless" and a danger to the "long-term viability of outer space." Only China, Russia, India, and the United States have effectively test shot ASAT missiles so far, while several other countries are in the process of building their own. Laser beams aimed at hostile spacecraft, jammers, plasma strikes, and orbital ballistic missiles are a few of the types of space weaponry that have already been produced.
- Experts warn, however, that as governments release an increasing number of satellites, each of which is a strategic or economic asset, preventing collisions may become increasingly difficult in the future. Space as a global commons must be established and maintained if international peace and security are to be ensured.

The global common

- International law classifies outer space as a 'Global Common,' which typically refers to a region where worldwide financial assets exist outside of any country's national jurisdiction and are governed by international legislation. The high oceans, Antarctica, and even cyberspace are an example of this.
- The UN General Assembly established the Outer Space Committee in 1959 to control the usage and study of outer space. The Outer Space Treaty (OST) was developed with the goal of making this space a global common for humanity, or as it states, a "domain of all human race."
- "Outer space, such as the Moon and other astronomical objects, is not subject to state appropriation by claim of sovereignty, by use or occupation, or by some other methods," according to the OST, and "the formation of army facilities, installations, and fortifications, the testing of any sort of weapon, and the conduct of military manipulations on celestial objects must therefore be banned by law."
- It also declares that "States must not install nuclear weaponry or other weapons of mass destruction in orbit or on celestial bodies, or otherwise deploy them in outer space." The most crucial aspect of global commons in this case is that using global airspace for "peaceful exploration" is a well-established customary international legislation.

21 S-400

News

- Indian Air Force to employ 'direct tactical planning' for S-400.

What is S-400?

- The S-400 Triumf is a **mobile, surface-to-air missile (SAM) system developed in the 1990s by Russia** as an upgrade to the S-300 family. The evolved version of the S-400 system is the S-500 Prometheus, which entered service in 2021.
- S-400 (NATO name SA-21 Growler) is considered one of the world's most advanced air defence systems **that can simultaneously track and neutralise a range of incoming objects spanning aircraft, missiles and Unmanned Aerial Vehicles (UAVs) over very long ranges.**
- It is especially suited to take down strategic aerial **platforms like bombers, mid-air refuellers, reconnaissance aircraft and**

Advanced Early Warning and Control Systems (AWACS).

Why is the S-400 deal so important to India?

- S-400 is very important for **India's national security**, especially as it faces **new threats from China, Pakistan and Afghanistan**, calling it a "game changer".
- The system will also **offset the air defence capability gaps**due to the IAF's dwindling fighter squadron strength.
- Integrating the S-400 into the national air defence architecture will be **much easier as India has a large number of legacy Russian air defence systems**, a major reason India did not consider the U.S. air defence systems as a viable alternative.
- For both **political as well as operational reasons, the deal is at a point of no return.**
- Buying the S-400 is a way for asserting India's 'strategic autonomy'.

22 HYPERSONIC MISSILES

News

- Earlier in the year, during the ongoing Russian invasion of Ukraine, Russia announces that its forces used a hypersonic missile to destroy a huge underground arms depot near the Ukrainian border with Romania and another to destroy a field depot.
- With a claimed maximum speed of 4.1 km/s, or 14,760 km/hr, the missile travels at 12 times the speed of sound. Unlike ballistic missiles, a hypersonic missile is the next step in the evolution of armed projectiles.

What is a hypersonic missile?

- A hypersonic missile is any projectile that travels at 5 and 25 times the speed of sound. These missiles are extremely fast and far harder for surface-to-air missile defence systems to target.
- The missile is travelling so fast in the atmosphere, that it forms a layer of a plasma cloud in front of its warhead that functions to block radio waves and thus protect it from detection.
- These missiles also possess evasive capabilities and have enough range to cover continents, making them potent offensive weapons.

Which countries have them?

- Apart from Russia's Kinzhal, US and China are in advanced stages of developing their own hypersonic missiles in the modern arms race. Officials have stated that the development of hypersonic missiles is a matter of national pride, much akin to the 1960s space race.
- However, much more importantly, the existence of hypersonic missiles which can be fitted with nuclear armament undermines the nuclear policy of deterrence.
- Apart from the trio, other nations like France, Germany, Japan, Australia and India are also in the process of developing their own hypersonic missiles. Many of these countries are trying to develop the new-age weapons in concert with other global partners, like India collaborating with Russia and Australia working with the US, while others like China and Japan are working on their own.

When will India get one?

- India's own hypersonic missile is expected to arrive within the next 5-6 years.
- "BrahMos Aerospace is capable of making hypersonic missiles. In five to six years, we will be able to have our first hypersonic missile by BrahMos," said Atul Rane, CEO and MD, BrahMos Aerospace, last month.
- BrahMos Aerospace is an Indo-Russian multinational aerospace and defence joint venture that is responsible for developing the fastest supersonic cruise missile, the BrahMos.
- BrahMos 2 is one of the projects that the Defence Research and Development Organisation (DRDO) is working on along with BrahMos Aerospace. In 2020, the DRDO successfully tested a hypersonic propulsion system – the Hypersonic Technology Demonstration Vehicle or HSTDV – which achieved speeds of Mach 6.

- "India has joined a select group of countries, including the United States, Russia, and China, that have indigenously developed technology capable of making the HSTDV take an unpredictable trajectory and elude interceptor detection.

23 DATA PROTECTION AND LOCALIZATION

Context

- The government has withdrawn the Personal Data Protection Bill from Parliament.
- It is looking for coming up with a "comprehensive legal framework" for regulating online space including separate legislation on data privacy, the overall internet ecosystem, cybersecurity, telecom regulations, and harnessing non-personal data for boosting innovation in the country.

Importance of data

- Data usually refers to information related to messages, social media posts, online transactions, and browser searches. It has become an important source of profits.
- Companies, governments and political parties find it valuable because they can use it to find the most convincing ways to advertise online.
- Much of the future's economy and law enforcement will be predicated on the regulation of data, introducing issues of national sovereignty.

Handling of data

- Data is stored in a physical space similar to a file cabinet of documents and transported across country borders in underwater cables. Data is collected and handled by entities called data fiduciaries.
- While the fiduciary controls how and why data is processed, the processing itself may be done by a third party, the data processor.
- The physical attributes of data — where data is stored, where it is sent, where it is turned into something useful — are called data flows.

What is Data Localization?

- Data localization refers to **the act of storing data on any physical device that may be present within the territorial borders of a country where the data has been generated**. Some governments often restrict free-flowing data and the data that could impact government operations in a region. Many governments attempt to protect and promote security across the borders to encourage data localization.

Advantages of Data Localization

- In today's time, **data is considered to be the new oil**, and this makes it very valuable. If the data is analyzed accurately, then it **can form the backbone for any successful business**.
- Governments looking to implement data localization might be seeking to **give their local corporations a competitive edge**. The national government can prevent the flow of data to external countries and thus, this data can be made available for the internal use by the domestic companies only. The **informational asymmetry caused will prove to be beneficial for local companies.**
- **Data is a national resource,** and thus the government holds a right on the revenue that is generated from the data. Similar to the inflow and outflow taxation of goods and services, the movement of data can also undergo taxation. The government can use the additional taxes generated from data for developing newer programs.

Disadvantages of Data Localization

- **Foundation of the Internet lies with the free movement of data**. In case the free flow of data is affected by imposing taxes or extreme protectionism, this will eventually destroy the Internet.
- Most companies prefer using the Internet as a medium to reach their customers is because it is cheaper and

free of excessive regulation. When robust data localization and protection laws are implemented, then **there is a high possibility that the Internet may face an abrupt end leading to its 'death'.**

- Another disadvantage that data localization holds is the **security problem that is associated with the storage of data**at a single location. The concept of storing data in a single geographical region is entirely opposite to the diversification approach followed by the MNCs. Also, the **citizens of the country are not willing to allow the government to spy on their data**. If all the data is stored within the geographical boundaries, then the **government can collate all this data and even invade an individual's privacy, if needed.**

Challenges to Data Localization in India

- **Presently, India doesn't have any infrastructure to support the security of data being generated in the country**. Without a secured infrastructure, the **data remains prone to all kinds of cyber-attacks, and also there is a severe risk involved**. With laws being implemented, it remains a challenge to develop an efficient infrastructure at a quick pace.
- The **storage of data in India includes higher operational costs for payment system operators**. In the case of cross-border transactions, data has to be stored in two places, which could increase the costs, and there is a high chance that these extra incurring costs will fall on to the consumers.
- Data localization can also be viewed **against the intellectual property rights of an individual**. This is because the individuals use their intelligence to form a system that can benefit from the data it has generated. Though, in the end, the consumers are deprived of these benefits, and a third-person might use the data in their favour.

Why has High Reluctance Shown by Companies?

- Most of the companies in the Indian market are not willing to adopt data localization as of now. The major reason why the companies are reluctant to comply with data localization is **due to the costs involved**.
- The costs can be in **various hardware forms such as- servers, USPs, generators**. It could also include the **cost of infrastructure**.
- Some **companies hold the belief that India is not ready to have such an infrastructure and ecosystem that supports data localization**.
- Large e-commerce players in the industry feel that there might be an increase of about 10-50% in the costs, depending on the strictness and rigidness of the final law.
- However, the big e-commerce and social media players are not going to be affected by this. The smaller businesses in the economy will be the ones who're going to be at the suffering end.

Global Effects of Data Localization

- On the global scale, data localization regulations have created a significant impact on the economy in an era where economic growth is driven by the Internet.
- Internet is also the key enabler for trading taking place across several industries. With restrictions added on data storage and transfer, **data localization holds a key threat to the free-flow of information taking place across the borders and maintenance of global supply chains**.
- Due to the imposed regulations, there is a **great impact that takes place on email communication, personal records, and social media services, adding to the limited access of information on which the manufacturing and service economies are heavily dependent.**

Present Data Laws in Effect in India

- As of now, **there is only a single mandatory rule for data localization in India.**This is **governed by the Reserve Bank of India (RBI) and is meant for payment systems**. Besides this, other bill drafts are yet to take the form of a law.
- The other prominent evidence present in this context is the Data Protection Bill of 2018. The bill itself has got a fixed set of requirements on the data transfer that takes place across the borders. The draft e-commerce policy has clauses on the cross-border transfer of data.

Need for data localization

- **Will help law-enforcement access data for investigations and enforcement.**
- Proponents highlight **security against foreign attacks and surveillance**, harkening notions of data sovereignty.
- Many domestic-born technology companies, which store most of their data exclusively in India, support localisation.
- Reliance Jio has strongly argued that **data regulation for privacy and security will have little teeth without localisation**, calling upon models in China and Russia.
- Instances of **cyber attacks and surveillance will be checked.** Recently, many WhatsApp accounts were hacked by an Israeli software called Pegasus. Social media is being used to spread fake news, which has resulted in lynchings, national security threats, which can now be monitored, checked and prevented in time.
- Data localisation will increase **the ability of the Indian government to tax Internet giants.**
- Strong data protection legislation will also **help to enforce data sovereignty.**

Final Thoughts

- **Data Privacy will require a balancing act between personal liberty and sovereign securities** such as prevention and investigation of crime and National security threats. Another legitimate concern of the State that needs to be balanced with the **Right to Privacy, recognized in Puttaswamy**, is social welfare measures.
- The **illegitimate commercial gains** being enjoyed by enterprises at the cost of privacy of individuals are also **likely to vanish due to data localization.**
- But Data protection is a complex exercise, and the law will need amendments from time to time depending on the problems that crop up. Thus, it must be brought into the Statute book expeditiously.

24 AGNI MISSILES

- The Agni series of ballistic missiles is being developed under the Integrated Guided Missile Development Programme of the Defence Research and Development Organisation of India.
- The Agni missile family consists of three deployed variants. The Agni-I, Agni-II and Agni-III are in service with the Indian Army. Agni-IV, the fourth in the Agni series of missiles, has completed all trials successfully by January 2017. A new intercontinental ballistic missile variant, the Agni-V, is also being developed and is expected to enter service by 2017-18.

Agni-I short-range ballistic missile

- The Agni-I is a short or intermediate-range ballistic missile. It was first tested at the interim test range in Chandipur off the coast of Orissa, India, in May 1989.
- The missile consists of a single engine. In March 2010, a nuclear-capable Agni-I was test fired from the integrated test range at Wheeler Island off the Orissa coast.
- The strap-down inertial navigation system uses an explicit guidance method. The structure is made of all-carbon composite materials to protect the payload during its re-entry stage. The flight trials proved the long-range capabilities of the missile. The missile can carry a conventional payload of 1,000kg or a nuclear warhead and has a range between 700km and 800km. These are transported by rail and road, and powered by solid propellants.

Agni-II medium-range ballistic missile

- The Agni-II is a medium-range ballistic missile equipped with two solid fuel stages. It was test fired in April 1999 from the IC-4 pad. The nuclear-capable Agni-II was tested by a special strategic command force in May 2010. The missile has a range of more than 2,000km and can reach most of the western, central and southern parts of China. A tank missile with top-attack, fire and forget capability was also inducted into service.

Agni-III intermediate range ballistic missile

- The Agni-III was test fired in July 2006 from Wheeler Island, but failed to reach its target. It was successfully test fired in April 2007. A third test in May 2008 proved the operational readiness of the missile. With a circular error probable under a 40m range, the missile is considered one of the most accurate strategic ballistic missiles of its range class in the world.
- The two-stage ballistic missile has a diameter of 2m. The first-stage booster weighs around 32t and is made using advanced carbon composite materials, while the second-stage booster weighs 11t and is made of iron-based steel alloy. The missile can support a series of warhead configurations and a total payload of 2,490kg for a range of 4,500km.
- Agni-IV intermediate range ballistic missile
- Agni-IV is a two-stage nuclear-capable intermediate range ballistic missile. The missile was first tested in November 2011 from Wheeler Island. It rose to an altitude of 900km during the test. It was successfully test-fired again in September 2012. It reached an altitude of 850km during its third test in January 2014. The missile was also successfully test-fired in January 2017.
- The Agni-IV has a length of 20m and weight of 17t. It can carry a payload of 800kg. The maximum range of the missile is 4,000km.

Maneuvering re-entry vehicle

- The Agni's manoeuvring re-entry vehicle features an attitude control system and aerodynamic fins. The 4m-long re-entry vehicle consists of five sections, with each section consisting of a two-layer composite structure. The MRV supports a range of payloads in different configurations.

Navigation and control

- The Agni series utilises a strap-down inertial navigation system (INS) for flight control and navigation. These missiles incorporate indigenously developed inertial sensors. The Agni-II's missile control system uses an MIL-STD-1553 data bus for all on-board communication and control device interconnection. The system integrates the INS, flight control computer, actuators and sensors.
- Navigation and guidance is provided by an advanced ground-based beacon system that uses the time delay of arrival (TDOA) concept. The TDOA continuously provides updates on missile flight position and speed.
- The Agni-IV is guided by a Ring Laser Gyro based INS, Micro Navigation System and Digital Controller System.

Propulsion

- The Agni-I is propelled by a single-stage engine powered by solid fuel. The Agni-II is powered by a two-and-half-stage solid propellant engine, while the Agni-III and Agni-IV are powered by a two-stage solid

propellant engine.

25 INS VIKRANT

News

- The fourth phase of Sea Trials for IAC Vikranthas been successfully completed.

Details

- The Indigenous design and construction of Aircraft Carrier by Indian Navy and Cochin Shipyard Ltd is a shining example in the Nation's quest for 'AatmaNirbhar Bharat' and 'Make in India Initiative' with more than 76% indigenous content.
- This has led to growth in indigenous design and construction capabilities, besides development of large number of ancillary industries, with employment opportunities for over 2000 CSL personnel and about 12000 employees in ancillary industries.

About

- It is country's **maiden indigenous aircraft carrier (IAC**-1).
- **Built by: Cochin Shipyard Ltd**.
- The IAC would be commissioned as **INS Vikrant in the first half of 2022,**which would be the most potent sea-based asset.
- **Capabilities:** can project Air Power over long distances, including Air Interdiction, Anti-Surface Warfare, offensive and defensive Counter-Air, Airborne Anti-Submarine Warfare and Airborne Early Warning.
- It has a **STOBAR** (short take off but arrested recovery) system of aircraft launch and recovery on the flight deck.
- It is armed with the **Barak LR-SAM**(long range surface-to-air missile) air defence and **AK-630** close-in weapon system besides a slew of advanced sensors and an electronic warfare suite.

Other specifications

- It is expected to have a top speed of 30 knots (approximately 55 kmph) and is propelled by four gas turbines.
- Its endurance is 7,500 nautical miles at 18 knots (32 kmph) speed.
- The vessel can carry up to 1,500 personnel and has 2,300 compartments.
- The ship shall operate MiG-29K fighter aircraft, Kamov-31 Air Early Warning Helicopters, the soon to be inducted MH-60R multi-role helicopter and the indigenously manufactured Advanced Light Helicopters.
- **Italian, Russian help:** While the **design was done with help from the Italian firm Fincantieri**, the Russians collaborated in designing and developing the aviation complex.

Significance of IAC Vikrant

- Shining example of 'AatmaNirbhar Bharat' as it has nearly **75 per cent indigenous content - from design to steel used in construction to key weapons and sensors**.
- It help secure India's interests in maritime domain.
- It will help to realize the **vision of SAGAR**(Security and Growth for All in the Region) and the wider goal of a **free, open and inclusive Indo-Pacific to ensure peace and stability** in the region.

HANDBOOK FOR PERSONALITY TEST UPSC CSE 2022

ENVIRONMENT & ECOLOGY

01 COP 27

News

- The 2022 United Nations Climate Change Conference or Conference of the Parties of the UNFCCC, more commonly referred to as COP27, was the 27th United Nations Climate Change conference, held from 6 November until 20 November 2022in Sharm El Sheikh, Egypt.

What's COP?

- COP, short for Conference of Parties is an annual conference organised by the United Nations for nearly 200 countries to talk about the climate crisis. It requires delegates and ministers from these countries to get together to find ways to cut emissions and adapt to a warming climate.
- This year's COP27 held at Sharm el-Sheikh, Egypt ended 2 weeks ago. Here are some issues I was looking forward to and the key takeaways since it ended.

Highlights on this year's COP27

'Breakthrough' to operationalise a new loss and damage fund

- 2022 witnessed countries like Pakistan experiencing the worst climate disasters. 1/3 of Pakistan was completely submerged by historic flooding. This affected more than 33 million people, total damages exceeded USD 14.9 billion, and total economic losses reached about USD 15.2 billion.
- The loss and damage fund intends to assist countries like Pakistan which has been hit hard by climate disasters. Governments also agreed to establish a 'transitional committee' to make recommendations on how to operationalise both the new funding arrangements and the fund at COP28 next year.
- Although considered a breakthrough for most people, scepticism remains. Rich nations have a track record of not living up to their climate promises, as seen from the failure to deliver the $100 billion in annual climate finance. Mohamed Adow, executive director at think tank Power Shift Africa shared, "what we have is an empty bucket,".

Failure to secure stronger commitments on cutting greenhouse gas emissions

- The attempts to have nations agree to peak global emissions by 2025 or phase-down of all unabated fossil fuels also fell flat. The bloc threatened to walk out of the talks over this issue, and while that was avoided, emissions continue to rise in this decade of critical action.
- Disappointment and anger were felt by Alok Sharma, the predecessor at COP26. He complained that key points fought last year were either missing or watered down. "Emissions peaking before 2025 as the science tells us is necessary? Not in this text," "Clear follow through on the phase down of coal? Not in this text. Clear commitment to phase out all fossil fuels? Not in this text. The energy text? Weakened in the final minutes."
- COP27's final text also includes language allowing a transition to "low-emission" sources. Many believed it can be interpreted as a loophole for natural gas, the lowest-emitting of fossil fuels.
- What was even more disappointing is how COP27 was shaped by the presence of fossil-fuel representatives. Major hydrocarbon producers like Saudi Arabia blocked language that would have called for a plan to phase out oil and gas.

Weak rules for carbon markets

- Carbon markets were one of the less contentious arenas of the talks. The outcome felt like there was overall low accountability and a high risk of greenwashing. Based on the agreed text, countries can say their trading information is "confidential" without justification. Additionally, guidelines are messy but bilateral trading will still move forward. The current market is moving faster than regulations can keep up.
- A lot of work will take place over next year's COP28. This was lackluster for many.

The 1.5C goal remains in grave jeopardy

- COP27 saw the failure to raise ambitions on reducing emissions as the world could miss the 1.5C goal. Calls to phase out all fossil fuels (not just coal) and to peak global emissions by 2025 were shot down by many nations that export oil.
- The hope for COP27 was to implement the commitments promised in COP26. Yet, updated commitments on

mitigation were few in COP27. Commitments to follow through further on phasing down coal and speeding up the rollout of renewable energy sources were watered down in the final agreed text. What seemed like a reversal of improvements. The German foreign minister expressed his frustration at "being stonewalled by several large emitters and oil producers."

Scientists say we can only adapt so much to climate change

- The 10 New Insights in Climate Science report from scientists around the world argue that the potential to adapt to climate change is not limitless. While adaptation actions are crucial to minimizing loss and damage from the climate crisis, mitigation efforts must be accelerated for the world to be able to keep up with the effects of climate change.

Launch of the Forest and Climate Leaders' Partnership (FCLP)

- This partnership aims to support the commitment of 140 countries made during COP26 for sustainable land use, and for the conservation, protection, sustainable management, and restoration of forests, and other terrestrial ecosystems.
- 27 countries which make up 60% of global GDP and 33% of the world's forests have already committed to the partnership and will facilitate action areas such as mobilizing public and donor finance to support implementation, supporting Indigenous Peoples' and local communities' initiatives, and incentivizing the conservation of high-integrity forests.

#Together4Transparency initiative launched

- Former US Vice President Al Gore underscored the need for transparency and accountability in climate action, adding that "You can't manage what you cannot measure." This initiative will support the transition towards the Enhanced Transparency Framework of the Paris Agreement.

First global stocktake moves closer to implementation

- The second technical dialogue of the first global stocktake was successfully completed, with participants sharing their best-available science-based methods and assessments of mitigation, adaptation, implementation, as well as the gaps and barriers they have faced. The stocktake is a key process in the implementation of the Paris Agreement and acceleration of climate action.

Forest and Climate Leaders' Partnership (FCLP) launched

- The Forest and Climate Leaders' Partnership (FCLP) seeks to accelerate the implementation of a COP26 commitment from over 140 countries to stop the loss of forests and degradation of lands by 2030. 27 countries which represent over 60% of the world's gross domestic product and 33% of the world's forests have already joined the FCLP.

Joint work programme to promote climate tech in developing countries

- High-level leaders from various governments, UN Environment Programme, and the UN Framework Convention on Climate Change has launched a new 5-year work programme to promote the adoption of climate technology solutions for mitigation and adaptation efforts in developing countries.

Government ministers call for more ambitious climate action

- In a high-level roundtable, government ministers collective called for the entire world to accelerate climate action, with many developing countries highlighting the need for further support and sustained access to climate finance. Most governments also agreed that the 1.5°C temperature limit should be the threshold.

Comprehensive summary of COP27 global climate action outcomes

- The UN Climate Change High-Level Champions summarized pertinent announcements and initiatives during the two-week COP27. These include items on mitigation, adaptation finance, equity, and implementation.

Countries agree on "Loss and Damage" fund for climate-vulnerable countries

- COP27 ended with countries agreeing to create a "loss and damage" funding for vulnerable countries hit hard by climate hazards, loss, and damages. A transitional committee is expected to recommend operationalization guidelines on funding agreements at CPO28 next year.

02 EFFECT OF GEOGRAPHY ON DELHI'S AIR POLLUTION

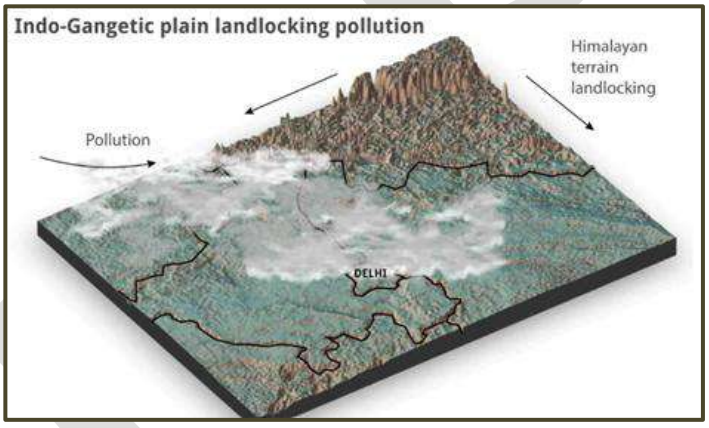
News

- The AQI across Delhi-NCR is going through the roof (it was 458 in the capital), and stage 4 of the Graded Action Plan (GRAP) has kicked in.

What are the factors that cause extreme air pollution in NCR?

- Various studies have shown that the key sources that contribute to air pollution in NCR are **motorized road transport, dust on roads and construction sites, brick kilns, polluting industries, coal-fired power plants, and biomass burning**.

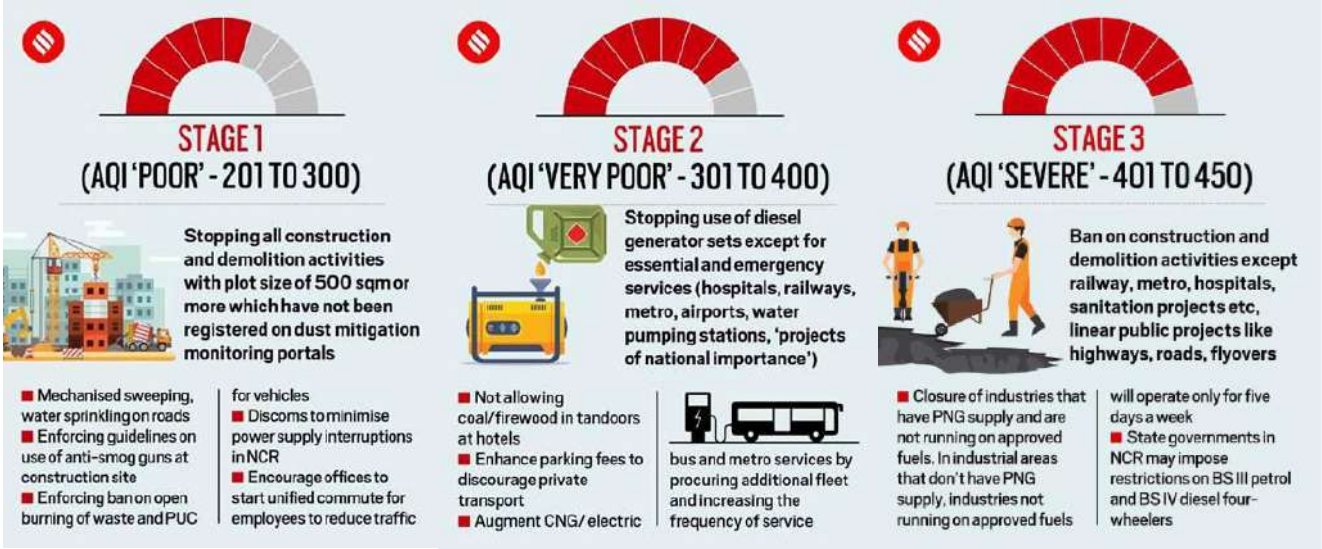
Effect of Geography on Delhi's Pollution



- Geography plays a major role not just in Delhi, but in a good part of the Indo-Gangetic basin that extends from Haryana in the west to the middle of Bihar in the east.
- This area is like a long valley surrounded by higher structures — a few hundred kilometers to the south of this plain is the elevation of the Malwa and Deccan plateaus, to the southwest lie the Aravalli mountains, and to the north are the Himalayas.
- This topography makes the Indo-Gangetic plain similar to California, which is peculiarly susceptible to pollution, and to fight which governments over the decades have taken very strong measures against vehicular and other kinds of atmospheric pollution.
- Within this area, Delhi itself is flanked by the Aravalli hills, which makes a good part of Delhi a "tabletop city".
- This makes Delhi susceptible to critical pollution episodes created by a confluence of meteorological conditions, high vehicular pollution levels, and topography. When all of these conditions come together, typically in the period from October to mid-December, pollution levels in the Indo-Gangetic basin go over the threshold.

AQI

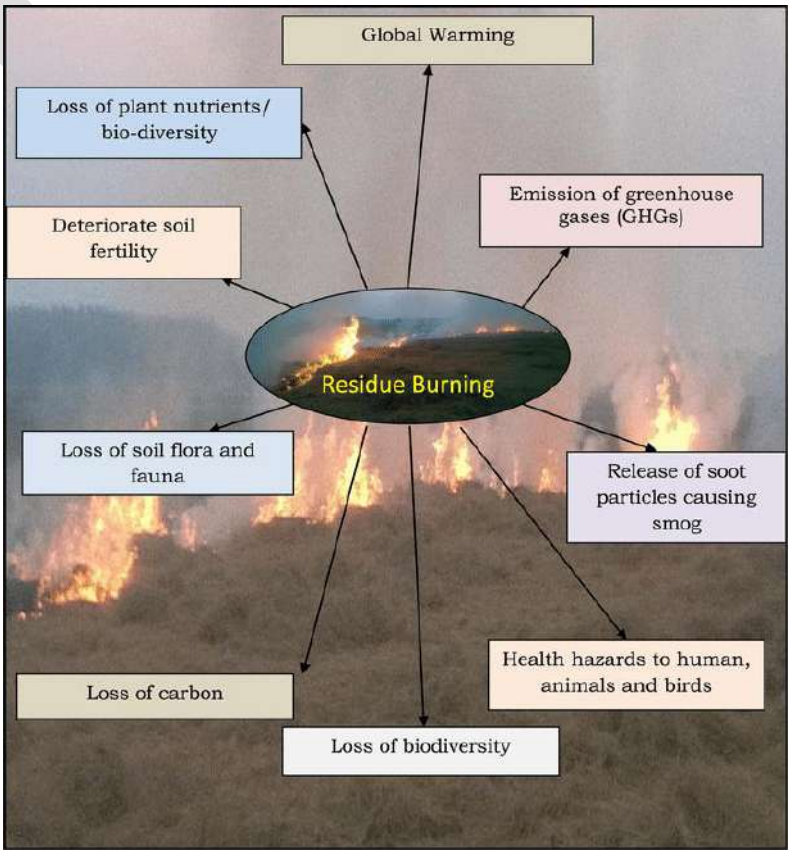
- An air quality index (AQI) is used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become.
- The measurement of air quality is based on eight pollutants, namely: Particulate Matter (PM10), Particulate Matter (PM2.5), Nitrogen Dioxide (NO2), Sulphur Dioxide (SO2), Carbon Monoxide (CO), Ozone (O3), Ammonia (NH3), and Lead (Pb).



03 STUBBLE BURNING

Context

- Every year around the months of October and November, farmers in states like Punjab, Haryana and Uttar Pradesh burn the stubble that is left after harvesting the paddy crop.



What is Stubble Burning?

- Stubble burning is, quite simply, the act of removing paddy crop residue from the field to sow wheat. It's usually required in areas that use the 'combine harvesting' method which leaves crop residue behind.
- Combines are machines that harvest, thresh i.e separate the grain, and also clean the separated grain, all at once. The problem, however, is that the machine doesn't cut close enough to the ground, leaving stubble behind.

Solutions to the burning problem

- In 2014, the Union government released the **National Policy for Management of Crop Residue**.
- Farmers can also manage crop residues effectively by employing agricultural machines like:

- Happy Seeder(used for sowing of crop in standing stubble)
- Rotavator (used for land preparation and incorporation of crop stubble in the soil)
- Zero till seed drill (used for land preparations directly sowing of seeds in the previous crop stubble)
- Baler (used for collection of straw and making bales of the paddy stubble)
- Paddy Straw Chopper (cutting of paddy stubble for easily mixing with the soil)
- Reaper Binder (used for harvesting paddy stubble and making into bundles)
- Among these, the most efficient technology to counter crop burning at the moment seems to be the **Turbo Happy Seeder (THS).**

Other uses of stubble

- **Converting Crop Stubble into Animal Feed, Manure, Cardboard**
- In South India, stubble is not burnt as there's economic value as animal feed.
- Instead of burning of the stubble, it can be used in different ways like cattle feed, compost manure, roofing in rural areas, biomass energy, mushroom cultivation, packing materials, fuel, paper, bio-ethanol and industrial production, etc.

Converting Crop Stubble to Biodegradable Cutlery

- Kriya Labs, an IIT-Delhi startup, has developed a machine that can convert the leftover rice straw into pulp, and that is further moulded to produce biodegradable cutlery.

Biochar

- Another option is to convert stubble into biochar, which can be used as a fertiliser, by burning it in a kiln.

In power plants

- There is also the option of using straw to replace coal in old power plants. This would not only help to extend the life of the built infrastructure, but will also reduce environmental costs.

Redesigning- Combine Harvesters

- It's important to gradually develop and improve the design of Combine Harvesters that do not leave the stubble behind. This can be done by the Combine Harvester manufacturers by slightly tweaking the design of their machines with a modified cutter that chops of the plant from the bottom, nearer to the base and does not leave behind the stubble. The government on its part should strictly regulate and allow only such Combine Harvesters to function that conform to the laid down standards of stubble size. This will eradicate the entire problem from root and cause.

Agri-Waste Collection Centers

- The government may consider setting up "Agri- waste Collection Centres" alongside the "Paddy Purchase Centres". Here, the farmers may sell their agri-waste at a reasonable price and earn some additional income and are not tempted to burn it. Farmer Producer Organizations (FPOs) or Farmers' Co-operatives may be supported for purchasing of this agri-waste/ crop residue from the farmers and later selling it to industries that convert it into cattle feed or fuel.
- Basically, the idea is to incentivize the farmers for not burning the stubble, by providing economic value for this crop residue or stubble, which may be converted into either cattle feed or fuel.

Incentivizing industries

- The industries which are converting this agri-waste/crop residue into wealth in the form of cattle feed or fuel, may also be suitably incentivized and subsidized.

Crop Diversification - A long term solution

- A shift to crops such as maize, beans and lentils need to be envisaged. This would reduce the burning because they are normally harvested by hand or can be gathered earlier. The Centre and state governments could adopt methods to incentivize farmers, rather than penalizing them. If production of other crops, like maize, is made more lucrative, then farmers will switch to growing those.
- Farmers need guaranteed purchases for corn, soybeans and lentils if they are to shift from rice.
- The government would also need to compensate farmers for adverse weather that can damage other crops more easily.
- Another way to reduce stubble burning is to replace long-duration paddy varieties with shorter duration

varieties like Pusa Basmati-1509 and PR-126. These can be harvested in the third week of September itself. This will widen the window between the end of the rice season and start of the wheat season. In this way it will give enough time for the paddy stubble to decompose, and eliminate the need for stubble-burning.

Policy measures and management

- Various policy measures at the national and sub-national levels seek to resolve the problem of crop stubble burning in India. As mentioned earlier, a National Policy for Management of Crop Residues is in place, along with a Crop Diversification Programme.
- According to the law, violators can be charged for non-compliance under the Air (Prevention and Control of Pollution) Act. There are also schemes to promote in situ and ex situ crop residue management through subsidized farm equipments such as the "happy seeder", rotavator and baler. However, **there are many gaps in terms of policy design, implementation and awareness.**
- In terms of policy design, the **National Programme** on crop diversification does not have clear provisions on outreach activities to inform farmers about alternate crop options.
- Similarly, there is insufficient convergence with other programmes, such as the National Rural Employment Guarantee Scheme, National Rural Livelihood Mission and agro-enterprise related schemes.
- The inter convergence could help with the management of paddy stubble or crop diversification.
- In terms of implementation, much-needed equipment is still unaffordable to many farmers despite subsidy provisions.
- Constraints in the supply chain and rental markets are other issues impacting the adoption of the happy seeder and other farm machines.
- Also, there is **little awareness** about new technologies and alternate cropping patterns.

The Chattisgarh Model of Gauthan

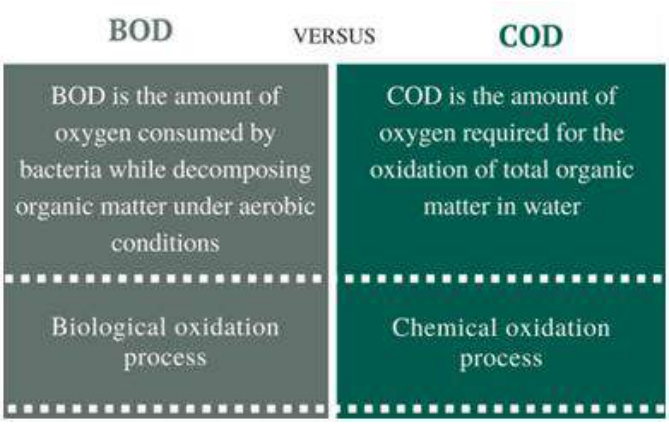
The Chhattisgarh Government has undertaken an innovative experiment of setting up "gauthans" to curb stubble burning. A gauthan is a dedicated five-acre plot, held in common by each village, where all the unused parali is collected through parali daan (people's donations) and is converted into organic fertilizer by rural youth. This provides them a living.The government supports the transportation of parali from the farm to the nearest gauthan. The state has already developed more than 2,000 gauthans.

The Chattisgarh Model of Gauthan generates employment among rural youth as well. A committee consisting of economists, agricultural experts, farmer delegates and bureaucrats can be set up at national level to evaluate the parali burning crisis and explore the possibilities of integrating Gauthan concept with schemes like the MGNREGA by expanding the MGNREGA scheme to harvesting and composting.

04 CLEANING OF GANGA RIVER

Context

- Minister of State for Water Resources, said in the Rajya Sabha that the water quality of the river Ganga is clean enough for bathing and capable for supporting the river ecosystem for almost the entire stretch of the river.
- Dissolved Oxygen (DO), an indicator of river health is within the "acceptable limits" of "bathing water quality criteria".



Findings of Central Pollution Control Board Report (2018)

- CPCB had identified 351 polluted stretches on 323

rivers based on monitoring results of 521 rivers in terms of Bio-chemical Oxygen Demand (BOD).

- It pointed out **four polluted stretches on the main stem of river Ganga**.
- There are five categories ranked 1 to 5, with 1 the most polluted and 5 the least.
- **2021 updated report findings:**
  - None of the stretches of the Ganga stretches were now in Priority Category I to IV
  - Only two stretches are in Priority Category V with Biological Oxygen Demand (BOD)
  - A comparison of median data of water quality parameters such as DO, Bio-chemical Oxygen Demand (BOD) and Faecal Coliform (FC) from 2014 and 2021 showed improvement.

Measures taken by government to clean Ganga

- Based on the assessment of water quality, various measures are being taken both by the Centre and the States to prevent pollution of rivers and drains out–falling into them.
- River cleaning is a continuous process and the Central government assists the State governments and urban local bodies through schemes like 'Namami Gange' and National River Conservation Plan (NRCP).
- **Ganga Action Plan**: It was, launched in 1986 by the then Prime Minister Rajeev Gandhi, with the main objective of pollution abatement of the river Ganga.
- **Bhuvan Ganga Portal**: This App developed by ISRO enables public to collect and report information on various pollution sources that affects the water quality of river Ganga.
- **Clean Ganga Fund:** It was set up in 2015. The fund invites voluntary contributions from residents of the country and Non-Resident Indian (NRIs) / Person of Indian Origin (PIO) and others.
- **Ban on Waste Disposal:** The National Green Tribunal banned the disposal of any waste in the Ganga in the year 2017.

National Mission for Clean Ganga (NMCG)

- NMCG has been focusing on youth as part of its outreach and public communications efforts as they are the impellers of change.
- NMCG has tied-up with **Diamond Toons to develop and distribute comics, e-comics and animated videos**.
- The content will be designed with the objective of bringing about **behavioral change amongst children** towards Ganga and other rivers.
- The total estimated budget for the project is Rs. 2.26 Cr.
- Chacha Chaudhary can be useful **in ground-level activation for Ganga rejuvenation**.
- Initially, the comics will be launched in Hindi, English and Bengali.

Namami Gange Programme'

- It is an **Integrated Conservation Mission**, approved as 'Flagship Programme' by the Union Government in June 2014 with budget outlay of **20,000 Crore** to accomplish the **twin objectives of effective abatement of pollution, conservation and rejuvenation of National River Ganga.**
- Main pillars of the Namami Gange Programme are:-
  - Sewerage Treatment Infrastructure
  - River-Front Development
  - River-Surface Cleaning
  - Bio-Diversity
  - Afforestation
  - Public Awareness
  - Industrial Effluent Monitoring
  - Ganga Gram
- Its implementation has been divided into
  - **Entry-Level Activities**(for immediate visible impact),
  - **Medium-Term Activities**(to be implemented within 5 years of time frame) and
  - **Long-Term Activities** (to be implemented within 10 years).

Way ahead

- Restoring ecological flows at every point along the Ganga's course.
- Preventing all waste water, starting with sewage and industrial waste, from mixing with the river. Especially along the heavily polluted Kanpur and Varanasi stretches of Ganga.
- Promoting massive water conservation and water resource management. Example- rain water harvesting schemes, at both centralized and decentralized levels within the Ganga River Basin.
- The STPs need to be verified on efficiency, reliability and technology parameters by independent agencies (tech-efficiency-reliability verification).
- Pre-treatment units at STPs or sewage pumping stations, including solid-liquid separation units before faecal sludge enters the STPs.
- **Countries like Malaysia have made it mandatory** for STPs to have a pre-treatment unit.
- Better enforcement and monitoring, for efficient faecal sludge management .

10 critical steps to Ganga Revival

05 LAND DEGRADATION

News

- The **Union Minister for Environment, Forest and Climate Change** Bhupendra Yadav reached **Abidjan, Cote D Ivoire** to attend the **Conference of Parties**, 15th meeting of the United Nations Convention on Combating Desertification (**UNCCD COP15**) from 9th May to 20th May 2022.

Agenda for COP15

- The fifteenth session of the Conference of the Parties (COP15) of the United Nations Convention to Combat Desertification (UNCCD) at Abidjan, Côte d'Ivoire, from 9 to 20 May 2022, will bring together **leaders from governments, the private sector, civil society and other key stakeholders** from around the world to drive progress in the future sustainable management of land and will explore links between land and other key sustainability issues.
- For the first time, an **Intergovernmental Working Group** (IWG) on effective policy and implementation measures for **addressing drought** under the United Nations Convention for Combatting Desertification (UNCCD) was established by decision 23/COP.14. A draft report has been prepared and will be discussed during the current session of COP15.
- Drought, land restoration, and related enablers such as **land rights, gender equality and youth empowerment** are among the top items on the Conference agenda. Through its decisions adopted by UNCCD's 197 Parties, COP15 is expected to galvanize sustainable solutions for land restoration and drought resilience, with a strong focus on future-proofing land use.

India and UNCCD

- **India hosted** COP 14 of UNCCD in 2019 in New Delhi and is also the **current president** (took over from China) of UNCCD.
    - COP 14 was attended by Prime Minister **Narendra Modi** and he announced that India would **raise its ambition** of the total area that would be restored from its land degradation status, from twenty-one a million hectares to twenty-six million hectares between now and 2030.
- The above vision will be achieved by **restoring land productivity** and the **ecosystem of 26 million hectares** of most degraded and vulnerable land, with major emphasis on the degraded agricultural, forest and other wastelands by adopting a **landscape restoration approach**.
    - India during its presidency has made a **significant contribution** in bringing the nations together towards the global goal of halting and reversing land degradation.
    - A High-level Dialogue of the United Nations General Assembly held on 14th June 2021 on desertification, land degradation and drought, was addressed by Prime Minister of India, Shri Narendra Modi wherein he highlighted the **success stories and initiatives** taken by India to combat land degradation.
    - In another significant development during India's presidency, **G-20 leaders** recognizing the importance of combating land degradation and **creating new carbon sinks**, put up an aspirational goal to collectively plant 1 trillion trees, urging other countries to join forces with G20 to reach this global goal by 2030.

About UNCCD

- The United Nations Convention to Combat Desertification (UNCCD) was **established in 1994** to protect and restore land and ensure a safer, just, and more sustainable future.
- The UNCCD is the **only legally binding framework** set up to address desertification and the effects of drought.
- There are **197 Parties** to the Convention, including 196 country Parties and the European Union.
- The Convention **– based on the principles of participation, partnership and decentralization –** is a multilateral commitment to mitigate the impact of land degradation, and protect land to provide food, water, shelter and economic opportunity to all people.
- The Convention **unites governments, scientists, policymakers, the private sector and communities** around a

shared vision to restore and manage the world's land.
- This work is crucial to **ensure the sustainability of the planet** and the prosperity of future generations.

About COP

- The Conference of the Parties (COP) was established by the Convention as its **main decision-making body**.
- COP is mandated to **review reports submitted by the Parties** detailing how they are carrying out their **Land Degradation Neutrality** (LDN) commitments and make recommendations based on these reports.
- The COP has been **meeting biennially** since 2001 and has held 14 sessions.

06 SDGs

Context

- In meeting Sustainable Development Goals, India has slipped three places since last year and now stands at 120th rank among 192 countries. India is behind on at least 17 key government targets that have a deadline in 2022.

Sustainable Development Goals target

- SDG targets have been set in a wide array of fields and sectors—from **economy and employment, to housing, agriculture, land records, sustainable environment and energy.**
- **Economy:** The target for the economy is to raise the gross domestic product to nearly $4 trillion by 2022-23. The economy has **largely shrunk during the COVID-19 pandemic**, making it even more difficult to meet the deadline.
- **Employment:** The target is to increase the female labour force participation rate to at least 30 per cent by 2022-23; it stood at 17.3 per cent in January-March 2020.
- **Housing:** The targets are to construct 29.5 million housing units under Pradhan Mantri Awas Yojana (PMAY)-Rural and 12 million units under PMAY-Urban; only about 46.8 per cent and 38 per cent respectively of the targets under 'Housing for All' have been achieved.
- **Provision of drinking water:** The target is to provide safe piped drinking water to all by 2022-23; only 45 per cent of the target has been achieved.
- **Agriculture:** The target is to double farmers' income by 2022. While the average monthly income of an agricultural household has increased to Rs 10,218 from Rs 6,426. The share of income from crop production in the average monthly income of an agricultural household has, in fact, dropped — to 37.2 per cent in 2018-19, from 48 per cent in 2012-13.
- **Digitisation of land records:** Another target is to digitise all land records by 2022. While states like Madhya Pradesh, West Bengal and Odisha have made good progress, states like Jammu and Kashmir, Ladakh and Sikkim languish at 5 per cent, 2 per cent and 8.8 per cent digitisation of land records, respectively. Overall, **14 states have witnessed deterioration in the quality of land records since 2019-20.**
- **Air pollution:** The target is to bring down PM2.5 levels in Indian cities to less than 50 microgramme per cubic metre (µg/m3). In 2020, when vehicular movement was restricted due to the pandemic, 23 of the 121 cities monitored for PM2.5 exceeded 50 µg/m3.
- **Solid waste management:** The target is to achieve 100 per cent source segregation in all households. The overall progress is 78 per cent; and while states like West Bengal and Delhi are woefully behind. Manual scavenging is targeted for eradication, but India still has 66,692 manual scavengers.
- **Increasing the forest cover:** The target is to increase it to 33.3 per cent of the geographical area, as envisaged in the National Forest Policy, 1988. By 2019, 21.67 per cent of India was under forest cover.
- **Energy:** The target is to achieve 175 GW of renewable energy generation capacity by 2022. Only 56 per cent of this target has been achieved thus far.

Key highlights of State of India's Environment (SoE) 2022 report

- It has a comprehensive set of infographics and statistical analysis of how India's states are faring in meeting

the Sustainable Development Goals (SDGs).

- **Uttar Pradesh and Bihar** are below the national average in 11 and 14 SDGs, respectively. Kerala, Tamil Nadu and Himachal Pradesh fared best.
- With respect to **SDG 1 (poverty eradication),** six of the poorest performers include Bihar, Jharkhand, Odisha, Madhya Pradesh, Uttar Pradesh and Chhattisgarh.
- Meghalaya, Assam, Gujarat, Maharashtra and West Bengal — also feature in the list of worst performers as far as **ending hunger and malnutrition is concerned (SDG 2).**
- In **water and sanitation (SDG 6),** the performance of Delhi, Rajasthan, Assam, Punjab and Arunachal Pradesh is a cause for concern .
- **SDG 7** — related to **clean and affordable energy** has seen an above average performance, with most states achieving the target.
- In **climate action (SDG 13),** 13 states and two Union territories score below the national average. Odisha tops the good performance chart, followed by Kerala; Jharkhand and Bihar bring up the rear.

07 MISSION LIFE

Context

- **The Prime Minister, Shri Narendra Modi attended a bilateral meeting with UN Secretary-General, H.E. Mr Antonio Guterres and subsequently launched Mission LiFE at the Statue of Unity, Ekta Nagar, Kevadia, Gujarat.**

Details

PM on Mission LIFE

- The Prime Minister remarked, **The mantra of Mission Life is 'Lifestyle For Environment'**.
- Emphasising the benefits of Mission LiFE, the Prime Minister said that **it connects the powers of the people for the protection of this earth, and teaches them to utilise it in a better way**.
- He underlined that Mission LiFE **makes the fight against climate change democratic, in which everyone can contribute within their capacity.**
- **Mission LiFE believes that the environment can be protected by making changes in our lifestyle**
- **Mission LiFE makes us all trustees of the environment**. A trustee is someone who does not allow indiscriminate use of resources. A trustee works as a nurturer and not as an exploiter
- The Prime Minister elaborated that **Mission LiFE emboldens the spirit of the P3 model i.e. Pro Planet People.** Mission Life, unites the people of the earth as pro planet people, uniting them all in their thoughts.
- **It functions on the basic principles of 'Lifestyle of the planet, for the planet and by the planet'.**
- The Prime Minister **quoted the Atharvaveda and recited, "'Mata Bhumiah Putroham Prithivyah' that is, the earth is our mother and we are her children."**
- The Prime Minister threw light on the **concept of 'Reduce, Reuse and Recycle' and circular economy and mentioned that it has been a part of the lifestyle of Indians for thousands of years.**

India's commitment to addressing climate change:

- The total forest cover is 21.71% of the total geographical area in 2021, compared with 21.67% in 2019
- India's forest cover is increasing and so is the population of lions, tigers, leopards, elephants and rhinos.
- The annual per capita carbon footprint in India is only about 1.5 tonnes, compared to the world average of 4 tonnes per year.
- Initiatives like Ujjwala Yojana, 75 'Amrit Sarovars' in every district and unprecedented emphasis on waste to wealth.
- Today India has the fourth largest capacity for renewable energy in the world. India's renewable energy capacity has increased by about 290 percent in the last 7-8 years
- India has also achieved the target of achieving 40 percent of the electric capacity from non-fossil-fuel sources 9 years ahead of the deadline.

- India had also achieved a target of 10 percent ethanol blending in petrol, and that too 5 months before the deadline.
- Through the National Hydrogen Mission, India has moved towards an environment-friendly energy source. This will help India and many countries of the world to achieve their goal of net zero
- Highlighting the global campaign of One Sun, One World, One Grid, the Prime Minister remarked that India now wants to increase its partnership with the world even more while strengthening its resolve towards such goals.
- By leading the creation of the Coalition for Disaster Resilient Infrastructure, India has conveyed its concept towards environmental protection to the world. Mission LiFE is the next step in this series

Background:

- Mission LiFE aims at following a three-pronged strategy for changing our collective approach towards sustainability.
- **First is by nudging individuals to practise simple yet effective environment-friendly actions in their daily lives (demand); second is by enabling industries and markets to respond swiftly to the changing demand (supply) and; third is to influence government and industrial policy to support both sustainable consumption and production (policy).**
- The idea of LiFE was introduced by India during the 26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow in 2021.
- The idea promotes an environmentally conscious lifestyle that focuses on 'mindful and deliberate utilisation' instead of 'mindless and wasteful consumption.
- **With the launch of the Mission, the prevalent "use-and-dispose" economy governed by mindless and destructive consumption will be replaced by a circular economy, defined by conscious and deliberate consumption.**

What are the other Related Initiatives?

- National Afforestation Programme (NAP)
- National Mission for a Green India (GIM)
- National Action Plan on Climate Change (NAPCC)
- National Biodiversity Action Plan
- Rural Livelihood Schemes: Recognition of natural resources intrinsically linked to rural livelihoods is also reflected in flagship schemes like the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and the National Rural Livelihood Mission (NRLM).

08 SOLID WASTE MANAGEMENT

Context

- **Engagement of formal waste management system remains low in the cities due to funds crunch, low sectoral development & lack of know-how.**

Details

- **With burgeoning population and even faster urbanisation, there has been an explosion in the generation of municipal solid waste (MSW) in Indian cities.**
- This has severely damaged the environment and public health, and strained the capacity of urban local bodies to collect, transport, treat and scientifically dispose of solid wastes.
- **Urban India alone generates nearly 0.15 million tonnes per day of MSW, with per capita generation ranging between 0.30 kg per day to 0.45 kg per day.**
- **The volume of waste is projected to reach 165 million tonnes by 2031 and 436 million tonnes by 2050, if existing policies, programmes and management strategies are not adequately addressed.**
- It is important to note that the **engagement of formal waste management system remains low in the cities,**

primarily due to insufficient funds, low sectoral development and lack of know-how about sustainable waste management businesses.

- Hence, in many developing countries, including India, waste collection and material recycling activities are majorly performed by the informal waste sector

Informal Sector

- The **informal sector may refer to individuals, families, and private sector enterprises working in solid waste management services, whose activities are not organised, sponsored, financed, contracted, recognised, managed, taxed or reported upon by governmental authorities.**
- Informal stakeholders are waste-pickers in dumpsites and at communal waste collection points, informal waste-collectors, itinerant waste-buyers, small junkshop dealers and big waste godown-owners.
- According to the Solid Waste Management Rules (SWM), 2016: **"informal waste collectors" includes individuals, associations or waste-traders who are involved in sorting, sale and purchase of recyclable materials**.
- The informal sector is often not officially approved, recognised and acknowledged, besides the fact that they potentially contribute to waste recycling practices of cities by collecting, sorting, processing, storing and trading waste materials in the recycling value chain.
- 'Role and size of informal sector in waste management — a review', a paper published in Waste and Resource Management in 2013, estimates that the **informal waste economy employs about 0.5-2 per cent of the urban population worldwide.** Assuming an urbanisation rate of 50 per cent, the world's urban population can be calculated at 2.8 billion people.
- **Applying the informal sector range of 0.5-2 per cent to the urban population ranges (2.49-2.8 billion people) leads to an estimated size of roughly 12.5-56 million people worldwide working in the informal sector in waste management. Waste-pickers alone account for 0.1 per cent of India's urban workforce.**
- The informal recycling sector reduces the cost incurred in the treatment and disposal of solid waste by extracting recyclables before the mixed waste is subjected to any specific treatment or haphazardly dumped into the landfills.
- The informal sector is the backbone of the recycling industry in the country, contributing a lot in terms of environmental sustainability and circular economy. It also enormously contributes in reducing the economic burden of urban local bodies.
- For instance, the Bruhat Bengaluru Mahanagara Palike (BBMP) became the first municipality in the country to register waste-pickers and catalogue scrap dealers. As reported by a 2014 study conducted by Hasiru Dala, a Bengaluru-based non-profit, nearly 4,200 registered waste-pickers save the city about Rs 23 crore annually, which would otherwise have been an addition to the BBMP's budgeted Rs 450 crore.

Concerns

- The informal sector lives in close proximity to dumpsites and works under unhygienic and unhealthy conditions.
- Often, the workers have no access to drinking water or public toilets.
- They do not have appropriate personal protective equipment (PPE) such as gloves, gumboots and aprons.
- Due to the poor living and working conditions, malnutrition, anaemia and tuberculosis are common among them.
- Waste-pickers are potentially exposed to a wide range of occupational hazards. Community waste bins and dumpsites act as breeding grounds for various bacterial and viral diseases.
- As a result, waste-pickers often face gastrointestinal ailments.
- Infections are also caused by their contact with human and animal excreta, bodily fluids and dead animals. They also get cut by sharp objects, ragged metal edges and broken glass in the mixed waste.
- Despite their crucial role, informal waste-workers continue to be subjected to systemic marginalisation, economically as well as socially.
- They are treated as dirty and unwanted elements of society, and they have to deal with exploitative social behaviour.
- Further, child labour is quite prevalent and life expectancy is low. In addition, waste-pickers are not covered

under any labour legislation. As a result, they do not benefit from social security and medical insurance schemes. There is a dire need to initiate policy action for their social and economic upliftment.

Case studies

Bengaluru municipality: a story of change

- Bengaluru became the first municipality to set up dry waste collection centres (DWCC)in the country.
- DWCCs are an important element of decentralised waste management in Bengaluru, where the recyclable materials are segregated processed, and resold to recycling industries.
- Though the concept was modelled after the neighbourhood recycling centres, it is based on the principles of waste hierarchy, to put in practice the three Rs — reduce, recycle and reuse — at the neighbourhood-level.
- DWCCs facilitate the collection and buy-back of all dry waste from local residents, contract and waste-workers, and scrap dealers.
- They help integrate informal waste-workers into the operations of these centres and encourage or implement extended producers' responsibility (EPR) of packaging materials that are not being recycled currently, thus serving as the cornerstone for the triple bottom line of operations — people, planet and profit.

Download links for Statewise Interview Material

States Name	Links
DELHI	https://www.aptiplus.in/uploads/pdfs/interview_material_Delhi.pdf
HARYANA	https://www.aptiplus.in/uploads/pdfs/interview_material_Haryana.pdf
KARNATAKA	https://www.aptiplus.in/uploads/pdfs/interview_material_Karnataka.pdf
MAHARASHTRA	https://www.aptiplus.in/uploads/pdfs/interview_material_Maharashtra.pdf
RAJASTHAN	https://www.aptiplus.in/uploads/pdfs/interview_material_Rajasthan.pdf
UTTAR PRADESH	https://www.aptiplus.in/uploads/pdfs/interview_material_Uttar_Pradesh.pdf

Pune's women-driven SWaCH model

- The Kagad Kach Patra Kashtakari Panchayat (KKPKP) — a trade union of informal waste-pickers and waste-buyers in Pune and Pimpri-Chinchwad was formed in 1993 and got occupational identity in 2007.
- SWaCH is a joint project of KKPKP and the Pune Municipal Corporation (PMC) — the first such entity created through municipal action.
- Today, KKPKP has over 9,000 members, 80 per cent of whom are women from socially backward and

marginalised castes.

- SWaCH has over 3,000 worker-members (all women), who provide door-to-door waste collection services (in exchange for fees paid by each household), sort the waste and drop off non-recyclables at city-run feeder points.
- They also earn by selling recyclables to local scrap dealers.
- SWaCH has become a classic model reflecting direct user fee counting for transparency, accountability, efficiency, relationship with citizens and women empowerment.

Way forward

- There is lack of clear and comprehensive laws and policies to protect the rights of waste-pickers in India. There is an **urgent need to frame and implement a uniform waste-picker welfare law that recognises and integrates them into the waste management chain.**
- The law must include basic provisions related to mandatory identity cards; access to waste for collection, segregation, and sorting; PPE to minimise occupational hazards; right to basic necessities like water, sanitation and facilities for clean living; and health insurance.
- The **role of waste-pickers could be formalised by permitting them to use the designated collection and compaction stations (transfer stations, material recovery facilities) in a city for the segregation of recyclables.**
- There is a need to identify, organise, train, and empower the waste-pickers. This can be done by designing an **inclusive waste management model to integrate the waste-pickers**. For example, involving them in the primary door-to-door collection of waste, or engaging them in material recovery facilities.
- There should be provision of enough space for sorting, recycling, trade of recyclables.

09 SOLID WASTE MANAGEMENT RULES, 2016

Solid Waste Management Rules, 2016

- The Solid Waste Management Rules (SWM), 2016 replaced the **Municipal Solid Wastes (Management and Handling) Rules, 2000,** which have been in place for the past 16 years.

Salient features of the SWM, 2016

- **Segregation of Waste is important:** As per the new rules, all waste generators should start segregating their waste into three categories – Biodegradables, Dry Waste (Plastic, Paper, metal, Wood) and Domestic Hazardous Waste (diapers, napkins, mosquito repellents, cleaning agents) before they hand it over to the collectors.
- **Collection and Disposal of Sanitary Napkins**: In order to manage the sanitary waste like diapers and sanitary pads effectively, the new guidelines have made it mandatory for the manufacturers to provide a pouch or wrapper for disposal whenever they sell their products to the customer.
- **Introduction of New Things – User Fees And Spot Fines**: Under the new rules, waste generators will have to pay some amount to the waste collectors for activities like collection, disposal, and processing of waste. The local body across India has the authority to decide the 'User Fees.' The rules also stipulate **zero tolerance for throwing, burning or burying the solid waste generated on streets, open public spaces, water bodies,** "Spot Fines" are also introduced under these new rules which means if someone is found littering or disobeying the guidelines, then local bodies have the authority to fine them.
- **Collect Back System For Non-biodegradable Packaging Waste**; The new guidelines says that the brand owners who sell or market their products in packaging material which are non-biodegradable or are not environmental friendly, will have to put a system in place to collect back the packaging waste generated due to their production.
- **A Bin is a must for Street Vendors**: All street vendor should keep suitable containers or bins for storage of the waste generated by them such as food waste, disposable plates, cups, cans, wrappers, coconut shells, leftover food, vegetables, fruits etc. They are also responsible for their own waste and should deposit their

waste at a waste storage depot or container or vehicle as notified by the local authority.

- **Guidelines for the Over-growing Landfills**: No non-recyclable waste having calorific value of 1500 K/cal/kg or more shall be disposed in the landfills. That waste can either be utilised for generating energy or can be used for preparing refuse derived fuel. It can also be used for co-processing in cement or thermal power plants. As per the new rules, the landfill site should be 100 metres away from a river, 200 metres from a pond, 500 metres away from highways, habitations, public parks and water supply wells and 20 km away from airports/airbase.
- **Waste Processing and Treatment Guidelines**: The new rules advise that the bio-degradable waste should be processed, treated and disposed of through composting or bio-methanation within the premises as far as possible and the residual waste shall be given to the waste collectors or agency as directed by the local authority. The developers of Special Economic Zone, industrial estate, industrial park will also have to earmark at least 5 percent of the total area of the plot or minimum 5 plots/ sheds for recovery and recycling facility. T he rules have also **mandated bio-remediation or capping of old and abandoned dump sites within five years**.
- **Involvement of Ragpickers**: The new rules help in the integration of ragpickers, waste pickers and kabadiwalas from the informal sector to the formal sector by the state government.
- **Guidelines for Municipal authorities**: All local bodies are required to set up few by-laws regarding waste management, segregation of waste within their society. They are also required to set up a system in place so as the process of waste segregation can be followed smoothly by all waste generators. They are also required to promote the idea of composting, waste segregation and waste management through different educative campaigns.
- **The Process of Monitoring**: The government has also established a Central Monitoring Committee under the chairmanship of Secretary, MoEF&CC to monitor the overall implementation of the rules effectively. It is advised that the committee comprising of various stakeholders from the central and state governments will meet once a year to discuss and monitor the implementation of these rules.

10 e-WASTE

Context

- T**he Union environment ministry unveiled a set of draft rules that further incentivises registered electronic waste recyclers.**

Background

- According to Global E-waste Monitor 2020**, Global e-waste will increase by 38 per cent in the decade between 2020 and 2030**.
- There was **6 million tonnes of electronic waste in 2019 which is an average of 7.3 kg per capita.** That is a nearly 21 per cent increase in just five years
- **Asia generated the greatest volume of e-waste** in 2019.
- Most E-waste in 2019 consisted of small equipment, large equipment and temperature exchange equipment.
- **Less than 18 per cent of the e-waste generated in 2019 was collected and recycled**.
- The **number of countries that have adopted a national e-waste policy, legislation or regulation has increased from 61 to 78 and includes India**. It is far from the target set by the International Telecommunication Union to raise the percentage of countries with an e-waste legislation to 50 per cent.
- The Global E-waste Monitor 2020 is a **collaborative product of the Global E-waste Statistics Partnership, formed by the United Nations University, International Telecommunication Union, International Solid Waste Association, UN Environment Programme.**

E-Waste

- E-Waste is short for **Electronic-Waste and the term used to describe old, end-of-life or discarded electronic appliances.**

- It **is categorised into 21 types under two broad categories: Information technology and communication equipment and Consumer electrical and electronics.**
- E-waste includes their components, consumables, parts and spares.
- E-waste **contains several toxic additives or hazardous substances such as mercury, brominated flame retardants (BFR), CFCs and HCFCs.**
- The **increasing levels of e-waste, low collection rates, and non-environmentally sound disposal and treatment of this waste stream pose significant risks to the environment and to human health**.
- **International E-Waste Day has been observed on 14th October** since 2018.

India specific

- There are **312 authorised recyclers of e-waste in India, with the capacity for treating approximately 800 kilo tonnes annually**.
- About **90 per cent of the country's e-waste is recycled in the informal sector**.
- India's **first e-waste clinic for segregating, processing and disposal of waste from household and commercial units has been set-up in Bhopal, Madhya Pradesh**.
- According to the Central Pollution Control Board (CPCB), **India generated more than 10 lakh tonnes of e-waste in 2019-20, an increase from 7 lakh tonnes in 2017-18.** Against this, the e-waste dismantling capacity has not been increased from 7.82 lakh tonnes since 2017-18.

Concerns

- **Toxicity:** E-waste consists of toxic elements such as Lead, Mercury, Cadmium, Chromium, Polybrominated biphenyls and Polybrominated diphenyl.
- **Effects on Humans:** Some of the major health effects include serious illnesses such as lung cancer, respiratory problems, bronchitis, brain damages, etc due to inhalation of toxic fumes, exposure to heavy metals and alike.
- **Effects on Environment:** E-waste is an environmental hazard causing groundwater pollution, acidification of soil and contamination of groundwater and air pollution due to the burning of plastic and other remnants.

Challenges Related to Management of E-Waste in India

- A key factor in used electronic devices not being given for recycling was because **consumers themselves did not do so**.
- In India, about **5 lakh child laborers in the age group of 10-14 are observed to be engaged in various E-waste activities** and that too without adequate protection and safeguards in various yards and recycling workshops.
- There is **absence of any public information on most State Pollution Control Boards (SPCBs)/PCC websites.**
- **No clear guidelines are there for the unorganized sector** to handle E-waste.
- Also, **no incentives are mentioned to lure people engaged to adopt a formal path for handling E-waste**.
- **80% of E-waste in developed countries meant for recycling is sent to developing countries such as India, China, Ghana and Nigeria**.
- **Lack of coordination between various authorities** responsible for E-waste management and disposal including the non-involvement of municipalities.
- End of life computers often contain sensitive personal information and bank account details which, if not deleted leave **opportunity for fraud.**

International Conventions and government initiatives

- Originally the **Basel Convention** did not mention e-waste but later it addressed the issues of e-waste in 2006 (COP8).
- **Nairobi Declaration** was adopted at COP9 of the Basel Convention. It aimed at creating innovative solutions for the environmentally sound management of electronic wastes.
- **Rotterdam Convention, 2004** seeks to promote exchange of information among Parties over a range of potentially hazardous that may be exported or imported.
- In India prior to 2011, e-waste was covered under the **Hazardous Waste Management (HWM) Rules.**
- In 2011, under the **Environmental Protection Act 1986, the E-waste (Management and Handling) Rules, 2011**

were enacted

- In 2016, the **E-Waste (Management) Rules, 2016** were enacted which replaced the 2011 Rules. The Rules were amended in 2018
- CPCB has also issued guidelines **Environmentally Sound Management of E-waste (on Collection, Storage, Dismantling & Segregation, Recycling, and Treatment & Disposal of E-Waste)**
- **Awareness Program on Environmental Hazards of Electronic Waste** initiated by Ministry of Electronics and Information Technology
- **Creation of Management Structure for Hazardous Substances** seeks to raise awareness among people about the 2016 Rules and its implementation.
- **Swachh Digital Bharat** seeks to create awareness among the public about the hazards of e-waste recycling by the unorganised sector, and to educate them about alternate methods of disposing of their e-waste.

NGT's Directions

- **Further steps should be taken for scientific enforcement of E-Waste Management Rules**, 2016 (EWMR) in the light of the reports of the CPCB.
- It noted gaps in collection targets, as the amount of e-waste collected in 2018-19 was 78,000 tonnes against a target of 1.54 lakh tonnes. There are clear governance deficits on the subject.
- The **CPCB may consider steps for compliance of Rule 16 requiring reduction in the use of Hazardous substances in the manufacture of electrical and electronic equipment and their components or consumables or parts or spares.**
- It took note that a large number of accidents take place in residential areas on account of unscientific handling of e-waste.
- This **needs special attention for constant vigilance in such hotspots**. This also requires review and updation of siting norms for e-waste by the CPCB which may be done within three months.
- **All the state pollution control boards need to identify the hotspots by constant vigil and to coordinate with the District Administration** at local levels to prevent damage to the environment and public health and meaningful enforcement of rule of law.

E-Waste Management Rules, 2016

- The **Ministry of Environment, Forest and Climate Change notified** the E-Waste Management Rules, 2016 in supersession of the E-waste (Management & Handling) Rules, 2011.
- **Over 21 products (Schedule-I) were included under the purview of the rule**. It included Compact Fluorescent Lamp (CFL) and other mercury containing lamps, as well as other such equipment.
- For the first time, the **rules brought the producers under Extended Producer Responsibility (EPR), along with targets**. Producers have been made responsible for the collection of E-waste and for its exchange.
- Various producers can have a **separate Producer Responsibility Organisation (PRO) and ensure collection of E-waste,** as well as its disposal in an environmentally sound manner.
- **Deposit Refund Scheme** has been introduced as an additional economic instrument.
- The **role of State Governments has been also introduced** to ensure safety, health and skill development of the workers involved in dismantling and recycling operations.
- A provision of penalty for violation of rules has also been introduced.
- **Urban Local Bodies (Municipal Committee/Council/Corporation) have been assigned the duty to collect and channelize the orphan products** to authorized dismantlers or recyclers.
- **Allocation of proper space to existing and upcoming industrial units for e-waste dismantling and recycling.**

Way Forward

- There is need for **better implementation methodologies and inclusion policies** that provide accommodation and validation for the informal sector to step up and help us meet our recycling targets in an environmentally sound manner.
- Also, successfully **raising collection rates** required every actor to be involved, including consumers.
- There is a need to **strengthen the domestic legal framework** to address the issue of unregulated imports of e-

waste

- Steps should be taken to **formalize the informal sector** by integrating it with the formal sector.
- Government should **introduce vocational training programs** to rightly skill the current unorganized sector employees to ensure their smoother transition to working with organized sector
- Governments must **encourage research into the development of better environmentally-sustainable e-waste recycling techniques**
- There is urgent need for a **detailed assessment of the E-waste** including quantification, characteristics, existing disposal practices, environmental impacts.
- There is **need of an effective take-back program providing incentives to producers**.
- **Mass awareness programmes** should be initiated to encourage consumers to reuse/ recycle electronic products

11 PLASTIC WASTE

Context

- **Around 3.46 million tonnes per annum (TPA) of plastic wastes were generated during 2019-20**, Ashwini Kumar Choubey, minister of state in the ministry of environment, forest and climate change, told the Lok Sabha.

What is Plastic Pollution?

- Plastic pollution occurs when **plastic has gathered in an area and has begun to negatively impact the natural environment** and create problems for plants, wildlife, and even the human population.
- This includes killing plant life and posing dangers to local animals.
- Plastic is an incredibly useful material, but it is not biodegradable.

Various Causes of Plastic Pollution

- As plastic is **less expensive**, it is one of the most widely available and overused items in the world today.
- **Rapid urbanization and population growth** increase the demand of cheap plastics.
- Since it is an **affordable and durable material**, it is utilized in every other way possible, from packaging materials to plastic bottles and containers, straws to plastic carry bags.
- Plastic takes **400 years and even more to Decompose**. The decomposition rate of plastic typically ranges from 500 to 600 years, depending on the type.
- **Abandoned Fishing Nets**
- Disposal of plastic is often **mismanaged**; it ends up in landfills.
- **Burning plastic is incredibly toxic**and can lead to harmful atmospheric conditions and deadly illnesses.

Serious Effects of Plastic Pollution

- **Negative Effects on Human Health:** Microplastics entering the human body via direct exposures through ingestion or inhalation can lead to an array of health impacts, including inflammation, genotoxicity, oxidative stress, apoptosis, and necrosis, which are linked to an array of negative health outcomes including cancer, cardiovascular diseases.
- **Plastic-contaminated seafood**: Scientists have found micro plastics in 114 marine species, and around one-third of these end up on our plates.
- **Upsets the Food Chain**: Because it comes in sizes large and small, polluting plastics even affect the world's tiniest organisms, such as plankton.
- **Groundwater Pollution:** Most of the litter and pollution affecting the world's oceans and groundwater comes from plastics.
- **Land Pollution:** When plastic is dumped in landfills, it interacts with water and forms hazardous chemicals. When these chemicals seep underground, they degrade the water quality. The wind carries and deposits plastic from one place to another, increasing the land litter.

- **Air Pollution:** Burning of plastic in the open air leads to environmental pollution due to the release of poisonous chemicals.
- **Economic impacts:** Plastic pollution costs **$13 billion in economic damage** to marine ecosystems per year. This includes losses to the **fishing industry and tourism, as well as the cost to clean up beaches.** Economic costs include those linked to **clean-up operations, litter removal, the repair and replacement of damaged vessels and gear, reduced fishing catches, and a decline in coastal tourism and impact on related industries.**
- **Marine life:** The most visible and disturbing impacts of marine plastics are the **ingestion, suffocation and entanglement** of hundreds of marine species. Marine wildlife such as seabirds, whales, fishes and turtles, **mistake plastic waste for prey, and most die of starvation as their stomachs are filled with plastic debris.**

Plastic Waste Management Rules, 2016

- It aims to **increase minimum thickness of plastic carry bags from 40 to 50 microns**.
- Expand the jurisdiction of applicability from the municipal area **to rural areas**, because plastic has reached rural areas also.
- **Extended Producer Responsibility**: To bring in the responsibilities of producers and generators, both in plastic waste management system and to introduce collect back system of plastic waste by the producers/brand owners, as per extended producers responsibility
- **Introduced collection of plastic waste management fee** through pre-registration of the producers, importers of plastic carry bags/multilayered packaging and vendors selling the same for establishing the waste management system
- Promote **use of plastic waste for road construction** as per Indian Road Congress guidelines or energy recovery, or waste to oil etc. for gainful utilization of waste and also address the waste disposal issue.

What are microplastics?

- Microplastics are **plastic debris smaller than 5mm in length**, or about the size of a sesame seed.
- They come from a variety of sources, one of them is when larger pieces of plastic degrade into smaller pieces, which are difficult to detect.

Why is microplastic pollution especially harmful?

- The **durability of plastic**, which implies that plastic can take hundreds to thousands of years to decompose depending on the type of plastic and where it has been dumped.
- In the oceans, plastic pollution **impacts marine life, ocean health, coastal tourism and even human health.**
- Over the past few years, various news reports have shown that **marine animals such as whales, seabirds and turtles unknowingly ingest plastic and often suffocate.**
- For humans, too, marine plastic pollution is harmful if it **reaches the food chain**. For instance, microplastics have been found in **tap water, beer and even salt**.
- One of the first studies to estimate plastic pollution in human ingestion that was published in June 2019 said that an average person eats at least **50,000 particles of microplastic each year**.

Measures taken by government

- India has pledged to **ban all single-use plastics by 2022.**
- All offices of central and state governments and major PSUs have been told to prohibit single-use plastic products.
- India has **banned imports of solid plastic waste**.

- India has passed the Plastic Waste Management Rules, 2016 and introduced the **Extended Producer Responsibility.**

Way Forward

The 3R's +E Strategy:

- **Reduce:** To efficiently reduce plastic pollution, there is an evident need of reducing our usage of plastic.
- **Reuse:** Many plastic items can be reused or used for different purposes. Before throwing plastic items, it is important to consider how they can be reused.
- **Recycle:** Plastic recycling consists of collecting plastic waste and reprocessing it into new products, to reduce the amount of plastic in the waste stream.
- **Educate:** Another crucial solution is education in order to increase awareness and behavioral change.

Legal wayout:

- **Law can be framed** and used to tackle plastic pollution and support a circular plastics economy.
- **Policy shifts** can reduce plastic pollution by incentivizing changes in both business and consumer behavior, as well as in plastic design, alternatives and recycling.
- Governments can also **impose taxes** to deter the production or use of single-use plastics, or **offer tax breaks, subsidies and other fiscal incentives to encourage alternatives to single-use plastic products**.
- **Product standards, certifications and labeling requirements can be designed to educate the public on the environmental impacts of plastic**, and on the health and safety hazards involved in their production and use.
- **Extended Producer Responsibility (EPR) programs** can ensure that manufacturers maintain responsibility for single-use plastic products throughout the whole life cycles of those products.

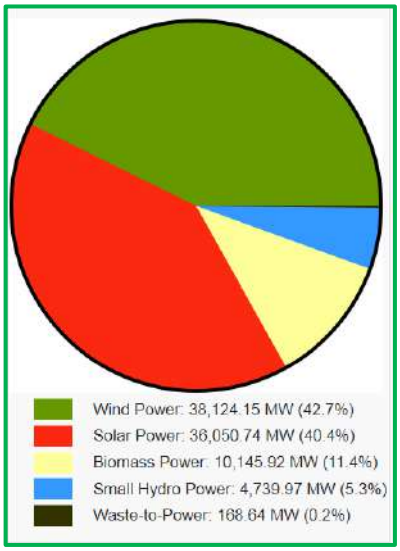
Conclusion

- There is no silver bullet to solving the world's plastic problem. It will require governments at both the national and sub-national levels to tackle the regulation of single-use plastic products, determining what policy approaches they want to use and what type of legislation will support their objectives.

12 RENEWABLE ENERGY

Context

- Union Minister of Power and New & Renewable Energy, Shri R.K. Singh has asked the Chief Ministers of all States, and Lieutenant Governors of Union Territories to set up State Level Steering Committees for Energy Transition.



What Is Renewable Energy?

- Renewable energy, often referred to as clean energy, comes from natural sources or processes that are constantly replenished. For example, sunlight or wind keep shining and blowing, even if their availability depends on time and weather.

Market size

- As of January 2022, India's installed renewable energy capacity stood at 152.36 GW, representing 38.56% of the overall installed power capacity. 975.60 MW of renewable energy capacity was added in January 2022. Power generation from renewable energy sources stood at 13.15 billion units (BU) in January 2022, up from 11.51 BU in January 2021.

Achievements of India

- India was ranked fourth in wind power, fifth in solar power and fourth in renewable power installed

capacity, as of 2020.

- Installed renewable power generation capacity has gained pace over the past few years, posting a CAGR of 17.33% between FY16-20. With the increased support of Government and improved economics, the sector has become attractive from an investors perspective.
- The **renewable energy capacity addition stood at 8.2 GW for the first eight months of FY22** against 3.4 GW for the first eight months of FY21.
- According to the data released by Department for Promotion of Industry and Internal Trade (DPIIT), **FDI inflow in the Indian non-conventional energy sector stood at US$ 11.21 billion between April 2000-December 2021.**
- More than Rs. 5.2 lakh crore has been invested in India's renewable energy sector since 2014.
- According to the analytics firm British Business Energy, **India ranked 3rd globally in terms of its renewable energy investments and plans in 2020.**
- India ranked **third on the EY Renewable Energy Country Attractive Index 2021.**

Targets

Paris Agreement Targets

- In the Paris Agreement India has committed to an Intended Nationally Determined Contributions target of achieving 40% of its total electricity generation from non-fossil fuel sources by 2030.

Central Electricity Authority's strategy blueprint

- We are also aiming for a more ambitious target of 57% of the total electricity capacity from renewable sources by 2027 in Central Electricity Authority's strategy blueprint.
- According to 2027 blueprint, India aims to have 275 GW from renewable energy, 72 GW of hydroelectricity, 15 GW of nuclear energy and nearly 100 GW from "other zero emission" sources.
- There is also a target for installation of Rooftop Solar Projects(RTP) of 40 GW by 2022 including installation on rooftop of houses.

UN Climate Summit

- In 2019 at UN climate summit, India announced that it will be more than doubling its renewable energy target from 175GW by 2022 to 450GW of renewable energy by the same year.
- These targets would place India among the world leaders in renewable energy use and place India at the centre of its "Sunshine Countries" International Solar Alliance project promoting the growth and development of solar power internationally to over 120 countries.

Some Government's Initiatives for generating Renewable Energy

Grid Connected Solar Rooftop Programme

Objective: For achieving cumulative capacity of 40,000 MW from Rooftop Solar (RTS) Projects by the year 2022.

Solar Park Scheme

- MNRE has come up with a scheme to set up a number of solar parks across several states, each with a capacity of almost 500 MW. The scheme proposes to offer financial support by the Government of India to establish solar parks to facilitate the creation of infrastructure required for setting up new solar power projects in terms of allocation of land, transmission, access to roads, availability of water, etc.

International Solar Alliance

- The International Solar Alliance (ISA) is an alliance of 121 countries initiated by India, most of them being sunshine countries, which lie either completely or partly between the Tropic of Cancer and the Tropic of Capricorn. The primary objective of the alliance is to work for efficient consumption of solar energy to reduce dependence on fossil fuels.
- The initiative was launched by Prime Minister Narendra Modi at the **India Africa Summit,** and a meeting of member countries ahead of the 2015 United Nations Climate Change Conference (COP 21) in Paris in November 2015. The framework agreement of the International Solar Alliance opened for signatures in Marrakech, Morocco in November 2016, and 200 countries have joined. **HQ**- Gurugram, Haryana

PM KUSUM

- Pradhan Mantri Kisan Urja Suraksha evem Utthan Mahabhiyan (PM KUSUM) Scheme for farmers aims for installation of solar pumps and grid connected solar and other renewable power plants in the country.
- The scheme aims to add solar and other renewable capacity of 25,750 MW by 2022.

National Green Corridor Project

- The green energy corridor is grid connected network for the transmission of renewable energy produced from various renewable energy projects.

National Wind-Solar Hybrid Policy

- This policy essentially aims at establishing a structure on the basis of which large-scale wind-solar hybrid power projects can be promoted.

National Offshore Wind Energy Policy

- The objective is to develop the offshore wind energy in the Indian Exclusive Economic Zone (EEZ) along the Indian coastline.

Sustainable Rooftop Implementation for Solar Transfiguration of India (SRISTI) scheme

- The Central government will offer with financial incentive to the beneficiary for installing Solar power plant rooftop projects within the country.

Biomass power & cogeneration programme

- It is being implemented with the main objective of promoting technologies for optimum use of country's biomass resources for grid power generation.

Draft National Wind-Solar Hybrid Policy

- The main objective of the Policy is to provide a framework for promotion of large grid connected wind - solar PV hybrid system for optimal and efficient utilization of transmission infrastructure and land, reducing the variability in renewable power generation and achieving better grid stability.

FDI Policy

- 100% FDI is allowed in the renewable energy sector under the Automatic route and no prior Government approval is needed.

Akshay Urja Portal and India Renewable Idea Exchange (IRIX) Portal

- Promotes the exchange of ideas among energy conscious Indians and the Global community.

National Biogas and Manure Management Programme

- Central Sector Schemes that provides for setting up of Family Type Biogas Plants mainly for rural and semi-urban/households.

Production Linked Incentive (PLI) Scheme

- Incentives for High Efficiency Solar PV Modules for Enhancing India's Manufacturing Capabilities and Enhancing Exports.

Mission Innovation CleanTech Exchange

- In June 2021, India launched the Mission Innovation Clean Tech Exchange, a global initiative that will create a whole network of incubators across member countries to accelerate clean energy innovation.

India Renewables Dashboard

- In April 2021, the Central Electricity Authority (CEA) and CEEW's Centre for Energy Finance (CEEW-CEF) jointly launched the India Renewables Dashboard that provides detailed operational information on renewable energy (RE) projects in India.

National Electricity Policy (NEP) 2021

- In April 2021, the Ministry of Power (MoP) released the draft National Electricity Policy (NEP) 2021 and has invited suggestions from all stakeholders such as Central Public Sector Undertakings, Solar Energy Corporation of India, power transmission companies, financial institutions like Reserve Bank of India, Indian Renewable Energy Development Agency, HDFC Bank, ICICI Bank, industrial, solar, and wind associations, and state governments.

National Mission on advanced ultra-supercritical technologies

- The Government of India has announced plans to implement a US$ 238 million National Mission on advanced ultra-supercritical technologies for cleaner coal utilisation.

Indian Railways Efforts

- Indian Railways is taking increased efforts through sustained energy efficient measures and maximum use of clean fuel to cut down emission level by 33% by 2030.

Renewable energy park at the Rann of Kutch in Khavada, Gujarat

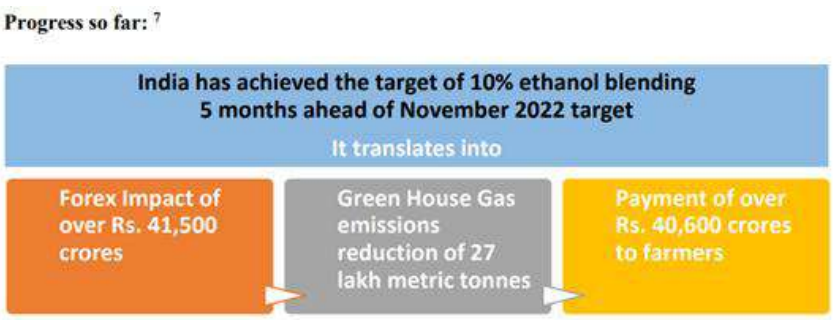
- In July 2021, the Ministry of New and Renewable Energy (MNRE) gave the go ahead to NTPC Renewable Energy Ltd., a 100% subsidiary of NTPC, to build a 4,750 MW renewable energy park at the Rann of Kutch in Khavada, Gujarat. This will **be India's largest solar park to be developed by the country's leading power producer.**

Conclusion

- The Cabinet Committee on Economic Affairs, CCEA approved the mechanism for ethanol procurement by public sector oil marketing companies under the Ethanol Blended Petrol program. It has approved a higher Ethanol price derived from different sugarcane-based raw materials under the program for the forthcoming sugar season.

13 ETHANOL BLENDING PROGRAM

Ethanol Blended Petrol (EBP) programme



- The government has been promoting the use of ethanol as a blend stock with main automotive fuel like petrol **in line with the National Policy on Biofuels - 2018 under the Ethanol Blended Petrol (EBP) Programme.**
- Ethanol Blended Petrol (EBP) programme was **launched in 2003**. The programme sought to promote the use of alternative and environment friendly fuels and to reduce import dependency for energy requirements.
- The ethanol blending programme is aimed at reducing the country's dependence on crude oil imports, cutting carbon emissions and boosting farmers' incomes.
- This programme has been extended to whole of India except Union Territories of Andaman Nicobar and Lakshadweep islands wherein OMCs sell petrol blended with ethanol up to 10%.
- The target of supplying petrol mixed with 10 percent ethanol (10 percent ethanol, 90 percent petrol) was

achieved in June, ahead of the original schedule of November 2022. The **Government has 20% blending target by 2025-26.**

- The OMCs are to procure ethanol from domestic sources. Government has notified administered the price of ethanol since 2014. OMCs are advised to continue according priority of ethanol from 1) sugarcane juice/sugar/sugar syrup, 2) B heavy molasses 3) C heavy molasses and 4) Damaged Food grains/other sources, in that order.

Steps Taken

To increase indigenous production of ethanol the Government took multiple interventions like:

- Re-introduction of administered price mechanism;
- Opening of alternate route for ethanol production;
- Amendment to Industries (Development & Regulation) Act, 1951 which legislates exclusive control of denatured ethanol by the Central Government for smooth movement of ethanol across the country;
- Reduction in Goods & Service Tax (GST) on ethanol meant for EBP Programme from **18% to 5%;**
- Differential ethanol price based on raw material utilized for ethanol production;
- Extension of EBP Programme to whole of India except islands of Andaman Nicobar and Lakshadweep wef 01st April, 2019;
- Interest Subvention Scheme for enhancement and augmentation of the ethanol production capacity by Department of Food and Public Distribution (DFPD);
- Publication of Long-Term Policy on ethanol procurement.

Environmental costs of ethanol blending

- Because ethanol burns more completely than petrol, it **avoids emissions such as carbon monoxide**. However, tests conducted in India have shown that there is **no reduction in nitrous oxides**, one of the major environmental pollutants.
- A report by the Institute for Energy Economics and Financial Analysis (IEEFA) says that for India to meet its target of 20% ethanol blended in petrol by the year 2025, it will need to bring in 30,000 additional sq km of land to come under maize cultivation. Half that land can be used more efficiently to produce clean electricity from solar energy, they contend.
- Increasing production of food-based feedstock for ethanol manufacturing may not be the best use of land in a hungry country, Institute for Energy Economics and Financial Analysis contends. India ranked 101 of 116 countries on the World Hunger Index 2021. Further, land can be used far more efficiently for generating renewable power for Electric Vehicles (EV) than for growing crops for ethanol.
- Use of land on this scale to grow crops for ethanol production is questionable considering India's food security concerns, the fact that sugarcane is a water-guzzling crop, and the availability of damaged or surplus grains is uncertain. For example, on average, one tonne of sugarcane can produce 100 kg of sugar and 70 litres of ethanol. Cultivation of each kg of sugar requires 1,600 to 2,000 litres of water. Hence, one litre of ethanol from sugar requires about 2,860 litres of water.

Final Thought

- According to a Report by "Expert Committee on Roadmap for Ethanol Blending in India by 2025" immense benefits can accrue to the country by 20% ethanol blending by 2025, such as saving Rs 30,000 crore of foreign exchange per year, energy security, lower carbon emissions, better air quality, self-reliance, use of damaged food grains, increasing farmers' incomes, employment generation, and greater investment opportunities.

- But the ramifications of India's ethanol policy are far-reaching, and its implications for land use appear not to have been adequately considered.
- A careful evaluation of both the target blending level and its timeframe is needed, considering land use, food security and other issues confronting the rural sector in particular.
- To achieve the key goal, that is emissions reduction, alternative mechanisms--enhanced EV uptake, installation of additional renewable generation capacity to allow zero-emissions recharging, etc.--need to be evaluated.

14 FOREST CONSERVATION RULES, 2022

Context

- The **opposition accused the Union government of diluting the rights of tribal communities through the new forest conservation rules, drawing a rebuttal from the Centre which said these rules simply aim to "streamline" project clearances.**

Details

- The new Forest Conservation Rules — notified by the Ministry on June 28 — **do not mention the earlier requirement of attaining a gram sabha NOC before diverting forest land for a project.**
- They also **allow forest rights to be settled after the final approval for forest clearances has been granted by the Centre,** a point flagged by critics.
- **The settling of forest rights now needs to be carried out by the state government instead of the Centre, as was the case earlier.** The state governments will be under even greater pressure from the Centre to accelerate the process of diversion of forest land, critics say.
- The government said that the **Forest (Conservation) Rules, 2022, are reformative with an objective to streamline the process of approvals under the Act, and enable the parallel processing under other Acts and Rules including FRA, 2006.**
- The **Forest Conservation Act of 1980, brought the diversion of forest land for non-forestry purposes under the purview of the central government** — prior to this the states were solely in charge of clearing projects and diverting forest land.
- The **Forest Conservation Act, laid down the process by which forest diversion could be carried out for projects such as mines or dams.**
- But the Forest Conservation Act, and the Forest Advisory Committee, which would decide on the cases of forest diversion, would earlier only look at issues of forest health, protection of wildlife species, major harm to biodiversity, the land required for compensatory afforestation in lieu of the forest diversion etc.
- It was **only when the Forest Rights Act, 2006 was enacted that the government mandated that the rights of forest dwelling communities need to be recognised, and that they needed to be consulted before the project was sanctioned**.

About the news rules

- It constituted an **Advisory Committee**, a **regional empowered committee** at each of the integrated regional offices and a **screening committee** at State/Union Territory (UT) government-level. The role of the Advisory Committee is restricted to **advise or recommend with regards to grant of approval** .
- The MoEFCC has directed the constitution of a **project screening committee in each state/UT for an initial review of proposals involving diversion of forest land.** The five-member committee **will meet at least twice every month** and will advise the state governments on projects in a time bound manner.
- All **non-mining projects between 5-40 hectares** must be reviewed within a period of 60 days and all such mining projects must be reviewed within 75 days. For projects involving a larger area, the committee gets some more time — 120 days for non-mining projects involving more than 100 hectares and 150 days for mining projects.
- All linear projects (roads, highways, etc), projects involving forest land up to 40 hectares and those that have

projected a use of forest land having a canopy density up to 0.7 shall be examined in the **Integrated Regional Office.**

- The applicants for diverting forest land in a hilly or mountainous state with green cover covering more than two-thirds of its geographical area, or in a state/UT with forest cover covering more than one-third of its geographical area, **will be able to take up compensatory afforestation in other states/UTs where the cover is less than 20%.**

15 ESZ

Context

- The Supreme Court directed that **every protected forest, national park and wildlife sanctuary across the country should have a mandatory eco-sensitive zone (ESZ) of a minimum one km starting from their demarcated boundaries.**

More on the news

- Environment Ministry guidelines show that the purpose of declaring ESZs around national parks, forests and sanctuaries is to create some kind of a "shock absorber" for the protected areas.
- These zones would act as a transition zone from areas of high protection to those involving lesser protection.
- A three-judge Bench highlighted how the nation's natural resources have been for years ravaged by mining and other activities.
- The judgment observed that the **government should not confine its role to that of a "facilitator" of economic activities for the "immediate upliftment of the fortunes of the State".**
- The State also has to act as a trustee for the benefit of the general public in relation to the natural resources so that sustainable development could be achieved in the long term.
- In a series of directions, the court held that **in case any national park or protected forest already has a buffer zone extending beyond one km, that would prevail.**
- **In case the question of the extent of buffer zone was pending a statutory decision, then the court's direction to maintain the one-km safety zone would be applicable until a final decision is arrived at under the law.**
- The court directed that **"mining within the national parks and wildlife sanctuaries shall not be permitted".**
- It held the **Principal Chief Conservator of Forests and Home Secretaries of States responsible for the compliance of the judgment.**
- The Principal Chief Conservator for each State and the Union Territory has also been directed to make a list of subsisting structures within the ESZs and submit reports to the apex court in three months.

Eco-Sensitive Zones (ESZs)?

- Eco-Sensitive Zones or Ecologically Fragile Areas **are areas within 10 kms around Protected Areas, National Parks and Wildlife Sanctuaries.**
- ESZs are **notified by MoEFCC, Government of India under Environment Protection Act 1986.**
- In case of places with sensitive corridors, connectivity and ecologically important patches, crucial for landscape linkage, even area beyond 10 km width can also be included in the eco-sensitive zone.
- The basic aim is to regulate certain activities around National Parks and Wildlife Sanctuaries so as to minimise the negative impacts of such activities on the fragile ecosystem encompassing the protected areas.
- **Prohibited activities:** Commercial mining, saw mills, industries causing pollution (air, water, soil, noise etc), establishment of major hydroelectric projects (HEP), commercial use of wood, Tourism activities like hot-air balloons over the National Park, discharge of effluents or any solid waste or production of hazardous substances.
- **Regulated activities:** Felling of trees, establishment of hotels and resorts, commercial use of natural water, erection of electrical cables, drastic change of agriculture system, e.g. adoption of heavy technology, pesticides etc, widening of roads.

- **Permitted activities:** Ongoing agricultural or horticultural practices, rainwater harvesting, organic farming, use of renewable energy sources, adoption of green technology for all activities.

16 WILD LIFE (PROTECTION) AMENDMENT BILL, 2021

News

- The Wild Life (Protection) Amendment Bill, 2021 was passed by Lok Sabha.

Wild Life (Protection) Amendment Bill 2021

- The 2021 amendment Bill proposes **50 amendments to the existing Wildlife (Protection) Act, 1972.**
- The amended bill also seeks **to rework the protection Schedules**.
- The Bill seeks to increase the number of species protected under the law, and **implement the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**
- Instead of the present six Schedules in the principal Act, the Bill **proposes three Schedules** –
  - **Schedule I** for species that will enjoy the highest level of protection
  - **Schedule II** for species that will be subject to a lesser degree of protection, and
  - **Schedule III** covers plants.
- **Obligations under CITES:** The Bill provides for the central government to designate a:
  (i) **Management Authority**, which grants export or import permits for trade of specimens, and
  (ii) **Scientific Authority,** which gives advice on aspects related to impact on the survival of the specimens being traded.
- **Invasive alien species:** The Bills empowers the central government to regulate or prohibit the import, trade, possession or proliferation of invasive alien species.
  - **Invasive alien species** refers to plant or animal species which are not native to India and whose introduction may adversely impact wild life or its habitat.
- **Control of sanctuaries:** The Act entrusts the Chief Wild Life Warden to control, manage and maintain all sanctuaries in a state.
- **Conservation reserves:** Under the Act, state governments may declare areas adjacent to national parks and sanctuaries as a conservation reserve, for protecting flora and fauna, and their habitat. The Bill empowers the central government to also notify a conservation reserve.
- **Surrender of captive animals:** The Bill provides for any person to voluntarily surrender any captive animals or animal products to the Chief Wild Life Warden. No compensation will be paid to the person for surrendering such items. The surrendered items become the property of the state government.
- **Penalties:** The Act prescribes imprisonment terms and fines for violating the provisions of the Act. The Bill increases these fines.

17 CHEETAH RELOCATION

News

- India's wait for cheetah could extend to months, as a formal MoU for transfer is yet to be signed.

Need of re-introduction

- Cheetah became the **only large carnivore to have gone extinct in India in the 1950s** due to **hunting and loss of habitat.**
- Action Plan for Introduction of Cheetah in India', is an effort to bring the **world's fastest cat back** to the country after 70 years.

Relocation details

- **Source:** Wildlife Institute of India and the Wildlife Trust of India, are translocating around 8-12 cheetahs from **South Africa, Namibia and Botswana** – which have the world's largest populations of the animal.
- **Destination:** The big cats will live at **Kuno Palpur National Park in Madhya Pradesh** as it is most suitable for cheetah translocation in terms of habitat and an adequate prey base.

Kuno National Park

- **Located in**: Madhya Pradesh, India.
- Also known as **Kuno-Palpur and Palpur-Kuno Wildlife Sanctuary**.

Action Plan for Introduction of Cheetah in India' details

- A cohort of around **12 to 14 cheetahs** will be imported from South Africa or Namibia and each of them will be **fitted with a satellite-GPS-very high frequency radio-collar.**
- The animals' **lineage and condition shall be checked** in the host country to **ensure that they are not from an excessively inbred stock and are in the ideal age group,** so as to conform to the needs of a founding population.
- Ministry of environment and the **Cheetah Task Force**, will **create a formal framework to collaborate** with governments of Namibia and/or South Africa, through the ministry of external affairs.

About Cheetah

- The cheetah (Acinonyx jubatus) is a **large cat native to Africa and central Iran.**
- It is the **fastest land animal**, capable of running at 80 to 128 km/h.
- **Habitat:** The cheetah occurs in a variety of habitats such as **savannahs in the Serengeti**, arid mountain ranges in the **Sahara and hilly desert terrain in Iran.**
- **Threats:** Habitat loss, conflict with humans, poaching and high susceptibility to diseases.
- **Protection status:** It is listed as Vulnerable on the IUCN Red List.
- **Re-introduction:** Cheetah was declared extinct from India in 1952 and is considered the only large mammal that has gone extinct since the country's independence. If the cheetah is reintroduced, **India would become probably the only country in Asia to have all the major big cats in the wild** (lions, tigers and leopards included).

18 URBAN FLOODING

Context

- The overflowing of Bellandur, Varthur, Saul Kere and Kaikondrahalli lakes in Bengaluru has put the spotlight back on the loss of interconnectivity of water bodies, which is being blamed for the recent urban flooding.

About Urban Flooding

- Urban flooding is the **inundation of property in a built environment, particularly in densely populated urban areas, caused by intense rainfall (on impermeable surfaces) which overwhelms the capacity of drainage systems.**
- Urban flooding is significantly **different from rural flooding as urbanization leads to developed catchments, which increases the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times.**
- Consequently, flooding occurs very quickly due to faster flow times.
- Urban areas are densely populated and people living in vulnerable areas suffer due to flooding and the **secondary effect of exposure to infection also has its toll in terms of human suffering, loss of livelihood and in extreme cases, loss of life.**
- Increasing trend of urban flooding is a universal phenomenon and poses a great challenge to urban planners the world over.
- Urban areas are also centres of economic activities with vital infrastructure which needs to be protected 24x7.

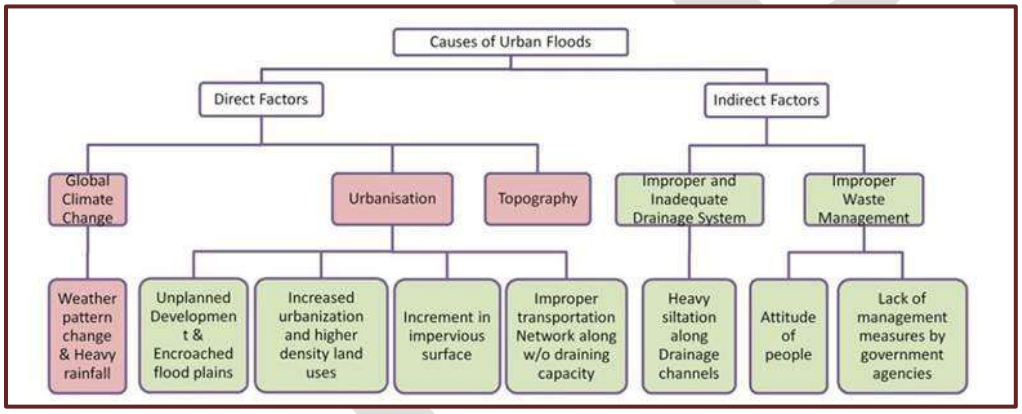
Urban Flood Risk in India

- A special feature in India is that we have **heavy rainfall during monsoons.**
- **Storm surges can also affect coastal cities**/ towns.
- Sudden **release or failure to release water from dams** can also have severe impact.
- In addition, the **urban heat island effect** has resulted in an increase in rainfall over urban areas.
- **Global climate change** is resulting in changed weather patterns and increased episodes of high intensity rainfall events occurring in shorter periods of time.
- Then the threat of **sea-level rise** is also looming large, threatening all the coastal cities.
- Cities/towns located on the coast, on **river banks, upstream/ downstream of dams, inland cities and in hilly areas** can all be affected.
- Further, the **systems very often do not work to the designed capacities because of very poor maintenance.**
- **Encroachments** are also a major problem in many cities and towns.

Impacts

Urban flooding has wide ranging impacts:

- **Damage to vital urban infrastructure** causing disruptions in transport and power
- **Loss of life and damage to property**
- **Risk of epidemics** due to exposure to waterborne and vector borne infections



- **Deterioration of water quality**
- **Economic losses** due to disruption in industrial activity, supply chains etc
- **Displacement of population** in low lying areas
- **Accidents and fires** due to short circuit

NDMA guidelines on urban flooding

- It **designates Ministry of Urban Development as the Nodal Ministry for Urban Flooding**.
- Among key provisions of the Guideline are **Early Warning System and Communication**
- Create a **National Hydro-meteorological Network**- for providing early warning in all urban centres.
- Developing **local networks for real-time rainfall data collection with a 'Local Network Cell' in the IMD headquarters.**
- **Sub divide Cities/ towns on the basis of watersheds and develop a protocol** for forecasting rainfall for urban areas on the basis of watershed.
- Design and Management of **Urban Drainage System**
- A **watershed based and ward-based inventory of the existing storm water drainage system** to be prepared.
- **Pre-monsoon desilting** of all major drains to be completed by March 31 each year.
- **Every building in an urban area must have rainwater harvesting** as an integral component.
- Concept **of Rain Gardens** to be incorporated in planning for public parks.
- **Integrated Planning and interactions** between Water and Solid Waste Management.

Case studies

Mumbai:

- Mumbai is often referred as a prime example when it comes to discussing urban floods in India.
- A United Nations Habitat paper on monsoon floods in Mumbai mentions that **even after 10 days of intense rainfall, the suburban and low-lying areas near the Mithi river remain waterlogged without services, appropriate shelter, potable water or food.**

- This area is estimated to have 70 per cent occupancy by slums and pavement dwellers, including one of the largest slums in the world — Dharavi.
- The recurrent urban flooding in Mumbai is a **prime example of lagged response by the government.**
- The major factor is the city's old drainage system, which is heavily silted and damaged.
- While there have been multiple plans and proposals to update Mumbai's storm water disposal system, no conclusion has been arrived at it yet.
- The **BRIMSTOWAD (Brihanmumbai Storm Water Disposal System) project, proposed in 1993, was intended to be a long-term roadmap for the city's vulnerability to flooding; but no action was taken on it till the major flooding of 2005.**The system has not been fully updated yet.
- Recently, Ministry of Earth Sciences (MoES) in coordination with Municipal Corporation of Greater Mumbai developed an **Integrated Flood Warning System for Mumbai called 'IFLOWS-Mumbai'.**

Gurugram:

- It takes only one seasonal downpour to bring the city to a standstill.
- Gurugram has seen an explosive growth in the urban population as well as infrastructure in the recent years.
- As a result of **poor planning, unregulated construction and mismanagement of environmental resources, water reservoirs and wetlands have vanished over the years**.
- The number of water bodies has reduced to 123 in 2018 from 644 in 1956.
- Green cover is only 9 per cent, which ideally should have been at least 33 per cent.
- Better late than never, the city has fortunately identified areas of intervention and is drafting a **district action plan as part of 'Gurujal' project.**
- The Municipal Corporation of Gurugram (MCG) has identified **38 sensitive areas that are most prone to urban flooding.**
- The district administration is pushing for several measures to improve water management including stringent building bylaws, enforcement and campaigning.

Way forward

- **Integrated approach should be adopted** for sustainable urban planning by empowering and educating Urban Local Bodies in decision making and planning of flood mitigation infrastructure.
- Focus on **increasing the resilience of communities and adaptive capacity of our infrastructure is needed.**
- **Water sensitive urban design and planning techniques** — especially in the context of implementation — are of utmost importance. These methods take into consideration the topography, types of surfaces (pervious or impervious), natural drainage and leave very less impact on the environment.
- **Vulnerability analyses and risk assessments** should form part and parcel of city master plans.
- **Disabling encroachment in sensitive zones** through robust anti-encroachment laws and by providing adequate affordable housing can help reduce number of persons vulnerable to changing climate.

19 HEAT WAVES

Heatwave in India

- In India, **a region or locality is considered to be under the influence of a heatwave if the maximum temperature reaches or exceeds**;
  - 40 degrees Celsius in the plains.
  - 30 degrees Celsius in hilly regions.
  - 37 degrees Over the coastal regions
- When the maximum temperature departure ranges between 4.5 and 6 degrees, the India Meteorological Department (IMD) declares a heatwave.
  - For example; If the normal temperature of a locality should be 40 degrees, and the actual recorded temperature is 45 degrees, the locality is under a heatwave.
  - A severe heatwave is declared when the recorded maximum temperature of a locality departure from normal is over 6.4 degrees.

- In India, heat waves occur from March to June, occasionally in July. The peak heatwave events have been reported in May.
- As per the IMD, the most heatwave prone states are Punjab, Haryana, Delhi, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Odisha, Madhya Pradesh, Rajasthan, Gujarat, Vidarbha, and parts of Karnataka, Andhra Pradesh, Telangana, and occasionally over Tamil Nadu and Kerala.

Implications of Heat Waves

Social impacts

- Extreme heat can lead to **heat-related illness and death, particularly in elderly populations, the poor, outdoor workers, and urban areas.**
- Heatwaves exacerbate the **urban heat island effects**, amplifying temperatures in built environments, and resulting in poorer air quality due to the creation of ozone that negatively impacts health.
- **Heat-related mortality is expected to be higher in cities**, particularly those characterised by high population density, inequalities, limited access to health care, high pollution levels and fewer green spaces.

Economic impacts

- Multiple areas of the economic sector **experience reduced worker productivity** during heatwaves, especially agriculture and construction.
- Globally, 2% of total working hours are projected to be lost every year, either because it is too hot to work or because workers have to work at a slower pace.
- **Lost productivity from heat stress at work**, particularly in developing countries, is expected to be valued at $ 4.2 trillion per year by 2030, driving more inequality.
- The agricultural sector, where 940 million people earn their livelihood, is set to be harder hit by hotter temperatures, pushing workers, crops and livestock past their physiological heat and drought tolerances.
- This will result in **lost labour, smaller harvests for farmers and higher prices for consumers**, and negative impacts on livelihoods.
- A World Bank report suggests that by 2050, about 600 million Indians will live in places that could experience a loss of living standards, which could cost 2.8% of the GDP, stalling efforts to pull large parts of the population out of poverty.
- **Increasing energy demand for cooling** also comes as an extensive economic cost to residents, businesses, and governments.
- With these extreme heat events, the need for access to cooling should be viewed as a basic necessity – not just for health and productivity reasons but, in some cases, even for survival.

Ecological impacts

- Heatwaves, without concomitant increases in precipitation, can lead to **water shortages and increased stress for plants, particularly in arid regions.**
- This has the **effect of reducing plant growth**, the basis of energy production and the food chain, with an overall drying-out of the landscape.
- For example, the 2003 European heatwave resulted in a 10% loss in glacier mass in Europe, which was five times more than the average annual loss.
- Similar impacts were reported for the French Alps in 2019.
- Over time, such deep permafrost warming and thawing could cause landslides and rockfalls, continuing the negative ecological impacts.

Health Impacts of Heat Waves

- The health impacts of Heat Waves typically involve **dehydration, heat cramps, heat exhaustion and/or heat stroke.**
- Children, the elderly and those with pre-existing morbidities are particularly vulnerable.
- Vegetable vendors, cab drivers, construction workers, police personnel, roadside kiosk operators and mostly weaker sections of the society have to work in the extreme heat to make their ends meet and are extremely vulnerable to the adverse impacts of heatwaves such as dehydration, heat and sunstrokes.

Why India is experiencing more heat waves?

- Magnified effect of paved and **concrete surfaces in urban areas and a lack of tree cover.**
- **Urban heat island effects can make ambient temperatures feel 3 to 4 degrees more than they are.**
- Higher daily peak temperatures and longer, more intense heat waves are becoming increasingly frequent globally due to climate change.

Mitigation and Adaptation Strategies

- The Mitigation and Adaptation Strategies are intended to **mobilise individuals and communities** to help protect their neighbours, friends, relatives, and themselves against avoidable health problems during spells of very hot weather.
- The **Government agencies need to play a critical role in preparing and responding to heatwaves at a local level,** working closely with health and other related departments on a long-term strategic plan.
- **Establish Early Warning System and Inter-Agency Coordination** to alert residents on predicted high and extreme temperatures. Who will do what, when, and how is made clear to individuals and units of key departments, especially for health.
- **Capacity building/training programme for health care professionals** at the local level to recognize and respond to heat-related illnesses, particularly during extreme heat events.
    - These training programmes should focus on medical officers, paramedical staff and community health staff so that they can effectively prevent and manage heat-related medical issues to reduce mortality and morbidity.
- **Public Awareness and community outreach** - Disseminating public awareness messages on how to protect against the extreme heatwave through print, electronic and social media and Information, Education and Communication materials such as pamphlets, posters and advertisements and Television Commercials on Do and Don't and treatment measures for heat-related illnesses.
- **Collaboration with non-government and civil society** to improve bus stands, build temporary shelters, wherever necessary, improve water delivery systems in public areas and other innovative measures to tackle Heatwave conditions.
- **Identifying heat hot spots through appropriate tracking of meteorological data** and promoting timely development and implementation of local Heat Action Plans with strategic inter-agency coordination, and a response which targets the most vulnerable groups.
- Review of existing occupational health standards, labour laws and sectoral regulations for worker safety in relation to climatic conditions.
- Policy intervention and coordination across three sectors health, water and power are necessary.

- Expedite the rollout of the National Action Plan on Climate Change and Health.
  - Preventing temperature-related morbidity and mortality could be a key programme under this mission.
  - Ensure an adequate supply of water. Timely access to drinking water can help mitigate this escalation.
- Further research using sub-district level data to provide separate indices for urban and rural areas to enable more targeted geographical interventions.
- **Provision of public messaging (radio, TV),** mobile phone-based text messages, automated phone calls and alerts.
- Promotion of traditional adaptation practices, such as staying indoors and wearing comfortable clothes.
- Popularisation of simple design features such as shaded windows, underground water storage tanks and insulating housing materials.
- **Advance implementation of local Heat Action Plans**, plus effective inter-agency coordination is a vital response that the government can deploy to protect vulnerable groups.

20 DROUGHT

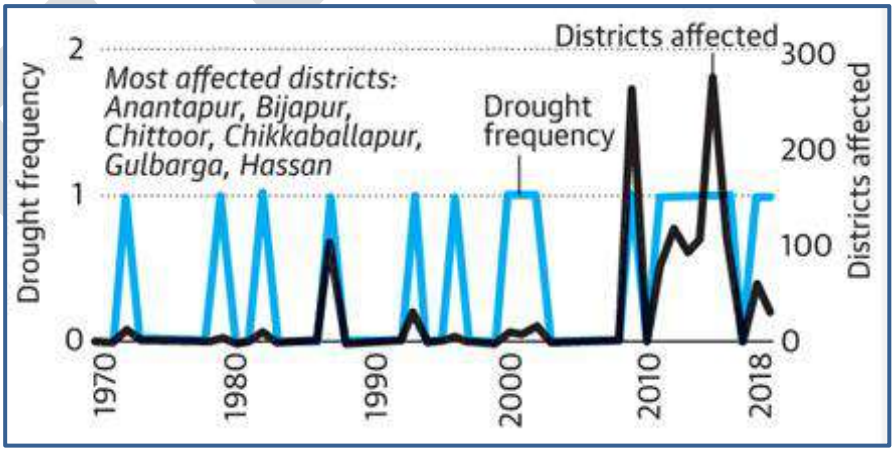
News

- The recent, **Drought in Numbers report** by **United** Nations (UN) has revealed that many parts of **India** fall under the regions that are **vulnerable to drought** It also states that **India's GDP reduced by 2 to 5**% between 1998 and 2017 **due to severe droughts** in the country.

Stats (India specific)

- The chart shows the number of extreme droughts (left axis) and the number of districts affected (right axis).
- Since 2000, there has been a sharp increase in the number of drought-hit districts.

Steps being taken



- **THE DELHI DECLARATION OF 2019,** signed by 14th CoP of the UNCCD, called for better access and stewardship over land, and emphasised gender-sensitive transformative projects.
- **THE BONN CHALLENGE**: To bring 150 million hectares of the world's deforested and degraded land into restoration by 2020, and 350 million hectares by 2030.
- **GREAT GREEN WALL**: Initiative by Global Environment Facility (GEF), where eleven countries in Sahel-Saharan Africa have focused efforts to fight against land degradation and revive native plant life to the landscape.
- **PEACE FOREST INITIATIVE:** It is an initiative of South Korea to use ecological restoration as a peace building process and aims at addressing the issue of land degradation in conflict-torn border areas.
- **INTERNATIONAL COALITION FOR ACTION ON SAND AND DUST STORMS (SDS):** SDS source base map will be developed with the goal of improving monitoring and response to these storms.

Steps being taken by India

- Integrated Watershed Management Programme
- National Afforestation Programme
- National Mission for Green India
- NREGA
- Soil Conservation in the Catchment of River Valley Project
- National Watershed Development Project for Rainfed Areas

- Fodder and Feed Development Scheme
- Command Area Development and Water Management programme
- Soil Health Card Scheme

Drought mitigations measures include

1. Water harvesting, protecting water sources against contamination, developing water sources – such as micro dams, ponds and wells, use of reserve sources of groundwater and water rationing/allocation
2. Restoring pastures and balancing land and water resources
3. Recovering the water holding capacity of soils through tree planting (including fruit trees) and the protection of riverbanks and wetlands
4. Implementing Integrated Water Resources Management (IWRM), such as mitigating upstream-downstream user conflicts and coordinating between water users, communities and sectors
5. Enhancing irrigation schemes
6. Diversifying rural livelihoods through social protection, cash-transfer programs or improving access to markets and rural services: Access to markets could help create alternative non-farm employment that could reduce the impacts of droughts
7. Crop insurance
8. Shifting to drought tolerant crops.
9. Managing livestock production within the landscape, including the relocation of herds, nomadic migrations and use of special reserved areas.

Other steps

- **Immediate impact steps** such as conservation of wetlands, rangelands and mangroves which absorb huge stocks of GHGs like CO2 from the atmosphere.
- **Long-term steps:** Planting of trees, reforestation and afforestation.
- **Regenerative agriculture and restoring natural systems** need a combination of traditional and modern practices, which offers great potential for job creation. Large-scale ecosystem restoration efforts have the potential to create up to 40 jobs for every 1 million dollars invested.

Cyclone Management in India

- **Cyclone disaster management in India**
- There is a huge impact of disasters like cyclones which may be impossible to overcome. Therefore, it is necessary to mitigate such future disasters and minimize their effects. These measures may either be structural or non-structural. Such measures are possible only with the help of government interventions and public participation. Some of these measures are as follows:

Land use planning

- This would avoid all the critical activities on the land of the most vulnerable areas. For example, any settlement activity on a floodplain may cause risk to the land. Such risk can be avoided by the concerned authorities through planning.

Hazard mapping

- It assesses the severity of cyclones, their frequency or probability of occurrence, and intensities on a map. This helps in estimating the severity of damage in the affected region. Such maps are prepared with the help of past climatological data, history of wind speed, and frequency of flooding.
- Early warning systems are one such means by which people are able to receive appropriate and timely information in a proper way before the disaster occurs in order to make quick decisions and take relevant action. The word 'system' is used to refer to the interplay between an array of elements aimed at facilitating communication and prompt response to protect and aid those in need. The four basic elements to which this system focuses is risk-knowledge, monitoring, response capability, and warning communication.

Engineered structures

- Any structure should be made in such a way that it can withstand wind forces. For that, the selection of good sites is also very important. Hence, any public infrastructure should be engineered structures.

Cyclone shelters

- Cyclone shelters are made in the area where there are recurrent cyclones. Such construction requires huge

funding and hence funds are either raised from the government or external donors. For the construction of cyclone shelters, many aspects need to be taken into consideration such as the site, density of population, transport and communication services, and topography of the area.

Flood management

- Flooding is the result of cyclonic storms. The flow of water can be regulated through the construction of dams, reservoirs, and channels. A public community can take the initiative in improving the drainage system through which such floods can be minimized. Flooding can also be managed by avoiding the storage of material under the shelters which may cause water drainage and by creating drainage systems around and under the shelter. The shelter floor should be made above 3 feet from the ground.

Mangrove plantation

- The roots of the mangrove plant help in mitigating tsunamis, soil erosion, etc. They also protect the coastal areas from storm surges and wind which is accompanied by cyclones.

Improving vegetation cover

- This helps in increasing the water infiltration capacity of the soil. The roots of the plants and trees will hold the soil intact and prevent soil erosion resulting in the prevention of floods.

Awareness program

- End-to-end awareness programs are very important for the public welfare as they may help them to take action against such calamities. The department of Meteorology and Hydrology updates regularly about the upcoming cyclones and other special weather news. It is expected from the community that they are well aware of the warning signals and the sources for their protection.

About the new cyclone warning system

- The new Impact-Based Cyclone Warning System was launched by the Indian Meteorological Department and the Ministry of Earth Sciences on 12th October 2020. Its ultimate objective is minimizing economic losses and destruction of property due to cyclones that occur every year on the Indian coasts. This system takes into consideration all the essential aspects such as location warning mechanism, local population, settlements, use of land, and other important elements. It is easily accessible to all the disaster management agencies to know about geological, cartographic, and district-wise hydrological data under this new mechanism. This system warns about the strong wind and risk on infrastructure that may occur, in advance. It also provides better forecasting and tracking of cyclones. This system has also resolved the tracking error of forecasting the cyclone. The observational aspects of cyclone warning systems include different types of observations such as space based, upper air and surface based.

Features of the cyclone warning system include:

- This warning system will issue specific warnings in districts and locations which will factor in the infrastructure, local population, settlements, land use and also other elements will be disseminated and prepared.
- All the disaster management agencies will also refer extensively to geological, cartographic and hydrological data that is available for the concerned district.
- If any of the locations is to be hit by a wind up to 160 kmph, this warning system will warn about the kind of infrastructure that will likely get damaged and these can be mapped.
- With the intention to meet the needs of Cyclone Warning Services and Marine weather services, seven Cyclone Warning Centers were established that covered the east & west coasts of our country. The three area Cyclone Warning Centres (ACWCs) are located at Chennai, Mumbai and Kolkata and other four are Cyclone Warning Centres (CWCs) which are located at Ahmedabad, Thiruvananthapuram, Visakhapatnam and Bhubaneswar.

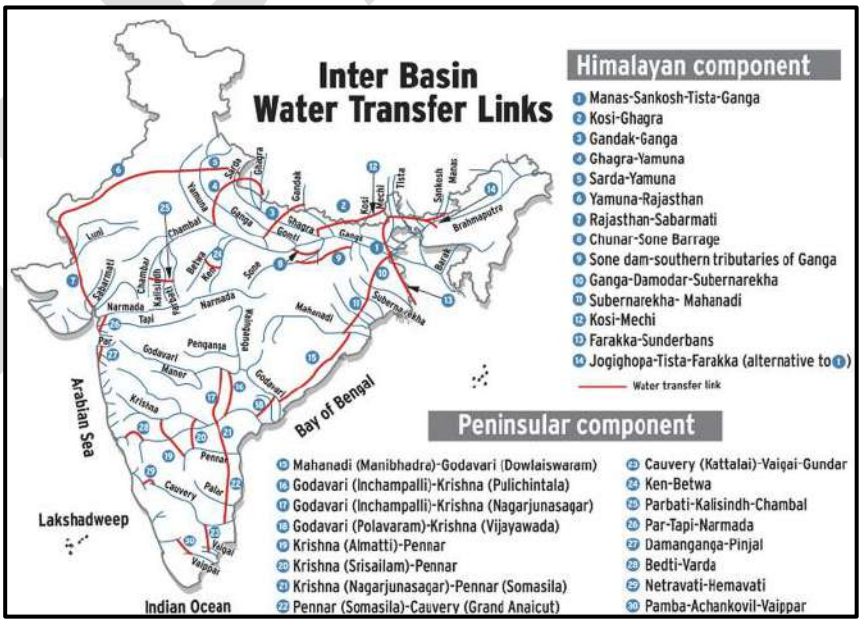
21 RIVER INTERLINKING PROJECT

Context

- The tribals in Gujarat are holding a public meeting to protest against the Centre's Par Tapi Narmada river-linking project.

River-linking project

- The Indian Rivers Inter-link aims to link India's rivers by a network of reservoirs and canals and so reduce persistent floods in some parts and water shortages in other parts of India.
- The Inter-link project has been split into three parts: **a northern Himalayan rivers inter-link component, a southern Penisular Rivers.**
- The project is being **managed by India's National Water Development Agency (NWDA), under its Ministry of Water Resources.**
- The idea to link rivers emerged with **the establishment of the National Water Development Agency in 1982 by then prime minister Indira Gandhi.**



The Basic idea is to connect the Himalayan and peninsular rivers via a network of canals so that excess water from one channel can be diverted to another which has inadequate flow.

Merits of interlinking

Food Security

- The projected population of India is expected to stabilize at about 1600 million by the year 2050 from the present population of about 1100 million.
- The food requirement for this increased population will rise from 260 million tons at present to 460 million tons in 2050.
- The proposed river link is going to increase irrigated area from the present 113 million hectare to 156 million

hectare by 2050 ensuring our food security.

Hydropower Development

- At present, the share of hydropower is only about 25% of the total power generation since our hydro-power development is only about 28,000 MW out of the potential of about 84,000 MW.
- Only 2% of the potential of north-east has been developed so far, although 45% of total hydro-power potential of the country lies there.
- The proposed grid, especially the Himalayan component, is going to provide 34,000 MW of additional hydropower for peaking purpose and for increasing the desired share of hydro to about 40%

Water Supply for Drinking and Industry

- The proposed NPP envisages supply of clean drinking water and water for industrial use amounting to 90 and 64.8 billion cum. respectively with a view to meet the demand by 2050.
- This will remove the current hardship, especially for the rural women who have to walk long distances daily to collect water for drinking and other domestic uses. No industrial growth is feasible without guaranteed water supply.

Navigation for inland water transport

- Currently, the national waterways run only for about 120 days or so in a year due to inadequate depth in the rivers, which is less than the required minimum depth of about 2m.
- The proposed grid is going to ease pressure on railways and roads by introducing inland navigation – through National Waterways (I, II, & III) by guaranteeing a minimum 2 m depth of water on all the 365 days in a year.

Flood and Drought Protection

- While one part of the country is devastated by recurring floods, the other part is suffering from drought due to acute shortage of water. The main challenge is how can the water causing devastation and running waste into the sea (especially from Brahmaputra, Ganga and Mahanadi Basins) can be diverted for productive use in the drought prone areas in the South and the West, so that the country gets rid of the current flood-drought-flood syndrome. The answer lies in river linking.

Increased Employment Opportunities in Rural Areas

- People in the rural areas are now compelled to migrate to cities in search of jobs, causing rapid deterioration of our national economy. Villages are getting poorer and cities are getting congested – resulting in unprecedented pollution of air, water and soil in the cities.
- Only way to reverse this unhealthy trend is to create more job opportunities in rural areas through agricultural and agro-industry based projects.
- As the proposed link canals and the storages are going to be mostly in rural areas, it is going to create large employment opportunities for the rural youths.

Dry Weather Flow Augmentation

- Transfer of surplus water stored in reservoirs during monsoon and releasing it during dry season will ensure a minimum amount of dry weather flow in the rivers which will help in pollution control, navigation, fisheries, growth of forests, protection of wild life etc.
- Any water body either in storage reservoirs or in flowing link canals will be very attractive and offer recreational opportunities for both rural and urban people.

Demerits and challenges of interlinking

- Although NPP has several merits as mentioned above, it has several demerits too as pointed out by the opposing group. These are briefly discussed underneath.

Environmental Problems

- A group of people, especially the NGOs, the Socio-Economic and the environmental lobby are strongly against the inter-link.
- They apprehend that such a massive inter- basin transfer of water will eventually result in environmental degradation, climatic changes, evaporation losses , loss of aquatic eco-system, water logging and salinity and submergence of vast areas of land in reservoirs and the huge network of unlined open canals
- For example, the approved Ken — Betwa river link in the Madhya Pradesh — Uttar Pradesh region will submerge 5000 hectares of Penna Tiger reserve.

- Also, in south India, an environmental impact study by the Center for Water Resources and Distribution Management (CWRDM) claims that the proposed Pampa-Achankovil-Vaipar link could potentially create an ecological disaster for both the Vembanad wetland system and the biodiversity of the Western Ghats.

Loss of Livelihood & Displacement of Tribal Poor People

- The project will cause loss of land, forests, fisheries etc. on which most of the poor and tribal people sustain their livelihood.
- There will be massive displacement of people losing their age old property, source of income, their culture and identity.

Massive Investment Required for Implementation

- The estimated cost for the implementation of the project at 2000 price index is Rs.5.6 lakh crores, which is likely to further increase manifold due to cost and time overrun.
- Such a massive investment in water sector is going to deprive important projects in other sectors for our socio-economic development due to inadequacy of funds.

Interstate Dispute

- In almost all the projects executed in the country so far, water of a river basin has been shared only by the riparian states.
- The proposed scheme envisages transfer of water from surplus basins to drought prone basins irrespective of whether they are riparian/cobasin or not.
- Recently, the country has witnessed bitter quarrel and animosity amongst the states of Karnataka and Tamil Nadu over the sharing of water from rivers Cauveri and Krishna, even though both the states are riparian states.
- One can well imagine the degree of complexity and the dispute that will arise over sharing of water from the proposed scheme where a large numbers of states are involved, resulting in tension and rivalry amongst the people of different states. Who is going to control, operate and maintain this mega project remains a questions.

Inter-country relations

- Changing the Himalayan water system in the north east will affect the regions of Bangladesh, Myanmar, Nepal and Bhutan.
- For example, in the year 2000 the state Arunachal Pradesh suffered flash floods due to a breach in the dam constructed on the river Tsangpo (called as Brahmaputra in India)in Tibet.
- Who will bear these costs remains a question. There is a need that other countries be made partners in the construction of such large scale projects.

Alternatives of Inter State River Linking

- Water harvesting at a national scale to rejuvenate the depleting water table levels.
- Improving existing irrigation systems.
- One of the alternatives to NRLP that has been discussed is virtual water trade within the country. Proponents of this alternative have argued that instead of physically transferring large quantities of water from the flood-prone east to the water scarce west and south, it would be desirable to transfer virtual water in the form of food grains.
- Setting up desalination plants.
- Control of river pollution.

In many places across India, such initiatives have shown their positive potential while larger scale projects have failed miserably. Best example is Maharashtra, which has the country's largest concentration of large dams and the least irrigation potential.

Final Thoughts

- The immediate need is to examine the feasibility of the river links and other alternatives to interlinks with more data and sound economic analysis of cost- benefit of different alternatives to achieve the same objectives.

22 SHALLOW WATER MINING

Context

- A new research by University of Helsinki, Finland has found that **mining metals such as gold, cobalt and copper from depths of 200 metres (m) below the sea, also known as 'shallow-water mining', could trigger local extinctions of marine species.**

Sea Bed Mining and Shallow Water Mining Activities

- The term 'seabed mining' refers to the extraction of high-value commodities, such as metals or gemstones, from the seabed. The **term is used for both deep-sea and shallow-water mining activities** and thus encompasses a range of activities under different environmental and regulatory contexts.
- **Shallow-water mining is not strictly defined by depth**, **but** rather, shallow-water operations are usually considered to be **those occurring on the continental shelf with easier access to the coast**, as opposed to deep-sea operations that target less accessible resources and require specialized technology.
- The main types of shallow-water minerals include:
- Mineral rich sands;
- Polymetallic nodules and phosphorites; and
- Placer deposits, consisting of metallic minerals or gemstones, such as tin, gold, or diamonds.

Shallow Water Mining over Deep Sea Mining

- Deep-Sea mining has not been implemented yet due to concerns over the environmental impacts of mining activities.
- Meanwhile, there is interest in shallow-water mining as it is considered a relatively low-risk and low-cost option to satisfy the demand for metals and minerals. Also, technology for shallow-water mining already exists.

Countries adopting Shallow Water Mining

- Namibia has been **mining diamonds off its coast in depths of up to 130 m**.
- Indonesia has been extracting placer deposits — sediments containing gold, silver, tin, and platinum.
- Mexico, New Zealand and Sweden have proposed shallow-water.
- Mexico is considering mining **marine phosphorites, phosphate-rich nodules** used in fertiliser and industrial chemicals, in water depths of 50-100 m.
- Sweden is interested in exploring the shallow waters (60-150 m) of the Bothnian Sea for **polymetallic nodules,** mineral deposits **containing nickel, cobalt, copper, titanium and rare earth elements.**

Polymetallic Nodules

Polymetallic nodules, also called manganese nodules, are mineral concretions on the sea bottom formed of concentric layers of iron and manganese hydroxides around a core. As nodules can be found in vast quantities, and contain valuable metals, deposits have been identified as a potential economic interest. Nodules vary in size from tiny particles visible only under a microscope to large pellets more than 20 centimeters across. However, most nodules are between 3 and 10 cm in diameter. Nodules lie on the seabed sediment. Polymetallic nodules are found in both shallow (e.g. the Baltic Sea) and deeper waters (e.g. the central Pacific), even in lakes.

Findings of the new Research

- Despite representing only a fraction of the global ocean, **continental shelves (shallow water) support high species diversity, habitat heterogeneity, and biological productivity**
- Shallow Water Mining was **not a sustainable substitute for deep-sea mining**, where valuable minerals needed to build batteries critical for clean energy transition are mined from ocean depths greater than 200 m.
- Despite countries adopting Shallow Water Mining the **impacts of shallow-water mining haven't been thoroughly investigated**. This could be because **"shallow-water mining has been on many occasions**

compared directly to sand and gravel extraction.

- **Further environmental impact studies have not been conducted** as they have been thought to be similar to the impacts of sand and gravel mining.

Impact on marine life

- Shallow-water mining involves removing sediment-bearing minerals, which offer refuge to seafloor organisms. This **could trigger local extinctions and changes in species composition**.
- Also, ploughing the seafloor **releases plumes, which could impact water quality**.
- Other issues could be the **release of harmful substances from the sediment and disturbance from noise and light**.
- As shallow-water ecosystems are already under stress due to pollution, and the impacts of climate change, **even small-scale mining activities can drastically affect marine ecosystems**, especially at local scales.
- Mineral extraction **removes the sediment, resident seafloor organisms, and ultimately the habitat, potentially resulting in local extinctions and changes in species composition.**
- Shallow-water mining **exerts additional pressures on vulnerable coastal ecosystems** which are **already burdened with cumulative impacts from human activities and the effects of climate change**, making them less resilient to new human activities.

Concerns and Way Ahead

- Nations have not agreed on whether deep-sea mining should be permitted amid environmental concerns at the recently concluded **27th session of the Assembly of the International Seabed Authority.** There **need to be deliberations and agreement on this.**
- There is not enough rigorous scientific information available concerning the biology, ecology and connectivity of deep-sea species and ecosystems, or all the ecosystem services they provide. Without this information, one could not understand the potential risks of the mining activity for deep-ocean biodiversity, ecosystems and human well-being. More scientific research is needed.
- As shallow-water mining has not been previously considered in many areas, its environmental regulation is inadequately reflected in national legislations. Appropriate policies need to be laid down and their proper implementation needs to be ensured.
- In light of international commitments **to halt biodiversity loss and to comply with the Sustainable Development Goals, countries should apply similar precautions to shallow-water mining as is being advocated for deep-sea mining**. Even if technology would allow it, unrestricted expansion of maritime activities does not align with sustainable use of ocean resources.
- Amidst the global transition to a low-carbon economy, **precautionary conservation measures and systematic comparisons of alternative ways to obtain the required minerals must be taken before seabed mining,** be it in the shallow water or in the deep sea, is allowed to proceed.
- Researchers said **shallow-water mining activities should not be considered the "silver bullet to resolve the growing global need for metals"** until the environmental and socioeconomic impacts are thoroughly investigated.

23 FOREST FIRES

Context

- The United Nations has taken note of burning practices and techniques of indigenous peoples around the world as a method to control wildfire incidents in a recent report on increasing incidences of fires globally.

More about news:

- "Support and integrate Indigenous, traditional, and contemporary fire management practices into policy" is one of the recommendations of the **United Nations Environment Programme** report titled **Spreading like**

wildfire: The rising threat of extraordinary landscape fires.

- Indigenous and traditional knowledge of land management particularly the **use of fire to manage fuel, including for wildfire mitigation — can be an effective way of reducing hazard.**
- It can ensure that **biodiversity and cultural** (including understanding traditional gender roles that can govern burning activities) and **ecological values** are respected, as well as create livelihood opportunities

Examples of Indigenous communities practice that can be globally used to control wildfires:

- **Australian Aborigines'** use of fire to create mosaic landscapes for hunting and gathering purposes also broke up the continuity of fuels and so inhibited the extensive spread of wildfires.
- **Canadian First Nations** used fire as a way of managing their territory.
- Indigenous peoples from the Venezuelan, Brazilian and Guyanese Amazon as well as the Brazilian Cerrado have used **fire for subsistence activities** and the control of savanna plant fuel levels to prevent the spread of wildfires into adjacent forests.
- **Brazil's Xavante Amerindians**, are trained in total fire suppression.
- The **Pemón in south-east Venezuela** use patch mosaic burning to protect and sustain forests in Canaima National Park, which helps reduce the impacts of wildfires in the region.
- In **South America**, indigenous knowledge is combined with science to protect indigenous territories from wildfire incidents.

UNEP Fire Ready Formula

- The United Nations Environment Programme (UNEP), called on global governments to adopt a **new 'Fire Ready Formula,'** as it warned that incidences of wildfires would rise in the future.
- **Key highlights of new formula:**
  - It envisages that **66 per cent of spending be devoted to planning, prevention, preparedness and recovery**. The remaining **34 per cent can be spent on response.**
  - **Integrated wildfire management** is key to adapting to current and future changes in global wildfire risk.
  - There is a need **to invest more in fire risk reduction, work with local communities and strengthen global commitment to fight climate change.**
  - Achieving and sustaining adaptive land and fire management requires a combination of policies, a legal framework and incentives that encourage appropriate land and fire use.

New "Fire Ready Formula" focuses on planning and prevention		
Sl. No.	**Budget item**	**Percentage share of the total on wildfire management recommended**
1	Planning	1 %
2	Prevention	32 %
3	Preparedness	13 %
4	Response	34 %
5	Recovery	20 %

Source: UNEP report

What was the need for this new formula?

- UNEP report projected that the number of wildfires is likely to increase by up to 14 per cent by 2030. It is projected to spike by 33 per cent by 2050. It would rise by 52 per cent by 2100.
- The **prevalence and behaviour of wildfires is changing** due to numerous factors including, but not limited to, climate change.
- **Change in land-use and land management practices** are also responsible for the increasing risks of wildfires.
- The true cost of wildfires — **financial, social, and environmental** — extends for days, weeks, and even years after the flames subside.

What causes the wildfire?

- **Natural causes:** lightening, soaring temperature, friction between dry leaves, etc. causes forest fires
- **Anthropogenic causes:**
- Poachers set a small patch of forest on fire to divert the wild animals which many times leads to such fires.

- Jungle areas are also set on fire by villagers to clear the dry leaves on the ground for easy collection of mahua flowers.
- Villagers burn patches of sal trees in the belief that it will lead to better growth when planted again.

How much damage do the forest fires cause?

- Forest fires can cause a lot of **damage to the regeneration in the forests and their productivity.**
- Moisture-loving trees such as Oaks and Deodars may **give way to other species and exotic weeds.**
- Forests help maintain aquifers and continuous flow of streams and springs, and provide firewood, fodder and non-timber produce to the local communities – all these capacities may get adversely affected in case of a fire.
- Forest fires may **destroy organic matter in the soil and expose the top layer to erosion**.
- They may also impact the wildlife by burning eggs, killing young animals and driving the adult animals away from their safe haven.
- Sometimes, a forest fire may get out of control and extend to human settlements, thus posing danger to human life and property.

What can be done to prevent and control forest fires?

- **Forecasting fire-prone days** using meteorological data.
- Clearing camping sites of dried biomass.
- Early burning of dry litter on the forest floor.
- Growing strips of fire-hardy plant species within the forest.
- Creating fire lines in the forests are some of the methods to prevent fires.
- **Fire lines** are strips in the forest kept clear of vegetation to prevent the fire from spreading.
- In 1999, the state government **notified forest fire rules** which restrict or regulate certain activities in and around forest areas such as lighting a fire, burning agricultural stubble or undergrowth (ghasnis) and stacking inflammable forest produce such as dried leaves and firewood.

24 INDIA'S ARCTIC POLICY

Context

- India's Arctic policy titled 'India and the Arctic: building a partnership for sustainable development' launched.

About India's Arctic policy

- India's Arctic policy would play an essential role in preparing the country for a future where humankind's biggest challenges, like climate change.
- Implementing India's Arctic policy will involve multiple stakeholders, including academia, the research community, business, and industry
- India's Arctic policy shall be implemented through an action plan, and an effective governance and review mechanism involving the inter-ministerial Empowered Arctic Policy Group.
- India's Arctic policy aims to promote the following agenda –
- Strengthening national capabilities and competencies in science and exploration, climate and environmental protection, maritime and economic cooperation with the Arctic region. Institutional and human resource capacities will be strengthened within Government and academic, research and business institutions.
- Inter-ministerial coordination in pursuit of India's interests in the Arctic.
- Enhancing understanding of the impact of climate change in the Arctic on India's climate, economic, and energy security.
- Contributing better analysis, prediction, and coordinated policymaking on the implications of ice melting in the Arctic on India's economic, military and strategic interests related to global shipping routes, energy security, and exploitation of mineral wealth.
- Studying linkages between polar regions and the Himalayas.

- Deepen cooperation between India and countries of the Arctic region under various Arctic forums, drawing expertise from scientific and traditional knowledge.
- Increase India's participation in the Arctic Council and improve understanding of the complex governance structures in the Arctic, relevant international laws, and geopolitics of the region.
- The National Centre for Polar and Ocean Research (NCPOR) in Goa, an autonomous institute under the Ministry of Earth Sciences, is the nodal institution for India's Polar research programme, which includes Arctic studies.

India and Arctic region

- India has a significant stake in the Arctic.
- It is one of thirteen nations holding **Observer status in the Arctic Council**, a high-level intergovernmental forum that addresses issues faced by the Arctic governments and the indigenous people of the Arctic.
- The country maintains that all human activity should be sustainable, responsible, transparent, and based on respect for international laws.
- In 2014 and 2016, India's first multi-sensor moored observatory in **Kongsfjorden** and the northernmost atmospheric laboratory in **Gruvebadet, Ny Alesund**, were launched in the Arctic region. Until 2022, India has successfully conducted thirteen expeditions to the Arctic.

About Arctic Council

- The Arctic Council is a **high-level intergovernmental forum** that addresses issues faced by the Arctic governments and the indigenous people of the Arctic.
- The eight countries with sovereignty over the lands within the Arctic Circle constitute the members of the council: **Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States.**
- Outside these, there are some observer states.
- The **1996 Ottawa Declaration** established the Arctic Council as a forum for promoting cooperation, coordination, and interaction among the Arctic states, with the involvement of the Arctic Indigenous communities and other Arctic inhabitants on issues such as sustainable development and environmental protection.
- Observer status is open to **non-Arctic states** approved by the Council at the Ministerial Meetings that occur once every two years. Observers have **no voting rights** in the Council.

25 INDIAN ANTARCTIC BILL

In News

- **The Parliament of India has passed the Indian Antarctic Bill, in 2022.**
- The Bill aims to extend the application of domestic laws to India's research stations in the Antarctic region.
- The bill prohibits Indian expedition to Antarctica without a permit or written authorisation of another party to the Antarctic Treaty.

Details

- The bill aims to ensure the **de-militarization of the region along with getting rid of mining or illegal activities.**
  - It also aims that there should **not be any nuclear test/explosion in the region.**
- The bill is pursuant to India's accession to the Antarctic Treaty, **the Protocol on Environment Protection (Madrid Protocol) to the Antarctic Treaty and the Convention on the Conservation of Antarctic Marine Living Resources.**
- The Bill provides a harmonious policy and regulatory framework for **India's Antarctic activities through well-established legal mechanisms** and will help in efficient and elective operations of the Indian Antarctic Programme.
- It will also **facilitate India's interest and proactive involvement in the management** of growing Antarctic

tourism and sustainable development of fisheries resources in Antarctic waters.

- It will also help in increasing the international visibility, and credibility of India in Polar governance leading to international collaboration and cooperation in scientific and logistics fields.
- The enforcement of such laws will confer Jurisdiction on the courts of India to deal with any dispute or crimes committed in parts of Antarctica.
- The Bill also proposed to set up **Indian Antarctic Authority (IAA) under the Ministry of Earth Sciences,** which shall be the apex decision-making authority and shall facilitate programmes and activities permitted under the Bill.

Present status

- India today has **two operational research stations in Antarctica named;**
  - Maitri (Commissioned in 1989).
  - Bharati (Commissioned in 2012).
- India has successfully launched 40 annual scientific expeditions to Antarctica till date.
- With Himadri station in Ny-Alesund, Svalbard, Arctic, India now belongs to the elite group of nations that have multiple research stations within the Polar Regions.
- The **Antarctic Treaty was signed in Washington D.C. in 1959** and was initially signed by 12 countries. India signed the Antarctic Treaty in 1983 and received consultative status in 1983.
- The Convention on the Conservation of Antarctic Marine Living Resources was signed at Canberra in 1980, for the protection and preservation of the Antarctic environment and, in particular, for the preservation and conservation of marine living resources in Antarctica.
- India signed the Protocol on Environmental Protection to the Antarctic Treaty in 1998. Antarctica lies south of 60 degrees South Latitude, which is a natural reserve, devoted to peace and science and should not become the scene or object of any international discord.

26 DISASTER MANAGEMENT IN INDIA

Constitution of India: Disaster Management

- Indian Constitution has specified specific roles for the Union and State Governments.
- However, the **subject of disaster management does not find mention in any of the three lists in the Seventh Schedule of the Indian Constitution.**

Disaster management

- Disaster management refers to the **conservation of lives and property during natural or human-made disasters**. Disaster management plans, by protecting from disease and droughts. Disaster management can be of either natural disasters or man-made disasters.

State Government & Disaster Management

- State Governments = post disaster relief and rehabilitation
- A few states have created a separate Disaster Management Department.

Laws

- **Essential Services Maintenance Acts (ESMA)** to ensure provision of essential services during the time of crisis.
- The **Code of Criminal Procedure (Cr.P.C)** still remains the most important Act to tackle crisis situations due to public order problems
- **Disaster Management Act was enacted in 2005.**

Recent Disasters in India

- From 2002 to 2013, India was among the five countries most frequently hit by natural disasters.

- These included the Indian Ocean Tsunami in 2004, which caused around 11,000 deaths and affected 2.79 million people in India, and the 2013 floods in Uttarakhand, which caused 5,748 deaths and affected 4,200 villages.
- Before this, India's major disasters included Cyclone Paradip in 1999, which caused around 10,000 deaths.
- According to the World Risk Index 2014, India is in the top half of all countries at risk from natural hazards.
- India has suffered from many disasters in its recent history too, both natural and climate related, and these continue to cause devastation.
- In November 2015, floods in the southern city of Chennai, Tamil Nadu, killed over 370 people and damaged crops worth US$190 m.
- And in May 2016, record temperatures of 51°C hit Phalodi, Rajasthan, during a heat wave that affected much of northern India.
- Since the enactment of the disaster management act in 2005, it has enacted a new multidisciplinary focus on disaster prevention and risk reduction and a move away from a relief-centric regime.

The Disaster Management Act, 2005

- The institutional framework under the Act mandated the creation of the National Disaster Management Authority and state disaster management authorities as the bodies responsible for disaster preparedness and risk reduction at the respective levels.
- The Disaster Management Division of the ministry of Home Affairs' retained responsibility for steering the national disaster response overall.
- And, it mandated the concerned Ministries and Departments to draw up their own plans in accordance with the National Plan.
- The Act further contains the provisions for financial mechanisms such as the creation of funds for the response, National Disaster Mitigation Fund and similar funds at the state and district levels.

Where Disaster Management Act has been lacking?

- The states have not able to implement the concerned plans.
- NDMA has failed the states to prepare for the disaster they are vulnerable to.
- Regarding floods, NDMA has no system in place for the early warnings in the vulnerable areas like Uttrakhand.
- There is a lack of coordination between the government agencies and ministries responsible for disaster management like the ministry of earth sciences, state governments,and NDMA.
- NDMA has failed in performing many important functions like recommending provision of funds for mitigation, as well as relief in repayment of loans or grant of fresh ones.
- NDMA's project management capacity has been found deficient. NDMA has not been able to complete many major projects so far.

National Disaster Management Plan, 2016

- Prime Minister Shri Narendra Modi recently released the National Disaster Management Plan (NDMP), as a first ever national plan prepared in the country.

Salient features

- The NDMP incorporates substantively the approach mentioned in the Sendai Framework
- The plan covers all phases of disaster management: prevention, mitigation, response and recovery.
- It provides for horizontal and vertical integration among all the agencies and departments of the Government.
- The plan has assigned roles and responsibilities of all levels of Government right up to Panchayat and Urban Local body level in a matrix format.
- As the plan is following the regional approach, it will be beneficial not only for disaster management but also for development planning.
- It also identifies major activities such as early warning, information dissemination, medical care, fuel, transportation, search and rescue, evacuation, etc. to serve as a checklist for agencies responding to a disaster.
- The plan emphasizes on preparing communities to cope with disasters, so it stresses on a greater need for Information, Education, and Communication activities.

Problems with the Disaster Management Plan, 2016

- The plan has been too general in its identification of the activities to be undertaken by the central and states governments for disaster risk mitigation, preparedness, response, recovery, reconstruction, and governance.
- The plan has not provided any time frame for undertaking these activities.
- There is not mention of the framework for monitoring and evaluation of the plan.
- The funding mechanism is also not clear about the project inneed of funds.
- Activities that the plan has included are not new. Same activities were listed in the previous plans too that too with the time-frame for implementation.
- Although the plan is said to be aligned with Sendai framework, but there are no goals or targets, unlike Sendai framework.

National Disaster Management Authority

- The National Disaster Management Authority (NDMA) **under the Chairmanship of the Prime Minister** is the **apex body responsible for laying down policies, plans and guidelines for disaster management** and for coordinating their enforcement and implementation throughout the country.
- The policies and guidelines will assist the Central Ministries, State Governments and district administration to formulate their respective plans and programmes.
- NDMA has the power to approve the National Plans and the Plans of the respective Ministries and Departments of Government of India. The general superintendence, direction and control of National Disaster Response Force (NDRF) are vested in and will be exercised by the NDMA.

Prime Minister's 10 Point Agenda on Disaster Risk Reduction

Sl No.	Agenda Point
1	All development sectors must imbibe the principles of disaster risk management
2	Risk coverage must include all, starting from poor households to SMEs to multi-national corporations to nation states
3	Women's leadership and greater involvement should be central to disaster risk management
4	Invest in risk mapping globally to improve global understanding of Nature and disaster risks
5	Leverage technology to enhance the efficiency of disaster risk management efforts
6	Develop a network of universities to work on disaster-related issues
7	Utilise the opportunities provided by social media and mobile technologies for disaster risk reduction
8	Build on local capacity and initiative to enhance disaster risk reduction
9	Make use of every opportunity to learn from disasters and, to achieve that, there must be studies on the lessons after every disaster
10	Bring about greater cohesion in international response to disasters

27 INDIA'S UPDATED NDCs

Context

- Cabinet approved India's Updated Nationally Determined Contribution to be communicated to the United Nations Framework Convention on Climate Change.

Details

- **The updated NDC seeks to enhance India's contributions towards achievement of the strengthening of global response to the threat of climate change, as agreed under the Paris Agreement.**
- India at the 26th session of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Glasgow, United Kingdom, **expressed to intensify its climate action by presenting to the world five nectar elements (Panchamrit) of India's climate action**.
- This update to India's existing NDC translates the 'Panchamrit' announced at COP 26 into enhanced climate targets.
- **The update is also a step towards achieving India's long term goal of reaching net-zero by 2070.**
- Earlier, India submitted its Intended Nationally Determined Contribution (NDC) to UNFCCC on October 2, 2015. **The 2015 NDC comprised eight goals; three of these have quantitative targets upto 2030 namely, cumulative electric power installed capacity from non-fossil sources to reach 40%; reduce the emissions intensity of GDP by 33 to 35 percent compared to 2005 levels and creation of additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover.**

New targets

- **As per the updated NDC, India now stands committed to reduce Emissions Intensity of its GDP by 45 percent by 2030, from 2005 level and achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030.**
- The approval, also takes forward the **Prime Minister's vision of sustainable lifestyles and climate justice to protect the poor and vulnerable from adverse impacts of climate change.**
- The updated NDC reads "**To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation, including through a mass movement for 'LIFE'– 'Lifestyle for Environment' as a key to combating climate change".**
- The decision on enhanced NDCs demonstrates India's commitment at the highest level for decoupling of economic growth from greenhouse gas emissions.
- India's updated NDC has been prepared after carefully considering our national circumstances and the

principle of **common but differentiated responsibilities and respective capabilities** (CBDR-RC). India's updated NDC also reaffirms our commitment to work towards a low carbon emission pathway, while simultaneously endeavoring to achieve sustainable development goals.

- Recognizing that lifestyle has a big role in climate change, the Prime Minister of India, at COP 26, proposed a **'One-Word Movement', to the global community. This one word is LIFE…L, I, F, E, i.e. Lifestyle For Environment.**
- The vision of LIFE is to live a lifestyle that is in tune with our planet and does not harm it. **India's updated NDC also captures this citizen centric approach to combat climate change.**
- The updated NDC also represents the framework for India's transition to cleaner energy for the period 2021-2030.
- The updated framework, together with many other initiatives of the Government, including tax concessions and incentives such as Production Linked Incentive scheme for promotion of manufacturing and adoption of renewable energy, will provide an opportunity for enhancing India's manufacturing capabilities and enhancing exports.
- It will lead to an overall increase in green jobs such as in renewable energy, clean energy industries- in automotives, manufacturing of low emissions products like Electric Vehicles and super-efficient appliances, and innovative technologies such as green hydrogen, etc.
- India's updated NDC will be implemented over the period 2021-2030 through programs and schemes of relevant Ministries /departments and with due support from States and Union Territories.
- The Government has launched many schemes and programs to scale up India's actions on both adaptation and mitigation.
- Appropriate measures are being taken under these schemes and programs across many sectors, including water, agriculture, forest, energy and enterprise, sustainable mobility and housing, waste management, circular economy and resource efficiency, etc.
- As a result of the aforesaid measures, India has progressively continued decoupling of economic growth from greenhouse gas emissions.
- The Net Zero target by 2030 by Indian Railways alone will lead to a reduction of emissions by 60 million tonnes annually.
- Similarly, India's massive LED bulb campaign is reducing emissions by 40 million tonnes annually.
- India's NDC do not bind it to any sector specific mitigation obligation or action.
- India's goal is to reduce overall emission intensity and improve energy efficiency of its economy over time and at the same time protecting the vulnerable sectors of economy and segments of our society.

28 RAMSAR SITES IN INDIA

Context

- India has added five more Ramsar sites, or wetlands of international importance, bringing the number of such sites in the country to 75.
- These are the Karikili Bird Sanctuary, Pallikaranai Marsh Reserve Forest and Pichavaram Mangrove in Tamil Nadu, the Sakhya Sagar in Madhya Pradesh and the Pala Wetlands in Mizoram.

Ramsar Sites

- **Any wetland site which has been listed under the Ramsar Convention that aims to conserve it and promote sustainable use of its natural resources** is called a Ramsar Site.
- Ramsar Convention is known as the Convention of Wetlands. It was established in 1971 by UNESCO and came into force in 1975.
- **India is a party** to the Ramsar Convention. India signed under it on 1st February 1982.
- **Sundarbans is the largest** Ramsar Site of India
- **Chilika Lake (Orissa) and Keoladeo National Park (Rajasthan) were recognized as the first** Ramsar Sites of India

- **Uttar Pradesh has the most** number of Ramsar Sites in India.
- **Renuka Wetland in Himachal Pradesh is the smallest** wetland of India.

List of 75 Total Ramsar Sites in India

- In this article, we will go through the list of a total of 75 Ramsar Sites of India along with the other related information of them. Check the list given below –

Sl. No	Name of the Ramsar Site	State
1	Kolleru Lake	Andhra Pradesh
2	Deepor Beel	Assam
3	Kabartal Wetland	Bihar
4	Khijadia Wildlife Sanctuary	Gujarat
5	Nalsarovar Bird Sanctuary	Gujarat
6	Thol Lake Wildlife Sanctuary	Gujarat
7	Wadhvana Wetland	Gujarat
8	Bhindawas Wildlife Sanctuary	Haryana
9	Sultanpur National Park	Haryana
10	Chandertal Wetland	Himachal Pradesh
11	Pong Dam Lake	Himachal Pradesh
12	Renuka Wetland	Himachal Pradesh
13	Wular Lake	Jammu & Kashmir
14	Hokera Wetland	Jammu and Kashmir
15	Surinsar-Mansar Lakes	Jammu and Kashmir
16	Tsomoriri Lake	Jammu and Kashmir
17	Asthamudi Wetland	Kerala
18	Sasthamkotta Lake	Kerala
19	Vembanad Kol Wetland	Kerala
20	Tso Kar Wetland Complex	Ladakh
21	Bhoj Wetlands	Madhya Pradesh
22	Lonar Lake	Maharashtra
23	Nandur Madhameshwar	Maharashtra
24	Loktak Lake	Manipur
25	Bhitarkanika Mangroves	Orissa
26	Chilka Lake	Orissa
27	Beas Conservation Reserve	Punjab
28	Harike Lake	Punjab
29	Kanjli Lake	Punjab
30	Keshopur-Miani Community Reserve	Punjab
31	Nangal Wildlife Sanctuary	Punjab
32	Ropar Lake	Punjab
33	Keoladeo Ghana NP	Rajasthan
34	Sambhar Lake	Rajasthan
35	Point Calimere Wildlife and Bird Sanctuary	Tamil Nadu
36	Rudrasagar Lake	Tripura
37	Bakhira Wildlife Sanctuary	Uttar Pradesh
38	Haiderpur Wetland	Uttar Pradesh
39	Nawabganj Bird Sanctuary	Uttar Pradesh
40	Parvati Agra Bird Sanctuary	Uttar Pradesh
41	Saman Bird Sanctuary	Uttar Pradesh
42	Samaspur Bird Sanctuary	Uttar Pradesh

43	Sandi Bird Sanctuary	Uttar Pradesh
44	Sarsai Nawar Jheel	Uttar Pradesh
45	Sur Sarovar	Uttar Pradesh
46	Upper Ganga River (Brijghat to Narora Stretch)	Uttar Pradesh
47	Asan Conservation Reserve	Uttarakhand
48	East Kolkata Wetlands	West Bengal
49	Sunderbans Wetland	West Bengal
50	Karikili Bird Sanctuary	TN
51	Pallikaranai Marsh Reserve Forest	TN
52	Pichavaram Mangrove	TN
53	Pala wetland	Mizoram
54	Sakhya Sagar	MP
55	Sirpur Wetland	Madhya Pradesh
56	Ranganathittu Bird Sanctuary	Karnataka
57	Nanda Lake	Goa
58	Satkosia Gorge	Odisha
59	Udhayamarthandapuram Bird Sanctuary	Tamil Nadu
60	Vedanthangal Bird Sanctuary	Tamil Nadu
61	Vellode Bird Sanctuary	Tamil Nadu
62	Vembannur Wetland Complex	Tamil Nadu
63	Gulf of Mannar Marine Biosphere Reserve	Tamil Nadu
64	Koothankulam Bird Sanctuary	Tamil Nadu
65	Tampara Lake	Odisha
66	Hirakud Reservoir	Odisha
67	Ansupa Lake	Odisha
68	Yashwant Sagar	Madhya Pradesh
69	Chitrangudi Bird Sanctuary	Tamil Nadu
70	Suchindram Theroor Wetland Complex	Tamil Nadu
71	Vaduvur Bird Sanctuary	Tamil Nadu
72	Kanjirankulam Bird Sanctuary	Tamil Nadu
73	Thane Creek	Maharashtra
74	Hygam Wetland Conservation Reserve	Jammu and Kashmir
75	Shallbugh Wetland Conservation Reserve	Jammu and Kashmir

29 TIGERS IN INDIA

Context

- International Tiger Day is marked on **July 29** with an aim to promote a global system for protecting the natural habitats of tigers and to raise public awareness and support for tiger conservation issues.

India and its Tiger's

- India's strategy of tiger conservation attaches topmost importance to involving local communities.
- India is **home to over 70% of the tiger population globally.**
- India is **home to 51 tiger reserves spread across 18 States and the last tiger census of 2018 showed a rise in the tiger population**.
- India achieved the **target of doubling of tiger population four years ahead of schedule of the St. Petersburg Declaration on tiger conservation.**

Tiger census

- The detailed report of the **4th All India Tiger Estimation** is unique in the following ways;
  - **Abundance index of co-predators** and other species has been carried out, which hitherto was restricted only to occupancy.
  - **Sex ratio of tigers** in all camera trap sites has been carried out for the first time.
  - Anthropogenic effects on tiger populations have been elaborated in a detailed manner.
  - Tiger abundance within pockets in tiger reserves has been demonstrated for the first time.
- The report compares information obtained from tiger surveys of 2006, 2010 and 2014 with data obtained from the 2018-19 review to estimate population trends at country and landscape scales, patch colonization and extinction rates.

About the survey

- The **quadrennial** tiger estimation is steered by the **National Tiger Conservation Authority** with technical support from the Wildlife Institute of India and implemented by state forest departments.
- The All India Tiger Estimation 2018 has entered the Guinness World Record for being the world's largest camera trap wildlife survey.

CA|TS

- It is a **conservation tool** that sets minimum standards to manage target species, and encourages assessments to benchmark progress.
- Launched in 2013, the tool was developed in collaboration with field managers, tiger experts and government agencies engaged in tiger conservation.
- CA|TS is a partnership of tiger range governments, inter-governmental agencies, institutions, NGOs and conservation organisations.

Project Tiger

- This tiger conservation programme launched in April **1973** by the Government of India during Prime Minister **Indira Gandhi's tenure**.
- **Aim:** Ensuring a viable population of Bengal tigers in their natural habitats, protecting them from extinction, and preserving areas of biological importance as a natural heritage
- From 9 tiger reserves since its formative years, the Project Tiger coverage has increased to **50** at present, spread out in 18 of our tiger range states.
- The tiger reserves are constituted on a **core/buffer strategy**.
  - **Core areas** have the **legal status of a national park or a sanctuary**.
  - Whereas, **buffer or peripheral** areas are a mix of forest and non-forest land, managed as a **multiple use area**.
- The government has set up a **Tiger Protection Force** to combat poachers and funded relocation of villagers to minimize human-tiger conflicts.

National Tiger Conservation Authority

- It was established in 2005 following a recommendation of the Tiger Task Force, to reorganise management of Project Tiger and the many Tiger Reserves in India. It is the overarching body for conservation of tigers in India.

Structure of NTCA

- **Environment Minister is the Chairman of the NTCA**.
- Below chairman are **eight experts** or professionals having qualifications and experience in wildlife conservation and welfare of people including tribals, apart from three Members of Parliament (1 Rajya Sabha, 2 Lok Sabha).
- The Inspector General of Forests, in charge of project Tiger, serves as ex-officio Member Secretary.

Functions

- Its main administrative function is **to approve the Tiger Conservation Plan prepared by the State Governments** and then evaluate and assess various aspects of sustainable ecology and disallow any ecologically unsustainable land use such as, mining, industry and other projects within the tiger reserves.
- As per the WLPA, every State Government has the authority to notify an area as a tiger reserve.
- However, the Tiger Conservation Plans sent by state government need to be approved by the NTCA first.
- Alternatively, Central Government via NTCA may advise the state governments to forward a proposal for creation of Tiger Reserves.

Global Tiger Initiative (GTI)

- The Global Tiger Initiative (GTI) was launched in 2008 as a **global alliance** of governments, international organizations, civil society, the conservation and scientific communities and the private sector, with the **aim of working together to save wild tigers from extinction**.
- In 2013, the scope was broadened to **include Snow Leopards**.
- The GTI's founding partners included the World Bank, the Global Environment Facility (GEF), the Smithsonian Institution, Save the Tiger Fund, and International Tiger Coalition (representing more than 40 non-government organizations).
- The initiative is led by the 13 tiger range countries (TRCs).

Global Tiger Forum

- The Global Tiger Forum (GTF) is the **only inter- governmental international body** established with members from willing countries to embark on a global campaign to protect the Tiger.
- The GTF was formed in 1993 on recommendations from an international symposium on Tiger Conservation at New Delhi, India.
- The GTF is focused on saving the remaining 5 sub-species of Tigers distributed over 13 Tiger Range countries of the world.

TX2 Conservation Excellence Award

- TX2 is the global award, which was set up in 2010 in St. Petersburg, Russia by international organizations working for tiger conservation like **UNDP, Global Tiger Forum, International Union for Conservation of Nature, World Wide Fund for Nature, Conservation Assured/Tiger Standards and the Lion's Share.**
- The TX2 awards include a **financial grant to assist ongoing conservation**.
- The award recognises a site that has achieved excellence in two or more of five themes:
  - Tiger and prey population monitoring and research (tiger translocation/prey augmentation);
  - effective site management;
  - enhanced law enforcement,
  - protection and ranger welfare improvement;
  - community-based conservation,
  - benefits and human-wildlife conflict mitigation and habitat and prey management.
- In **2018**, the **Pilibhit Tiger Reserve (PTR) in Uttar Pradesh** also won the TX2 award for doubling its population of wild tigers since 2010.

30 GROUND WATER

Context

- The Dynamic Ground Water Resources of the country are being periodically assessed jointly by Central Ground Water Board (CGWB) and State Governments. The Data for the same has been released.

Finding of the Data

- Analysis of data of 2020 groundwater assessment with previous assessments **suggests an improved**

groundwater situation in certain parts of the country.

- Ground water level in various parts of the Country is fluctuating because of continuous withdrawal necessitated by increased demand of fresh water for various uses including irrigation, vagaries of rainfall, increased population, food security, industrialization & urbanization etc.

Important initiatives on management of groundwater resources

State wise initiatives

- A number of States have done notable work in the field of water conservation/harvesting such **as 'Mukhyamantri Jal Swavlamban Abhiyan'** in Rajasthan, 'Jalyukt Shibar' in Maharashtra, 'Sujalam Sufalam Abhiyan' in Gujarat, 'Mission Kakatiya' in Telangana, Neeru Chettu' in Andhra Pradesh, Jal Jeevan Hariyali in Bihar, 'Jal Hi Jeevan' in Haryana, and Kudimaramath scheme in Tamil Nadu.

Atal Bhujal Yojana

- **Atal Bhujal Yojana (Atal Jal)** is being implemented in certain water stressed areas of the country, which includes activities like preparation of water security plan at Gram Panchayat level in participatory mode by involving communities to use available groundwater and surface water in an efficient manner.

Per Drop More Crop

- Department of Agriculture & Farmers Welfare (DA & FW) is implementing Per Drop More Crop component of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) which is operational from 2015-16. The PMKSY - Per Drop More Crop mainly focuses on water use efficiency at farm level through micro irrigation (drip and sprinkler irrigation system) to reduce the extraction of groundwater.

Jal Shakti Abhiyan

- Government of India launched Jal Shakti Abhiyan (JSA) in 2019, a time-bound campaign with a mission mode approach intended to improve water availability including groundwater conditions in the water-stressed blocks of 256 districts in India.
- Ministry of Jal Shakti has taken up the "Jal Shakti Abhiyan: Catch the Rain" (JSA:CTR) with the theme "Catch the Rain - Where it Falls When it Falls" to cover all the blocks of all districts (rural as well as urban areas) across the country.

'Master Plan for Artificial Recharge to Groundwater - 2020'

- Central Ground Water Board (CGWB), in consultation with States/UTs, has prepared 'Master Plan for Artificial Recharge to Groundwater - 2020'. The Master Plan – 2020 is a macro level plan indicating various structures for the different terrain conditions of the country.
- The Master Plan - 2020 envisages construction of about 1.42 crore rain water harvesting and artificial recharge structures in the country to harness 185 Billion Cubic Metre (BCM).

National Aquifer Mapping and Management program (NAQUIM)

- National Aquifer Mapping and Management program (NAQUIM) is being implemented by CGWB as part of Ground Water Management and Regulation (GWM & R) Scheme, a Central Sector scheme. NAQUIM envisages mapping of aquifers (water bearing formations), their characterization and development of Aquifer Management Plans to facilitate sustainable management of groundwater resources in the country. NAQUIM outputs are shared with States/UTs for suitable interventions.

Other

- Government of India generally supports artificial groundwater recharge/water harvesting works in the country through Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and Prime Minister Krishi Sinchayee Yojana - Watershed Development component (PMKSY-WDC), 'Surface Minor Irrigation (SMI) and Repair, Renovation and Restoration (RRR) of Water Bodies schemes' a component of PMKSY.

Groundwater in India

- Over the last 50 years, the number of borewells has grown from 1 million to 20 million, making India the world's largest user of groundwater.
- The Central Groundwater Board of India estimates that about 17% of groundwater blocks are overexploited (meaning the rate at which water is extracted exceeds the rate at which the aquifer is able to recharge) while 5% and 14% , respectively, are at critical and semi-critical stages. The situation is particularly alarming in

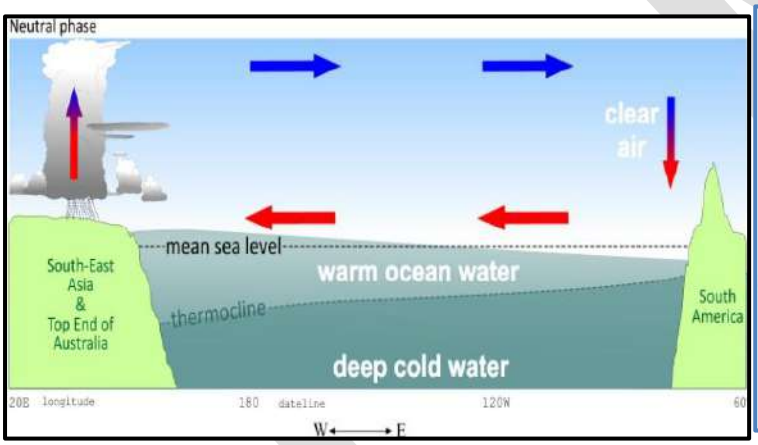
three major regions – north-western, western, and southern peninsular.

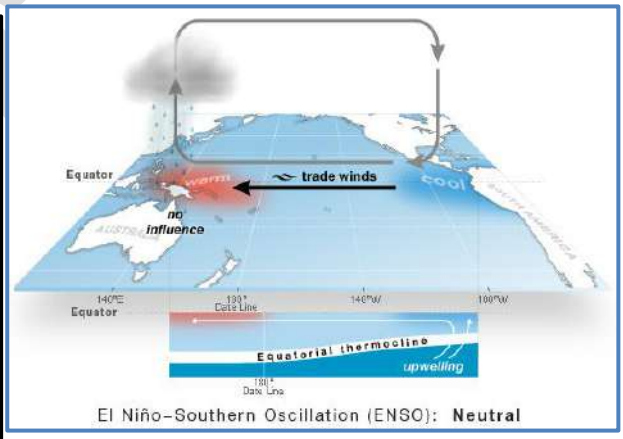
- Groundwater pollution and the effects of climate change, including erratic rainfall in the drier areas, put additional stress on groundwater resources.
- The World Bank has been working with the Government of India to enhance groundwater management in affected areas.

Closing thoughts

- Measures such as surface water harvesting through farm ponds and check-dams, the installation of water-efficient irrigation systems (e.g. more efficient drips and sprinklers) and growing leswater-intensiveve crops, need to be integrated on the demand side for improved management and reduced depletion.
- Several states affected by the depletion of groundwater, provide free or heavily subsidized power (including solar pumps) for pumping groundwater for irrigated agriculture.
- In the long-run, sustainable groundwater management will depend on cross-sectoral reforms to address the water-energy-agriculture nexus and providing the right incentives to resource users. This requires better coordination of policy, ,market and regulatory measures as well as repurposing current public support to more climate-smart solutions.
- Without sufficient regulation or replenishment of aquifers, the increased access to and use of groundwater for irrigation could lead to declining water tables and increasing water scarcity, which risks escalating long-term vulnerability.

31 ENSO MECHANISM

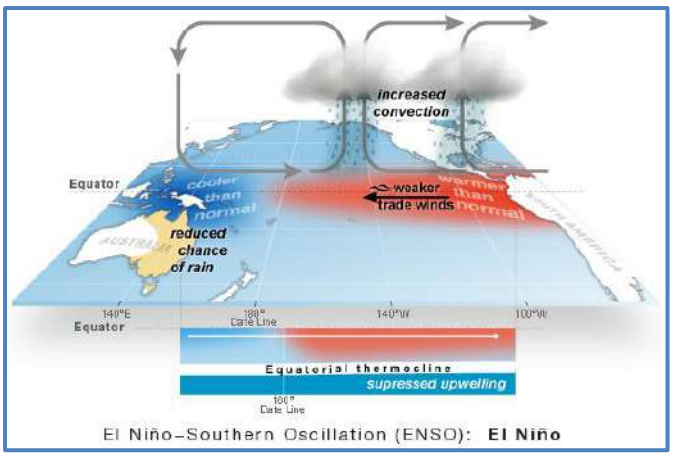




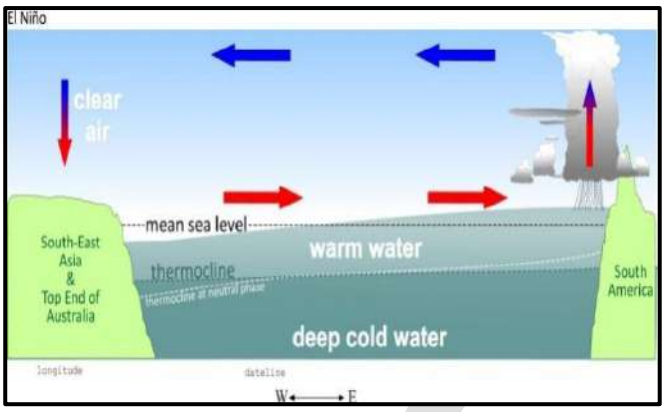
'Neutral phase'

- Under 'normal' conditions, we have a situation referred to as a Neutral phase.
- **At first, Easterly Trade Winds** (blowing from east to west) push the warm **surface water** away from South America towards tropical South-East Asia.
- Conversely, off the west coast of South America the depth of the warm equatorial top layer of the ocean has reduced, and the thermocline is nearer the ocean surface. This means that **cold, nutrient-rich water upwells into the upper parts of the ocean here.**
- Around tropical South-East Asia, warm surface water evaporates.
- This causes increased rainfall around Indonesia and neighbouring lands such as the Top end of Australia.
- In contrast, over the eastern tropical Pacific and off the coast of Peru, dry air accompanied with cloud dissipation sinks, resulting in much drier weather there.

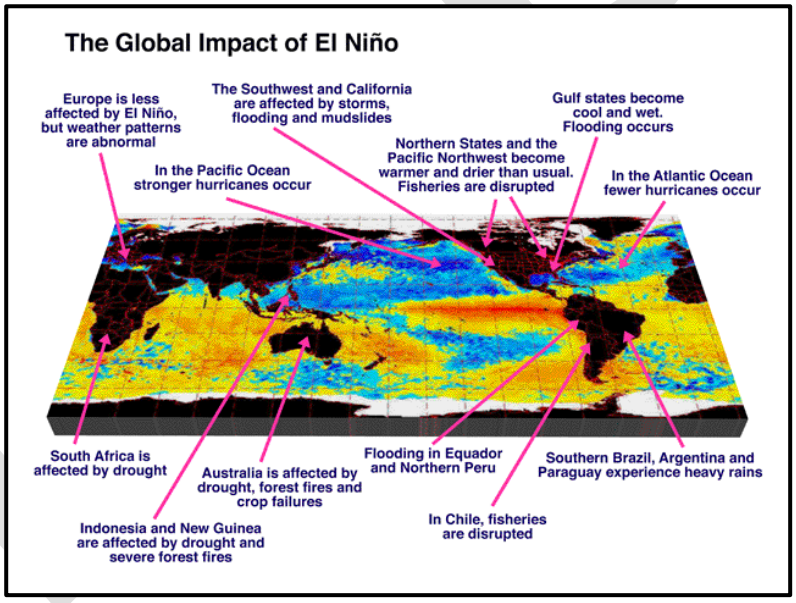
Note: The pattern of air rising in the west and falling in the east with westward moving air at the surface is referred to as the Walker Circulation.



El Niño–Southern Oscillation (ENSO): **El Niño**

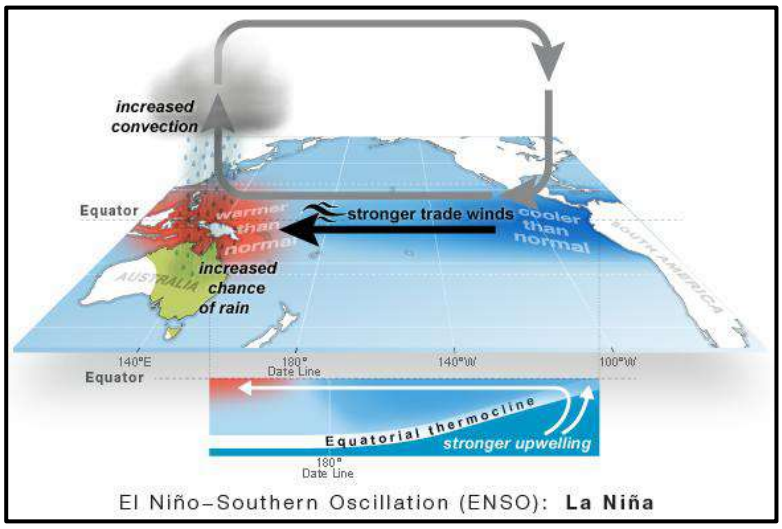


El Niño Phase



- The Trade Winds loses most of their strength in an El Niño phase, and may even reverse into a westerly wind (west to east) direction.
- As a result, warm surface water from tropical South-East Asiaflows towards the coast of South America.
- Off the coast of South America, the thermocline sinks. The cold deep water no longer upwells into the surface layer of the ocean.
- The source of nutrients is cut off, which has a subsequent effect on fishing stocks off South America.
- Nearby, over the eastern tropical Pacific, warm surface water evaporates. This results in more rainfall than usual there.
- Conversely, on the other side of the Pacific, Indonesia and neighbouring countries are drier than usual during an El Niño.

La Niña Phase



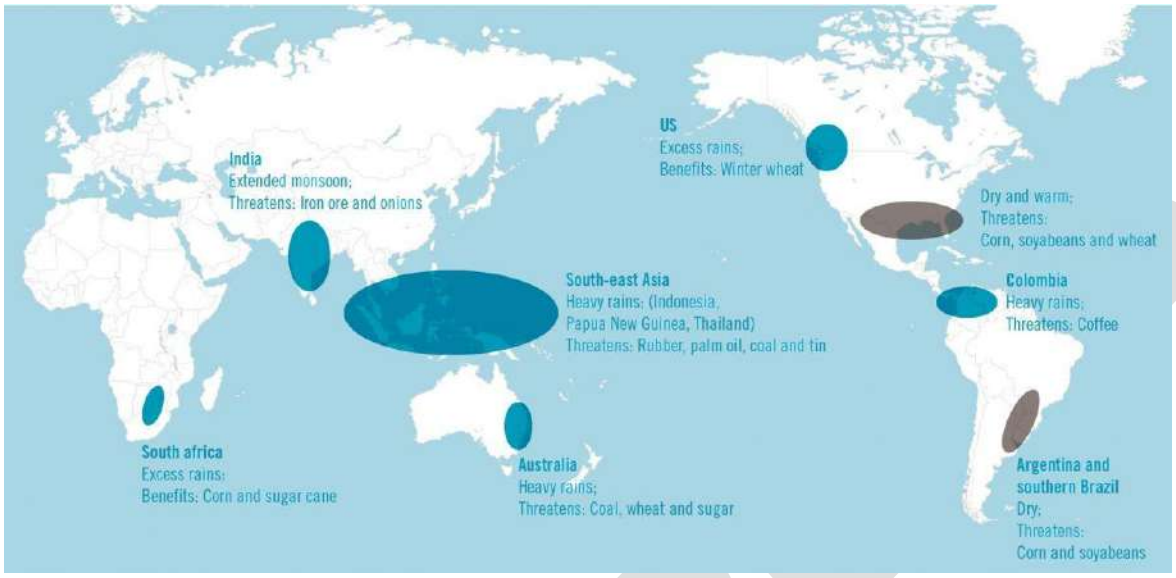
El Niño–Southern Oscillation (ENSO): **La Niña**

- In this pattern, trade winds blow warm water at the ocean's surface from South America to Indonesia.
- As the warm water moves west, cold water from the deep rises to the surface near the coast of South America.
- Since, La Niña blows all of this warm water to the western Pacific places like Indonesia and Australia get much more convectionalrain than usual.
- However, the cold water in the eastern Pacific causes less rain clouds to form there. So, places like the southwestern United States are much drier than usual.
- La Nina can also lead to more lightning activity within the Gulf of Mexico and along the Gulf Coast.
- And more tropical cyclones—which include hurricanes—forming in the deep tropics (near the islands in the

Caribbean, for example).

- In a nutshell, La Nina causes drought in the South American countries of Peru and Ecuador, heavy floods in Australia, high temperatures in Western Pacific, Indian Ocean, off the Somalian coast and a comparatively better monsoon rains in India.

Impact of La Niña



ENSO and India

- El Nino and La Nina impact India greatly.
- El Nino during winter causes warm conditions over the Indian subcontinent and during summer, it leads to dry conditions and deficient monsoon. Whereas, La Nina results in better than normal monsoons in India.
- India experienced deficient rainfall during El Nino years 2002 and 2009 whereas monsoon was normal during El Nino years 1994 and 1997. It means that in about 50 per cent of the year with El Nino during summer, India experienced droughts during monsoon.
- Crops like Paddy, Maize, Groundnut, Guar, Castor, Tur, Moong and Bajra suffer due to El Nino.

32 BLUE FLAG BEACHES

In News

- International eco-label "**Blue Flag", has been accorded to two new Indian beaches; Minicoy Thundi Beach and Kadmat Beach- both in Lakshadweep**, with this the number of beaches certified under the Blue Flag certification increased to 12 in India.

Blue Flag

- It is an **internationally recognized eco-label that is accorded based on 33 criteria. These criteria are divided into 4 major heads namely;** Environmental education and information, Bathing water quality, Environmental management, and Conservation and safety services on the beaches.
- Blue Flag beaches are **considered the cleanest beaches in the world.**

- It is accorded by the international jury composed of eminent members - United Nations Environment Programme (UNEP), United Nations World Tourism Organization (UNWTO), and Denmark-based NGO Foundation for Environmental Education (FEE) and International Union for Conservation of Nature (IUCN).
- The mission of Blue Flag is **to promote sustainability in the tourism sector, through environmental education, environmental protection and other sustainable development practices.**

BEAMS program

- **Under the Integrated Coastal Zone Management Project, the Ministry of Environment, Forest & Climate Change (MoEFCC) has piloted the Beach Environment & Aesthetic Management Service (BEAMS) Programme.**
- The objective of the BEAMS program is to abate pollution in coastal waters, promote sustainable development of beach facilities, protect & conserve coastal ecosystems & natural resources, and seriously challenge local authorities & stakeholders to strive and maintain high standards of cleanliness, hygiene & safety for beachgoers in accordance with coastal environment & regulations.
- Under this programme**, various activities related to pollution abatement, beach awareness, aesthetics, safety, surveillances services and environmental education, etc**., have been done at identified beaches aimed to achieve international standards for Blue Flag Beach Certification.
- A total of 12 beaches situated in 6 States and 4 Union Territories have been developed at par with the best international beaches with safe and ecologically sustainable infrastructure, acceptable bathing water quality, self-sustaining energy supply and environmentally sound services/management measures.
- **Beaches that have been conferred with internationally recognized Blue Flag Certification are;**
  1. Shivrajpur, Devbhumi Dwarka District, Gujarat
  2. Ghoghla (Diu) Dadara Nagar Haveli and Daman & Diu
  3. Padubidri, Udupi District, Karnataka
  4. Kasarkod, Karwar District, Karnataka
  5. Kappad, Kozhikode District, Kerala
  6. Kovalam, Kanchipuram District, Tamil Nadu
  7. Eden, Puducherry District, Puducherry
  8. Rushikonda, Vishakhapatnam District, Andhra Pradesh
  9. Golden, Puri District, Odisha
  10. Radhanagar (Havelock), Andaman & Nicobar Islands
  11. Minicoy Thundi Beach in Lakshadweep
  12. Kadmat Beach in Lakshadweep