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PROG-1

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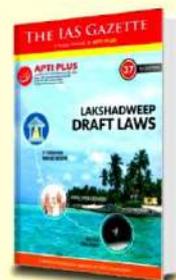
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GENERAL STUDIES-II

01

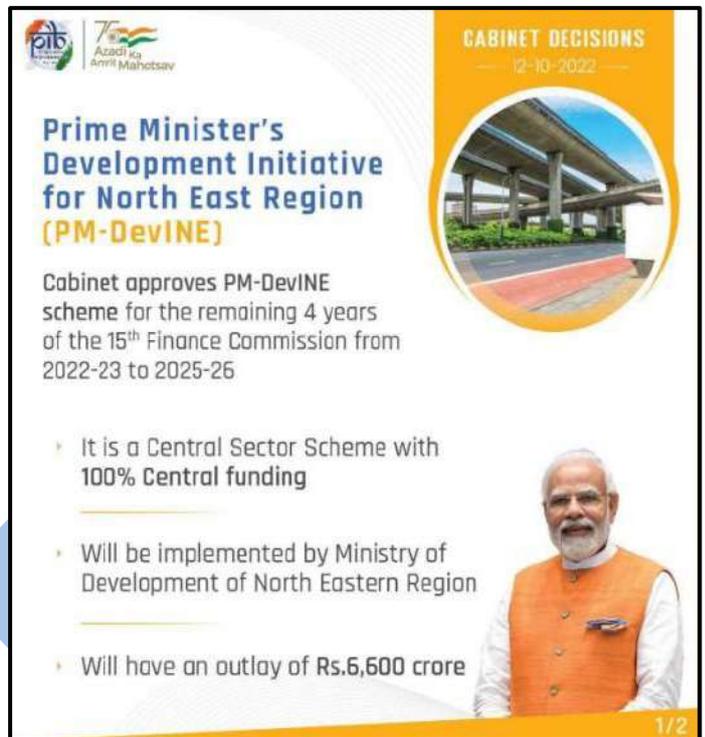
PRIME MINISTER'S DEVELOPMENT INITIATIVE FOR NORTH EAST REGION

Context

- Recently, the Union Cabinet by the Prime Minister approved a new Scheme, **Prime Minister's Development Initiative for North East Region (PM-DevINE)** for the remaining four years of the **15th Finance Commission from 2022-23 to 2025-26**.
- PM-DevINE, was announced in the Union Budget 2022-23 to address development gaps in the North Eastern Region (NER).

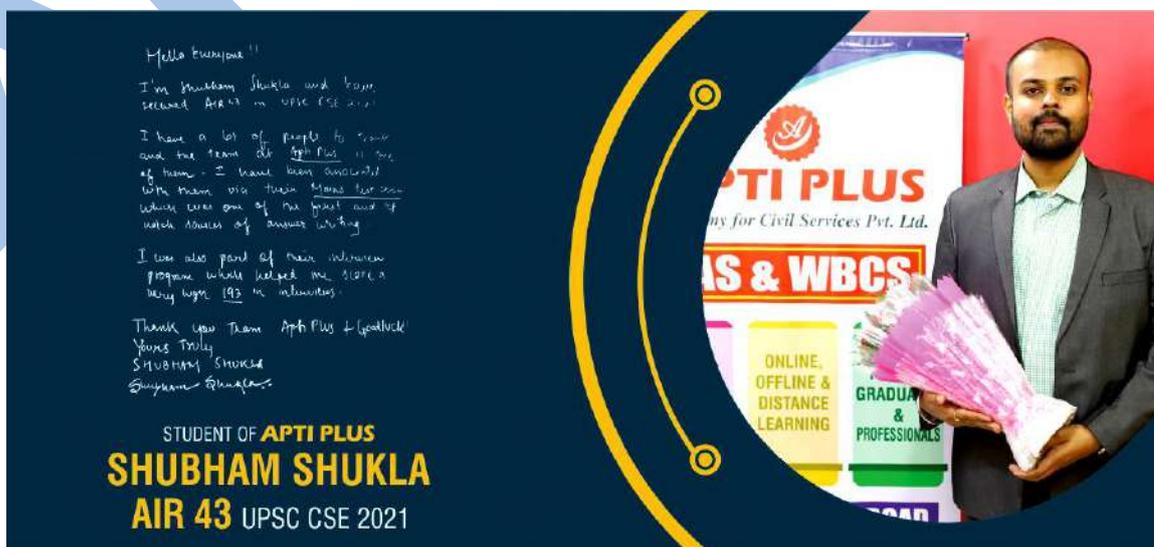
About PM-DevINE

- The new Scheme, PM-DevINE, is a **Central Sector Scheme** with 100% Central funding and will be implemented by the **Ministry of Development of North Eastern Region (DoNER)**.
- The PM-DevINE Scheme will have an outlay of Rs.6,600 crore for the four-year period from 2022-23 to 2025-26 (remaining years of the 15th Finance Commission period).
- PM-DevINE will lead to the **creation of infrastructure, support industries, social development projects and create livelihood activities for youth and women, thus leading to employment generation.**
- PM-DevINE will be implemented by Ministry of DoNER through North Eastern Council or Central Ministries/agencies.



Objectives of PM-DevINE

- Fund infrastructure convergently, in the spirit of PM Gati Shakti
- Support social development projects based on felt needs of the NER
- Enable livelihood activities for youth and women
- Fill the development gaps in various sectors



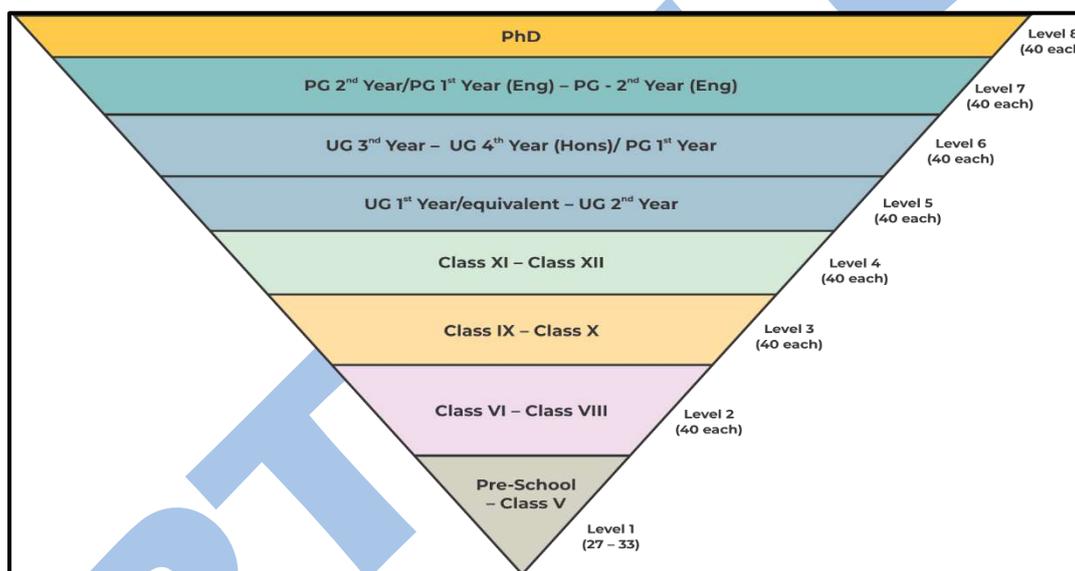
02 NATIONAL CREDIT FRAMEWORK (NCRF)

Context

- Recently, the Ministry of Education unveiled the draft National Credit Framework.
- The framework aims to formulate a **unified credit accumulation and transfer for general and vocational studies, and from school to higher education.**
- The draft framework has been formulated under UGC (Establishment and Operation of Academic Bank of Credits in Higher Education) Regulations, notified in July 2021.

About National Credit Framework

- The National Credit Framework is an umbrella framework for **skilling, re-skilling, up-skilling, accreditation, and evaluation encompassing our people in educational & skilling institutions and the workforce.**
- The government has developed the National Credit Framework (NCRF) to enable the integration of academic and vocational domains to ensure flexibility and mobility between the two.
- NCRF will also enable students who have dropped out of mainstream education to re-enter the education ecosystem.



Academic Bank of Credit

- Under the National Credit Framework, School students will soon be able to earn credits from academic and non-academic activities, which will be stored in the Academic Bank of Credit (ABC) just like in higher education with the Ministry of Education plans to introduce a National Credit Framework (NCF).
- The framework aims to formulate a unified credit accumulation and transfer for general and vocational studies, and from school to higher education.

Aim

- The National Credit Framework aims to formulate a unified credit accumulation and transfer for general and vocation education and from school to higher education.
- As envisaged in the National Education Policy 2020 to make education more holistic and effective with an emphasis on the integration of general (academic) education, vocational education and experiential learning, it becomes imperative to establish and formalise a national credit accumulation and transfer system.

03

PM'S SCHEME FOR MENTORING YOUNG AUTHORS (YUVA 2.0)

Context

- The Ministry of Education, Department of Higher Education, recently launched YUVA 2.0 - Prime Minister's Scheme for Mentoring Young Authors.
- In view of the significant impact of the first edition of YUVA with large-scale participation from young and budding authors in 22 different Indian languages and English, YUVA 2.0 is now being launched.

Theme

- THEME: 'Democracy (institutions, events, people, constitutional values – past, present, future)' in an innovative and creative manner.
- The launch of YUVA 2.0 (Young, Upcoming and Versatile Authors) is in tune with the Prime Minister's vision to encourage the youth to understand and appreciate India's democracy.

Aim of the scheme

- This scheme will help to develop a **stream of writers who can write on a spectrum of subjects to promote Indian heritage, culture, and knowledge system.**
- Besides, it will also provide a window for the aspiring youth to articulate themselves and present a **comprehensive outlook of Indian Democratic values on domestic as well as international platforms.**
- This scheme has been conceptualized on the premise that 21st-century India needs to groom a generation of young authors to create ambassadors of Indian literature.
- NEP 2020 has emphasized the empowerment of **young minds and creating a learning ecosystem that can make young readers/learners ready for leadership roles in the future world.**

Implementation

- The National Book Trust, India**, under the Ministry of Education will be the Implementing body, which will ensure phase-wise execution of the Scheme under well-defined stages of mentorship.
- The books prepared under this scheme will be published by National Book Trust, India, and will also be translated into other Indian languages ensuring the exchange of culture and literature, thereby promoting 'Ek Bharat Shrestha Bharat'.

04 4TH HELI-INDIA SUMMIT 2022

Context

- Recently, the Minister of Civil Aviation inaugurated the **4th Heli-India Summit 2022 in the Union Territory of Jammu and Kashmir**.
- The theme for the summit was: Helicopters for Last Mile Connectivity

Decrease in VAT

- The J&K government has decreased the VAT on Aviation Turbine Fuel (ATF) from 26.5 per cent to one per cent.
- This has set a new dawn for air connectivity in the Union territory with 360 per cent increase in refuelling, thus increasing the air connectivity to Jammu and Kashmir.

Advantages

- The helicopters have multifarious roles, providing urban connectivity which is no more an elitist prerogative in India but is based on **PM's vision of 'Sab Ude, Sab Jude'**.
- The other roles of helicopter service have been the emergency medical services and disaster management during floods, rescue operations etc.
- Jammu & Kashmir set an example of the best use of helicopter service when it erected transmission lines and towers using **Heli-cranes (sky cranes) on the Peer Panjal mountain range**.

Launch of important services

- a) **HeliSewa portal:** It is fully online and being used by all operators for obtaining landing permissions to helipads, and it also is creating a database of helipads in the country.
- b) **HeliDisha:** The guidance material on helicopter operations for State administration has been distributed to 780 districts.
- c) **Helicopter Accelerator Cell:** It is fully active in resolving helicopter issues and the advisory group of industry representatives is helping identify problem areas.

05 PM KISAN SAMMAN SAMMELAN 2022

Context

- Recently, the Prime Minister inaugurated the two-day event "PM Kisan Samman Sammelan 2022" at **Indian Agricultural Research Institute, New Delhi**.

Boost to Agri Startups

- The event brings together more than 13,500 farmers from across the country and around 1500 Agri Startups.
- More than 1 crore farmers, from various institutions are expected to attend the event virtually.
- The Sammelan had witnessed the participation of research policymakers and other stakeholders.

Pradan Mantri Kisan Samruddhi Kendras

- Prime Minister also inaugurate 600 Pradan Mantri Kisan Samruddhi Kendras (PMKSK) under the **Ministry of Chemicals & Fertilizers**.
- Under the scheme, the **fertilizer retail shops in the country will be converted into PMKSK in a phased manner**.

PMKSK will cater to:

- Wide variety of needs of the farmers and provide agri-inputs (fertilizers, seeds, implements)
- Testing facilities for soil, seeds, fertilizers
- Generate awareness among farmers
- Provide information regarding various government schemes
- Ensure regular capacity building of retailers at block/ district level outlets

Launch of Bharat urea

- During the event, Prime Minister will launch **Pradhan Mantri Bhartiya Jan Urvarak Pariyojana - One Nation One Fertilizer**.
- Under the scheme, Prime Minister will launch Bharat Urea Bags, which will help companies market fertilizers under the **single brand name "Bharat"**.

06

5TH ASSEMBLY OF THE INTERNATIONAL SOLAR ALLIANCE

Context

- Recently, the Fifth Assembly of the International Solar Alliance was inaugurated by the **Minister of Power and New & Renewable Energy**.

Presidency of the ISA Assembly

- **India holds the office of the President of the ISA Assembly**, with the Government of France as Co-President.
- Ministers from 20 countries and delegates from across 110 Member and Signatory countries and 18 prospective countries joined the inaugural ceremony of the 5th ISA Assembly.
- The Assembly is the **apex decision-making body of ISA**, in which each Member Country is represented.
- This body makes decisions concerning the implementation of the ISA's Framework Agreement and coordinated actions to be taken to achieve its objective.
- The Assembly meets annually at the ministerial level at the ISA's seat.

Key initiatives of ISA

- The Fifth Assembly of the ISA will deliberate on the key initiatives of ISA on three critical issues **energy access, energy security, and energy transition**.
- It assesses the aggregate effect of the programmes and other activities in terms of **deployment of solar energy, performance, reliability, cost, and scale of finance**.

About International Solar Alliance

- The International Solar Alliance is an international organisation with 110 Member and Signatory countries.
- It works with governments to improve energy access and security worldwide and promote solar power as a sustainable way to transition to a carbon-neutral future.
- ISA's mission is to unlock US\$ 1 trillion of investments in solar by 2030 while reducing the cost of the technology and its financing.
- It promotes the use of solar energy in the Agriculture, Health, Transport and Power Generation sectors.



GENERAL STUDIES - III

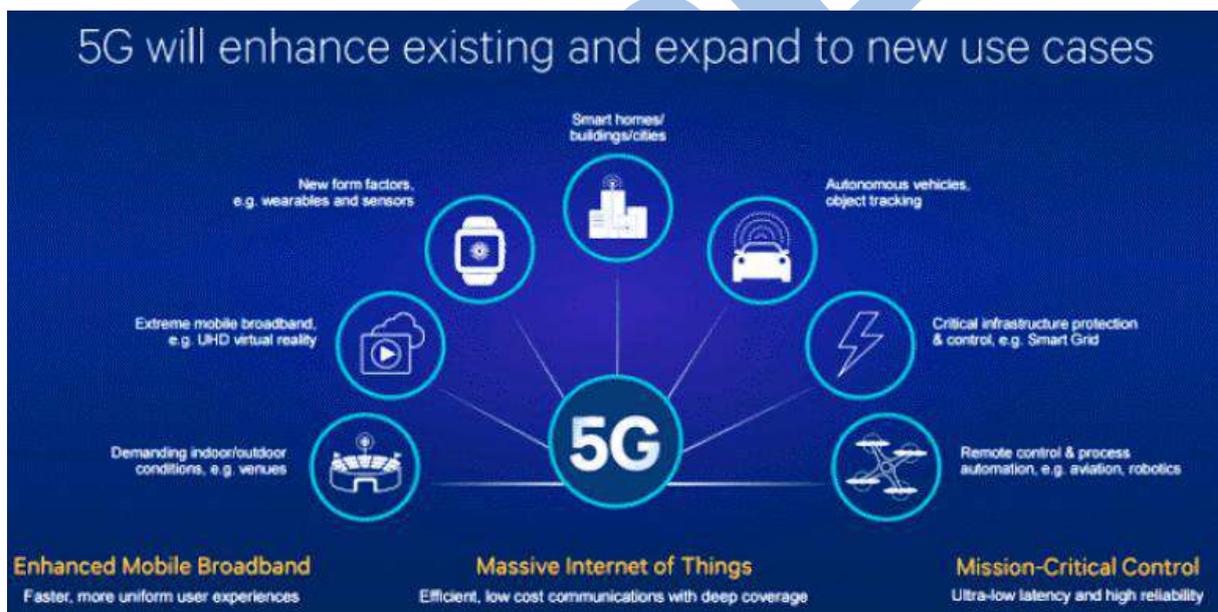
01 LAUNCH OF 5G SERVICES IN INDIA

Context

- Recently, the Prime Minister launched 5G services at the India Mobile Congress in Delhi.
- The 5G service is initially available in select cities starting from 01 of October 2022.

5G in India

- 5G is the next generation of mobile communication networks, which is supposed to offer much **faster speeds and wider use cases than 4G**.
- It is believed that the rollout of 5G will accelerate the adoption of cloud **gaming, AR/VR technology, Internet of Things, etc.**
- 5G also has several enterprise use cases.
- Initially high-speed mobile internet services on its 5G network will be rolled out for metro cities like Delhi, Mumbai, Chennai and Kolkata by Diwali this year.
- Bharti Airtel which was the second highest spender in the auction has said that 5G will be available on its network in all urban parts of the country by the end of 2023.
- Also, the company said that 5G will be available in towns and key rural areas by March 2024.



India's journey towards launching 5G

- In 2017, the government set up a high-level forum comprising representatives from the **industry, academia, government and regulators to evaluate and approve the country's roadmap for rolling out 5G**.
- The main agenda of this forum was to keep India's roadmap for 5G aligned with the **global standards to prevent the lack of homogeneity** in global telecom networks that was witnessed in services up to 4G.
- The forum, headed by Stanford University's Professor **AJ Paulraj submitted its report in 2018** and suggested a focus on areas including:

The technology involved in 5G

- 5G networks are deployed mainly in two modes: standalone and non-standalone.
- Both architectures have their advantages and disadvantages, and the path chosen by operators primarily reflects their view of the market for the new technology, and the consequent rollout strategy.
- In the standalone mode, which Jio has chosen, the 5G network operates with dedicated equipment, and runs parallel to the existing 4G network.
- While in the non-standalone mode, the 5G network is supported by the 4G core infrastructure.

- The non-standalone mode, which Bharti Airtel has opted for, lets operators maximise the utilisation of their existing network infrastructure with relatively lower investment.

Four pillars of Digital India

1. **Cost of Devices** – With Atmanirbhar Bharat the cost of devices can be reduced to a large extent. In the year 2014, there were 02 mobile manufacturing units in the country, whereas presently there are 200 manufacturing units. India is now in second position in the world for manufacturing of mobile and is also a large exporter of mobiles.
2. **Digital Connectivity** – The country has made huge progress; in 2014 there were 6 cr Broadband users which have now increased to 80 crore users. Approx 100 GPs were connected with OFC in the country and now more than 1,70,000 GPs in the country are connected with OFC. Internet users in the rural areas of the country are growing at a faster rate than in the urban area.
3. **Cost of Data** – The cost of data has reduced from Rs. 300 per GB in 2014 to Rs. 10 per GB in 2022. The average Data used per person is 14 GB per month, and the reduction in the cost of data has brought considerable savings per month for citizens.
4. **Idea of Digital First** – Many people carried the opinion that the rural poor of this country will not be able to adopt digital technology, but the citizens, particularly the rural people, have made these assumptions wrong. Rural India is fast adopting digital technologies and the internet in their daily lives.

5G roadmap

- The fifth-generation or 5G of long-term evolution mobile broadband networks is the most recent upgrade.
- 5G primarily operates across three bands: low, mid, and high-frequency spectrums, each with its own set of benefits and drawbacks.
- Revenue from 5G services is expected to rise at a CAGR of 164% over the next five years, contributing up to 1% of global GDP or \$1.3 trillion in revenue by 2030.

02

WHO GLOBAL TB REPORT 2022

Context

- The World Health Organisation (WHO) recently released the World Tuberculosis Report 2022.
- The 2022 report features data on trends of disease and the response to **the epidemic from 215 countries and areas, including all 194 WHO member states.**

Impact of COVID-19 pandemic on TB

- The Report notes the impact of the COVID-19 pandemic on the **diagnosis, treatment and burden of disease for TB all over the world.**
- While the COVID-19 pandemic impacted TB Programmes across the world, India was able to successfully offset the disruptions caused, through the introduction of critical interventions in 2020 and 2021.
- This led to the National TB Elimination Programme notifying over 21.4 lakh TB cases – 18% higher than 2020.

More about the report

- The WHO Report also notes the crucial role of nutrition and under-nutrition as a contributory factor to the development of active TB disease.
- In this respect, the TB Programme's nutrition support scheme – Ni-kshay Poshan Yojana has proved critical for the vulnerable.

Ni-kshay Poshan Yojana

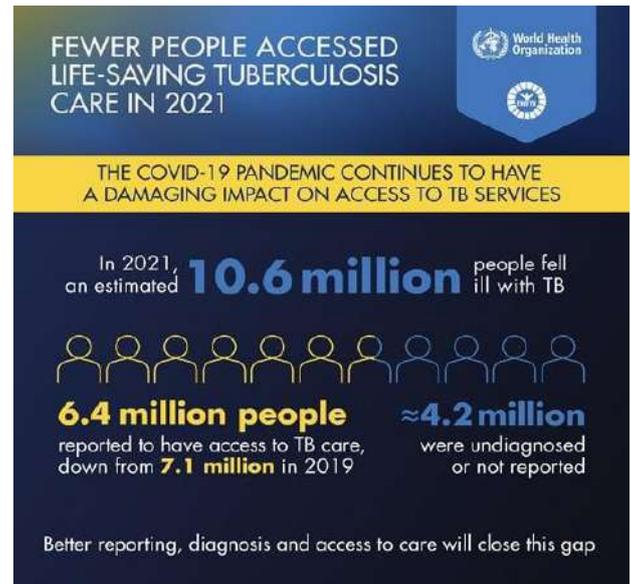
- The government has launched a Ni-kshay Poshan Yojana under the aegis of the National TB Elimination Programme (NTEP) to support the nutritional needs of TB patients.
- Under this scheme, over 62 lakh TB patients have received financial support amounting to Rs 1,651 crore since 2018. This includes a transfer of Rs 500 directly into the bank account of the patient.
- The government has been working tirelessly to provide free diagnosis, free medicines and other kinds of support to people who have been affected by the disease.

TB cases in India

- India has the world’s highest tuberculosis (TB) burden, with **26 lakh people contracting the disease and approximately four lakh people dying from it every year.**
- TB usually affects the most economically productive age group of society resulting in a significant loss of working days.

The target for TB eradication

- According to the United Nations Sustainable Development Goals (SDGs), all nations have set the goal of eradicating TB by the year 2030.
- But the Government of India has set the target of eradicating TB by the year 2025 and efforts are being made at every level to fulfil this resolution.



03 HERBICIDE-TOLERANT COTTON

Context

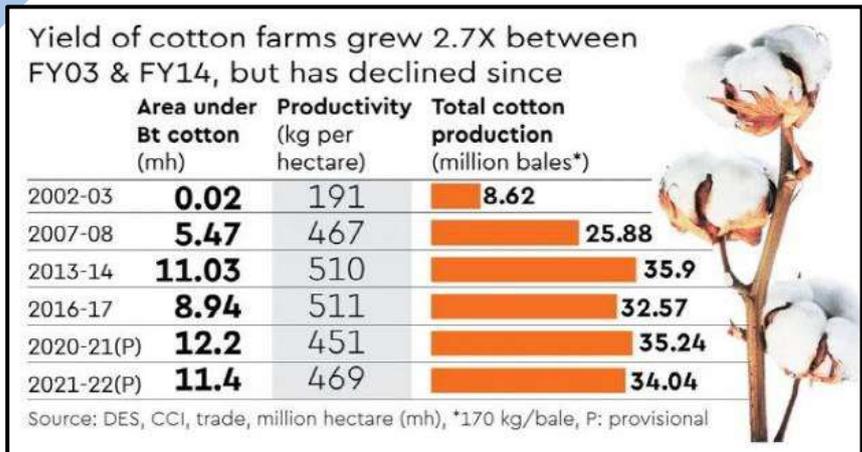
- After **Delhi University’s transgenic hybrid mustard**, India’s biotechnology regulator is set to recommend the “environmental release” of a **genetically modified (GM) cotton** of **German multinational company Bayer AG** that allows farmers to spray the herbicide glyphosate.

Transgenic cotton

- The transgenic cotton – Bollgard II Roundup Ready Flex (BG-II RRF) contains three alien genes, the first two (‘cry1Ac’ and ‘cry2Ab’) being isolated from a soil bacterium, Bacillus thuringiensis or Bt, and coding for proteins toxic to the American bollworm, spotted bollworm and tobacco caterpillar insect pests.
- The third gene, ‘**cp4-epsps**’, is sourced from another soil bacterium, Agrobacterium tumefaciens.
- BG-II RRF cotton had already undergone biosafety research and field trials by 2012-13.

About Herbicide Tolerant Bt (HTBt) Cotton

- The HTBt cotton variant adds another layer of modification, making the plant resistant to the herbicide glyphosate, but has not been approved by regulators.
- Fears include glyphosate having a carcinogenic effect, as well as the unchecked spread of herbicide resistance to nearby plants through pollination, creating a variety of superweeds



About Genetic Engineering Appraisal Committee

- The Genetic Engineering Appraisal Committee (GEAC) functions under the **Ministry of Environment, Forest and Climate Change (MoEF&CC)**.
- It is responsible for the appraisal of activities involving **large-scale use of hazardous microorganisms and recombinants in research and industrial production from the environmental angle.**
- The committee is also responsible for the appraisal of proposals relating to the release of genetically engineered (GE) organisms and products into the environment including experimental field trials.

04 GRIEVANCE PANELS FOR SOCIAL MEDIA

Context

- Recently, the Ministry of Electronics and IT (MeitY) received final approval from the Department of Legal Affairs over its proposal to set up **appellate committees to redress grievances for social media platform users**.
- The government-appointed bodies that will be **empowered to review and possibly reverse content moderation and user grievance decisions** taken by social media companies like **Facebook, Twitter and YouTube**.

Government stand

- The Ministry of Electronics and Information Technology (MeitY) wants adjudications to be done by **three-member grievance appellate committees**.
- The panels will be constituted by changes in the **Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021**.
- The government had, in February 2021, notified the IT Rules (Intermediary Guidelines and Digital Media Ethics Code), 2021 for social media apps, online news portals, news aggregators and OTT platforms.
- Amendments may provide for social media platforms to acknowledge within **24 hours user complaints and resolve them within 15 days**.

Empowerment to social media user

- Any person aggrieved by a decision of the grievance officer of social media platforms may prefer an appeal to the appellate committee within a period of 30 days.
- The amendment may provide for setting up of one or more such panels to address issues with different social media platforms.
- The complaints could range from **child sexual abuse material to nudity to trademark and patent infringements, misinformation, impersonation of another person and content threatening the unity and integrity of the country**.

About grievance appellate committee

- Each grievance appellate committee may consist of a **chairperson and two whole-time members appointed by the central government**, of which one will be a **member ex-officio and two independent members**.
- The grievance appellate panel will deal with such appeal expeditiously and make an **endeavour to resolve the appeal within 30 days from the date of receipt of the appeal**.

05 FOUNDATION STONE FOR AC-295 AIRCRAFT PLANT

Context

- The Prime Minister recently laid the foundation stone of a manufacturing facility being set up by the **Tata-Airbus consortium at Vadodara in Gujarat for C-295** on October 30.
- The C-295 transport aircraft carrier will modernise the **Indian Air Force's transport fleet**.

Indigenous manufacturing

- According to Defence Ministry officials, 96 per cent of the work that Airbus does in its facility in Spain would be done in the Indian facility and the electronic warfare suite for the aircraft would be done by public sector Bharat Electronics (BEL).
- This would be having one of the highest indigenous contents.
- The aircraft built in India would be supplied from 2026 to 2031 and the first 16 aircraft will come between 2023 to 2025.



- Indian Air Force would ultimately become the largest operator of this C-295 transport aircraft.
- India has signed the deal for this project as per the defence procurement procedure 2011 under which the tender for the project was issued.

About C-295 aircraft

- C-295MW aircraft is a transport aircraft of 5-10 Tonne capacity with contemporary technology that will replace the ageing Avro aircraft of the Indian Air Force.
- The aircraft has a rear ramp door for quick reaction and para dropping of troops and cargo.
- The aircraft can be used for tactical transport of up to 71 passengers or 50 paratroopers, and for logistic operations to locations that are not accessible by current heavier aircraft.
- It can operate from short or unprepared airstrips.

NEWS IN BRIEF

Unified Logistics Interface Platform (ULIP)

- Unified Logistics Interface Platform (ULIP), launched by the Prime Minister as part of the 'National Logistics Policy (NLP)' in September 2022.
- It is a promising initiative in the logistics sector that aims to bring ease of doing business in the logistics sector by simplifying the logistics processes, improving its **efficiency, bringing in transparency and visibility, and reducing logistics cost & time.**
- It aims to bring ease of doing business in the logistics sector by improving efficiency, simplifying logistics processes, bringing transparency and reducing logistics cost & time
- ULIP provides direct and indirect benefits like monitoring of cargo movement, consignment tracking, and inventory management thereby helping in structured planning to the stakeholder.

Grievance Redressal Index

- The Unique Identification Authority of India (UIDAI) has once again topped amongst all Group A Ministries, Departments and Autonomous Bodies for resolving public grievances in the rankings report published by the Department of Administrative Reforms and Public Grievances (DARPG) for the month of September 2022.
- This is the second consecutive month UIDAI has topped the said rankings.
- UIDAI has been a top performer in resolution of Public Grievances received through CPGRAMS, and making continuous efforts to make Aadhaar holders experience better.

Power EX-2022

- Recently, Indian Computer Emergency Response Team (CERT-In) in collaboration with Power-CSIRTs (Computer Security Incident Response Teams in the Power sector), successfully designed & conducted the Cyber Security Exercise "PowerEX" for 193 invited Power Sector Utilities.
- The Objective of the exercise was to "Recognize, Analyse & Respond to Cyber Incidents in IT & OT Systems."
- Theme: "Defending Cyber induced disruption in IT & OT Infrastructure"

Matdata Junction-Radio series

- Recently, the Chief Election Commissioner launched a yearlong Voter Awareness Program 'Matdata Junction' during an event organized at Akashvani Rang Bhavan.
- The Matdata Junction is a **52-episode radio series** produced by the election commission of India, in collaboration with **All India Radio.**
- The program as a combination of information and entertainment, would specifically help address urban apathy and inform the audience about the election processes in the **conduct of free, fair, transparent, inducement free, accessible and inclusive elections in an interactive communication format.**

Two Indian Beaches in Blue Beaches

- In yet another recognition of India's commitment to protect and conserve the pristine coastal and marine ecosystems through holistic management of the resources, the globally recognized and the coveted International

eco-label "Blue Flag", has been accorded to two new beaches – **Minicoy Thundi Beach and Kadmat Beach- both in Lakshadweep.**

- **India now has 12 Blue Flag beaches**, an eco-label given to the cleanest beaches in the world.

Sanjeevani - Lifestyle Clinic

- An integrated facility, aptly named the "Sanjeevani - Lifestyle Clinic" to provides advice on diet, exercise and behavioural counselling thereby rendering comprehensive preventive and curative care on lifestyle diseases to all serving & retired personnel and their dependents have been inaugurated at the Armed Forces Clinic, New Delhi.
- The aim of "Sanjeevani - Lifestyle Clinic" is to sensitise Armed Forces personnel and dependents identified to be at risk, regarding lifestyle disorders, prevent and manage chronic disorders like diabetes, hypertension and obesity etc, without pharmacologic interventions by promoting a healthy lifestyle through dietary education, exercise and positive motivation.
- This initiative will bring a positive change to quality of life and self-confidence of affected serving soldiers, veterans and their families.

Online Building Plan Approval System

- The Government has recently approved the extension of the Online Building Plan Approval System (OBPAS) under the eChhawani portal to five more Cantonment Boards, namely **Agra, Ranikhet, Babina, Jammu and Cannanore.**
- This will further enhance the speed, accuracy, consistency and transparency in the process of building plan scrutiny in these cantonments.
- With this extension, the benefits under OBPAS can now be availed by residents living in 22 Cantonment Boards across the country.
- eChhawani is a Citizen-Centric project of Directorate General of Defence Estates, Ministry of Defence to provide online services across 62 Cantonment Boards through a common web portal in paperless, faceless and cashless manner.

Cheetah Task Force constituted

- The Ministry of Environment, Forest and Climate Change has constituted a Task Force for monitoring Cheetah introduction in **Kuno National Park, Madhya Pradesh, and other suitable designated areas.**
- The National Tiger Conservation Authority (NTCA) would facilitate the working of the Cheetah Task Force and render all necessary help.
- The Task Force shall be in **force for a period of two years.**
- This task force may appoint a subcommittee to regularly visit the Cheetah introduction area as and when decided by them.
- The Task Force has been constituted to:
 - Review, progress and monitor the health status of the Cheetah, upkeep of the quarantine & soft release enclosures and protection status of the entire area
 - Monitor hunting skills and adaptation of Cheetahs to the habitat of Kuno National Park.
 - Monitor release of Cheetah from Quarantine bomas to soft release enclosures and then to grass land and open forest areas.
 - Open Cheetah habitat for eco-tourism and suggest regulations in this regard.

BILATERAL AGREEMENTS AND SUMMITS

U.S.-India Strategic Clean Energy Partnership

- Recently, the revamped US-India Strategic Clean Energy Partnership SCEP was launched during the ministerial meeting.
- The meeting underscored the critical importance of bilateral clean energy engagement to **strengthen energy security and accelerate a clean, secure, and just energy transition.**
- The United States and India reiterated their commitment to accelerating a just and sustainable energy transition.

- As the climate and clean energy leaders, the United States and India share a common vision to deploy clean energy at scale during this critical decade to reduce emissions and achieve climate change mitigation goals, considering different national circumstances.
- Both India and U.S. increased clean energy collaboration between stakeholders of both countries which is **facilitating expanded clean energy investment, including in emerging technologies.**
- The Ministers stressed that climate and clean energy collaboration should promote energy access, affordability, and energy justice while supporting sustainable economic growth and just energy transitions.
- India and the United States noted the Importance of facilitating increased energy investments to ensure sustainable, affordable, reliable, resilient and cleaner energy systems.

Five technical pillars of cooperation

Agencies from across the U.S. and Indian governments demonstrated several accomplishments across the five technical pillars of cooperation on:

1. Power & Energy Efficiency
2. Renewable Energy
3. Responsible Oil & Gas
4. Sustainable Growth
5. Emerging Fuels and Technologies

India, GCC group to start free trade pact

- India and the Gulf Cooperation Council (GCC) member countries are expected to start negotiations for a free trade agreement next month with an aim to boost economic ties between the two regions.
- GCC is a union of six countries in the Gulf region – **Saudi Arabia, UAE, Qatar, Kuwait, Oman and Bahrain.**
- India has already implemented a free trade pact with the UAE in May this year.

Trade potential

- According to experts, the GCC region holds huge trade potential and a trade agreement would help further boost India's exports to that market.
- The GCC market is unexploited by domestic exporters and it holds huge potential.
- GCC has emerged as a major trading partner for India and there is huge potential for increasing investments between the two regions.

India's Import and Export

- India imports predominately crude oil and natural gas from the Gulf nations like Saudi Arabia and Qatar.
- Although India exports pearls, precious and semi-precious stones; metals; imitation jewellery; electrical machinery; iron and steel; and chemicals to these countries.

90th General Assembly of Interpol

- Addressing the 90th General Assembly of Interpol, Secretary General of Interpol has said that Interpol has no role in curbing state-sponsored terrorism as it focuses on "ordinary law crime", which accounts for a majority of the crime that occurs across the world.
- He said Interpol is a platform that allows its member countries to share information with each other.
- This is the second time since 1997 the 195-member-strong body is holding such a large conference in India.

About Interpol

- The International Criminal Police Organization (INTERPOL) is an intergovernmental organization that **helps coordinate the police force of 194 member countries.**
- Interpol was set up in **1923.**
- The General Secretariat provides a range of expertise and services to the member countries.
- It is headquartered in **Lyon, France**

Function of Interpol

- Interpol is a secure information-sharing platform that facilitates criminal investigation of police forces across the globe through collection and dissemination of information received from various police forces.
- It keeps track of the movements of criminals and those under the police radar in various regions and tips off police forces which had either sought the Interpol's assistance or which in its opinion will benefit from the particulars available with it.
- Aided by state-of-the art databases and computer analytics, the Interpol operates round the clock and employs some of the best minds in the area of crime analysis and technology.

- It aims to promote the **widest-possible mutual assistance between criminal police forces.**

MILITARY EXERCISES AND INITIATIVES

First Training Squadron (1TS)

- The ships of the First Training Squadron (1TS) comprising INSTir, Sujata and CGS Sarathi arrived at Port Al-Shuwaikh, Kuwait in Oct 2022.
- The ships are deployed in the **Persian Gulf as part of their training deployment.**
- The ships were accorded a warm welcome by senior officers of the Kuwaiti Naval forces, Border Guard and the Embassy of India officials besides school children.
- The three-day port call includes professional **engagements, cross-ship visits, community outreach and social interactions.**

Exercise Prasthan

- An offshore security exercise, code-named 'Prasthan' was conducted in the Offshore Development Area (ODA) off Mumbai, under the aegis of Headquarters, Western Naval Command.
- The exercise is an important element of ensuring offshore security and aims to integrate the efforts of all maritime stakeholders, including the Indian Navy, Indian Air Force, Coast Guard, ONGC, the Port Trust, Customs, the state fisheries department, and the Marine Police, in refining SOPs and response-actions to a variety of contingencies in the ODAs.
- The exercise provides all stake holders a realistic scenario to assess their readiness to respond to and combat contingencies in the Western ODA, as also to operate together in a coordinated manner.

Submarine Launched Ballistic Missile

- Recently, INS Arihant carried out a successful launch of a Submarine Launched Ballistic Missile (SLBM).
- The missile was tested to a predetermined range and impacted the target area in the Bay of Bengal with very high accuracy.
- All operational and **technological parameters of the weapon system have been validated.**
- The successful user training launch of the SLBM by INS Arihant is significant to prove crew competency and validate the SSBN programme, a key element of India's nuclear deterrence capability.

Exercise Garuda - VII

- Recently, the Indian Air Force (IAF) and French Air and Space Force (FAF) participated in 'Garuda VII' at **Air Force Station Jodhpur.**
- The IAF contingent also includes Combat Enabling Assets like Flight Refuelling Aircraft, AWACS and AEW&C.
- This joint exercise will provide a platform for both the countries to enhance **operationally capability and interoperability, while also sharing best practices.**

Singapore-India Maritime Bilateral Exercise 'Simbex' - 2022

- The Indian Navy has recently hosted the 29th edition of the Singapore-India Maritime Bilateral Exercise (SIMBEX).
- SIMBEX-2022 is being conducted in two phases – **the Harbour Phase at Visakhapatnam and the Sea Phase in the Bay of Bengal.**
- The Harbour Phase witnessed extensive professional and sporting interactions between the two navies including cross-deck visits, Subject Matter Expert Exchanges (SMEE) and planning meetings.
- SIMBEX series of **exercises began in 1994** and were initially known as Exercise Lion King.
- The exercise exemplifies the **high level of cooperation between India and Singapore in the maritime domain.**

YOJANA

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- Geoscientific Explorations

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General Studies - III

- Green Telecom
- Zoological Diversity
- Safeguarding Oceans

APTI PLUS

* The table of content is segregated as per its relevance with Mains Syllabus of CSE Examination.
* The article mention under GS paper in table of content might be important for many other topics in GS Papers as well.
* The details relevance of each article/Topics with respect to GS syllabus has been mention at the starting of each article.

**LEGACY OF SUCCESS CONTINUES IN UPSC CSE 2021
HEARTIEST CONGRATULATIONS OUR STAR PERFORMERS**

45⁺ SELECTIONS IN IAS 2021



AIR 9
PREETAM KUMAR



AIR 29
BHAVISHYA



AIR 43
SHUBHAM SHUKLA



AIR 50
ABHIJIT RAY



AIR 93
DEEPESH KUMARI



AIR 102
PRAKHAR



AIR 107
PANKAJ



AIR 137
RISHABH



AIR 152
NEHA



AIR 158
RAJ



AIR 180
SHRISTI



AIR 186
SAMIKSHA



AIR 211
LALITH



AIR 220
GARIMA



AIR 228
MAYANK



AIR 229
ARPITA



AIR 232
BISWA



AIR 240
UTSAV



AIR 269
ANUP



AIR 300
SHIVANI



AIR 319
GAJANAN



AIR 324
AJIT



AIR 325
KAJALE



AIR 355
PRATIBHA



AIR 379
ANURAG



AIR 439
KESHAV



AIR 469
SASHI



AIR 494
ABHINANDAN



AIR 497
SHUBHAM



AIR 534
SUDHA



AIR 541
RITESH



AIR 590
RAJESH



AIR 621
RAJNISH



AIR 622
RAJESH K.



AIR 636
SHANTANU



AIR 644
SPARSH



AIR 648
SHUBHAM



AIR 650
DHARAVATH



AIR 658
SAPAVATH



AIR 673
B S MEENA

AND MANY MORE...

01 GEOSCIENTIFIC EXPLORATIONS

GS Syllabus Covered

GS- I: Distribution of key natural resources across the world (including South Asia and the Indian sub-continent); factors responsible for the location of primary, secondary, and tertiary sector industries in various parts of the world (including India).

GS-II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

Introduction

- **Geological exploration** is the process of finding commercially viable mineral resources and the objective is to locate them in the shortest possible time and at the lowest possible cost.
- **Acquisition and dissemination** of pre-competitive baseline geoscience data of the highest standards.
- The baseline geoscience data collected by the **Geological Survey of India** is the core for generating more mineral exploration work which leads to mineral discoveries.

Mineral exploration in India

- The Geological Survey of India (GSI) is the premier geoscience organisation involved in **mineral exploration** in the country since its inception in 1851.
- The growth of the mineral industry is directly linked to the **mineral endowment of a country**.
- The baseline geoscience data collected by GSI is the core for generating more mineral exploration work which leads to mineral discoveries.
- During the inception of GSI, the prime mandate was to carry out:
 - Geological survey of the country
 - Exploration in specific parts of the country with special objectives to locate mineral resources.

Recent Thrust Areas

Mission-I Baseline Geoscience Data Generation

- The **National Mineral Exploration Policy (NMEP)2016**, emphasises the acquisition and dissemination of pre-competitive baseline geoscience data of the highest standards.
- The creation of a **geoscience data repository** and a special initiative to probe deep-seated/concealed mineral deposits are **primary requisites to promote mineral exploration in the country**.
- Accordingly, GSI is on a mission to generate nationwide baseline geoscience data.
- Presently, GSI is carrying out pan-India mapping projects like **National Geochemical Mapping (NGCM)**, **National Geophysical Mapping (NGPM)**, **National Aero Geophysical Mapping (NAGMP)**, and **Specialised Thematic Mapping (STM)** programmes.

Mission-II Natural Resource Assessment

- The Geological Survey of India (GSI) is **augmenting natural mineral and coal resources for enhancing the Mining Sector's contribution to the GDP of India**.
- In response to the national requirement, thrust has been given to exploration for strategic and critical minerals like **tungsten, molybdenum, nickel, lithium, cobalt, rock phosphate, potash, etc.**
- **Regional Mineral Targeting (RMT)** projects have been introduced for the scanning of larger areas with a multi-thematic data integration approach for the identification of promising areas for further exploration.
- Further, to boost the mining sector, GSI has recently handed over 252 Geological Memorandums to the concerned State Governments for auctioning as composite licences following the guidelines of **Minerals (Evidence of Mineral Contents) Amendment Rules, 2021 (amended MMDR Act 2021)**.

Mission-III Geoinformatics

- The Geological Survey of India (GSI) has implemented **Online Core Business Integrated System (OCBIS)** portal to fulfil the responsibility to **disseminate multi-thematic geoscientific information freely for the use of all concerned stakeholders through "Bhukosh"**.

- GSI is also taking up the lead role in setting up of **National Geoscience Data Repository (NGDR)** for hosting exploration-related geoscientific data collected by all stakeholders to facilitate, expedite and enhance the exploration coverage of the country.
- An MoU has been signed between **GSI and Bhaskaracharya National Institute for Space Applications and Geo-Informatics (BISAG-N)**, under the Ministry of Electronics and Information Technology (MeitY) for the implementation of NGDR.

Mission-IV Fundamental & Multidisciplinary Geosciences and Special Studies

- Through the National Landslide Susceptibility Mapping (NLSM), GSI has prepared a **seamless landslide susceptibility over a 4.3 lakh sq. km** area spanning the landslide-prone zones spread over parts of 18 States/UTs.
- In collaboration with the British Geological Survey (BGS) under the National Environment Research Council (NERC), UK funded, multi-consortium LANDSLIP project, GSI is engaged in developing an experimental regional Landslide Early Warning System (LEWS) based on rainfall thresholds since 2017.
- To execute the above multidisciplinary task, GSI is collaborating with multiple national and international organisations.
- The GSI established state-of-the-art permanent **Seismic-Geodetic Observatories** at 10 different strategic locations across India, viz. **Itanagar, Mangan, Agartala, Jammu, Nagpur, Lucknow, Jaipur, Pune, Thiruvananthapuram and Little Andaman.**

Way forward

- The Geological Survey of India (GSI) promotes a platform like the **Central Geological Programming Board (CGPB) which facilitates** synergy and avoids duplication and waste of resources, where all State Governments, central ministries, PSUs, and academic institutes participate and GSI’s programmes are discussed.
- GSI formulates its national programmes through this consultative process and ensures that the programmes align with the current global and national thrust areas, and align to the **national and international policy directives and SDGs.**

02 WATER GOVERNANCE

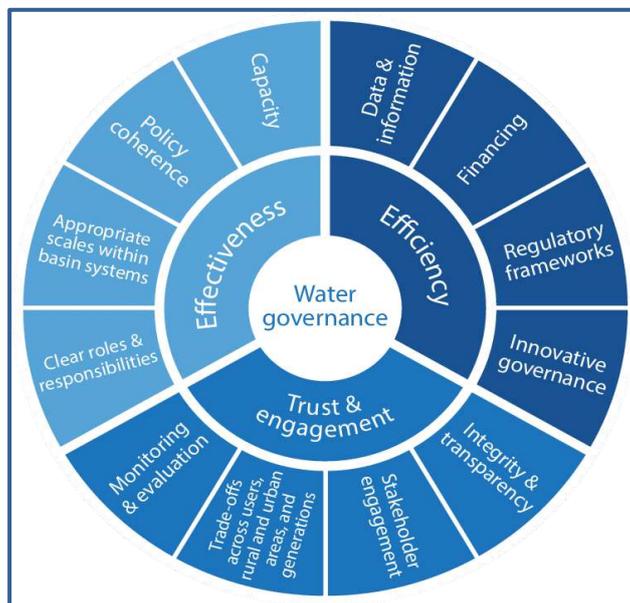
GS Syllabus Covered

GS-II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

GS-III: Conservation, environmental pollution and degradation, environmental impact assessment.

Introduction

- Water governance refers to the **political, social, economic, and administrative systems** that influence the use and management of water.
- Water governance relates to the enabling environment in which water management actions take place: that is, the overarching policies, strategies, plans, finances and incentive structures.
- Effective water governance promotes **responsible actions and measures to protect and ensure the sustainability of water resources** and to optimize the services and benefits obtained from those resources.
- **Good water governance** is essential to achieve water security, fairly allocate water resources, and avoid disputes.



Gujarat model of water governance

- Gujarat and the Indian water journey have been invaluable in showing the world how water management can be reinvented to make it sustainable and restore our environment.
- These initiatives, are centred on people partnering with technology aiming at sustainability, paving the way for affordable, scalable and reliable models for the entire world.
- The State transformed by adopting **environment-friendly policies, climate-resilient engineering, and strengthening grassroots leadership** stands out as an example of sustainable development and offers a path to follow.

Transformation

- In the late 1990s, Gujarat's western and northern parts dried up due to severe droughts and the inflating desert of Kutch had left a terrible impact on livelihood.
- The State and district administration had devoted considerable resources and time to manage the scarcity of water.
- To address these challenges once and for all, water was placed at the centre stage of the State's developmental policy.
- The State government focus on **open defecation free** with an emphasis on rainwater harvesting and efficient use of water.
- The State-wide drinking water supply grid' was planned to provide clean tap water free from chemical and bacteriological contamination.
- To promote sustainable agriculture in **drought-prone North Gujarat, Saurashtra and Kutch**, a unique approach to transferring Narmada floodwater to these regions through a series of canal/pipeline networks was taken up.

Enabling Water-Use Efficiency in Agriculture

- To water-secure water in mission mode, "**SujalamSufalam Jal Abhiyan**" was initiated around the twin objectives of deepening water bodies before monsoons and enhancing water storage for rainwater collection.
- It entails numerous water conservation activities including the **cleaning and deepening of ponds, canals, and tanks, check dams and reservoirs, repair of water storage structures, construction of rainwater harvesting structures, etc., through a participative approach.**

Government measures

- a. **Saurashtra Narmada Avtaran Irrigation' (SAUNI):** The scheme was also taken up under which, during monsoon, surplus water from Narmada is transferred and stored in about 115 reservoirs of Saurashtra.
- b. **Atal Bhujal Yojana:** It is a unique policy initiative that was undertaken to **empower local communities by ensuring their participation and improving their sense of ownership among all other stakeholders.**
- c. **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):** Under this scheme, farmers are encouraged to **adopt water-smart irrigation technologies** to improve productivity with reduced water wastage.
- d. **Catch the Rain campaign:** One of the crucial measures undertaken is on improving rainwater harvesting under the "**Catch the Rain' campaign.**
- e. **Jal Shakti Abhiyan:** The mission was launched as a campaign and mission-mode initiative to make the best of the monsoons and enable water conservation.
- f. **Namami Gange:** The initiatives were launched for the **rejuvenation of the river Ganga and its tributaries by adopting a multi-level and multi-agency approach.**

Jal Jeevan Mission

- The Jal Jeevan Mission was launched in 2019 and envisages a supply of 55 litres of water per person per day to every rural household through **Functional Household Tap Connections (FHTC) by 2024.**
- This mission was designed in partnership with States and aimed to ensure long-term assured water service delivery.
- **The Swachh Bharat Mission 2.0** focuses on reducing waste production and its suitable treatment, reuse or disposal.
- The key impact areas of this mission are biodegradable **solid waste, greywater, plastic waste, and faecal sludge management.**

- The National Project on Aquifer Management (NAQUIM), one of the world's biggest programmes of its kind, envisages the formulation of aquifer management plans to facilitate the sustainable management of groundwater.

Way Forward

- The socio-economic development and economic growth, especially in drought-prone and desert areas depend upon how wisely water resources are utilised.
- Water, being a finite resource, plays a key role especially in arid and semi-arid regions in restoring and sustaining the environment including flora and fauna.



03

WONDER IN THE WEST

GS Syllabus Covered

GS- II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

GS-III: Conservation, environmental pollution and degradation, environmental impact assessment.

Introduction

- The region in and around Gujarat is blessed with a plethora of varied ecosystems that accommodate numerous species of wildlife.
- Gujarat has many biodiversity hotspots that are abodes of several migratory birds and other rare and endangered species of flora and fauna.
- It is one of the rich biodiversity States, which is indicated by the presence of 7,500 species of flora and fauna.

Biodiversity hotspots

- Gujarat State has many biodiversity hotspots like Little Rann of Kutch, Greater Rann of Kutch, Marine National Park, Jamnagar, wetlands and forests of Barda Sanctuary, Porbandar, Grasslands of Velavadar, Thol Lake and Nalsarovar, Northern part of Western Ghat in South Gujarat, etc.
- They are abodes of several migratory birds and other rare and endangered species of flora and fauna.
- The flora of this region is unique in nature as the species have developed many adaptations like resistance to salinity to sustain themselves in the hostile and adverse climatic conditions in arid and semi-arid regions.
- The National Parks and Sanctuaries of Gujarat are home to unique, rare and threatened species of animals and plants.

Protecting ecosystem

- A balanced ecosystem is a prerequisite for the smooth functioning of everything in the environment.
- Any deliberate or unprecedented imbalance in biodiversity disturbs its surroundings causing an imbalance in the ecosystem which further trickles down to food chains and then to the food web. Maintaining the natural balance in an ecosystem is essential for multiple reasons.

- Realising the sensitivity of the overall impacts governments have deliberated and formulated policies to protect the biodiversity of their respective lands.
- The State has also done commendable work for the conservation and wise use of **wetlands as per the Ramsar Convention**.
- Gujarat has four Ramsar sites, i.e., wetlands of international importance and several wetland-based **Important Bird and Biodiversity Areas (IBAs)**.
- The notable Ramsar sites of the State are:
 - **Nalsarovar and Thol Bird Sanctuaries near Ahmedabad**
 - **Khijadia Sanctuary near Jamnagar**
 - **Wadhvana wetland near Vadodara**

Measures to protect the ecosystem

- With industrialisation, ecosystems across the world have been destroyed, therefore the balance between technological development and nature becomes all the more critical.
- Way back in 1977, a **Natural History Museum was established in Gandhinagar**.
- The area is now popularly known as **Indroda Nature Park (INP)**.
- Later, this was subsumed into the **Gujarat Ecological Education and Research (GEER) Foundation** which was founded in June 1982 by the Forests and Environment Department of the Government of Gujarat to undertake activities such as ecological education, ecological research, natural history interpretation, climate change research, wetland monitoring, biodiversity monitoring of Sanctuaries and National Parks.
- The GEER Foundation was also recognised by the Scientific and Industrial Research Organisation (SIRO), Gujarat State Centre on Climate Change by the Department of Science and Technology, Government of India and the Nodal Agency of Gujarat State Wetland Authority by the State Government.
- Under State Government's Nature Education Scheme, GEER Foundation conducted a total of 3,950 Nature Education/ Ecological Camps for students from various schools and colleges of the State.

04

GREEN TELECOM

GS Syllabus Covered

GS-III: Achievements of Indians in science & technology; indigenization of technology and development of new technology.

GS-III: Science and Technology- developments and their applications and effects in everyday life.

Introduction

- The Indian telecom sector has experienced phenomenal growth in the recent past and is rising exponentially.
- The Government is taking initiatives on various fronts for increasing **Tele-density and Broadband penetration in urban and rural India**.
- With the advent of 5G technology, it is expected that there will be a significant rise in the towers, small cells, and BTS (or equivalent electronics) resulting in accelerating GHG and **carbon emissions, and the resultant contribution to overall global warming**.
- To reduce the adverse effect on the overall ecosystem by the telecom sector, steps must be taken to lessen energy consumption and migrate towards renewable sources of energy to mitigate the effects of global warming.

Background

- Ever since the start of industrialisation in the 18th century with steam power and mechanisation of production, the air and water pollution levels have been rising on Earth.
- Although pollution was present in the **pre-industrialisation era also**, it was negligible enough to be offset by the carbon dioxide stored and absorbed by the forests throughout the planet.
- However, in the 20th century, the pollution levels were more noticeable and the number of **Greenhouse Gases (GHGs)** rising was giving effect to **"Global Warming."**

Global Warming and Climate change

- The term “Global Warming’ refers to an unnatural increase in the average temperature of the planet as compared to pre-industrial levels.
- The various phenomena of global warming along with other natural calamities like **typhoons, flash floods, melting of icebergs**, etc. are collectively termed ‘climate change.’
- **Climate Change** is the biggest challenge the world is facing today.
- This requires all countries to come together and discuss measures to curtail the GHG emissions in the atmosphere.
- The respective sectors like **Agriculture, Industry, Service sector**, etc. have to take corrective steps in their area to mitigate the effects of climate change for a balanced ecological system.



India's telecom market

- India's telecom market is the **second largest** in the world in terms of subscriptions.
- This market is characterised by one of the lowest broadband rates in the world.
- As per the latest **TRAI report**, India had 1.15 billion mobile subscriptions and about 800 million broadband connections, most of which were on mobile devices and connected through telecom towers and small cells.
- There are more than **7 lakh telecom towers** spread over the length and breadth of the country.

Intervention required

- To reduce the adverse effect on the overall ecosystem by the telecom sector, steps must be taken now on the two main fronts:
 1. **Reducing the energy consumption of the electronics**, designing eco-friendly electronics, buildings, consumables, and effective network planning with the overall aim to reduce power requirement; and
 2. Migrating towards renewable sources of energy to mitigate the effects of global warming.

Reducing the Energy Consumption

- There are ways to reduce the energy consumption of the electronics used in providing telecom services including those based on 5G technology.
 - a. **Use of 5G Technologies:** In the 5G technology, the energy issues are handled right from the design stage itself.
 - The energy efficiency of a future network like 5G is expected to be improved by a factor of twenty as compared to LTE/4G technology.
 - 5G technology will also help in the **most efficient and flexible allocation** of resources for providing telecom and broadband services.
 - b. **Cell switch-off techniques**, i.e., by **turning Radio Frequency (RF) chains** off when not in use and keeping only backhaul links alive; the base station is only changed to active mode when a signal is sensed. This can reduce base-station energy consumption by up to 40%.
 - c. **Introducing smart shutdown techniques** using **Artificial Intelligence (AI)** across multiple sites and radio networks to reduce power consumption.
 - d. Close or sunset old 2G, 3G Technology-based systems
 - e. **Use of Dynamic Spectrum Sharing (DSS)**, which allows new mobile technologies to make use of older networks' spectrum, sharing it on a dynamic basis.

- f. **Installing Internet of Things (IoT) sensors** on infrastructure to monitor energy usage and quality of service, in real-time.

Migrate towards Renewable Sources of Energy

- Telecom towers consume **65-70% of energy** from the operations of telecom networks.
 - To reduce the effect on the environment and ecology due to the energy needs of telecom equipment, there is an urgent need to move to renewable sources of energy for telecom towers, i.e., green telecom towers for energy saving.
 - India was ranked **fourth in wind power, fifth in solar power, and fourth in renewable power installed capacity, as of 2020.**
 - As per the **Central Electricity Authority report**, the total installed capacity increased by **CAGR 15.92% between the Financial Years 2016-22.**
 - For providing energy to the telecom towers, some of the following renewable sources can also be used.
- a. **Solar Power:** India is one of the best recipients of solar energy with abundant availability. Its generation has increased by more than **18 times from 2.63 GW** in March 2014 to 49.3 GW at the end of 2021.
- There are now hybrid models where power is drawn from both the grid and solar cells, thus reducing the dependence solely on grid and DG sets.
 - In telecom towers, solar, grid, and DG-based power supply are increasingly being used in the field.
- b. **Wind Power:** Wind power is a clean, reliable, renewable, and cost-competitive source of renewable energy that has been used for decades.
- **Wind power generation** along with solar power generation (hybrid renewable power) is becoming quite popular now and many more wind turbines are getting installed.
- c. **Geothermal Power:** Geothermal power is a renewable form of energy utilising underground hot water or steam created by the natural heat beneath the earth's surface.
- **Low-temperature geothermal** sources can be utilised to heat and cool by installing heat pump systems.
- d. **Fuel cell:** Fuel cells are a promising technology for use as a source of heat and electricity. A fuel cell combines hydrogen and oxygen to produce electricity, heat and water.
- Fuel cells operate best on **pure hydrogen.**
 - Fuels like natural gas, **methanol or even gasoline** can be reformed to produce the hydrogen required for fuel cells.
- e. **Other innovative solutions: Wave power, tidal power, and ocean currents** can also be used to drive turbines to generate electricity.
- Technologies to harness these forms of power are presently being developed to the stage of commercialisation.

Impediments to Renewable Energy Implementation

There are significant barriers to the implementation of renewable energy that need to be addressed. The key issues include the following:

1. Many renewable energy technologies remain expensive on account of higher capital costs, compared to conventional energy supplies for bulk energy supply to urban areas or major industries.
2. Implementation of renewable energy technologies needs significant initial investment and may need support for relatively long periods before reaching profitability.
3. There is still a lot to be done for consumer awareness of the benefits and opportunities of renewable energy.
4. Financial, legal, regulatory, and organisational barriers need to be overcome to implement renewable energy technologies and develop markets in India.

Conclusion

- With the proliferation of broadband and mobile devices, there has been significant growth in the number of telecom towers and associated electronics at the Base-Stations (electronics below the telecom towers).
- It is expected that the 5G technologies-based mobile network will be rolled out and expanded quickly in India.
- This will increase the number of towers and small cells significantly.

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05

ZOOLOGICAL DIVERSITY

GS Syllabus Covered

GS- III: Conservation, environmental pollution and degradation, environmental impact assessment.

Introduction

- India is one of the **mega-biodiversity countries** in the world with unique biogeographical locations, diversified climatic conditions and a wide array of ecosystems from the deep sea to high mountain ranges in the Himalayas.
- According to **world biogeographic classification**, India represents two of the major realms, the Palearctic and Indo-Malayan, and three biomes viz. **Tropical Humid Forests, Tropical Dry Deciduous Forests, and Warm Deserts/Semi-Deserts.**
- Indian landmass has been classified into **10 Biogeographic Zones.**
- Altogether, 1,03,258 species have been documented in India.
- Among the animals reported from the country, 2,841 species are protected under different schedules of the Wildlife (Protection) Act, 1972 for better conservation.

Coastal and Marine Biodiversity

- India is endowed with a long coastline of 7,516 km on the mainland, **Lakshadweep, and the Andaman & Nicobar Islands.**
- The country has the **18th largest Exclusive Economic Zone (EEZ)** with a total area of 2.37 million square kilometres.
- In the **Indian Ocean region**, India is one of the highest marine biodiversity countries with 20,444 species.
- Besides, 9,457 species from freshwater, 3,939 species from estuarine, and 5,747 species from mangrove ecosystems have been recorded in the country.



State Fauna

- The **Zoological Survey of India** has made notable progress in its mandatory scientific function of faunistic survey/exploration of India towards documenting its faunal wealth.
- During the last century, a variety of terrestrial and marine ecosystem areas, especially the diversity-rich areas in the forest ecosystems, grasslands, coastal plains (terrestrial ecosystem types), and varying coastal/marine ecosystems, including coral-reef ecosystems, were explored. The faunal diversity of 28 States and Union Territories has been published.
- Scientists of the Zoological Survey of India (ZSI) are describing new species at the rate of 125 to 175 per year.
- Till December 2021, a total of **5,300 species** have been described as new to science.
- In 2021, ZSI discovered one new genus and 131 species and recorded 102 species.

Status Survey

- Significant progress made in the monitoring of the status of the **endangered/rare species of animals was undertaken.**
- Recently, the **Zoological Survey of India (ZSI)** has taken an initiative of a massive tagging programme of **Olive Ridley Sea turtles along the Odisha coast and Leatherback turtles in Great Nicobar Island** for tracking their migration and movement between feeding and breeding areas in the **Bay of Bengal and the Indian Ocean.**
- ZSI has also initiated several innovative programmes from the molecular level to the monitoring of fauna.

- There are at least **37 species of mammals genetically** identified from Himalayan regions through non-invasive genetic study techniques.

Long-Term Monitoring of Fauna

- **Long-Term Ecological Observatories (LTEO) Monitoring Arthropods** in LTEO sites funded by the Ministry of Environment, Forest and Climate Change, is also being implemented through ZSI.
- A pilot project on **Biodiversity Corridor-Baseline** Survey and Feasibility assessment under Project for Improvement of Himachal Pradesh Forest Ecosystems Management & Livelihoods has been initiated by ZSI.
- Moreover, to understand the impact of climate change, long-term monitoring plots have been established in Andaman and Nicobar Islands and Lakshadweep.

Mapping of Fauna

- The Zoological Survey of India (ZSI) has implemented several **geospatial modelling studies including the mapping of biological corridors, landscape change analysis, and climate change risk modelling for several studies of the Himalayan** as well as other areas in collaboration with the State Forest Department.
- Mobile Applications and Web GIS have been developed in collaboration with National Remote Sensing Centre, ISRO, to provide specific information on different animals in Protected Areas of India.
- A **geospatial database** has been created for the threatened vertebrates of the **Indian Himalayan Region**.
- The database will be useful in understanding the diversity and richness of wildlife species in the Himalayan region.
- ZSI is currently working on developing the geospatial repository of the fauna of India based on the **National Zoological Collections**.

Reef Restoration

- Approximately, 1050 sq. meter area of degraded reefs has been restored with branching coral species belonging to the family Acroporidae, which are the dominant reef contributors in all world reefs, in collaboration with the Government of Gujarat through World Bank-ICZM.
- Presently, the **translocation of corals in the Gulf of Kutch is being carried out for Indian Oil Corporation**.
- Studies on pollinators, invasive and alien species, and climate change concerning faunal diversity and conservation have been envisaged.

06

SAFEGUARDING OCEANS

GS Syllabus Covered

GS-II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

GS- III: Conservation, environmental pollution and degradation, environmental impact assessment.

Introduction

- **About two-thirds of our Earth's surface** is covered by water, and the oceans hold about 96.5 per cent of the entire Earth's water.
- Oceans are the most significant source of present and future energy requirements.
- There is about **70 per cent water in the protoplasm** of millions of cells, the basic biological unit of plants, animals and human beings.
- Different organisms are found in different ocean depths, providing a colourful spectrum to marine life and its ecosystem.
- According to scientific studies so far, about **2.5 lakh marine life species have been identified all over the world**.

Vulnerability to Depth Ocean's Organisms

- The deepest point in the world is located in the **Mariana Trench in Japan**, about 11,000 meters deep from sea level.

- In the ocean living organisms and natural resources are in danger due to human activities.
- Land waste is dumped in the oceans in the form of **oil, pesticides, plastics and industrial waste, which the ocean's ecosystem is badly affected.**
- The existence of coral reefs is being threatened by pollution and fossil fuels.
- Besides **marine pollution, climate change** is the second main reason for the destruction of coral reefs.
- Scientific studies have proved that when foreign substances enter the ocean, they cause serious harm to the marine ecosystem and the environment.

Innovative Scientific Research Initiatives

- Research on ocean organisms, minerals and other natural resources is going on in India's laboratories.
- Many innovative research works are being carried out by Indian scientists dealing with the effects of **environmental pollution, anthropogenic interference and climate change on the ocean.** Some vital initiatives in this regard include:

1. RV Sindhu Sadhana Scientific Research Focused on the Indian Ocean

- Indian scientists are constantly involved in research to understand all the factors of environmental pollution.
- The **National Institute of Oceanography (NIO) in Goa**, is constantly undertaking research projects related to the ocean, including the organisms living in it and the minerals found there.
- The NIO is the laboratory of the **Council of Scientific and Industrial Research (CSIR), India's most prominent scientific research organisation.**
- It has been conducting research in the field of oceanography since 1966.

2. Scientific Objectives of RV Sindhu Sadhana Abhiyan

- With the help of the scientific expedition RV Sindhu Sadhana, the understanding of the study and research of the Indian Ocean has transformed considerably.
- This scientific expedition of CSIR, which ventured out to decode the secrets of the Indian Ocean, was unique for India and the whole world.
- This sea expedition had **two main objectives:**

A. Gene Mapping of Marine Microorganisms: The first main objective on board the RVSindhu Sadhana Marine Research Ship was to map the genomic and proteomic diversity of the Indian Ocean.

- The expedition team conducted a scientific analysis of proteins and genes in marine organisms to understand the processes occurring at the **cellular level of marine microorganisms.**
- The study made it possible to understand how climate change, pollution and stress from trace metals and nutrients affect ocean organisms.
- The scientific team used modern molecular biomedical techniques, genetic sequencing and bioinformatics to understand the dynamics of the Indian Ocean ecosystem through these samples.
- Scientists also studied if there is any adaptive behaviour in the genes of marine organisms in response to climate change and pollution which would help in the conservation efforts of marine species.

B. Study of Trace Metals Trace metals: Minerals like **manganese, cobalt, iron, nickel, copper, and zinc** are found in the oceans and help in the growth of organisms.

- These trace metals present in small amounts in the tissues of living beings mainly act as **catalysts in the enzyme system and energy metabolism.**
- They settle in the oceans through continental water flow and atmospheric and hydrothermal activities.
- An essential objective of this campaign has also been to use ecological principles to discover important marine bioresources and their metabolites.

3. Development of Indus Sadhana's Marine Laboratory

In 2012, NIO acquired a new indigenously built marine research vessel, 'RV Sindhu Sadhana', which enables Indian oceanographers to conduct marine research not only in the adjoining sea of India but also in any part of the Indian Ocean.

- The ship is equipped with several state-of-the-art instruments, with the help of which scientists can continue their research during the voyage.
- This research vessel houses several small laboratories and is equipped with world-class instruments like **Echo Sounder, Acoustic Doppler, Profiler, Autonomous Weather Station, and Air Quality Monitor for ocean technology and research.**

4. Deep Ocean Mission

- About 30 per cent of India's human population inhabits the coastal areas.
Hence, the sea Humans have yet to discover about 95 per cent of the deep ocean.
- Keeping in mind the significance of the ocean, the United Nations has declared the decade 2021-2030 as the Decade of **Ocean Science for Sustainable Development**.
- India has a unique maritime position; its 7517 km long coastline is home to nine coastal states and 1382 islands.
- The Cabinet Committee on Economic Affairs has approved the "Deep Ocean Mission" of the Ministry of Earth Sciences.
- The Deep Ocean Mission consists of the following **Six Major** components:
 - ✓ **Development of Technologies for Deep Sea Mining and Manned Submersible**
 - ✓ **Development of Ocean Climate Change Advisory Services**
 - ✓ **Technological Innovations for Exploration and Conservation of Deep-Sea Biodiversity**
 - ✓ **Deep Ocean Survey and Exploration**
 - ✓ **Energy and fresh water from the ocean**
 - ✓ **State-of-the-art Marine Centre' for Ocean Biology**

DEEP OCEAN MISSION

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> ➤ Deep Sea Mining through 'Underwater Vehicles' and 'Underwater Robotics' ➤ Asserting exclusive rights to explore polymetallic nodules from seabed over 75,000 sq km of areas in international water ➤ Estimated polymetallic nodules resource potential: 380 million tonnes (MT) | <p>THESE POLYMETALLIC NODULES CONTAIN</p> <p>Manganese 92.6 MT</p> <p>Nickel 4.7</p> <p>Copper 4.3</p> <p>Cobalt 1</p> <p>(*figures are rounded off)</p> |
| <ul style="list-style-type: none"> ➤ Development of ocean climate change advisory services ➤ Technology for sustainable utilisation of marine bio-resources | <ul style="list-style-type: none"> ➤ Deep ocean survey and exploration ➤ Energy from the ocean and offshore-based desalination ➤ Krill fishery from southern ocean |

5. Samudrayan

- India has launched an ocean expedition named "Samudrayan" to explore deep-sea organisms, minerals and other natural resources.
- This unique ocean submersible 'Samudrayan' was launched in October 2021.
- With this, India joins the world's elite group using specialised technology for deep-sea scientific exploration.
- Other major countries in this group include the **United States, Russia, Japan, France, and China**.
- Samudrayan mission comprises an automatic manned submersible vehicle designed to carry three persons to a depth of 6000 metres under the sea.
- This vehicle is equipped with various scientific instruments for deep-sea exploration.
- Biologists have constantly been researching to explore the ocean rather than the Earth's landmass to discover its innumerable organisms and natural resources.

Conclusion

- Keeping Safeguarding Oceans things in mind, it is logical that we should save our land and the sea.
- Man-made dead zones are formed when there is a lack of oxygen in the ocean due to physical and chemical interventions arising from human activities.
- It is essential to curb these human activities to save the ocean and its ecosystem.
- The government and stakeholders must make every possible effort to conserve the ocean and its ecosystem.

KURUKSHETRA

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- Agri Start-ups: Transforming Agri-preneurship
- Artificial Intelligence in Agri-preneurship

APTI PLUS

* The table of content is segregated as per its relevance with Mains Syllabus of CSE Examination.

* The article mention under GS paper in table of content might be important for many other topics in GS Papers as well.

* The details relevance of each article/Topics with respect to GS syllabus has been mention at the starting of each article.



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01 PROMOTING WOMEN ENTREPRENEURS

GS Syllabus Covered

GS-I: Role of women and women's organization, population and associated issues, poverty and developmental issues, urbanization, their problems and their remedies.

GS-II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

Introduction

- India has traditionally been a **patriarchal society with low participation of women in the economy.**
- But the fact remains that women represent nearly **50 per cent of the total population**, and it is crucial to encourage women's role in the economy at every level.
- Women entrepreneurs, especially women in Agri-preneurship, represent the fastest-growing category of entrepreneurship worldwide and India is no exception.
- Since 2016, the "**Startup India, Stand-up India**" campaigns have gained considerable momentum.
- In addition, it has been enhancing their morale and enthusiasm to do something productive for their family, local community and in turn the nation.
- Since the launch of the Startup India initiative by the Government of India in 2016, the **growth of start-ups and new-generation enterprises has been manifolded.**

Agri-preneurship and Women Empowerment

- Agri-preneurship is a synthesis of agriculture/ allied sectors and entrepreneurship to **generate commercially-viable products/services and high-value businesses/processes.**
- At present, women in India contribute to about **14 per cent of agri-business owners.**
- Agri-preneurship comprises the **creation, development, nurturing and expansion** of agri-business enterprises in agri-based and its allied sectors, which include entrepreneurial interventions of agri-tech, farming, and marketing of agri-products in organised business practices from comparatively unorganised sectors.
- **Empowerment of women** is essential as their thoughts and their value systems lead to the development of a good family, a good society and ultimately a good nation.

Public Policy Initiatives

- **Institutionalised Initiatives for Promoting Agri-preneurship:** The novel scheme of Agri-preneurship designed for effective implementation by the National Institute of Agricultural Extension Management (MANAGE), Hyderabad with its 'Agri-Clinics and Agri-Business Centres Scheme' for the agri-graduates/Agri diploma holders, has given a considerable boost with financial and institutional support from Ministry of Agriculture, Government of India.
- This system has been promoting and fast-tracking the prevailing process of both agri-extension activities and empowering the transfer of technology in Agri/agri-based enterprise ecosystem by building up the integrated supply of agri-inputs on one hand and encouraging the marketing of agro-based enterprise products/services on the other.
- b) **Promoting Local Agripreneurs and Agri-Business Incubators (ABIs):** The Prime Minister of India has been emphasising the innovative practices and use of technology in agri-based and allied agri-sectors to nurture agri-business enterprises.
 - For instance, '**Organic Sikkim**' has been successfully making agri-farmers about **20 pence per centre income** by taking away the middlemen and discovering new markets for their agri-products through Sikkim's organic retail stores – predominantly managed by women agripreneurs for varied ty of agri-based products like pulses, rice, turmeric, ginger, mandarin oranges, cardamom, etc.
- c) **Rashtriya Krishi Vikas Yojana (RKVY):** The central government has been **promoting agripreneurship and innovative agri-enterprises by extending technical and financial support** and also by enabling the localised/ State Agricultural Universities and ICAR Research Institutions.

- These startup entrepreneurs, including women agripreneurs, have been given the stored training for 60-days through 29 Agri-Business Incubation (ABIs) centres across India, thus contributing to the growth of agripreneurship in general and women agripreneurship.
 - This agri-enterprise has been able to enhance income-generation activities and address the unemployment issue in the local/ rural ecosystem, thereby contributing to the growth of a farming community of which **70 per cent are women**.
- d) **The NABARD (National Bank for Agriculture and Rural Development):** Through its District Development Managers (DDMs) in all the districts across India has been managing a variety of agri-businesses and women agripreneurs enterprises, in partnership with many NGOs (Non-Government Organisations), CSR (Corporate Social Responsibility) Projects of corporates and large organisations, etc.
- e) **Micro-Finance Institutions (MFIs):** The microfinance movement, which commenced in Karnataka along with MYRADA (an NGO) has promoted and nurtured thousands of micro, small and medium women agripreneurs.
- At present, this **MFI movement is the largest movement in the world**, which is impacting the transformation of millions of women in rural India, in a variety of ways through 'Diversity, Equity and Inclusion (DEI) principles.
 - The initiatives taken by the Government of India have significantly boosted the confidence of women agripreneurs and their holistic approach towards **life, self-reliance, socio-economic empowerment, and thereby self-actualisation**.

Issues and Challenges

- Women agripreneurs face various challenges during the time of work and implementation, including:
 - Dual responsibility of home and enterprises
 - Serious threats from established corporate players
 - Lack of knowledge/market awareness
 - Lack of knowledge in branding, management, accounting, lack of information sources, required skill sets and training
- The infrastructure challenges including **storage, warehousing, electricity and credit facility and finance especially formal finance** (for both investment credit and working capital financing) continue to daunt the women agripreneurs.

Way Forward

- With the faster pace of global growth across **30-plus industrial sectors**, women in business are advancing at a faster rate than in earlier decades.
- This has been getting expedited owing to enabling policies for start-ups by the Government of India and start-up Policies by all the state governments, enhanced access to the educational/training programs and digital media, and of course, ease-of-access to fund/credit facilities, grant-in-aid by various agencies like **SSI Board, KVIC, NIESBUD, State Financial Corporations, CSR Grants by Corporates, etc.**

Promoting Women Entrepreneurship Through Stand-Up India

- Over **Rs 20,000 crore** sanctioned to almost **90,000 women entrepreneurs** under Stand-Up India
- **83% of loans** sanctioned under Stand-up India scheme has been given to women entrepreneurs
- **Margin money requirement reduced** from 25% to 15% under Stand-up India making more women entrepreneurs eligible to borrow

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02

AATMANIRBHARTA THROUGH AGRI-PRENEURSHIP

GS Syllabus Covered

GS-II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

GS-III: Indian Economy and issues relating to planning, mobilization, of resources, growth, development and employment.

Introduction

- India is an **agrarian country**, where agriculture remains a key sector of the Indian economy accounting for around **18- 20 per cent** share in the gross domestic product.
- One of the options which mitigate the burden on agriculture, while at the same time arresting **rural-urban migration**, is **Agri-preneurship i.e., entrepreneurship in agriculture and its allied sectors**.
- **Agri-preneurship** plays various roles in the **growth and development** of the national economy through entrepreneurship development which increases the income level and employment opportunities in rural as well as urban areas.

Merits of Agri-preneurship

- One of the options which mitigate the burden on agriculture, while at the same time arresting rural-urban migration is **Agri-preneurship** i.e., entrepreneurship in agriculture and its allied sectors.
- Adoption of new and innovative methods, processes and techniques in agriculture and its allied sectors ensures better output and remuneration and is the harbinger of progressive change in the rural economy.
- The demand for an entrepreneur in the agriculture and allied set-up has grown in the recent past, due to the rapid integration of **global supply chains** and the associated compliances required in maintaining ecological balance.
- The central government clarion calls for **'Udyami Bharat' in June 2022** setting the context of the importance of entrepreneurship and its underlying potential.

Subsectors of Agri-preneurship

- Agri-preneurship spans across various subsectors, viz. **food processing, fisheries, tissue culture, apiary, seed processing, smart agri-tech provisioning, soil testing, vermicompost, etc.**
- Agri-preneurship may be engaged in the **production of diverse species of vegetables, fruits, etc.** and their post-production operations, including processing and marketing.
- Agri-preneurship may include rice mills, pulses mills, sugar factories, bakeries, fertiliser production units, food processing units, agricultural implements, agro-service centres, etc. Agri-preneurship can even be a tool for **women's empowerment**.

Rural-urban migration

- In rural India, the poorer infrastructural facility is one of the key push factors, while better job opportunities in urban areas are one of the important pull factors contributing to the growing rural-urban migration.
- The **ratio of the urban population** to the total population of the country grew at an annual exponential rate of **2.76 per cent** due to which the **urban population which stood at 27.81 per cent in 2001 increased to 31.16 per cent in 2011**.



- Almost 56 per cent of the increase in urban population during 2001-11 is ascribed to reasons such as rural-urban migration, and reclassification of rural settlements into urban and boundary changes.

Policies and Programmes

Rashtriya Krishi Vikas Yojana

- The Ministry of Agriculture & Farmers Welfare revised the **Rashtriya Krishi Vikas Yojana** in 2017 as **Rashtriya Krishi Vikas Yojana - Remunerative Approaches for Agriculture and Allied sector Rejuvenation (REVY-RAFTAAR)**.
- The scheme aims at making farming a **remunerative economic activity**.
- The scheme provides financial support and nurtures the incubation ecosystem by **strengthening farmers' efforts, risk mitigation, focusing on the development and creation of pre and postharvest infrastructure, and promoting Agri-preneurship and innovations**.
- RKVY-RAFTAAR includes **agri-partnership orientation**, with a stipend for the entrepreneur; seed stage funding and funding for incubates.

PM Formalisation of Micro Food Processing Enterprises Scheme

- The Ministry of Food Processing Industries' PM Formalisation of Micro Food Processing Enterprises Scheme, with an outlay of Rs. 10,000 crores, provides financial, technical and business support for the upgradation of existing micro food processing enterprises.
- The scheme aims to **enhance the competitiveness of existing individual microenterprises** in the unorganised segment of the food processing industry and promote the formalisation of the sector.

Agriculture Infrastructure Fund

- As a part of the Atma Nirbhar Bharat Package, an Agriculture Infrastructure Fund was launched in 2020 as a dedicated Central Government scheme for **providing medium to long-term credit facilities for investment in the creation of post-harvest management infrastructure and community farming assets**.
- This entailed a three per cent interest subvention from the Government and a credit guarantee fee by Credit Guarantee Fund Trust for Micro and Small Enterprises up to Rs. 2 crores.

PM Employment Generation Programme & ASPIRE

- The Ministry of MSME's programmes such as the **Prime Minister's Employment Generation Programme** and **A Scheme for Promotion of Innovation, Rural Industries and Entrepreneurship (ASPIRE)** and **Khadi and Village Industries Commission's** schemes promote **self-employment emanating from agricultural activities in rural areas**.

Gramodyog Vikas Yojana

- Gramodyog Vikas Yojana of the Ministry of MSME, which is an **artisan-centric programme implemented** with the aim of the revival of traditional and inherent skills of rural artisans in village industries, has a special focus on the Agro Based and Food Processing Industry which includes **Oil Industry, Aromatic Oil, Honey and Bee-Keeping, Pal Gur and other Palm products, fruits and vegetable processing Industry, Pulses and Cereals Processing Industry, Spices and Condiments Processing Industry**.

Challenges for entrepreneur

- There are two most important challenges faced by any entrepreneur, which include access to **affordable finance and technology**.
- **Poor Technologies and Equipment:** Information helps people to explore opportunities analyse the situation and make appropriate decisions at right time.
- **Problems in the Marketing of Agricultural Products:** Production has no value unless it is sold and consumed. The marketing of agricultural products has become difficult for the farmer because of so many problems.

Way Ahead

- Amid the adverse effects of COVID-19, the Central Government adopted a holistic corrective approach, which has now started showing positive signs.
- Entrepreneurship has been adopted as a subject in the curricula of many teaching institutes so that young entrepreneurs are aware of entrepreneurship being one of the career options and also for honing the skills of young entrepreneurs.
- **Atmanirbhar Bharat or Self-Reliant India** is based on the tenet of maximising the inherent potential.
- There is an urgent need for promoting entrepreneurial culture among people in rural areas.

- Adoption of new and innovative methods, processes and techniques in agriculture and its allied sectors ensures better output and remuneration and is the harbinger of progressive change in the rural economy.



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03 SKILL FOR AGRI- ENTREPRENEURSHIP

GS Syllabus Covered

GS-II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

GS-III: Achievements of Indians in science & technology; indigenization of technology and development of new technology.

Introduction

- Agriculture offers several opportunities for entrepreneurship, there are many new prospects in the agribusiness sector, including packaging, the provision of **raw materials, processed agri-food manufacturing, the export of agricultural products, and other related industries.**
- Entrepreneurship is the process of identifying and utilising available opportunities and resources to convert an idea into a product or service to market.
- The development and survival of the rural economy are significantly impacted by agricultural entrepreneurship.

Concept of Entrepreneurship

- The term 'Entrepreneur' is derived from the French verb 'Entreprendre' which means 'to undertake.
- **In the early 16th century**, the Frenchmen who led military expeditions were referred to as entrepreneurs.
- **Entrepreneurship** is the process of identifying opportunities in the marketplace, arranging the resources required for pursuing these **opportunities and investing the resources to exploit the opportunities for long-term gain.**
- The term entrepreneurship is often used synonymously with the term entrepreneur.

Agri-Entrepreneurship

- Agri-entrepreneurship can contribute to both **social and economic development, including job creation, poverty reduction, improved nutrition, improved health, increased food security, and improved rural economy.**
- It is synonymous with agricultural entrepreneurship and refers to the **establishment of agricultural and allied businesses.**
- Agricultural entrepreneurs undertake business related to agricultural activities; **some entrepreneurial areas in agriculture are farming, product marketing, inputs marketing, and processing of agricultural produce.**

Opportunities in Agri-Entrepreneurship

- The reform in WTO's policy has led the agriculture sector to expand in opportunity.
- Agriculture offers several opportunities for **entrepreneurship.**
- There are many new prospects in the agribusiness sector, including **packaging, the provision of raw materials, processed agri-food manufacturing, the export of agricultural products, and other related industries.**
- Potential agri-entrepreneurship opportunities are as follows:
 1. **Agro-Produce Processing units:** In these facilities, no new products are manufactured; instead, only agricultural produce is processed. For instance, consider mills for grinding grains (rice, wheat), pulses, etc.
 2. **Agro-Produce Manufacturing facilities:** In these facilities, completely new goods are created using agricultural products as the primary raw material. Examples include bakeries, strawboard factories, and sugar factories.
 3. **Agro-Input Manufacturing facilities:** Here, items are produced for either mechanising agriculture or expanding manufacturing facilities. Examples include fertiliser production units, agricultural tool manufacturing units, etc.
 4. **Agro-Service Centres:** These include the stores and repair facilities for farm equipment, implements, and machinery.
 5. **Miscellaneous Areas:** In addition, the establishment of apiaries, feed processing facilities, seed processing facilities, mushroom production facilities, goat rearing, organic vegetable and fruit retail outlets, bamboo plantations, etc. may be possible in these areas.

Factors of Entrepreneurship

- Several factors contribute to the success of an enterprise, including the **entrepreneur's organisational, marketing, and human relations strategies.**
- Four distinct factors influence entrepreneurship: **economic development, culture, technological development, and education.**
- These factors may have an impact on the emergence of entrepreneurship in both positive and negative ways.

Core Competencies and Skills

- An entrepreneur is someone who assumes the risk of starting their own business in hopes of earning a profit.
- There are some specific traits and abilities that are needed to be an entrepreneur, and these may frequently be acquired through **training, efforts, and preparation.**
- Important entrepreneurial characteristics are as follows:
 1. **Need for Achievement:** Entrepreneurs have a strong drive to succeed in their businesses and life. Their aspirations go well beyond merely reaching one target; instead, they are always striving to surpass it.
 2. **Visualisation:** Entrepreneurs have dreams, and they envision how they will be realised. In doing so, they create a future for their business enterprises based on market demands, the socio-economic environment, and the technology environment.
 3. **Technical Expertise:** Whether it is in terms of technology, operations, finances, or market dynamics, an entrepreneur is fully knowledgeable about all the technical aspects of his/her enterprise.
 4. **Innovativeness:** Entrepreneurs don't always adhere to traditional guidelines. They are constantly looking for fresh opportunities to expand their current company. They build new things and come up with ideas by imagining solutions to issues.
 5. **Independency:** Entrepreneur frequently finds it challenging to work in a regulated setting due to their desire for control and the freedom to make decisions. Entrepreneurs require independency in their job and decision-making.
 6. **Risk Bearing Ability:** Entrepreneurship is inextricably linked to risk. Entrepreneurs who take reasonable risks (moderate risk/ calculated risk) outperform those who take excessive or no risks at all in terms of returns on their assets.
 7. **Leadership Ability:** Entrepreneurs exemplify leadership traits. They have good communication skills, are good decision-makers, good planners, organisers, and motivators who take the initiative to carry out plans and are goal-oriented.
 8. **Human Relations Skills:** To make money and gain customers' trust for their goods and services, entrepreneurs need to get along well with their customers.
 9. To manage their business profitably, they must also maintain strong ties with their employees.
 10. **Flexibility:** Entrepreneurs need to be adaptable to shifting markets, trends, technology, laws, and regulatory frameworks, as well as shifting economic conditions.

SKILL INDIA MISSION

Progress Under Pradhan Mantri Kaushal Vikas Yojana

- 146 prospective skills qualification approved for market-based future skills
- 1.24 lakh people trained for jobs in healthcare sector
- 22 Lakh active apprentices engaged
- 9.93 lakh participants trained through 39,251 programmes to promote entrepreneurship

7 YEARS OF SKILL INDIA MISSION

Way Forward

- Agri-entrepreneurs must use a **variety of strategies to effectively employ their entrepreneurial skills.**

- They may aim to diversify their sources of income to make them more successful and sustainable by capturing value along the **value chain through the integration of value-adding enterprises individually or collectively.**
- **Extension and agro-advisories** need to promote group entrepreneurship by organising groups of **entrepreneurs and establishing linkages along the value chain.**

04 ORGANIC FARMING

GS Syllabus Covered

GS-II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

GS-III: Conservation, environmental pollution and degradation, environmental impact assessment.

Introduction

- Organic farming can be defined as a cultivation method where **no chemical fertilizers, synthetic pesticides or synthetic compounds are used.**
- It promotes sustainable farming practices by using **natural fertilizers, biological pest control made from plant or animal waste, organic manure etc.**
- The main aim is to undo the **damage caused by the green revolution and restore ecological balance.**

Meaning and Concept of Organic Farming

- **Green Revolution and other research and development** in the field of crop cultivation played an important role in Organic Farming.
- The Standing Committee of the Parliament defined organic farming as: “Organic Farming is based upon sound **agronomic practices, crop rotation, use of farmland manure for biofertilizers and biopesticides** for enhancing soil productivity and use of natural methods and biopesticides to control pests and weeds are important ways to avoid harmful impacts associated with chemical fertilisers and pesticides on agriculture and allied sectors in the country”.
- Organic farming not only adequately addresses issues of **soil, ecology and human health but also gives impetus to sustainable agriculture**, it received the attention of the Government of India.

Programmes and Policies for Organic

a) Organic Farming Policy

- Given this, in 2005, Organic Farming Policy was introduced by the Government of India.
- The Organic Farming Policy intends to **promote technically sound, economically viable, environmentally non-degrading, and socially acceptable use of natural resources for organic farming.**
- The Policy seeks to actualise the area and crop potential for **organic farming, sustaining soil fertility, conserving bioresources, strengthening the rural economy, promoting value addition, accelerating the growth of agribusiness and securing a fair standard of living for the farmers and agricultural workers and their families.**

The Objectives of the Organic Farming Policy are mentioned below:

- Maintenance of soil fertility by encouraging and enhancing the biological cycle within farming systems involving microorganisms, soil flora and fauna, plants and animals
- Identification of areas and crops suitable for organic farming
- Setting up of model organic farms for getting seed material for organic cultivation
- Assurance of production and supply of quality organic input
- Adoption of biological methods for pest and disease control Adoption of biological and mechanical methods for weed management
- The harnessing of traditional and indigenous knowledge relating to organic farming
- Creation of awareness among farmers towards organic agriculture
- Development of a domestic market for organic produce
- Improvement in farmers' income through quality produce
- Generation of rural employment opportunities

Way forward

- Organic farming not only adequately addresses issues of **soil, ecology and human health but also gives impetus to sustainable agriculture.**
- Food grains are essential for the growing population in the country.
- There is a need to **create awareness building** about the benefits of organic farming may be done among different stakeholders.
- Continuous training, capacity building and hand support to the farmer are indispensable.

05

AGRI START-UPS: TRANSFORMING AGRI-PRENEURSHIP

GS Syllabus Covered

GS-III: Food processing and related industries in India- scope' and significance, location, upstream and downstream requirements, supply chain management.

GS-II: Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

Introduction

- Agritech start-ups work with technology at the core of their work philosophy.
- Most of the agritech start-ups have based their business models around state-of-the-art technologies like **Artificial Intelligence (AI), Machine Learning (ML) and the Internet of Things (IoT).**
- To take more and more farmers in their folds, these start-ups are leading multiple innovations which bring technology to the doorsteps of the **farmers at cheaper and affordable rates.**
- This way these agritech start-ups are **transforming Agri-preneurship.**

Background

- Agri-preneurship is not a new thing for India, but a renewed interest of young entrepreneurs can easily be noticed in recent times which has given birth to hundreds of **Agri start-ups, especially after 2014.**
- With a special focus on Agri marketing and the use of technology in agriculture by the Government of India, the sector witnessed a **sudden surge of small agri enterprises.**
- The number of agritech start-ups which was **43 in 2013, swelled to 1,300 by April 2022.**
- According to a study by India Brand Equity Foundation, the investments and growth phase for agritech start-ups started in 2019 and India has received a **total funding of USD 1.6 billion in these entities till 2021.**
- Agri start-ups have emerged into five categories.
 1. **Market linkage and supply chain**
 2. **Farm Inputs**
 3. **Precision agriculture and farm management**
 4. **Farming as a Service (FaaS)**
 5. **Financial Services.**

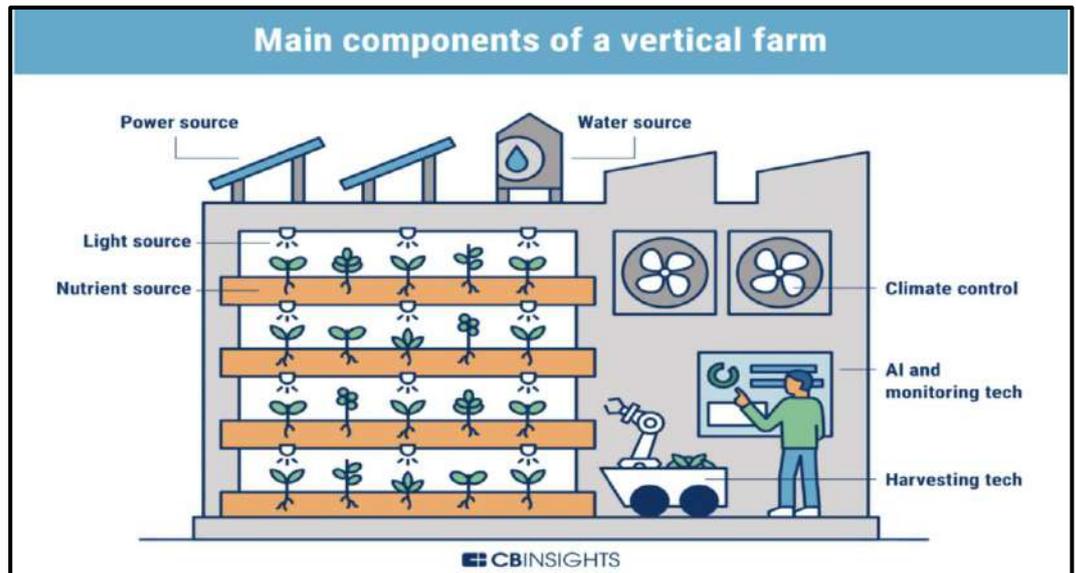
Bringing Technology to the Fields

- Using inputs in the fields might seem the most basic agri practice which farmers have been dating for hundreds of years.
- By deploying technology at a very affordable price, companies analyse the air vapour arising from these fields to know the exact level of various nutrients in the soil.
- Based on this analysis, the farmers get to **know what fertiliser they need to use and in what quantity.**
- **Vertical farming, automation and robotics, livestock technology, modern greenhouse practice, precision farming, artificial intelligence, blockchain and drone farming** are some of the prominent technologies that are transforming today's agriculture.

Vertical Farming

- Vertical farming is the practice of growing crops in **vertically stacked layers.**

- It often incorporates controlled-environment agriculture, which aims to optimize plant growth, and soilless farming techniques such as **hydroponics, aquaponics, and aeroponics.**
- India is a country of small and marginal farmers, around **86 per cent of the total farmers have either 5 acres of land or less.**
- Vertical farming may be the solution to this problem as this technology facilitates farmers to cultivate 4-5 times more crops on a single piece of land.



Robotics and Drone Technology

- The major problems of Indian agriculture currently include a lack of awareness among farmers about using the right quantity of input at right time and a lack of manpower.
- Using pesticides manually in an open atmosphere is hazardous for the health of farmers and dozens of incidents have been reported from across India where farmers died while spreading chemicals in their fields.
- Using robotics and drone technology in agriculture may easily save us from these hazards.

Organic Farming

- Organic farming is fast becoming the **flavour of the season.**
- Especially after the Government of India has officially started giving thrust on organic and natural farming, exponential growth potential has started unravelling.
- Lakhs of individual farmers are already following organic cultivation, but it has only been on an individual basis till now.
- To escalate it to mass scale, a well-structured industrial mechanism must be developed to ensure an authentic **quality of biofertilizers, bio-pesticides, vermicompost, natural compost, jeevamrit, etc.** on affordable rates to crores of farmers across the country.

Livestock Farming Technology

- Livestock management includes **dairy, poultry, fishery, shrimp farming, etc.**
- These are called allied sectors which are not agri, in the strict sense but are agri based and normally farmers only do these activities on smaller scales to increase their income level.
- The livestock Sector in our country has been growing at a **Compound Annual Growth Rate (CAGR) of 8.15 per cent from 2014-15 to 2019-20.**
- **Milk production, Egg Production and Meat Production** in the country is growing at a compound annual growth rate of 6.28 per cent, 7.82 per cent and 5.15 per cent respectively from 2014-15 to 2019-20.

GS Syllabus Covered

GS-III: Science and Technology- developments and their applications and effects in everyday life.

GS-III: Achievements of Indians in science & technology; indigenization of technology and development of new technology.

Introduction

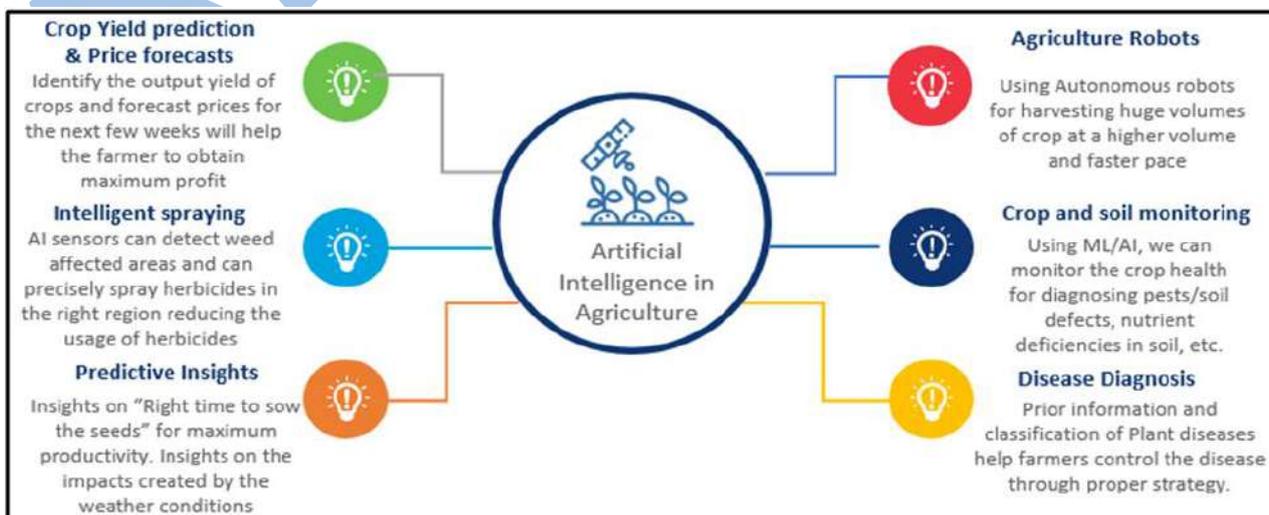
- The adoption of **innovative and transformative smart farming practices** in the country is gradually becoming a major trend.
- **Smart and technology-driven resource management, modernisation of Agri supply chains, climate risk mitigation strategy, digitising farm collectives as farmer producer organisations (FPOs), the emergence of a start-up ecosystem and Government initiatives** in digital farming are some of the steps being taken to encourage smart farming practices.
- Artificial Intelligence as a technology is still developing and has a great future.

AI solutions for industries

- In a recent discussion paper, **NITI Aayog** sees AI solutions as critical for industries, including agriculture.
- In agriculture, AI machines can give farmers information on **soil quality and other information like when to sow, where to apply herbicide**, and where to anticipate insect outbreaks.
- India might see a farming revolution if AI systems can advise farmers on optimum practices. Agriculture is a high-priority sector of the Indian economy, as **58 per cent of the country's families** is dependent on it in some way, either directly or indirectly, for their means of subsistence.
- In recent years, technology related to **artificial intelligence (AI), such as machine learning, robots, and computer vision**, has been integrated into the business models of many agri-tech companies.

Applications of IoT in Agriculture

- The application of Internet of Things technology in farming has the potential to revolutionise not only human life but also life on the entire planet.
- **Extreme weather, eroding soil, drying land**, and the collapse of ecosystems are all factors that are now making food production more difficult and expensive.
- **High-resolution information** is utilised during soil testing.
- In contrast to **proximity sensing**, which uses sensors located near the target area, remote sensing uses sensors located in the air or on satellites.
- To maximise yield, **hardware solutions are combined with software and robots to apply the right amount of nourishment to each plant.**



Agri Tech Startups

i) **DeHaat:** DeHaat, which translates to "village" in Hindi, is a company that assists farmers with a few of the most significant difficulties, including the **implementation of AI-enabled solutions that improve supply chain efficiency and production effectiveness in the agricultural sector.**

- It is one of the very few companies in India that offers complete services and solutions to the agriculture sector.
- They are operational in the states of **Bihar, UP, Odisha, and West Bengal**, and the network is comprised of more than one million farmers from those regions.
- In addition to this, it collaborates with more than **3,000 microentrepreneurs** to provide last-mile delivery and aggregation services.

ii) **See Tree:** See Tree was launched in 2017 to provide farmers with **vital data for managing and optimising the health of their trees.**

- The firm has created AI systems that track the health of each tree, finding failing trees and groups of healthy trees.
- It evaluates the impact of various **farming approaches and provides actionable data on their effectiveness.**

iii) **Cropin:** Cropin is an India-based Agri-Tech Start-up, an intuitive, intelligent, and self-evolving technology that provides farming solutions that are future-ready for the whole agricultural industry.

- It provides **agribusinesses with decision-making tools that promote consistency, reliability, and sustainability.**
- Cropin is digitising every farm and data-managing the whole ecosystem by providing capabilities for live reporting, analysis, interpretation, and insights that span continents.
- Their smarter farming solutions are powered in real-time, allowing users to record patterns, forecast trends, and create a business plan for the future, it constantly ensures effective operations, lower expenses, and improved visibility for field agents.

Precision farming

- The use of new technology particularly **Artificial Intelligence** has paved way for the precision farming.
- Precision farming has become an **essential component** in the impending agricultural revolution, which is about to sweep the globe.
- Because of the advancement of science, genetically modified newer sets of crops that are resistant to **pests and use less water have been introduced.**
- The new revolution will rely heavily on highly developed analytic skills as well as continually developing internet of things capabilities such as drones designed for precision agriculture.

Way forward

- The use of technology is however not limited to agriculture only but has spread its wings to allied activities such as **dairy farming.**
- **Artificial intelligence (AI)** has emerged as one of the most important strategies ever developed for enhancing the genetics of farm animals.
- The potential of AI is however most farmers in India have relatively tiny landholdings, and as a result, they are unable to afford the cost of purchasing costly technologies and other necessities.

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