



Environment

Classroom Study Material

(May 2018 to February 2019)

ENVIRONMENT

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Regular	Weekend	PUNE	LUCKNOW	JAIPUR & HYDERABAD	Batch also at:	
18 Apr 1 PM	15 May 9 AM	11 June 1 PM	13 Apr 9 AM	25 Apr	11 Apr 1 PM	15 May
						AHMEDABAD

1. CLIMATE CHANGE

1.1. GLOBAL SCENARIO

1.1.1. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE REPORT

Why in news?

The IPCC has released its Special Report titled “Global Warming of 1.5°C”.

What is the IPCC?

- It was established by the **United Nations Environment Programme (UNEP)** & the **World Meteorological Organization (WMO)** in 1988 to provide policymakers with regular scientific assessments concerning climate change, its implications and potential future risks, as well as to put forward adaptation and mitigation strategies.
- India is a member.**

Related Information

Hothouse Earth: A situation in which a planet has passed a tipping point (approximately 2 degree Celsius) beyond which its own natural processes trigger uncontrollable warming.

Key findings of the Report

- Present global warming status:** Human-induced global warming in 2017 has already reached 1°C above pre-industrial levels;
 - Since 2000, the estimated level of human-induced warming has been equal to the level of observed warming due to contributions from solar and volcanic activity over the historical period.
- Impacts of global warming at 1.5°C:** World would witness greater sea level rise, increased precipitation and higher frequency of droughts and floods, hotter days and heatwaves, more intense tropical cyclones, and increased ocean acidification and salinity.
- Impact of transition from 1.5°C to 2°C:**
 - Decline in crop yields, unprecedented climate extremes and increased susceptibility could push poverty by several million by 2050.
 - Coral reefs would decline by 70-90 percent with global warming of 1.5°C, whereas virtually all (> 99 percent) would be lost with 2°C.
 - Additional people could be at risk from malaria.
 - About 350 million additional people could be exposed to deadly heat waves.

- If global emissions continue as per the commitments made under Paris Agreement, the carbon budget (the amount of CO₂ that the world can emit) for 1.5°C warming will be exhausted by 2030.
 - In order to limit warming at 1.5°C, the world will have to reduce CO₂ emissions by 45 per cent by 2030 from the 2010 levels and reach net-zero emissions by 2050.

1.1.2. EFFECTS OF CLIMATE CHANGE ON THE OCEAN

Why in News?

According to a recent study, all oceans in the world are heating up **60 per cent faster** than what IPCC had stated in its Fifth Assessment report.

Details

- According to IPCC Fifth Report, world's oceans have absorbed 90% of the temperature rise caused by man-made carbon emissions, while only 1% in the atmosphere.
- The sea level rise (SLR) can impact food security, create conflict between neighbouring countries and put low lying countries at risk. Various reports suggest a sea level rise of 1 additional metre by 2100.
- Immediate effects** of SLR include saltwater intrusion of surface waters, increasingly severe storm surges, submergence and increased flooding of coastal land.
- Longer-term effects** of SLR are increased erosion, saltwater intrusion into groundwater and a decline of coastal wetlands (saltmarshes, mangroves etc.)
- SLR **endangers freshwater supplies** (through salinization), **food yields** (through loss of arable land) and **physical safety** (through damages to coastal infrastructure such as roads, housing and sanitation systems), in several low-lying Small Island States and leads to the displacement of people.
- Increasing ocean temperatures and significant amounts of melting fresh water may result in a slowing of the ocean conveyor belt, altering oceanic patterns, changing global weather conditions and disrupting marine food webs.
- Extreme weather events:** Increasing sea surface temperatures increase evaporation and atmospheric moisture, creating and facilitating environmental conditions for

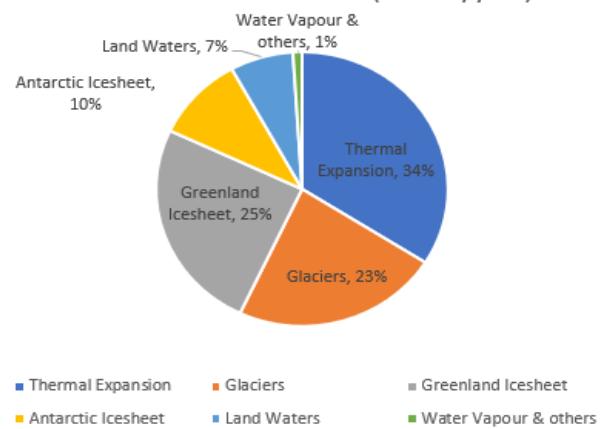
- ocean storms to escalate into more powerful systems.
- Coral bleaching:** Increasing ocean temperatures also impact corals which expel the zooxanthellae.

Sea Level Rise

- It is caused primarily by **two factors** related to global warming:
 - the added water from melting ice sheets; and glaciers
 - the expansion of seawater as it warms.

Contribution in Sea Level Rise

2004-2015 Sea Level Rise (3.5mm/year)



1.1.3. DEAD-ZONE

Why in News?

Scientist have recently predicted that the dead zone in Gulf of Mexico will become larger.

About Dead Zones

- Dead zones (**Hypoxic zones**) are areas of the ocean (**occasionally in lakes and even rivers**) where **oxygen has fallen to such low levels** that most marine life cannot survive.
- Dead zones are **reversible** if their causes are reduced or eliminated.

Causes

- Rising sea temperatures-**
 - For each degree of ocean warming, oxygen concentration goes down.
 - It **causes layers of ocean water to stratify** so the more oxygen-rich surface waters are less able to mix with oxygen-poor waters from the deeper ocean.
 - The higher temperatures are putting more stress on marine species, causing their **metabolisms to speed up** and their **need for oxygen to increase**.
- Eutrophication:** Nutrient pollution from sources such as sewage.

Impacts of Dead Zones

- Impact on Global Warming-** As Oxygen levels fall, the pace of climate change can accelerate, with low oxygen levels triggering the release of chemicals like nitrous oxide. This greenhouse gas is **300 times more powerful** than carbon dioxide at trapping heat in the atmosphere.
- Impact on Corals-Low oxygen levels can kill coral reefs.**
- Impact on Human-** due to loss of valuable ocean produce.

1.2. MITIGATION MEASURES

1.2.1. LAND DEGRADATION NEUTRALITY

Why in news?

Recently a session was held at **United Nations Convention to Combat Desertification (UNCCD)** to review the first global assessment of land degradation which seeks to achieve **Land Degradation Neutrality (LDN)** by 2030.

United Nations Convention to Combat Desertification (UNCCD)

- Adopted in 1994 and entered into force in 1996, it is the **only internationally legally binding framework** set up to address the problem of desertification.
- The Convention addresses specifically the **arid, semi-arid and dry sub-humid areas**, known as the drylands.
- UNCCD 2018-2030 Strategic Framework** has been launched to improve the condition of affected ecosystems, combat desertification/land degradation and to improve the living conditions of affected populations.
- 2010 to 2020 has been declared as **United Nations Decade for Deserts and the Fight Against Desertification**.

About LDN

- As per the UNCCD definition, LDN is a state whereby **the amount and quality of land resources**, necessary to support ecosystem functions and services and enhance food security, **remains stable or increases** within specified temporal and spatial scales.
- The **overarching principle for LDN** includes:
 - Avoid:** By addressing drivers of degradation and through proactive measures to prevent adverse change in land quality and confer resilience, via appropriate regulation, planning and management practices.

- **Reduce:** By application of sustainable management practices.
- **Reverse:** Restoring or rehabilitating degraded land through actively assisting the recovery of ecosystem functions.
- LDN can prevent Soil erosion, desertification, water scarcity, migration insecurity and income inequalities caused by land degradation. Thus, it helps in **combating the impacts of climate change**.

Steps taken to achieve LDN

- **Creation of an LDN fund** to invest in bankable projects on land rehabilitation and sustainable land management worldwide including sustainable agriculture, sustainable livestock management etc. It is **promoted by UNCCD and managed by Mirova** (a private Investment management firm).
- UNCCD releases **the Global Land Outlook**.
- **The Land for Life Programme** was launched at UNCCD COP 10 in 2011 to confront the challenges of land degradation and desertification.
- In India, **National Action Plan (NAP)** to combat desertification was launched in 2001 for 20 years.
- **Desertification and Land Degradation Atlas** (2016) of entire country was prepared by ISRO.
- Schemes like Integrated Watershed Development Program, Per Drop More Crop, National Afforestation Program, National Green Mission, etc. have components to tackle Land degradation.

1.2.2. CLIMATE ENGINEERING

Why in News?

Stratospheric Aerosol Injection (SAI), a climate engineering method could potentially slow global warming.

Climate Engineering Solutions

- Climate Engineering or Geoengineering projects are designed to tackle the effects of climate change directly, usually by removing CO₂ from the air or limiting the amount of sunlight reaching the planet's surface.
- Various method of Geo-engineering are:
 - **Greenhouse gas removal: Examples**
 - ✓ **Carbon capture and storage (CCS)**, where some of the carbon being emitted by coal-fired power stations is recaptured by physically sucking it

in and transporting it elsewhere (like oilfields) to be sequestered underground.

- ✓ **Carbon Capture Utilization Storage (CCUS):** It's a process that captures carbon emissions from sources like coal-fired power plants and either reuses or stores it so it will not enter the atmosphere.
- ✓ In CCS, emissions are forced into underground rocks at great cost and no economic benefit while CCUS aims at using CO₂ emissions by exploiting the resource itself and creating new markets around it.
- ✓ **Biochar making:** Partly burn materials such as logging slash or crop waste to make a carbon-rich, slow-to-decompose substance known as biochar, which can then be buried or spread on farmland. Biochar has been used for centuries to enrich the soil for farming, but of late has been drawing increased attention for its ability to sequester carbon.

○ **Solar Radiation Management or Sunlight Reflection Methods (SRM):** This method aims to reduce the amount of heat trapped by greenhouse gases by reflecting sunlight back into space, either by increasing the reflectivity of the earth's surfaces, or by deploying a layer of reflective particles in the atmosphere.

- ✓ **Stratospheric Aerosol Injection (SAI):** It involves spraying into the stratosphere fine, light-coloured particles designed to reflect back part of the solar radiation before it reaches and warms the earth. Sulphur Dioxide gas is used for the process.
- ✓ **Cirrus cloud manipulation:** Here the cirrus clouds are removed or thinned so that their long-wave trapping capacity is reduced and thus cools the surface.
- ✓ **Marine cloud brightening:** The low warm clouds which are highly reflective to sunlight are modified to increase their reflectivity.
- ✓ **Space sunshade:** Obstructing sunrays with space based mirrors.
- ✓ **Using pale-coloured roofing material or growing high albedo crops.**

1.3. INTERNATIONAL COOPERATION

1.3.1. GLOBAL ENVIRONMENT FACILITY (GEF)

Why in news?

- Recently, the **Sixth GEF Assembly summit** took place in **Da Nang, Vietnam** in June 2018.

About GEF

- It is a financial mechanism **established under the 1992 Rio Earth Summit**.
- It is managed by **World Bank**.
- Presently, it involves an international partnership of **183 countries, international institutions, civil society organizations and the private sector** that addresses global environmental issues.
- The **Council** is the GEF's main governing body, comprises 32 Members appointed by and from among GEF member countries (14 from developed countries, 16 from developing countries and 2 from economies in transition).
- The **GEF Assembly** is composed of all 183-member countries which meets every four years to review general policies, GEF's operation and the membership of the Facility.
- Environmental Conventions under GEF financial mechanism**
 - Convention on Bio diversity (CBD)
 - Convention to combat desertification (UNCCD)
 - Framework convention on climate change (UNFCCC)
 - Stockholm Convention on Persistent Organic Pollutants
 - Minamata Convention
 - Montreal Protocol (provides support)

GEF/UNDP Small Grants Programme (SGP)

- The program is funded by **Global Environment Facility (GEF)** and executed by the **United Nation Development Program (UNDP)**.
- It was launched alongside the **Rio Earth Summit** in 1992.
- It provides direct **financial and technical support** to communities and Civil Society Organizations for various projects that conserve and restore the environment while enhancing people's well-being and livelihoods.
- In India the program is hosted through the **National Host Institution (NHI)** i.e. - **Centre for Environment Education (CEE)**
 - It is a national level institution supported by Ministry of Environment and Forest, Government of India as a "**centre of excellence**".

More about the summit

- It announced GEF replenishment of **\$4.1 billion**, a cut in the funding from USD 4.1

billion in 2014. This will be the **first time GEF's budget has been reduced** since its origin because US has pledged to slash its contribution to GEF by almost half.

- The GEF has proposed certain changes in the light of funding cut from US
 - Increased co-financing requirement for the poorest countries to **5 times** and larger developing countries to **9 times the original grant**.
 - A new "**index of development**" for restricting countries from accessing funding that have developed beyond a certain point according to this index.
 - Large countries whose average GDP growth is more than 5% over the last four years to be **ineligible to receive any GEF funding**.
- It approved a grant of USD 15 million for the **Bay of Bengal Large Marine Ecosystem (BOBLME) project**, started by the UN Food and Agriculture Organization (FAO) in 2009, involving all eight countries along its coastline - Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand.
 - BOBLME project aims to promote sustainable fishing, reduce marine pollution and improve the lives of approximately 400 million people who live along its coasts.

1.3.2. KATOWICE COP 24

Why in news?

The 24th Session of the **Conference of the Parties** to the United Nations Framework Convention on Climate Change (COP 24) was held in Katowice, Poland.

About UNFCCC

- In 1992, countries joined the UNFCCC, as a **framework for international cooperation** to combat climate change by limiting average global temperature increases.
- It is one of three conventions adopted at the "**Rio Earth Summit**" in 1992. Its sister Rio Conventions are the UN Convention on Biological Diversity and the Convention to Combat Desertification. MoEFCC is the nodal ministry for the three conventions.
- Important funds established under the UNFCCC are:**
 - Green Climate Fund:** It was **established at COP 16** held in Cancun. It assists developing countries in adaptation and mitigation practices. **World Bank** is the Interim Trustee of the fund.
 - The Adaptation Fund (AF):** It was established in 2001 to finance concrete adaptation projects and programmes in developing country Parties to the

Kyoto Protocol that are particularly vulnerable to the adverse effects of climate change.

- It is financed with a share of proceeds from the clean development mechanism (CDM) project activities and other sources of funding.
- **The Special Climate Change Fund (SCCF)** was established in response to guidance from the Conference of the Parties (COP7) in Marrakech in 2001. The SCCF complements the Least Developed Countries Fund (LDCF). Unlike the LDCF, the **SCCF is open to all vulnerable developing countries.**

Key outcomes in Katowice

Rulebook Specifics

- **Accounting Guidance Rules** to guide the countries for their Climate pledges (“nationally determined contributions”, NDCs), to compare pledges and to add them up as a global aggregate.
- **Market mechanisms:** It provides for the trading of carbon credits i.e. overachievement of NDCs, as well as individual projects generating carbon credits for sale.
- **Other outcomes:**
 - **Accounting Rules** to prevent “double counting” of emissions reductions by the buyer and seller of offsets **could not be finalised.**
 - The schemes and methodologies for the implementation of **Sustainable Development Mechanism- SDM would be discussed in COP-25.** The SDM is intended to replace the Kyoto Protocol’s “Clean Development Mechanism” (CDM) for carbon offsets.
 - **Overall Mitigation in Global Emissions (OMGE):** It is **voluntary** and new element under the Paris Agreement, that takes carbon markets beyond the offsetting approaches of the existing markets like the CDM. The primary purpose of OMGE is to deliver on cost-effectively reducing greenhouse gas emissions, rather than creating carbon markets for their own sake.
- **Loss and damage:** The **global stocktake rules add loss and damage clause.**
- **Setting up an expert compliance committee:** The committee will be able to investigate countries that fail to submit climate pledges.
- **Talanoa Dialogue:** The convention invited countries to consider the outcomes of the Talanoa dialogue in preparing their NDCs and in efforts to enhance pre-2020 ambition.

Kyoto Protocol: The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its

Parties by setting internationally binding emission reduction targets.

- It entered into force on 16 February 2005.
- The targets for the first commitment period (2008-2012) of the Kyoto Protocol cover emissions of the six main greenhouse gases, namely: Carbon dioxide (CO₂); Methane(CH₄); Nitrous oxide (N₂O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulphur hexafluoride (SF₆)
- Doha Amendment of Kyoto Protocol entered into force the second commitment period(2013-2020) for its targets.
- India is a party to Kyoto Protocol and has ratified the second commitment period.

Talanoa Dialogue is a facilitative dialogue in 2018, to take stock of the collective efforts of Parties in relation to progress towards the long term goal referred to Paris Agreement and to inform the preparation of nationally determine contributions (NDCs).

Post-2020 Actions are meant for all countries as per their nationally determined contributions (NDCs) under 2015 Paris Agreement.

Pre-2020 Actions refer to existing obligations of small group rich and developed nations to take mitigation actions under **Kyoto Protocol.**

Virtual Climate Summit

- It is organized as part of the Talanoa Dialogue.
- It is a **Heads of Government level conference held entirely online as the first Virtual Summit (#VirtualClimateSummit)** of global political leaders, eliminating emissions and promoting inclusive dialogue.
- It was **organised** by the Climate Action Network (CAN) and the Climate Vulnerable Forum (CVF).

1.3.3. SUVA EXPERT DIALOGUE ON LOSS AND DAMAGE

Why in news?

Recently Suva Expert Dialogue on loss and damage was held at COP-23 UNFCCC, Bonn.

Loss and damage in UNFCCC

- In simple terms, loss and damage is a concept where rich countries, who have historical responsibility for climate change, are asked to be liable to developing countries, who are already facing climate change.
- **Initiative under UNFCCC:**
 - Establishment of the **Subsidiary Body of Implementation (SBI)** Work Program on loss and damage in Cancun (COP 16), 2010
 - Establishment of the **Warsaw International Mechanism (WIM)** under the Cancun Adaptation Framework at COP 19, 2013
 - It is also anchored in the Article 8 of the 2015 Paris agreement which emphasizes the “importance of averting, minimizing and

addressing loss and damage associated with the adverse effects of climate change".

Related Information

The **Marrakech Partnership for Global Climate Action**, established at the CoP22 (UNFCCC), aims to mobilize climate actions quickly and to reap the benefits in efficiency and effectiveness through partnerships and coordination between different actors.

Small Island Developing States (SIDS)

- They are a group of 57 small island countries that tend to share similar sustainable development challenges, including small but growing populations, limited resources, remoteness, susceptibility to natural disasters etc.
- They were first recognized as a distinct group of developing countries at the United Nations Conference on Environment and Development in June 1992.

1.3.4. MONTREAL PROTOCOL ASSESSMENT

Why in news?

The quadrennial review of the Montreal Protocol revealed a healing ozone layer.

Vienna Convention for the Protection of the Ozone Layer [1985]

- It acts as a framework for the international efforts to protect the ozone layer.
- It paves the way for a legally binding treaty through protocol called Montreal protocol.
- India is a party to Vienna convention and its protocols.

Montreal Protocol [1987]

- It aims at reducing the production and consumption of **ozone depleting substances (ODS)**.
- It has been ratified by 197 parties making it **universally ratified protocol** in United Nations history.
- It's one of the most successful and effective environmental treaties ever negotiated and implemented, as all 142 developing countries were able to meet the 100% phase-out mark for CFCs, halons and other ODS in 2010.

Kigali agreement to amend the Montreal Protocol [2016]

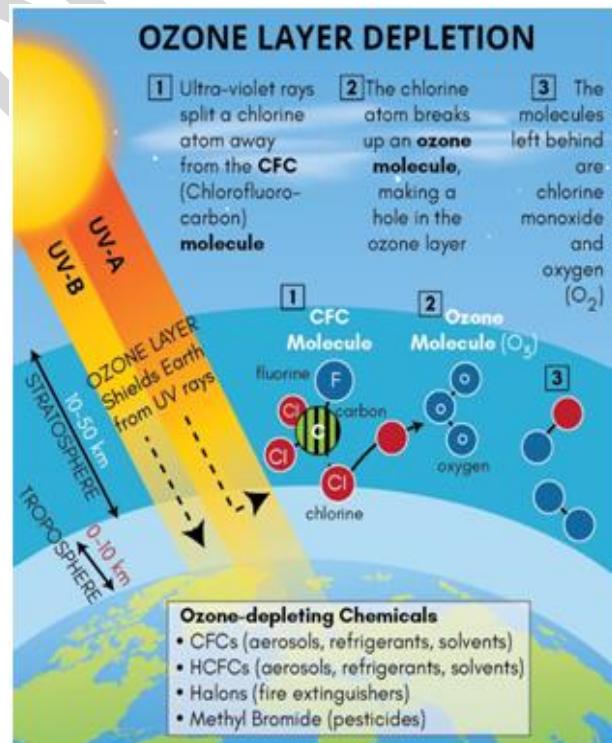
- Its aim is to phase out Hydrofluorocarbons (HFCs), a family of potent greenhouse gases by the late 2040s.
- It will be binding on countries from 2019.

Key findings of the Scientific Assessment of Ozone Depletion 2018

- Actions taken under the Montreal Protocol** have led to **decreases in the atmospheric abundance of controlled ozone-depleting substances (ODSs)** and the start of the recovery of stratospheric ozone.
- At projected rates, Northern Hemisphere and mid-latitude ozone is scheduled to **heal completely** (i.e. equivalent to 1980 values) by the 2030s followed by the Southern Hemisphere in the 2050s and Polar Regions by 2060.

Ozone change and its influence on climate

- Influence on stratospheric climate:** Decrease in stratospheric ozone has been an important contributor to observed **stratospheric cooling**.
- Influence on surface climate and oceans:** These changes include the observed pole ward shift in Southern Hemisphere tropospheric circulation, with associated impacts on surface temperature and precipitation.



2. POLLUTION

2.1. AIR POLLUTION

2.1.1. BLACK CARBON

Why in news?

A recent study has found that black carbon travelling from Mediterranean countries **during the western disturbances and wind trajectories** may be one of the contributing factors leading to pollution and receding snowline in the Himalayas.

About Black Carbon

- Black carbon is a **potent climate-warming component of particulate matter** formed by the **incomplete combustion** of fossil fuels, wood and other fuels.
- It is a **short-lived climate pollutant (SLCP)** with a significant direct and indirect impacts on the climate, glacial regions, agriculture and human health.
 - ✓ **SLCP** are defined as gases and particles that contribute to warming and that have a lifetime of a few days to approximately 10 years.
 - ✓ Other than black carbon (BC) it includes tropospheric ozone (O_3) and its precursors CO, VOC and NOx, methane (CH_4), and some hydrofluorocarbons (HFCs).

Related news and Information

Climate and Clean Air Coalition to Reduce Short Lived Climate Pollutants is a voluntary partnership of governments, intergovernmental organizations, businesses etc. committed to reduce short-lived climate pollutants with over 120 state and non-state partners. It was **initiated in 2012** by governments of Bangladesh, Canada, Ghana, Mexico, Sweden and the United States, along with the United Nations Environment Programme (UNEP).

Global Air Pollution and Health Conference

- WHO organised the first global conference on air pollution and health in Geneva, Switzerland.
- Theme:** ‘Improving Air Quality, Combating Climate Change: Saving Lives.’
- Target:** To reduce the number of deaths from air pollution by two thirds by 2030 as mandated by World Health Assembly (decision making body of WHO).
- Plan:** ‘Geneva Action Agenda to Combat Air Pollution’ has been proposed.

Impact of Black Carbon

- Climate impact**
 - It is very effective at **absorbing** light and heating its surroundings.

- It influences **cloud formation** and impacts regional circulation (monsoon) and rainfall patterns.
 - When deposited on ice and snow, black carbon and co-emitted particles **reduce surface albedo** (the ability to reflect sunlight) and heat the surface.
 - Can affect the health of ecosystems in several ways for eg by depositing on plant leaves and increasing their temperature.
- **Health impact:** Black carbon and its co-pollutants are key components of fine particulate matter (PM_{2.5}) air pollution.

- Brown Carbon:** It originates primarily during **the combustion of organic biomass** and coexists with Black Carbon. It has similar climate effect as Black Carbon due their light absorbing property.
- Blue Carbon:** It is the **carbon stored and sequestered in coastal ecosystems** such as mangrove forests, seagrass meadows or intertidal saltmarshes.

2.1.2. PETCOKE

Why in News?

Central Government had banned the import of pet coke for use as fuel. It is allowed only for **cement, lime kiln, calcium carbide and gasification industries**, when used as the feedstock or in the manufacturing process on actual user condition.

About Pet Coke

- Petroleum coke or pet coke, is a **solid carbon rich** (90% carbon and 3% to 6% sulfur) material derived from oil refining.
- It is categorized as a “bottom of the barrel” fuel.
- It is a dirtier alternative to coal and **emits 11% more greenhouse gases than coal** and nearly 17 times more sulphur than coal.
- Petcoke is a source of fine dust which can get lodged in the lungs. It may **contain vanadium which is a toxic metal**.
- Sulphur-heavy petcoke and other polluting fuels such as furnace oil are widely used by cement factories, dyeing units, paper mills, brick kilns and ceramics businesses.
- India is the **world's largest consumer of petcoke** and imports over half its annual pet coke consumption mainly from the United States.

Reasons for use of Pet Coke

- Cheaper alternative:** Per-unit delivered energy for petcoke is much cheaper compared to coal.
- Favourable tax regime:** with respect to other fuels such as natural gas.

- **Clean energy cess** of Rs. 400 per tonne levied on coal, further promote shift to pet-coke.
- **Zero Ash Content** in Pet coke is a big advantage over coal which has significant ash content. It also allows cement firms can use low grade limestone.

2.1.3. GHG EMISSION FROM SHIPPING INDUSTRY

Why in news?

Members of the **International Maritime Organisation (IMO)** have reached an agreement on **reducing their** greenhouse gas emissions from shipping by at least 50% of 2008 levels **by 2050**.

About IMO

- It is the **United Nations specialized agency** with responsibility for the safety and security of shipping and the prevention of marine pollution by ships.
- India has been one of the earliest members of the IMO, joining it as a member-state in the year 1959.
- The MARPOL convention was adopted under IMO. **MARPOL Convention, 1973.**
- **International Convention for the Prevention of Pollution from Ships (MARPOL)** is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.
- It has six technical Annexes:
 - Annex I – Regulations for the Prevention of Pollution by Oil.
 - Annex II – Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk.
 - Annex III – Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form.
 - Annex IV – Prevention of Pollution by Sewage from Ships.
 - Annex V – Prevention of Pollution by Garbage from Ships.
 - Annex VI – Prevention of Air Pollution from Ships.
- **India is a signatory to MARPOL convention.**

Details

- The ultimate goal for shipping industry is to reduce greenhouse gas emission **to zero** by the middle of the century, with most newly built ships running **without fossil fuels by the 2030s**.
- The international shipping industry CO₂ emissions are projected to grow between 50 and 250% by 2050 if no action is taken.
- **Heavy fuel oil (HFO)** also known as “**residual fuel oil**”, considered as the world’s dirtiest and most polluting ship fuel, is a tar-like **residual waste from the oil refining process**.

- The combustion of HFO produces high levels of pollutants such as particulate matter, black carbon, sulphur oxide, nitrogen oxide.
 - Reducing speed could lower power requirements and thereby fuel consumption.
 - Ships can install scrubbers or other exhaust gas cleaning devices to remove polluting particles.
- IMO was tasked with limiting and reducing emissions from shipping under the **Kyoto Protocol** in 1997.
 - Despite its major role in polluting the planet, shipping was **not accounted for** in the **Paris agreement** on climate change.

2.1.4. NATIONAL CLEAN AIR PROGRAMME

Why in news?

National Clean Air Programme (NCAP) was recently launched by **Ministry of Environment, Forest and Climate Change (MoEFCC)**.

About NCAP

- It is a pollution control initiative to cut the concentration of particles (PM₁₀ & PM_{2.5}) by 20-30% by 2024. It will have 2017 as the base year for comparison and 2019 as the first year.
- It is to be implemented in **102 non-attainment cities**. These cities are chosen on the basis of **Ambient Air Quality India (2011-2015)** and **WHO report 2014-2018**.
- It is **not legally binding**.
- **Its objectives include-**
 - Stringent implementation of mitigation measures for prevention, control and abatement of air pollution.
 - Augment and strengthen air quality monitoring network across the country.
 - Augment public awareness and capacity building measures.

Significance of NCAP

- **First such effort** - Framing a **national framework** for air quality management with a **time-bound reduction target**.
- **Multisectoral Collaboration and Participatory approach:** It has tried to incorporate measures for **urban as well as rural areas**. Further, NCAP also identifies the **trans-boundary nature of air pollution**.
- **Linking Health and Pollution:** NCAP has now taken on board the **National Environmental Health Profile** of 20 cities that the MoEFCC

initiated along with the Indian Council of Medical Research with special focus on air pollution and health.

Implementation of NCAP

- The **Central Pollution Control Board (CPCB)** shall execute the nation-wide programme for the prevention, control, and abatement of air pollution within the framework of the NCAP.

Central Pollution Control Board (CPCB)

- It is the statutory organization constituted under the Water (Prevention and Control of Pollution) Act, 1974.
- Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981.
- It functions under the Ministry of Environment, Forest and Climate Change.
- Some of the important functions of the CPCB are :**
 - To promote cleanliness of streams and wells in different areas of the States by prevention, control and abatement of water pollution, and
 - To improve the quality of air and to prevent, control or abate air pollution in the country.
 - Co-ordinate the activities of the State Board and resolve disputes among them.
 - Provide technical assistance and guidance to the State Boards, carry out and sponsor investigation and research relating to problems of water and air pollution, and for their prevention, control or abatement;
 - It is responsible for the enforcement of Hazardous Waste (Management & Handling) Rules 1999.**

Components of NCAP: It has 3 components

Mitigation Actions: NCAP details various mitigation actions.

- Web-based, three-tier mechanism** - to review, monitor, assess and inspect to avoid any form of non-compliance. The system will work independently under the supervision of a single authority.
- Extensive Plantation Drive at pollution hot spots** in the cities/towns.
- Technology Support.**
- Regional and Transboundary Plan:** Air quality management at South-Asia regional level by activating the initiatives under '**Male Declaration on Control and Prevention of Air Pollution and its Likely Transboundary Effects for South Asia' and South Asia Cooperative Environment Programme (SACEP)**' to be explored.
- City Specific Air Quality Management Plan for 102 Non-Attainment Cities.**

- Further, the state capitals and cities with a population more than a million may be taken up on priority for implementation.

Knowledge and Database Augmentation

- Air Quality Monitoring Network:** It includes setting rural monitoring network and 10 city super network.
- National Emission Inventory:** This will be formalized under the NCAP. Its significance is in tracking progress towards emission reduction targets and as inputs to air quality model.

Institutional Strengthening

- Institutional Framework:** It involves a **National Apex Committee** at the MoEFCC and State-level Apex Committee under the chief secretaries in various states. There are various other institutions being envisaged such as Technical Expert Committee and National-level Project Monitoring Unit (PMU) at the MoEF&CC and **National-level Project Implementation Unit (PIU)** at the CPCB.
- Setting up Air Information Centre:** for data analysis, interpretation, dissemination.
- Operationlize the NPL-India Certification Scheme (NPL-ICS)** for certification of monitoring instrument.
- Air-Quality Forecasting System (AQFS):** As a state-of-the-art modelling system, it will forecast the following day's air quality.
- Network of Technical Institutions-Knowledge Partners:** Dedicated air pollution units will be supported in the universities, organizations, and institutions and a network of highly qualified and experienced academicians, academic administrators, and technical institutions will be created.
- Technology Assessment Cell (TAC):** It will evaluate significant technologies with reference to prevention, control, and abatement of pollution.

Related news

- NITI Aayog has proposed 15-point action plan titled '**'Breathe India'**' for combating air pollution in ten most polluted cities in the country, including Delhi, Kanpur and Varanasi.
 - According to the **World Health Organisation (WHO)** global air pollution database, India has 14 out of the 15 most polluted cities in the world in terms of PM 2.5 concentrations.

2.1.5. CLEAN AIR- INDIA INITIATIVE

Why in news?

Recently, the clean air-India initiative was launched in Delhi by Prime Minister of Netherlands.

About the initiative

- It is a collaborative project between **Get in the Ring** (a platform for start-ups by the government of the Netherlands), **Start-up India** and **INDUS Forum** (an online matchmaking platform of Indian and Dutch businesses).
- Aim:** To curb air pollution in Indian cities by promoting partnerships between Indian start-ups and Dutch companies and build a network of entrepreneurs working on business solutions for cleaner air.

#StartUpLink

- It was launched by Invest India and Dutch government for Indian and Dutch start-ups which offers access to key information, relevant networks, pilot opportunities, and navigators for the respective start up ecosystems.
- 'Clean Air' India Ring** is a critical component of the Indo-Dutch #StartUpLink.
- As a partner for #StartUpLink, Dutch company shell has established a Shell E4 Start hub, the **first energy focused start up hub in India**.

2.1.6. OTHER AIR POLLUTION INITIATIVES IN NEWS

2.1.6.1. SYSTEM OF AIR QUALITY AND WEATHER FORECASTING AND RESEARCH (SAFAR)

- Recently, most advanced System of Air Quality and Weather Forecasting (SAFAR) was inaugurated.
- It monitors** UV-Index, PM1, PM2.5, PM10, Mercury, Black Carbon, Sulfur Dioxide, Ozone, Nitrogen Oxides, Carbon Monoxide, Benzene, Toluene and Xylene.
- It is implemented in four cities** of India – Delhi, Pune, Mumbai and Ahmedabad.
- It is developed by Indian Institute of Tropical Meteorology, Pune, and operationalized by India Meteorological Department (IMD).

2.1.6.2. NATIONAL AIR QUALITY INDEX

- It transforms complex air quality data of various pollutants into a single number (index value) nomenclature and colour.
- There are **six AQI categories**, namely Good, Satisfactory, Moderately polluted, Poor, Very

Poor, and Severe. AQ sub-index and health breakpoints are evolved **for eight pollutants** (PM10, PM2.5, NO₂, SO₂, CO, O₃, NH₃, and Pb) for which short-term (upto 24-hours) National Ambient Air Quality Standards are prescribed.

- SAMEER app** has been developed to display AQI at a city and receive complaints.
- Related Information** - Pollutants covered under National Ambient Air Quality Standards are: Sulphur dioxide, Nitrogen dioxide, lead, Ozone, PM10, PM2.5, carbon monoxide.

2.1.6.3. COMPREHENSIVE ENVIRONMENTAL POLLUTION INDEX (CEPI)

- It is measured by Central Pollution Control Board for Monitoring Polluted Industrial Areas (PIAs).
- It is a rational **number between 0 and 100**.
- CEPI score of 70 or above is considered as **critically polluted cluster tag**.
- Categorization of industrial sectors based on CEPI score:**
 - Industrial Sectors having Pollution Index score of 60 and above - Red category
 - Industrial Sectors having Pollution Index score of 41 to 59 – Orange category
 - Industrial Sectors having Pollution Index score of 21 to 40– Green category
 - Industrial Sectors having Pollution Index score incl. & upto 20- White category (newly introduced)

2.1.6.4. WAYU (WIND AUGMENTATION PURIFYING UNIT)

- It is developed by **Council of Scientific and Industrial Research – National Environmental Engineering Research Institute (CSIR-NEERI)** as a part of Technology Development Project being **funded by Department of Science and Technology**.
- The device works on two principles mainly **Wind generation for dilution of air pollutants and Active Pollutants removal**.
- It has filters for Particulate Matter removal and activated carbon (charcoal) and UV lamps for poisonous gases removal such as VOCs and Carbon Monoxide.
- It has the capacity to purify air in an area of 500 meter square.

2.1.6.5. ENVIRONMENT POLLUTION (PREVENTION AND CONTROL) AUTHORITY (EPCA)

- Central government recently, re-constituted EPCA.

- It was constituted under **Section 3(3) of Environment (Protection) Act, 1986.**
- It was **empowered by the Supreme Court** for protecting and improving the quality of the environment and preventing and controlling the environmental pollution in the National Capital Region.
- It was also mandated to **enforce Graded Response Action Plan (GRAP)** for Delhi and the NCR region, which comprises the graded measures for each source framed according to the AQI categories.

2.2. WATER POLLUTION

2.2.1. TOXICITY IN INDIAN RIVERS

Why in news?

A recent report titled **Status of trace and toxic metals in Indian rivers 2018** by Central Water Commission.

More about the news

- The report has highlighted that **42 rivers in India** have at least **two toxic heavy metals** in quantities beyond the permissible limit.
- Ganga was found to be polluted with five heavy metals—chromium, copper, nickel, lead and iron.
- Sources:** Mining, milling, plating and surface finishing industries are the **main sources of heavy metal pollution** and the concentration of such toxic metals has increased rapidly over the past few decades.

Toxic metals and sources of metal Pollution

- The term “**heavy metal**” refers to any metal and metalloid element that has a relatively high density ranging from 3.5 to 7 g/cm³ and is toxic or poisonous at low concentrations.
- Primary metals** considered to be toxic are lead, arsenic, copper, cadmium, mercury and nickel.
- Health impacts of toxic metals:** Heavy metals pose a serious threat to humans and the environment because of its toxicity, non-biodegradability and bioaccumulation and may result in reduction of species diversity.

Corrective measures

- Controlling runoff pollution** such as agriculture runoff, urban runoff and runoff from livestock farms through afforestation, sustainable agriculture practices and using wastewater for irrigation etc.

- Using **Green remediation techniques** such as Phytoextraction for soils and wetlands contaminated with toxic metals. e.g. - Water hyacinth is used for cleansing polluted water by absorbing pollutants especially chromium.

Metal	Source
Arsenic	Pesticides, fungicides, metal smelters
Cadmium	Welding, electroplating, pesticides, fertilizers, batteries, nuclear plants
Chromium	Mining, electroplating, textile, tanneries
Copper	Mining, electroplating, pesticides
Lead	Paint, batteries, pesticides, automobile emissions, mining, burning of coal
Manganese	Welding, fuel addition, ferro manganese production
Mercury	Pesticides, batteries, paper industries
Nickel	Electroplating, zinc base coating, battery industries
Zinc	Refineries, brass manufacturing, metal plating, immersion of painted idols

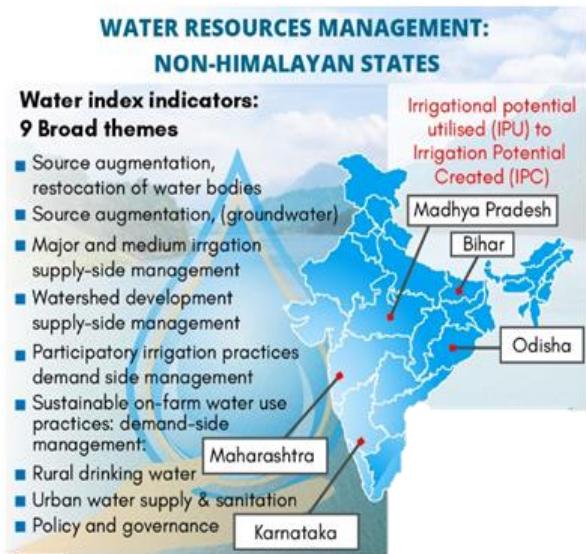
2.2.2. COMPOSITE WATER MANAGEMENT INDEX

Why in News?

Recently, NITI Aayog released Composite Water Management Index (CWMI) to assess and improve the performance of states/UTs in efficient management of water resources.

Background

- World Bank** indicates that by 2030 India's per capita water availability may shrink to half, which will push the country into '**water scarce**' category from the existing '**water stress**' category.
 - Water Stressed Condition:** When annual per-capita water availability is less than 1700 cubic meters.
 - Water Scarcity Condition:** When annual per-capita water availability is less than 1000 cubic meters.
- India is home 16% of World's population however, it holds only about 4% of global freshwater.
- Water is a State subject** and its optimal utilization and management lies predominantly within the domain of the States.
- With nearly **70% of water being contaminated**, India is placed at 120th amongst 122 countries in the water quality index.



Finding of the report

- **About Index:** Index evaluates states on nine broad sectors and 28 indicators (see infographic)
 - 14 of the 24 states analysed scored below 50% on water management and have been classified as “low performers”.
 - 21 Indian cities including Delhi, Bengaluru, Chennai and Hyderabad will run out of groundwater by 2020, affecting 100 million people.
- India is undergoing the **worst water crisis** in its history
 - 600 million people in India face high to extreme water stress in the country.
 - 75% of the households in the country do not have drinking water at their premise.
 - 84% rural households do not have piped water access.
- **Decreasing annual per capita availability of water:** It fell from 1,820 cubic meters in 2001 to 1,545 cubic meters in 2011, which may further fall to 1,341 cubic meters in 2025.
- **Food security risk:** Underperformance of states like Uttar Pradesh, Bihar, Rajasthan and Haryana poses significant water and food security risks for the country as they account for 20-30% of India's agriculture output and are home to over 600 million people.
 - Many **water-scarce states have performed better** in the Index like Gujarat, Madhya Pradesh, Andhra Pradesh, Karnataka, Maharashtra and Telangana.

2.2.3. GUIDELINES FOR GROUNDWATER EXTRACTION

Why in news?

- The Central Ground Water Authority (CGWA) recently notified revised guidelines for ground water (GW) extraction to be effective from 1st June 2019.
- However, National Green Tribunal has stayed its implementation stating that the guidelines have liberalised extraction of groundwater adding to the crisis unmindful of the ground situation and likely impact it will have on environment.

Brief Background

- India is the **largest user of ground water in the world**- about 25% of the global ground water extraction. About 80% of India's drinking water needs is dependent on groundwater.
- **The Easement Act, 1882**, provides every landowner with the right to collect and dispose, within his own limits, all water under the land and on the surface. Landowners are not legally liable for any damage caused to water resources as a result of over-extraction.
- **Central Ground Water Authority (CGWA)**, constituted under the Environment (Protection) Act of 1986 has the mandate of regulating ground water development and management in the country.
- **CGWA has been regulating ground water development** for its sustainable management in the country through measures such as issue of advisories, public notices, grant of No Objection Certificates (NOC) for ground water withdrawal.

Salient features of the revised guidelines:

- **For Industries**
 - **Introduction of the concept of Water Conservation Fee (WCF)** which varies with the category of the area, type of industry and the quantum of ground water extraction and is designed to progressively increase from safe to over-exploited areas and from low to high water consuming industries as well as with increasing quantum of ground water extraction.
 - Encouraging **use of recycled and treated sewage water** by industries.
 - Provision of **action against polluting industries**, and measures to be adopted to ensure prevention of ground water

- contamination in premises of polluting industries/ projects.
- **Mandatory requirement** of digital flow meters, piezometers and digital water level recorders (with or without telemetry depending upon quantum of extraction).
 - **Mandatory water audit** by specified industries abstracting ground water.
 - **Mandatory roof top rain water harvesting** except for specified industries.
 - **Monitoring:** Monthly water level data shall be submitted to CGWA through the web portal.
 - **Exemptions**
 - Exemption from requirement of NOC has been given to agricultural users, users employing non-energised means to extract water, individual households (using less than 1 inch diameter delivery pipe) and Armed Forces Establishments during operational deployment or during mobilization in forward locations.

Related news

Recently, a new study by researchers has found widespread uranium contamination in groundwater from aquifers in **16 Indian states**.

More on findings of the study

- The majority of high-uranium levels were located in Rajasthan and parts of Punjab, Haryana and Gujarat
- The results showed that most of the wells tested in Rajasthan and Gujarat had **more uranium than the WHO's recommended limit of 30 µg/L**.
- The primary source of **uranium is granite**, which is common in the Himalayan range. Over the years, uranium may have slowly leached into the water.
- However, anthropogenic factors such as **over-exploitation of groundwater** for agricultural irrigation and nitrate pollution due to **overuse of nitrogenous fertilizers** may have further enhanced uranium mobilization.

Issues associated with uranium contamination

- The **Bureau of Indian Standards' Drinking Water Specifications** does not prescribe any limit for uranium which makes **quality monitoring of water table impossible**. Some of the major contaminants which are monitored under the specification include: Cadmium, Cyanide, Mercury, Lead, Arsenic, Chromium etc.
- Uranium in drinking water raises concerns because of **chemical toxicity, chronic kidney problems etc.**

2.2.4. NATIONAL WATER INFORMATICS CENTRE

Why in News?

The government has set up **National Water Informatics Centre (NWIC)** to maintain a comprehensive water resources data.

About NWIC

- It would be a **repository of nation-wide water resources data** and would work as a Subordinate Office under the Ministry of Water Resources, River Development and Ganga Rejuvenation which is to be headed by a Joint Secretary level officer.
- It will provide latest and reliable water data (**other than classified data**) through web-based India Water Resources Information System (India-WRIS) on a **GIS platform** in Public Domain.
- It will also **collaborate with leading national and international research institutes** to provide technical support to central and state organisations dealing with water emergency response of hydrological extremes.
- It is a component of **National Hydrology Project** and also in consonance with the **National Water Mission** which has an objective of “conservation of water, minimizing wastage and ensuring its more equitable distribution through integrated water resources development and management”.

National Hydrology Project

- It is a **central sector scheme**. Under this, the Hydro-meteorological data will be stored and analyzed in real time basis and can be seamlessly accessed by any user at State, District and Village level.
- Its components include:
 - In Situ Hydromet Monitoring System and Hydromet Data Acquisition System.
 - Setting up of National Water Informatics Centre (NWIC).
 - Water Resources Operation and Management System
 - Water Resources Institutions and Capacity Building

India-Water Resource Information System

- It is a joint venture of the **Central Water Commission (CWC)**, Ministry of Water Resources and Indian Space Research Organization (ISRO), Department of Space.
- India-WRIS provides '**Single Window solution**' for all water resources data & information in a national GIS framework.

2.2.5 RAINWATER HARVESTING IN METROPOLITAN CITIES

Why in news?

The Parliamentary Standing Committee on Urban Development submitted its report on “Rainwater Harvesting in Metropolitan Cities”.

Techniques of Rainwater Harvesting in Urban Areas- NITI Aayog has outlined the following techniques-

- **Roof Top Rain Water Harvesting-** A container needs to be constructed or placed beneath the roof level, which will store the rainwater intercepted and redirected towards it through pipes made out of wood, bamboo, or PVC.
- **Driveway Rain Off Harvesting-** This technique is useful where the built-up area is much larger, such as office complexes. The rain water is harvested by intercepting it with the help of a shallow gutter or a bump near the gate and directed to a recharge well.

Some Traditional Methods of Rainwater Harvesting in states- In India, rainwater harvesting has been in practice for more than 4000 years.

- Himachal Pradesh- **Kul, Kuhi**
- Rajasthan- **Baoris, Jhalaras, Johad, Nadis, khadins, kunds**
- Maharashtra- **Bhandaras**
- Bihar- **Ahar-Pynes**
- Karnataka- **Kere**
- Madhya Pradesh- **Bundela Tank, Chandela Tank, Katas, Pat**
- Tamil Nadu- **Eri, Ooranis**
- Nagaland- **Cheo-ozihhi**
- Andhra Pradesh- **Cheruvu**
- West Bengal- **Dungs**

2.3. NITROGEN POLLUTION

Why in News?

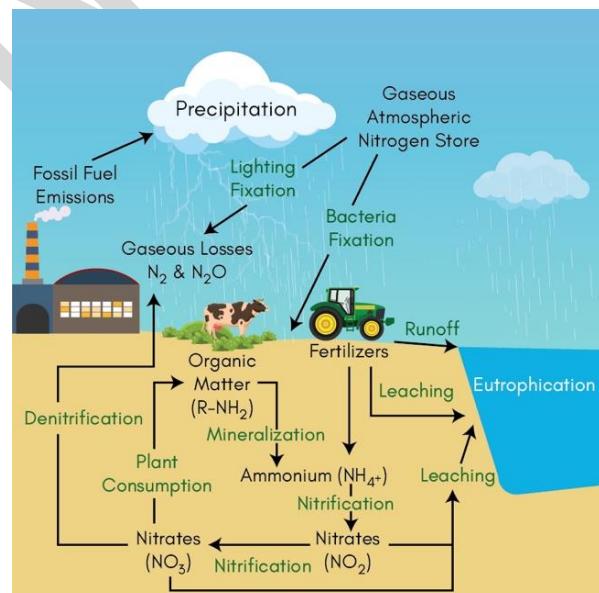
Recently, Indian Nitrogen Assessment report highlighted the nitrogen emission scenario in India.

Nitrogen Emission Hotspot

- Recently, Greenpeace conducted a study of satellite-based data for the identification of **nitrogen emission hotspot** (NEH) around the world.
- **South Africa's Mpumalanga** province emits the highest amounts of nitrogen dioxide and the largest number of hotspots are found in **China**.
- **Hotspot in India:** **Delhi-NCR, Sonbhadra in UP & Singrauli in MP** (both taken as one entity) and **Talcher-Angul in Odisha**.

Highlights of the report

- In India nitrogen emissions grew at 69% from 2001 to 2011 and has **replaced methane** as the second largest Greenhouse Gas (GHG) from Indian agriculture.
- Agricultural soils contributed to over 70% of nitrous oxide (N_2O) emissions, followed by waste water (12%) and residential and commercial activities (6%).
- India is globally the biggest source of ammonia emission, nearly double that of NOx emissions.
- Health impact: Blue Baby Syndrome, reduced functioning of the thyroid gland, Vitamin A shortages etc.
- Excessive nitrogen in the form of fertilizer **brings down the carbon content** of the soil, result in diminishing returns in terms of crop yield.
- Excessive eutrophication which turns water body into Dead Zone, substance like nitric acid is a component of acid rain.
- Nitrous oxide (N_2O) is 300 times more potent as a greenhouse gas as opposed to CO₂. It is also a dominant ozone-depleting substance and also leads to formation of smog.



Steps taken to control Nitrogen pollution

National

- **Soil Health Card** provides information to farmers on nutrient status of their soil along with recommendations on appropriate dosage of nutrients for crop.
- **Mandatory neem-coated urea production** to slow down the dissolution of nitrogen into soil, resulting into less nutrient requirement.

- **Bharat Stage Norms:** Aim to regulate the harmful emission from vehicle like carbon monoxide (CO), unburnt hydrocarbons (HC), Nitrogen Oxides (NOx) and Particulate matter (PM).
- **National Air Quality Index (NAQI)** has been implemented in which Nitrogen Dioxide is one of the eight pollutants to be controlled and monitored.

Global

- **Gothenburg Protocol:** It aims to Abate Acidification, Eutrophication and Groundlevel Ozone and is a part of the Convention on Long-Range Transboundary Air Pollution.
 - **Objective:** To control and reduce emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x), ammonia (NH₄), volatile organic compounds (VOCs), and Particulate Matter (PM) that are caused by human activities.
- **Kyoto Protocol:** It aims to reduce the emissions of the Green House Gases such as Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF₆) and carbon dioxide (CO₂).
- **International Nitrogen Initiative (INI):** It is an international program, set up in 2003 under sponsorship of the Scientific Committee on Problems of the Environment (SCOPE) and from the International Geosphere-Biosphere Program (IGBP) to optimize nitrogen's beneficial role in sustainable food production.

2.4. PLASTIC POLLUTION

Why in News?

Recently, India committed to eliminate all single-use plastic in the country by 2022.

Plastic Waste (Management and Handling) Rules, 2016

- **It defines the minimum thickness of plastic carry bags i.e.** 50 microns. This would increase the cost and the tendency to provide free carry bags would come down.
- **Responsibility of local bodies:** Rural areas are brought under the rules. The gram sabhas have been given responsibility of implementation.
- **Extended Producer Responsibility:** Producers and brand owners have been made responsible for collecting waste generated from their products.
- **Responsibility of waste generator:** All institutional generators of plastic waste shall segregate and store their waste as per Solid Waste Management Rules, and handover segregated wastes to authorized waste disposal facilities.

- **Responsibility of street vendors and retailers:** Not to provide such carry bags or fine would be imposed. Only the registered shopkeepers on payment of a registration fee to local bodies would be allowed to give out plastic carry bags on charge.
- To promote the use of plastic for road construction or energy recovery.

Background

- India was the global host of **2018 World Environment Day (June 5, 2018)** with “**Beat Plastic Pollution**” as the theme, reflecting world commitment to combat single-use plastic pollution.
- According to **United Nations Environment Programme (UNEP)** if current pollution rates continue, there will be more plastic in the sea than fish by 2050, as globally, only 14% of plastics is recycled.
- Only 24 States and Union Territories have complied with the **Centre's Plastic Waste Management (PWM) Rules, 2016**, to regulate manufacture, sale, distribution and use of plastic carry bags including those of compostable plastic, and plastic sheets for packaging or wrapping applications.
- **Single Use Plastic:** Also referred as disposable plastics, are commonly used for plastic packaging and include items intended to be used only once before they are thrown away or recycled. It account for 50% of the plastic we use, with none states in India have plans in place to tackle single use plastics.

Microplastics

- **Microplastics or Microbeads** are plastic pieces or fibre which is very small, generally measuring less than 1mm.
- They have a variety of use, most notably being personal care products like toothpaste, body creams, clothing and industrial use.
- They have an ability to spread easily and provide silky texture and colours to the product. Thus, adding visual appeal of the cosmetic products.

Impact of plastic Pollution

- **Bio-accumulation:** Plastic bags are often ingested by animals who mistakenly taken them for food due to which toxic chemicals enter the human food chain.
- **Leaching of harmful chemical:** As the plastics degrade and become brittle, they leach out monomers like **Bisphenol A** which can then be absorbed by marine life, with relatively little known consequences.
 - They have been linked to decreasing crop productivity, impacting food security,

- birth defects, impaired immunity, endocrine disruption and other ailments.
- Source of vector borne diseases:** They provide abundant surfaces area for colonization opportunities. In addition, these plastics are essentially rafts for organisms to travel further than they usually would, making them vectors for spreading invasive marine species.
- Air Pollution:** Disposing of plastic waste by burning it in open-air pits releases harmful gases like furan and dioxin.
- Financial Loss:** The total economic damage to the world's marine ecosystem caused by plastic amounts to at least \$13 billion every year.

International efforts for tackling Plastic Debris

- UN Environment launched #CleanSeas campaign:** to eliminate major sources of marine litter, microplastics in cosmetics and the excessive, wasteful usage of single-use plastic by the year 2022.
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal:** It aims at preventing and minimizing the generation of wastes including those ending up in the ocean. Much of the marine litter and microplastics found in the sea may be determined as 'waste' as defined under the Convention.
- Stockholm Convention on POPs:** It aims to protect human health and the environment from POPs (organic chemicals that persist in the environment, bio accumulate in humans and wildlife, have harmful effects and have the potential for long-range environmental transport). Plastics can adsorb POPs such as PCB, DDT and dioxins and these are frequently detected in marine plastic litter.
- The Honolulu Strategy:** It is a framework for a comprehensive and global collaborative effort to reduce the ecological, human health, and economic impacts of marine debris worldwide.

Related news

Alliance to End Plastic Waste

- Alliance to End Plastic Waste** was recently founded.
- It is a **nonprofit organization** which includes companies from across the globe. From India, **Reliance Industries** is a part of the alliance.
- It has committed over \$1.0 billion with the goal of investing \$1.5 billion over the next five years to help end plastic waste in the environment.

Taj Declaration

- It aims at **gradual phasing out of single-use plastic** water bottles and cutlery in the 500-metre radius of the **Taj Mahal** in the next five years and to make the monument litter-free.

Ocean Clean up

Recently, the Ocean Cleanup project was started in the Pacific Ocean.

- Ocean Cleanup is a non-profit organisation which is developing advanced technologies to rid the world's oceans of plastics.
- It is directed at cleaning The **Great Pacific Garbage Patch (GPGP)** which is a zone between Hawaii and California. About 1.8 Trillion pieces of plastic float on the surface of the GPGP.

WESTERN GARBAGE PATCH One area of marine debris concentration is located off the coast of Japan, which researchers believe to be a small recirculating gyre.

SUBTROPICAL CONVERGENCE ZONE This area, located north of the Hawaiian archipelago, has an abundance of marine life and marine debris, and is one of the mechanisms for accumulation of debris in the Hawaiian Islands.

EASTERN GARBAGE PATCH

Concentration of marine debris have been detected in an area midway between Hawaii and California Known as the Northern Pacific Subtropical High, or the "eastern garbage patch." Some speculate this patch is roughly the size of Texas, though its exact area is unknown.



OTHER GYRES WITH MARINE DEBRIS

Little research has been conducted to date on marine debris in other areas. It is believed that each of the world's five major gyres contain similar accumulations of trash, but no one can say for sure how large these areas are, and no accurate estimate exists of how much debris there is in the ocean.

2.5. BLUE FLAG CERTIFICATION

Why in news?

13 Indian beaches have been shortlisted for the Blue flag certification.

More on news

- The Ministry of Environment, Forest and Climate Change had started a pilot project under a **Unified Coastal Areas Management Programme** to develop the Indian beaches according to the Blue Flag standards in December 2017.
- Chandrabhaga beach** of Odisha's Konark coast was the first to complete the tag certification process and will be **the first in Asia** to get the Blue Flag certification.
- Apart from it, **12 other beaches** across are also being developed by the **Society for Integrated Coastal Management (SICOM)** as blue flag beaches which include Maharashtra's Chiwla and Bhogave beaches

and one beach each from Puducherry, Goa, Daman and Diu, Lakshadweep and Andaman and Nicobar Islands.

- **Beach Management Service (BeaMS)** It's an integrated coastal management scheme introduced by the ministry to reduce existing pollutants on beaches and achieve such high international standards.

Blue Flag Standards

- The Blue Flag beach standards were established by **Copenhagen-based Foundation for Environmental Education (FEE)** in 1985 in France.
- The Blue Flag is an environmental award for beaches, sustainable boating tourism operators, and marinas.
- Only local authorities or private beach operators can apply for a Blue Flag for beaches.
- The criteria for Blue Flag beaches cover four main area:
 - water quality,
 - environmental management,
 - environmental education and
 - safety.

Society for Integrated Coastal Management (SICOM)

- It has been established under the aegis of MoEFCC.
- The main objectives of SICOM are as follows:
 - To support implementation of Integrated Coastal Zone Management (ICZM) activities in India.
 - To implement the World Bank assisted India ICZM Project
 - To provide Research Development (R&D) and stakeholders participation in management of the Coastal areas in India.

2.6. PESTICIDES BAN

Why in News?

The Government of India has decided to ban the use of 18 pesticides following the recommendations of the **Anupam Verma Committee**.

STATUS OF TOXIC PESTICIDES IN INDIA



Regulations for pesticide in India

- **Insecticide Act 1968**, was enacted to regulate imports, manufacture, storage, transport, sale, distribution and use of insecticides with a view to prevent risk to human beings and animals.
- **The Central Insecticide Board and Registration Committee (CIBRC)** approves the use of pesticides in India.
- The **health and family welfare ministry** monitors and regulates pesticide levels in food, and sets limits for residues in food commodities.
- Department of Agriculture, Co-Operation & Farmers Welfare (DAG&FW) has launched a scheme "**Strengthening and Modernization of Pest Management Approach in India**" to promote Integrated Pest Management (IPM).
- "**Grow Safe food**" Campaign has been initiated to create awareness about the safe and judicious use of pesticides among the various stakeholders.
- India is signatory to **UNEP led Stockholm Convention For Persistent Organic Pollutants** and **Rotterdam Convention** which promotes open exchange of information and calls on exporters of hazardous chemicals to use proper labelling, include directions on safe handling, and inform purchasers of any known restrictions or bans.
- **Draft Pesticides Management Bill 2017** aims to regulate the manufacture, imports, storage, transportation, inspection, testing and distribution of pesticides.

3. BIODIVERSITY

3.1. CONVENTION ON BIOLOGICAL DIVERSITY

Why in News?

- Recently, Conference of the Parties (COP 14) to the Convention on Biological Diversity (CBD) was held, adopting **Sharm El-Sheikh Declaration**.
- India also recently submitted Sixth National Report (NR6) to the CBD.
 - Submission of national reports is a **mandatory obligation on Parties** to international treaties, including CBD.
 - NR6 provides an update of progress in achievement of **12 National Biodiversity Targets (NBT)** developed under the Convention, in line with the **20 global Aichi biodiversity targets**.
 - India has achieved two **NBTs (6&9)**, it is on track to achieve 8 NBTs and in respect of the remaining 2 NBTs.
 - **Threat to Wildlife:** In India has a total of **683 animal species** in the International Union for Conservation of Nature's (IUCN) critically endangered, endangered and vulnerable categories, as compared to 646 species in 2014 when the fifth national report was submitted, and 413 in these categories in 2009.

Convention on Biological Diversity (CBD)

- It seeks to address all threats to biodiversity and ecosystem services, including threats from climate change.
- It aims to promote the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources.
- It was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit").
- It's a legally binding multilateral environmental

agreement with a participation of 196 member countries.

- **India is a member.**

Protocols adopted under the Convention.

- **Cartagena Protocol on Biosafety:** It seeks to protect biological diversity from the potential risks posed by **living modified organisms** resulting from modern biotechnology.
 - It establishes an **advance informed agreement** (AIA) procedure for ensuring that countries are provided with the information necessary to make informed decisions before agreeing to the import of such organisms into their territory.
 - It also establishes a **Biosafety Clearing-House** to facilitate the exchange of information on living modified organisms.
- **Nagoya Protocol on Access and Benefit Sharing:** It aims at sharing the benefits arising from the **utilization of genetic resources** in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies.

Highlight of COP-14

- **Adoption of Sharm El-Sheikh Declaration** on Investing in Biodiversity for People and Planet.
- **New Deal for Nature:** It is an agreement on a comprehensive and participatory process to develop post-2020 global biodiversity framework to further achieve the 2050 Vision for Biodiversity.
- **Launch of International Alliance of Nature and Culture** to advance work on biological and cultural diversity in collaboration with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and indigenous peoples and local communities.

CBD strategic goal	Aichi Target	The 12 National Biodiversity targets of India are:
Address underlying causes	<p>1 Improve awareness of biodiversity</p> <p>2 Mainstream biodiversity</p> <p>3 Reform incentives</p> <p>4 Implement plans for sustainability</p>	<p>① By 2020, a significant proportion of the country's population, especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably (Aichi Target 1).</p> <p>② By 2020, values of biodiversity are integrated into national and state planning processes, development programmes and poverty alleviation strategies (Aichi Target 2).</p>
Reduce pressures and promote sustainable use	<p>5 Reduce habitat loss and degradation</p> <p>6 Fish sustainably</p> <p>7 Make farming and forestry sustainable</p> <p>8 Reduce pollution</p> <p>9 Tackle invasive species</p> <p>10 Minimise climate change impacts</p>	<p>③ Strategies for reducing the rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being (Aichi Target 5 &15).</p> <p>④ By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritized invasive alien species are managed (Aichi Target 9).</p> <p>⑤ By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries (Aichi Target 6, 7, 8).</p> <p>⑥ Ecologically representative areas under terrestrial and inland water, and also coastal and marine zones, especially those of particular importance for species, biodiversity and ecosystem services, are conserved effectively and equitably, based on protected area designation and management and other area-based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20% of the geographic area of the country, by 2020 (Aichi Target 10,11, 12).</p>
Safeguard ecosystems, species and genes	<p>11 Protect and manage critical sites</p> <p>12 Prevent extinctions</p> <p>13 Maintain genetic diversity</p>	<p>⑦ By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity (Aichi Target 13).</p> <p>⑧ By 2020, ecosystem services, especially those relating to water, human health, livelihoods and well-being, are enumerated and measures to safeguard them are identified, taking into account the needs of women and local communities, particularly the poor and vulnerable sections (Aichi Target 14).</p>
Enhance benefits from biodiversity and ecosystems	<p>14 Safeguard ecosystem services</p> <p>15 Restore degraded forest</p> <p>16 Implement access and benefit sharing</p>	<p>⑨ By 2015, Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization as per the Nagoya Protocol are operational, consistent with national legislation (Aichi Target 16).</p> <p>⑩ By 2020, an effective, participatory and updated national biodiversity action plan is made operational at different levels of governance (Aichi Target 3, 4,17).</p>
Enhance implementation through planning, knowledge management and capacity building	<p>17 Implement NBSAPs</p> <p>18 Protect traditional knowledge</p> <p>19 Share biodiversity knowledge</p> <p>20 Increase conservation finance</p>	<p>⑪ By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge in accordance with national legislation and international obligations (Aichi Target 18).</p> <p>⑫ By 2020, opportunities to increase the availability of financial, human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the Strategy for Resource Mobilization is adopted (Aichi Target 19, 20).</p>

3.2. FLORA & FAUNA

3.2.1. ASIATIC LION CONSERVATION PROJECT

Why in News?

The Ministry of Environment, Forest and Climate Change launched the “**Asiatic Lion Conservation Project**”.

Asiatic Lion

- Asiatic Lion, *Panthera Leo Persica* is listed in **Schedule 1 of Wildlife Protection Act, 1972** and in **Appendix-I of CITES**, while IUCN lists it in **endangered category**.
- The lion is one of **five** pantherine cats inhabiting India, along with the Bengal tiger, Indian leopard, snow leopard and clouded leopard.
- Their population is limited to only five protected areas in Gujarat – **Gir National Park, Gir Sanctuary, Pania Sanctuary, Mitiyala Sanctuary and Girnar Sanctuary**.

Asiatic vs African Lions

- **Size:** Asiatic lions tend to be smaller than their African cousins.
- **Mane:** Compared to the African lion, the male Asiatic lion has a relatively short, sparse mane. As a result, the male Asiatic lion's ears tend to remain visible at all times. In addition to being less well-developed, the mane is generally darker than that of African lions.
- **Skin Fold:** The most distinguishing characteristic of the Asiatic lion is a longitudinal fold of skin that runs along the belly. This trait is found in all Asiatic lions. It is absent in African Lions.
- **Pride Size:** Asiatic prides tend to be smaller than their African counterparts.

Background

- 23 Lions died in short period of 20 days in 2018, due to **Canine Distemper Virus (CDV) and tick-borne Babesiosis**.

About the Project

- It will be funded from the **Centrally Sponsored Scheme- Development of Wildlife Habitat (CSS-DWH)** with the contributing ratio being 60:40 of Central and State share.
- **Focus:** To cause habitat improvement, scientific interventions, disease control and veterinary care supplemented with adequate eco development works for the fringe population in order to ensure a stable and viable Lion population in the Country.

Related News

Integrated Development of Wildlife Habitats

- Recently, the government approved continuation of the scheme beyond the 12th Plan period from 2017-18 to 2019-20.
- It is a **Centrally Sponsored Scheme** where GoI provides **financial and technical assistance to the State/UT** Governments for activities aimed at wildlife conservation.
- **Component:** Scheme consists of Centrally Sponsored Scheme of Project Tiger (CSS-PT), Development of Wildlife Habitats (CSS-DWH) and Project Elephant (CSS-PE).
- **Implementation** of the schemes would be done through the respective States in designated Tiger Reserves, Protected Areas and Elephant Reserves.

3.2.2. TIGER CONSERVATION

Why in news?

As part of the country's first inter-state translocation of tigers project, a female cub was shifted from Bandhavgarh Tiger Reserve (BTR) in Madhya Pradesh to Satkosia Tiger Reserve (STR) in Odisha.

About the project

- It is conceived by the **MoEFCC, NTCA and Wildlife Institute of India (WII)**, Dehradun.
- It involves shifting six tigers (three pairs) from different reserves in the central state to the eastern state.

Conservation Efforts in India

- **Project Tiger (1973):** It's a centrally Sponsored Scheme for **in-situ** conservation of wild tigers in designated tiger reserves (50 at present).
- **The National Tiger Conservation Authority (NTCA):** It is a **statutory body** and has overarching supervisory/coordination role as provided in the **Wildlife (Protection) Act, 1972**. It implements major tiger conservation initiatives like project tiger, Tiger conservation plan etc.
 - **Minister of MoEFCC** is the chairman of the authority.
- **Monitoring System for Tigers – Intensive Protection and Ecological Status (M-STripes):** It is a software-based monitoring system launched across Indian tiger reserves by the NTCA.

Global Conservation Efforts

- **The Global Tiger Initiative (GTI), 2008:** A global alliance of governments, international organizations, civil society, the conservation and scientific communities and the private sector and includes organization like **the World Bank**, the Global Environment Facility (GEF), etc.
 - **Aim:** To work together to save wild tigers from extinction. In 2013, the scope was broadened to include **Snow Leopards**.
 - The initiative is led by **the 13 tiger range countries** (Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Russia, Thailand, and Vietnam).
 - **TX2:** In 2010, **the St. Petersburg Declaration on Tiger Conservation** was adopted under the GTI and TX2 was endorsed. Its goal was **to double** the number of wild tigers across their geographical areas. The WWF is implementing the programme in 13 tiger range countries.
- **The Global Tiger Forum (GTF):** is the only inter-governmental international body established with members from willing countries to embark on a global campaign to protect the Tiger.
- **Conservation Assured Tiger Standards CA|TS:** It is a new tool for tiger conservation management. It is a set of criteria which allows tiger sites to check if their management will lead to successful tiger conservation. It is an important **part of Tx2** programme.

3.2.3. CHEETAH REINTRODUCTION PROJECT

Why in news?

The National Tiger Conservation Authority (NTCA) has reported to the Supreme Court that African

cheetahs, to be translocated in India from Namibia, will be kept at **Nauradehi wildlife sanctuary in Madhya Pradesh**.

About the Plan

- NTCA is nodal agency for the Cheetahs reintroduction plan.
- In 2009, **Project Cheetah** was launched and Kuno Wildlife Sanctuary (MP) and Shahgarh area in Rajasthan were identified as other two sites for cheetah reintroduction plan.
- Nauradehi was found to be the most suitable area for the cheetahs as its forests are not very dense to restrict the fast movement of Cheetahs.

About African Cheetah

- It is a large cat that occurs in Southern, North and East Africa And also in some localities in Iran.
- It inhabits different habitats like dry forests, scrub forests, and savannahs.
- **IUCN status:** Vulnerable (**Asiatic Cheetah** – Critically endangered)
- India was once home to many cheetahs, but it was declared extinct in India in 1952 and last spotted in Chhattisgarh 1947.
- The only mammal to become extinct in India in last 1,000 years.

Significance of the move

- It will make India the only country in the world to host six of the world's eight large cats, including lions, tigers, jaguars, panthers and leopards.
- Cheetah is the flagship species of the grasslands. This will help dryland ecosystems of India to return to their natural state.

3.2.4. ELEPHANT CONSERVATION

3.2.4.1. GAJ YATRA

- It's a nationwide campaign to protect elephants, launched on the occasion of World Elephant Day led by the **Wildlife Trust of India (WTI)** and **International Fund for Animal Welfare (IFAW)**, both NGOs, from Tura in Garo Hills, Meghalaya.
- It was organized in the Garo Hills in recognition of the people's initiative of community forests for human-elephant harmony and conservation of animals such as **hoolock gibbon**.

3.2.4.2. NEW ELEPHANT RESERVE

- Recently, Nagaland government declared the **Singphan Wildlife Sanctuary** as an Elephant Reserve (30th in total), with the approval of central government.

- **Singphan Elephant Reserve** - It has huge tracts of forest, strategically located in contiguity with the **Abhaypur Reserve Forest of Assam**.
- **Other Protected areas in Nagaland:** Intanki National Park, Puliebadze Wildlife Sanctuary, Fakim Wildlife Sanctuary and Rangapahar Wildlife Sanctuary.

Steps Taken for Elephant conservation

- Elephant is **National Heritage Animal** and categorised as **Endangered** under IUCN list.
- It is under **schedule I of the Indian Wildlife (Protection) Act, 1972** and in **Appendix I** of the Convention on International Trade in Endangered Species of Flora and Fauna (**CITES**). Karnataka has the highest number of elephants followed by Assam and Kerala respectively.
- **Project Elephant:**
 - It was launched in the year 1992 as a Centrally Sponsored Scheme.
 - Objectives: To protect elephants, their habitat & corridors; to address issues of man-animal conflict and welfare of captive elephants
 - Elephant reserves are established across states to achieve above objectives.
- **Elephant corridors:** These are narrow strips of land that allow elephants to move from one habitat patch to another. There are approx. 100 identified elephant corridors in India.
- **Monitoring of Illegal Killing of Elephants (MIKE) Programme**
 - It was established in 2003, through a **Conference of the Parties (COP)** resolution to the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**.
 - It is an international collaboration that tracks trends in information related to the illegal killing of elephants across Africa and Asia, to monitor effectiveness of field conservation efforts.
- **Asian Elephant Alliance**
 - It was launched in July 2015 in **London, United Kingdom**.
 - It is an **umbrella of five NGOs**-Elephant Family, International Fund for Animal Welfare (IFAW), IUCN Netherlands, World Land Trust (WLT) and Wildlife Trust of India (WTI).
 - It aims to secure a safe future for the wild elephants of India, which make up approximately half of the world's wild Asian elephants.

3.2.5. ASIAN RHINOS

Why in News?

Recently, 2nd Asian Rhino Range Countries (i.e. **India, Nepal, Bhutan, Indonesia and Malaysia**) meeting, has signed- **The New Delhi Declaration on Asian Rhinos 2019**.

About the Declaration

- It intends to conserve and review the population of the Greater one-horned, Javan and Sumatran rhinos (**three species of Asian Rhino**) every four years to reassess the need for joint actions to secure their future.
- The declaration outlines a series of strategic actions including **Trans-boundary collaboration** among India, Nepal, and Bhutan for one-horned rhino; engagement of the **local communities**; initiate proactive monitoring on potential adverse **impacts of climate change**; accelerate **natural and conservation breeding** of Sumatran rhino etc.

Related Facts

- Javan and Sumatran rhinos are currently classified as **critically endangered**.
- The Sumatran rhino, the smallest of all rhino species and the **only Asian rhino with two horns**, became **extinct in the wild** in Malaysia.

The Great One-Horned Rhinoceros

- The great one-horned rhino or Indian Rhino is the largest of the rhino species found commonly in Nepal, Bhutan, Pakistan and India.
- In India, it is found in Assam – Kaziranga National Park, Manas National Park, Pobitora Reserve Forest, Orang National Park, Laokhowa Reserve Forest etc.
- It is listed as **Vulnerable on the IUCN Red List** and is protected under the Schedule I of the Wildlife Protection Act. It is threatened by poaching, habitat destruction, flooding etc.
- Indian Rhino Vision 2020** – It has been implemented by Assam State Government with the Bodo autonomous council as an active partner and supported by WWF- India. The aim is to increase the number of Rhinos and provide long term viability of the one-horned rhino population.
- The government of Assam** has raised the **Special Rhino Protection Force** from people living in the fringe areas of the Kaziranga National Park.

3.2.6. GREAT INDIAN BUSTARD

Why in News?

A recent study suggests that, Great Indian Bustard population has been **falling continuously**, from around 1,260 in 1969 to less than 200 in 2018.

About Great Indian bustard (*Ardeotis Nigriceps*)

- It's among the heaviest bird with a horizontal body and long bare legs giving it an ostrich like appearance.
- Habitat:** Arid and semi-arid grasslands, open country with thorn scrub, tall grass interspersed with cultivation. It **avoids irrigated areas**.

- It is **endemic to Indian Sub-continent**, found in central India, western India and eastern Pakistan.
- Currently, it is found in only **six states in the country** — Madhya Pradesh, Gujarat, Maharashtra, Andhra Pradesh, Rajasthan and Karnataka.
- Protection:** Listed in **Schedule I of the Wildlife (Protection) Act, 1972** and **Critically Endangered** on the IUCN Red List
- It is also listed in **Appendix I of CITES** and covered under **CMS or Bonn Convention**.
- Bustard Species Found in India:** Great Indian Bustard, the Lesser Florican and the Bengal Florican; Houbara also belong to Bustard family but it's a migratory species.
- Importance to Ecosystem:** **GIB is an indicator species** for grassland habitats and its gradual disappearance from such environments shows their deterioration.
 - Once the species is lost, there will be no other species to replace it, and that will destabilise the ecosystem of the grassland and affect critical biodiversities, as well as blackbucks and wolves, who share their habitat with the GIB.
- Conservation Steps:** Great Indian Bustard, popularly known as '**Godawan**', is **Rajasthan's state bird**. It's one of the Species for The **Recovery Programme** under the **Integrated Development of Wildlife Habitats** of the Ministry of Environment and Forests.

Bustard Recovery Programme

- It recommends **linking local livelihoods** with bustard conservation.
- For effective conservation, the guidelines direct **state governments to identify the core breeding areas** for bustards and keep them inviolate from human disturbances.
- The guidelines suggest **restriction on infrastructure development** and land use diversion for roads, high tension electric poles, intensive agriculture, wind power generators and construction.

Convention on the Conservation of Migratory Species of Wild Animals (CMS) or Bonn convention

- It is the only convention under UNEP which provides a global platform for the conservation and sustainable use of migratory animals and their habitats (and their migration routes). India is a member of the convention.
- Appendix I of the Convention:** It includes Migratory species threatened with extinction.
- Appendix II of the Convention:** It includes Migratory species that need or would significantly benefit from international co-operation.

3.2.7. GANGETIC DOLPHIN

Why in news?

Recently, study showed that **rising salinity in Sunderbans** region of India is causing a decrease in population of the Ganges River Dolphins.

About Gangetic dolphins

- It inhabits the Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu river systems of Nepal, India, and Bangladesh.
- It is among the **four freshwater dolphins found** in the world – the other three are- baiji found in the Yangtze River (China), the ‘bhulan’ of the Indus (Pakistan) and the ‘boto’ of the Amazon River (Latin America).
- It is **fluviatile (riverine) in habitat**, it may also be **found in brackish water**. It **never enters the sea**.
- A long thin snout, rounded belly and large flippers are its characteristics.
- It is a **mammal and cannot breathe in the water** and must surface every 30-120 seconds.
- Because of the sound it produces when breathing, the animal is popularly referred to as the 'Susu'.

Conservation Status

- It is the **national aquatic animal** and had been granted **non-human personhood status** by government in 2017.
- It is mentioned under **Schedule I of the Wildlife Protection Act (1972)** and been categorised as **endangered** on the Red List of Threatened Species by the IUCN.
- **Vikramshila Gangetic Dolphin Sanctuary (VGDS)** in Bihar is India's **only sanctuary** for the Gangetic dolphin.
- It is listed under the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** Appendix I.
- The presence of Dolphins in a river system **signals a healthy ecosystem**. Since the river dolphin is at the apex of the aquatic food chain, its presence in adequate numbers symbolizes greater biodiversity in the river system and helps keep the ecosystem in balance.

Conservation Efforts

- A **Conservation Action Plan for the Gangetic Dolphin 2010-2020** has been formulated by the Ministry of Environment, Forest and Climate Change. It provides following recommendations:

- **Potential sites for intense dolphin conservation** should be demarcated and States with Gangetic Dolphin populations should have a **regional Dolphin Conservation Centre**.
- **The use of nylon monofilament fishing gillnets** should be **banned** and **Critical water flow and minimum depths** for all river dolphin habitats should be determined.
- **Trans-boundary Protected Areas** between India, Nepal and Bangladesh.
- **National Mission for Clean Ganga (NMCG)**: In its efforts of biodiversity conservation in Ganga River basin, it has been working on the Ganges River Dolphin Conservation Action.
- **National Dolphin Research Centre (NDRC), Patna**: It's India's and Asia's first Centre for strengthening conservation efforts and research to save the endangered mammal.

Other Indian River Dolphins

- **Indus Dolphin (Bhulan)**
 - They are **endangered**, **freshwater**, and functionally **blind** species of dolphins which rely on **echolocation** to navigate, communicate and hunt prey including prawns, catfish and carp.
 - Except for a tiny, isolated population of Only five to 11 individual Indus Dolphins in India's Beas River (185 km stretch between Talwara and Hariske), Indus river dolphins live exclusively in the Indus river in Pakistan.
 - **Punjab** has recently declared it as their **state aquatic animal**.
- **Irrawaddy Dolphin**
 - They are **Critically Endangered** and live in **both salt- and freshwater** in South and Southeast Asia.
 - **Three** exclusively freshwater populations are found in **Irrawaddy/Ayeyarwady** River (Myanmar), **Mekong** River (Lao PDR, Cambodia); and **Mahakam** River (Indonesia).
 - In addition, very small numbers survive in the partially freshwater Songkhla Lake (Thailand) and the brackish Chilika Lake (India).

3.2.8. BANNI GRASSLAND

Why in news?

Nomadic tribes (Maldhari) are leaving their villages in Banni region due to water scarcity.

About Banni grassland

- The Banni grassland of Gujarat (near Rann of Kutch) is the **largest natural grassland in the Indian** subcontinent known for its **scarce rainfall and semi-drought conditions**.

- The land of Banni is formed out of **ocean clay**, so it includes an element of salt from very beginning. This land is formed out of alluvial and clayey sand.
- Migratory pastoralism** has been followed here from centuries with a broader geographical landscape that included Sindh in Pakistan and even extended into parts of Baluchistan and Afghanistan.
- Now, Banni is divided into eastern and western parts separated by **National Highway 341**, which leads to the India-Pakistan International Border.
- There are 22 ethnic communities living in the area called **Maldhari pastoralists** ('mal' means animal stock and 'dhari' means keeper).
- It is also known for strange dancing light phenomena known locally as Chir Batti.
- A huge freshwater lake locally known as **Chhari-Dhand** is a prominent feature of the Banni grassland. It is a legally protected wetland conservation reserve.

Species (Flora and Fauna)	Details (Conservation status/ Habitat etc.)
Indian Leopard or common Leopard (<i>Panthera pardus</i>)	<ul style="list-style-type: none"> Conservation Status: IUCN: VU; WPA,1972: Schedule I; CITES: Appendix I Habitat: In India, the leopard is found in all forest types, from tropical rainforests to temperate deciduous and alpine coniferous forests. It is also found in dry scrubs and grasslands, the only exception being desert and the mangroves of Sundarbans. Threat: increasing conflict with humans, poaching for illegal trade in body parts and loss of habitat. Conservation Effort: Rajasthan has become the first state in the country to launch a project to conserve leopards by improving their prey base, mitigating conflicts with humans and controlling poaching.
Snow Leopard	<ul style="list-style-type: none"> Conservation Status: IUCN: VU; WPA,1972: Schedule I; CITES: Appendix I; CMS: Appendix I Habitat: Snow leopards live in the mountainous regions of central and southern Asia. In India, their geographical range encompasses a large part of the western Himalayas including the states of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Sikkim and Arunachal Pradesh in the eastern Himalayas. Conservation Efforts: Project Snow Leopard (2009) launched to safeguard and conserve India's unique natural heritage of high-altitude wildlife populations and their habitats by promoting conservation through participatory policies and actions.
Black Panthers	<ul style="list-style-type: none"> A black panther is the melanistic color variant of any big cat species. Conservation Status: IUCN: VU; WPA,1972: Schedule I; CITES: Appendix I Habitat: Forest in Sundergarh, Odisha, Kerala (Periyar Tiger Reserve), Karnataka (Bhadra Tiger Reserve, Dandeli-Anshi Tiger Reserve and Kabini Wildlife Sanctuary), Chhattisgarh (Achanakmar Tiger Reserve, Udanti-Sitanadi tiger reserve), Maharashtra (Satara) etc.
Nilgiri Tahr (State animal of Tamil Nadu)	<ul style="list-style-type: none"> Conservation Status: IUCN: EN; WPA,1972: Schedule I Habitat: Open montane grassland (Shola Grassland) habitats at elevations from 1200 to 2600 m (generally above 2000 m) of the South Western Ghats. Their range extends over 400 km from north to south, and Eravikulam National Park is home to the largest population.
Hog deer or Pada	<ul style="list-style-type: none"> Conservation Status: IUCN: EN Habitat: Two sub-species of hog deer have been reported from its range. The western race is distributed from Pakistan and the terai grasslands (along the Himalayan foothills, from Punjab to Arunachal Pradesh), while the eastern race of hog deer is found in Thailand, Indo-China, Laos, Cambodia, and Vietnam. A small population of genetically similar to eastern race hog deer has been recently reported Keibul Lamjao National Park (KLPN), Manipur.
Kashmir Stag (Hangul)- State animal of Jammu & Kashmir	<ul style="list-style-type: none"> Conservation Status: IUCN: CR; WPA,1972: Schedule I Habitat: Jammu & Kashmir (Dachigam National Park) Threats: Continuing decline in area, extent and quality of habitat Conservation Efforts: Project Hangul
Blue Sheep or Bharal	<ul style="list-style-type: none"> Conservation Status: IUCN: LC Habitat: Species live on high-altitude mountains mainly in India, Nepal, Tibet, Pakistan and Bhutan. E.g. Gangotri National Park, Uttarakhand.
Red Panda (Lesser Panda or Red Cat-bear)	<ul style="list-style-type: none"> Conservation Status: IUCN: EN; WPA,1972: Schedule I; CITES: Appendix I Habitat: A mammal native to the eastern Himalayas and southwestern China. In India, largely found in Sikkim, western Arunachal Pradesh, Northern West Bengal and parts of

	<p>Meghalaya.</p> <ul style="list-style-type: none"> Threat: It is poached for its meat, and for use in medicines, and as a pet.
Sangai (Brown-antlered deer or dancing deer or Eld's deer)- State animal of Manipur	<ul style="list-style-type: none"> Conservation Status: IUCN: EN; WPA,1972: Schedule I Habitat: Floating marshy grasslands, Phumdis, of the Keibul Lamjao National Park, located in the southern parts of the Loktak Lake (largest freshwater lake in eastern India) Endemic species found only in Manipur, India. Phumdi — floating mass of entangled vegetation formed by the accumulation of organic debris and biomass with soil.
Chrysilla Vollupe (rare spider discovered)	<ul style="list-style-type: none"> Recently discovered from the Waynad Wildlife Sanctuary (Kerala) after nearly 150 years. Belongs to the family of jumping spiders (Salticidae)
Red Sanders (Pterocarpus Santalinus)	<ul style="list-style-type: none"> Conservation Status: IUCN: NT; CITES: Appendix II It is an endemic tree of South India. They are found in Tropical Dry Deciduous forest of the Palakonda and Seshachalam hill ranges of Andhra Pradesh and in Karnataka and Tamil Nadu and occur in hot, dry climate with a rainfall of 88-105 cm. It prefers lateritic and gravelly soil and cannot tolerate water logging. It is used for various purposes such as immunity medicine, furniture, radiation absorbent, musical instrument, food dyes and spices, Ayurveda and Sidha medicine, decorative and ornamental purposes etc. Threats: Illegal felling of trees for smuggling
North Indian Rosewood/Shisham (Dalbergia sissoo)	<ul style="list-style-type: none"> IUCN: D latifolia (Indian rosewood) as vulnerable and D sissoo (sheesham or North Indian rosewood) as Least Concern; CITES: Appendix II It is a deciduous tree found in tropical to subtropical climates and is economically important for its value in forestry, agroforestry, horticulture and medicine. <p>Uses</p> <ul style="list-style-type: none"> Soil fertility: Native to the Indian sub-continent it is a member of the legume family and can fix nitrogen from the atmosphere through bacteria nodules on its root system. It also has insecticidal and larvicidal properties, as well as resistance to some wood boring insects.
Vultures in India:	<ul style="list-style-type: none"> Conservation Status: There are nine species of vultures in India out of which, 3 have been on critically endangered list of IUCN and also listed under Schedule I of the Wild Life (Protection) Act, 1972. These are: <ul style="list-style-type: none"> White-rumped Vulture (<i>Gyps bengalensis</i>) Slender billed Vulture (<i>Gyps tenuirostris</i>) Indian Vulture/long-billed vulture (<i>Gyps indicus</i>). Note: <ul style="list-style-type: none"> Himalayan Griffon; closely related to Indian Gyps- not endangered; only Near Threatened Red-headed vulture is on critically endangered list of IUCN but not listed under Schedule I of the Wild Life (Protection) Act, 1972. Threats: Use of veterinary drug Diclofenac Conservation Efforts: The Bombay Natural History Society (BNHS – BirdLife in India) and the RSPB (BirdLife in the UK), are working as part of Saving Asia's Vultures from Extinction (SAVE).
Amur Falcon	<ul style="list-style-type: none"> Conservation Status: IUCN: LC Habitat: Amur falcon species are distributed in India, Africa and Northeast Asia in Grassland, Savanna, Forest, Wetlands (inland). Amur Falcons are the migratory bird that stay every year at Doyang lake during their flight from Mongolia to South Africa. Pangti village in Nagaland is considered as the world's Amur Falcon capital.
Elephant Bird (Vorombe Titan)	<ul style="list-style-type: none"> Elephant birds are an extinct group of colossal flightless birds that roamed Madagascar during the Late Quaternary. Vorombe titan was named the world's largest bird (3 meters high and weighs upto 800 kg). Earlier, Aepyornis Titan was known as largest ever Elephant Bird in the year 1984.
Sri Lankan Frogmouth (rare bird)	<ul style="list-style-type: none"> For the first time, this rare bird has been sighted on the eastern side of the Western Ghats (in Chinar Wildlife Sanctuary). Sri Lankan Frogmouth is usually found on the western side of the Western Ghats. It has a unique habitat in Sri Lanka and is present in the Thattekad bird sanctuary, Kerela. It is also found in Karnataka, Goa, and Maharashtra. Its preferred habitat is a dry and open area with some small trees or bushes. It is a relative of Nightjar, a crepuscular and nocturnal bird breeding in Europe and

	<p>temperate Asia.</p> <ul style="list-style-type: none"> The main feature is that it lays only one egg a year after the mating season in April-May.
Sarus Crane (<i>Antigone Antigone</i>)- State bird of Uttar Pradesh	<ul style="list-style-type: none"> Conservation Status: IUCN: VU Habitat: It generally inhabits natural wetlands with low water depth, marshy and fallow areas and agricultural fields. They are large <u>non-migratory crane</u> and India's only resident breeding crane and the world's tallest flying bird. The Sarus crane has three disjunct populations in the Indian sub-continent, south-east Asia and northern Australia. Threat: habitat loss and degradation due to draining the wetland and conversion of land for agriculture and other uses. Conservation Efforts: Sarus Crane Conservation Project launched by Wildlife Trust of India in Uttar Pradesh.
Olive Ridley Turtle	<ul style="list-style-type: none"> Conservation Status: IUCN: VU; CITES: Appendix I Habitat: It's found in warm and tropical waters, primarily in the Pacific and Indian Oceans. Gahirmatha located in the Bhitarkanika Wildlife Sanctuary, Odisha houses the world largest mass nesting site of these turtles. Rushikulya rookery coast, and Bahuda Rookery are other major nesting site of olive ridleys on the Odisha coastline. They are known for their arribadas (synchronised mass nesting) during which time tens of thousands of female turtles come ashore to nest in the span of a few days.
Northern River Terrapin	<ul style="list-style-type: none"> Conservation Status: IUCN: CR; CITES: Appendix I Habitat: It's a species of riverine turtle found in the rivers that flow in Eastern India. It is a native of Bangladesh, Cambodia, India, Indonesia and Malaysia.
Indian Ocean Humpback Dolphin	<ul style="list-style-type: none"> Conservation status: IUCN: EN; WPA,1972: Schedule I Habitat: It is known to occur within the shallow waters of Indian Ocean from South Africa to India.
Eurasian otter (<i>Lutra Lutra</i>)	<ul style="list-style-type: none"> Conservation Status: IUCN: NT; CITES Appendix I Habitat: Semiaquatic mammal native to Eurasia, recently reported from the Western Ghats in India. While the species is widespread across Europe, northern Africa and several south Asian countries, it is not as frequently sighted as smooth-coated Otter (IUCN status-VU) or small-clawed otters (IUCN status-VU) in India. They are carnivorous mammals and adapt to a variety of habitats ranging from marine to freshwater environments. Threats: Loss of wetlands, illegal poaching for pelts
Mugger crocodile (<i>Crocodylus palustris</i>)	<ul style="list-style-type: none"> It is a reptilian species also called marsh crocodile or broad-snouted crocodile and is one of the three-crocodile species (others are Saltwater Crocodile and Gharial) found in India. Conservation Status: IUCN: VU; WPA,1972: Schedule I; CITES: Appendix I Habitat: wetlands (inland), marine neritic (shallow part of ocean), artificial/aquatic & marine. Principal threats: Habitat destruction, fragmentation, and transformation, mortality due to increased fishing activities.
Gharial (<i>Gavialis gangeticus</i>)	<ul style="list-style-type: none"> Conservation Status: IUCN: CR; WPA, 1972: Schedule I Habitat: Endemic to the Indian sub-continent. In India, the major breeding populations are confined to two rivers only, Girwa and the Chambal. Threats: Habitat alteration and destruction, Prey depletion, Pollution and siltation, Hunting and Mortality due to fishing nets. Become extinct in most of the subcontinent with exceptions of Nepal and India. Conservation Efforts: In 1976, Project Crocodile was initiated with support from the United Nations Development Programme and Food and Agriculture Organization. The project included an intensive captive rearing and breeding programme intended to restock depleted Gharial habitats.
Ganges shark (<i>Glyptis gangeticus</i>)	<ul style="list-style-type: none"> Conservation Status: IUCN: CR; WPA,1972: Schedule I, Part IIA Habitat: Endemic to India, it inhabits the River Hooghly in West Bengal, as well as the rivers Ganges, Brahmaputra, Mahanadi in the states of Bihar, Assam and Orissa. It is amongst the 20 most threatened shark species.
Arabian Sea Humpback Whale	<ul style="list-style-type: none"> Conservation Status: IUCN: EN Habitat: India, Iran, Iraq, Kuwait, Oman, Pakistan, Sri Lanka, United Arab Emirates,



(Megaptera novaeangliae Arabian Sea subpopulation)	Yemen • Threats: Ship strikes, unforgiving fishing gear and seismic explorations pose grave threat to it.
IUCN Categories	Criteria
Extinct (EX)	A designation applied to species in which the last individual has died or where systematic and time-appropriate surveys have been unable to log even a single individual.
Extinct in the Wild (EW)	A category containing those species whose members survive only in captivity or as artificially supported populations far outside their historical geographic range.
Critically Endangered (CR)	A category containing those species that possess an extremely high risk of extinction as a result of rapid population declines of 80 to more than 90 percent over the previous 10 years (or three generations, whichever is longer), a current population size of fewer than 50 individuals , or other factors.
Endangered (EN)	A designation applied to species that possess a very high risk of extinction as a result of rapid population declines of 50 to more than 70 percent over the previous 10 years (or three generations), a current population size of fewer than 250 individuals , or other factors.
Vulnerable (VU)	A category containing those species that possess a very high risk of extinction as a result of rapid population declines of 30 to more than 50 percent over the previous 10 years (or three generations), a current population size of fewer than 1,000 individuals , or other factors.
Near Threatened (NT)	A designation applied to species that are close to becoming threatened or may meet the criteria for threatened status in the near future.
Least Concern (LC)	A category containing species that are pervasive and abundant after careful assessment.
Data Deficient (DD)	A condition applied to species in which the amount of available data related to its risk of extinction is lacking in some way. Consequently, a complete assessment cannot be performed . Thus, unlike the other categories in this list, this category does not describe the conservation status of a species
Not Evaluated (NE)	A category used to include any of the species described by science but not assessed by the IUCN.

3.3. CONSERVATION MEASURES

3.3.1. MEASURING NATURAL CAPITAL

Why in news?

EnviStats India 2018 report by the **Ministry of Statistics and Programme Implementation (MOSPI)**, revealed that India's economic growth took a toll on its natural assets like forests, food and clean air.

More on news

- The average growth rate of gross state domestic product (GSDP) during 2005-15 for almost all the states was around 7-8 per cent but **11 states registered a decline in their natural capital**.
- The **natural capital accounting (NCA)** method has been used to account for income and costs associated with natural resource used, based on a framework approved by the United Nations in 2012 called the **System of Environmental Economic Accounts (SEEA)**.

Natural Capital

- It includes those elements of the nature that provide valuable goods and services to humans, such as the stock of forests, food, clean air, water, land, minerals, etc.

- It incorporates a broad perspective on the set of services provided by ecosystems assets.

Natural Capital Accounting, or environmental-economic accounting

- It is a tool that can help to gain an understanding of the interaction between the economy and the environment.
- It can be used to measure the state of ecosystems, flows of ecosystem services as well as changes in stocks and flows of natural resources in relation to economic changes.

3.3.2. LEGAL ENTITY STATUS FOR ALL ANIMALS

Why in news?

The Uttarakhand High Court has declared the "entire animal kingdom including avian and aquatic" as legal entities.

More on News

- The entire animal kingdom, including avian and aquatic ones, are **declared as legal entities** having a distinct persona with corresponding rights, duties and liabilities of a living person.
- Role of citizens:** All the citizens throughout the state of Uttarakhand are hereby declared persons in loco parentis as the human face for the welfare/protection of animals.

- **Significance:** Judgment, is meant to act as a deterrent to poachers, companies that pollute the natural environment and those who abuse pets or wildlife.
- High court in 2017 accorded the status of “living entity” to the Ganga and Yamuna rivers, all their tributaries, streams, every natural water flowing with flow continuously or intermittently of these rivers, a decision subsequently stayed by the Supreme Court.

3.3.3. ACCESS AND BENEFIT SHARING

Why in News?

Recently, Uttarakhand High Court has directed Divya Pharmacy, to share its profits with local and indigenous communities, as part of the **Fair and Equitable Benefit Sharing (FEBS) objectives of the Biodiversity Act, 2002**.

Biodiversity Act (BDA), 2002

- India being a signatory to CBD, enacted the **Biodiversity Act** in 2002, with three main objectives:
 - Conservation of biological diversity.
 - Sustainable use of its components.
 - Equitable sharing of benefits arising out of the use of biological resources.
- **Institutional Structure:** Three-tier system was established with **National Biodiversity Authority (NBA)** at the Centre, **State Biodiversity Boards (SBBs)** in each of the Indian states and local-level **Biodiversity Management Committees (BMCs)** functioning with both municipalities and panchayats.
- Act recognises the role and participation needs of ILCs in conserving the biological resources. Under it, a company is required to **share 0.5 per cent of its sales post taxes** if its annual turnover is above Rs 3 crore.
- It also provides for the involvement of ILCs through biodiversity management committee (BMCs) in preparation of **people's biodiversity registers (PBRs)** and issuance of **mutually agreed terms (MAT)**.

What is access and benefit-sharing (ABS)?

- It refers to the way in which genetic resources may be accessed, and how the benefits that result from their use are shared between the people or countries using the resources (users) and the people or countries that provide them (providers).
- The benefits to be shared can be **monetary, or non-monetary**, such as the development of research skills and knowledge.
- **Working Procedure:** Access and benefit-sharing is based on **prior informed consent**

(**PIC**) being granted by a provider to a user and negotiations between both parties to develop **mutually agreed terms (MAT)** to ensure the fair and equitable sharing of genetic resources and associated benefits.

Related initiatives for ABS

Centre for Biodiversity Policy and Law (CEBPOL)

- Government of India in collaboration with Norwegian Government has established this centre to develop professional expertise in biodiversity policies and laws and develop capacity building.

UNEP – GEF – MoEF ABS Project

- **Objective:** To increase the institutional, individual and systemic capacities of stakeholders to effectively implement the Biological Diversity Act, 2002 and the Rules 2004 to achieve biodiversity conservation through implementing Access and Benefit Sharing Agreements in India.

3.3.4. NATIONAL REDD+ STRATEGY

Why in news?

Union Ministry for Environment, Forest and Climate Change (MoEFCC) **released National REDD+ Strategy**.

Background

COP 11, 2005 at Montreal	Coalition of 9 rainforest nations sought attention to growing threat of deforestation and introduced concept of Reducing Emission from Deforestation (RED)
COP 12, 2006 at Nairobi	‘Compensated Conservation’ policy introduced by India intended to compensate countries for maintaining and increasing carbon pools of their forests.
COP 13, 2007 at Bali	‘Compensated Conservation’ policy approach finally recognized
COP 16, 2010 at Cancun	Official entry of REDD as a UNFCCC-enabled mitigation mechanism
COP 19, 2013 at Warsaw	It agreed on Warsaw REDD+ framework

Important provisions of National REDD+ Strategy

- **Coverage of REDD+** will cover all trees within forest areas and tree outside forest (TOF).
- **Phased approach of REDD+**
 - **Phase 1:** development of national strategies or action plans, policies and measures, and capacity-building.
 - **Phase 2:** implementation of national policies, measures and national strategies or action plans.
 - **Phase 3:** evolution into results based actions that should be fully measured, reported and verified.

- **Sub-national REDD+ Approach:** The country has been divided into 14 physiographic zones by the Forest Survey of India. State Governments may collaborate and develop REDD+ Action Plan in a physiographic zone.
- **REDD+ Activities for Enhancement of Forest Carbon Stocks** include Namami Ganga, Forestry Interventions for Other Major River Catchments, Green Highways (Plantation, Transplantations, beautification & Maintenance) Policy – 2015 and innovative programmes like Green Army of Maharashtra.
- **Developing strategies for addressing Deforestation and Forest Degradation** through awareness amongst stakeholders.
- **Capacity Building and Trained Human Resource** through Green Skill Development Programme.
- **Funding:** Devolution through Finance Commission, Compensatory Afforestation Fund and Green Climate Fund and Other External Sources of Funding.

REDD+

- REDD+ means “Reducing Emissions from Deforestation and forest Degradation”, conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks in developing countries.
- **REDD+ aims** to achieve climate change mitigation by incentivizing forest conservation.

Carbon pools

- A system that has the capacity to store or release carbon.
- The **Marrakesh Accords** (regulatory framework for the implementation of the Kyoto Protocol) recognize five main carbon pools or reservoirs in forests: Above-ground biomass, below-ground biomass, dead wood, litter and soil organic matter.

3.3.5. PROTECTION OF PLANT VARIETIES AND FARMERS' RIGHTS (PPV&FR) ACT, 2001**Why in news?**

Recently, farmers were sensitized on PPV&FR Act 2001.

About the Act

- It's the world's only Intellectual Property Rights legislation on plant varieties that recognised and protected the rights of both breeders as well as farmers maintaining traditional landraces.
- **Aim:** To provide an effective system for IPR protection of plant varieties and the rights of

breeders, including farmers. The protection period is for 15 years, and 18 years in the case of trees and vines.

• Objective

- To **recognize and protect the rights of farmers** in respect of their contributions made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties.
- To **accelerate agricultural development** in the country, protect plant breeders' rights; stimulate investment for research and development both in **public & private sector for the development** new of plant varieties.
- Facilitate the **growth of seed industry** in the country, to ensure the availability of high quality seeds and planting material to the farmers.

3.3.6. RECOVERY PROGRAMME FOR WILDLIFE SPECIES**Why in news?**

The National Board for Wildlife (NBWL) recently added four species- **the Northern River Terrapin, Clouded Leopard, Arabian Sea Humpback Whale, Red Panda**- to a Recovery Programme for Critically Endangered Species.

About National Board for Wildlife (NBWL)

- It is a statutory Board constituted under the **Wild Life (Protection) Act, 1972**.
- It is **chaired by the Prime Minister**. Its **vice chairman is Minister of Environment**.
- It has **power to review all wildlife-related matters** and approve projects in and around national parks and sanctuaries.
- **No alteration of boundaries in national parks and wildlife sanctuaries** can be done without approval of the NBWL.
- It **advises the Central Government on framing policies** and measures for conservation of wildlife in the country.

More about Recovery Programme

- It is one of the components of centrally sponsored scheme - **Integrated Development of Wildlife Habitats (IDWH)** which provides assistance to the State/UT governments for activities aimed at wildlife conservation.
- **Other Species Identified** under the recovery programme - Snow Leopard, Bustard (including Floricans), Dolphin, Hangul, Nilgiri Tahr, Marine Turtles, Dugongs, Edible Nest Swiftlet, Asian Wild Buffalo, Nicobar

Megapode, Manipur Brow-antlered Deer, Vultures, Malabar Civet, Indian Rhinoceros, Asiatic Lion, Swamp Deer and Jerdon's Courser.

3.3.7. CONSERVATION OF MIGRATORY BIRDS AND THEIR HABITATS

Why in news?

Ministry of Environment, Forest and Climate Change (MoEFCC) has developed a **National Action Plan for Conservation of Migratory Birds and their Habitats** along Central Asian Flyway (CAF) for the period 2018-23.

About Action Plan

- It is based on **Central Asian Flyway Action Plan** which provides a common strategic framework for regional collaboration and affirmative action for protecting, conserving, restoring, and sustainably managing populations of migratory bird species and their habitats in the Indian subcontinent falling under the Central Asian Flyway region.
- Long Term Goal:** To arrest population decline and secure habitats of migratory bird species.

A **flyway** is a geographical region within which a single or a group of migratory species completes its annual cycle - breeding, staging and non-breeding etc. This includes breeding areas, stop-over areas and wintering areas.

- Central Asian Flyway (CAF)**, one among the **nine flyways in the world**, encompasses overlapping migration routes over 30 countries for different water birds linking their northern most breeding grounds in Russia (Siberia) to the southernmost non-breeding (wintering) grounds in West and South Asia, the Maldives and the British Indian Ocean Territory.
- India has a strategic role in the flyway**, as it provides critical stopover sites to over 90% of the bird species known to use this migratory route.
- At least 370 species of migratory birds from three flyways (**CAF, The East Asian – Australasian flyway, and Asian East African flyway**) are reported to visit the Indian subcontinent.

3.3.8. COMMUNITY FOREST RESOURCE

Why in news?

Recently, People's Forests Report was released by Centre for Science and Environment (CSE) on Community Forest Resource (CFR) management.

Background

- National Forest Policy, 1988**, led to the emergence of **joint forest management (JFM)**, leading to increased availability of non-

timber forest produce (NTFPs), fuelwood and improved forest protection.

- In 2006, The **Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act** or the **Forest Rights Act (FRA)** was passed which provides for recognition of forest lands as **community forest resources (CFR)**.

Joint Forest Management (JFM) Vs Community forest resource (CFR) management

- The primary and most significant basis for JFM is provided by the National Forest Policy of 1988. Thus, it lacks any statutory sanctity unlike CFR which is a right recognised under the FRA, 2006.
- Under JFM, both forest department and the local community form a Joint Forest Management Committee (JFMC) and an executive committee to manage and protect forests by sharing the cost and benefits. However, CFR management committees (CFRMCs) comprise members exclusively from the gram sabha with no representation of forest or other officials with 100% authority over collection and sale of all NTFPs.

Forest Right Act 2006: It provides for a rights-based, democratic and decentralized governance of forests. Rights recognized under FRA.

- Individual forest rights (IFR)** to legally hold forestlands that the forest dwelling communities have been residing on and cultivating prior to 13 December 2005.
- Community rights (CRs)** of ownership, use and disposal of 'minor forest produce', also known as **non-timber forest produce (NTFP)**. CRs include rights of grazing, collection of firewood, fish and other such products from water bodies, as well as rights to biodiversity and intellectual property, including those related to traditional knowledge.
- Community forest resource (CFR)** rights under Section 3(1)(i) to protect, regenerate, conserve or manage forest resources for sustainable use, providing for community governance of forests.
- Eligibility** to get rights under the Act is **confined to those who "primarily reside in forests"** and who depend on forests and forest land for a livelihood. Further, either the claimant must be a member of the Scheduled Tribes scheduled in that area or must have been residing in the forest for 75 years.
- The Act provides that the gram sabha, or village assembly, will initially pass a resolution** recommending whose rights to which resources should be recognised.

About CFR

- CFR rights** is the most empowering provision of the Act because it restores gram sabha's [village council] control over governance of forests from



- the forest department, thereby democratising the country's colonial forest governance as a whole.
- **CFR management committees (CFRMCs)** are created by Gram Sabha, which are expected to prepare a conservation and management plan for community forest resources in order to sustainably and equitably manage CFR areas.

3.3.9. 'CULTURAL MODEL' OF CONSERVATION

Why in news?

Idu Mishmi tribe of Arunachal Pradesh is protesting against the declaration of Dibang Wildlife Sanctuary (DWS) as Tiger Reserve and asking for a **Cultural Model of Conservation**.

More on news

- The Idu Mishmi people traditionally follow an **animist and shamanistic faith** and believe that tigers are their elder siblings. Tigers are never hunted by Idu Mishmi and even if a tiger is killed in self-defense, it will receive the same burial as a human being.

Colonial versus Cultural model of conservations

- **Colonial Model of Conservation:** In this model, human presence is taken as threat to nature and **denies indigenous peoples' rights** and provoked long-term social conflict.
- **Cultural model of Conservation:** It respects for the rights of indigenous peoples and other bearers of "traditional knowledge" and prevents social conflicts.
- The **Kinshasa Resolution of 1975** (under IUCN) provides international recognition to cultural model of conservation.

Application by Cultural model of conservation in different tribes of India

- **Bishnoi Tribe of Rajasthan:** Bishnois consider trees as sacred and protect the **entire ecosystem** including animals and birds that exists in their villages. Tribe has organized their own Tiger Force which is a brigade of youth actively pursue wildlife protection.
- **Chenchu Tribe of Andhra Pradesh:** They are involved in tiger conservation at Nagarjunasagar Srisailam Tiger Reserve (NSTR).
- **Maldhari Tribe in Junagadh(Gujarat):** The success of lion conservation in Gir forest area is due to **peaceful coexistence** of tribe with lions.
- **Bugun Tribe of Arunachal Pradesh:** They protect the critically endangered bird **Bugun Liocichla**. For its efforts Singchung Bugun Community Reserve won the India Biodiversity Award 2018.
- **Nyishi tribe of Arunachal Pradesh** in conserving hornbills in the **Pakke/Pakhui** Tiger Reserve. Recently, government of Arunachal Pradesh

declared the Pakke Paga Hornbill Festival (PPHF)– the **state's only conservation festival**, as a '**state festival**'.

3.3.10. KHANGCHENDZONGA BIOSPHERE RESERVE

Why in news?

Recently, Khangchendzonga Biosphere Reserve was included in the UNESCO's World Network of Biosphere Reserve (WNBR) under the Man and Biosphere Programme (MAB). Now the total number of Biosphere reserves under MAB programme has reached to 686.

About Khangchendzonga Biosphere Reserve

- It is one of the **highest ecosystems** in the world and located at trijunction of India (Sikkim), bordering Nepal to the west and Tibet (China) to the north-west.
- The Khangchendzonga National Park (KNP), which comprises the core area of the KBR, was inscribed as India's first '**Mixed World Heritage Site**' in 2016.
- Over 118 species of the large number of medicinal plants found in **Dzongu Valley** in north Sikkim are of ethno-medical utility.
- **Fauna:** Red Panda, Snow Leopard, Himalayan Black Bear and herbivores species of Musk deer, Great Tibetan Sheep, Blue Sheep, Boral and Barking Deer.

Related Information

UNESCO: MAB Programme

- Launched in 1971, it is an **Intergovernmental Scientific Programme** that aims to establish a scientific basis for the improvement of relationships between people and their environments.
- It combines the natural and social sciences, economics and education to improve human livelihoods and the **equitable sharing of benefits**, and to **safeguard natural and managed ecosystems**.

World Network of Biosphere Reserve (WNBR) and India

It covers internationally designated protected areas, each known as biosphere reserves, that are meant to demonstrate a balanced relationship between people and nature.

- India has 18 biospheres reserves, of which 11 have been included in the WNBR.
- The **Nilgiri Biosphere Reserve** was the first reserve from the country to be included in the WNBR.

Others MAB -WNVR site in India

- Nigiri – Tamil Nadu, Kerala and Karnataka
- Gulf of Mannar- Tamil Nadu
- Sundarban- West Bengal
- Nanda Devi-Utrakhand
- Nokrek- Meghalaya

- Pachmarchi-Madhya Pradesh
- Simlipal- Orissa
- Achanakmar-Amarkantak- Madhya Pradesh
- Great- Nicobar- Andaman and Nicobar Island
- Agasthyamala- Kerala and Tamilnadu

3.3.11. INDIAN SUNDARBANS- A WETLAND OF INTERNATIONAL IMPORTANCE

Why in News?

India has designated Sundarban Reserve Forests as the wetlands of International Importance, making it the 27th site in India.

More on Sundarbans

- The Indian Sunderbans, with 2,114 sq. km. of mangrove forests, comprise almost 43% of the mangrove cover in the country according to a 2017 Forest Survey of India report. It is the **largest tidal halophytic mangrove forest** in the world.
- It is located in the **Ganga- Brahmaputra delta region**.
- Sundarbans has now become the **largest Ramsar Site** in India.
- The Sundarbans was made a **UNESCO World Heritage Site** in 1987.
- They are the **only mangrove habitat** which supports a **significant population of tigers (Royal Bengal Tigers)**, and they have unique aquatic hunting skills.
- The Site is also home to a large number of rare and globally threatened species such as the **critically endangered northern river terrapin**, the **endangered Irrawaddy dolphin**, and the **endangered fishing cat**.
- **Threats to Conservation:** climate change, sea level rise, widespread construction, clearing of mangrove forests for fisheries, establishment of coal-based thermal power plant just a few kilometres north of the reserve forest in Bangladesh.

RAMSAR SITES IN INDIA



About Wetlands of International Importance

- It is declared under **Ramsar Convention on Wetlands of International Importance**, an intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources.
- It was adopted in the **Iranian city of Ramsar** in 1971 and came into force in 1975.
- **Chilika lake** was designated the first Ramsar site in India in 1981.
- Some **criteria** for identifying Wetlands of International Importance include:
 - Sites containing representative, rare or unique wetland types
 - Sites of international importance for conserving biological diversity - Criteria based on species and ecological communities
 - Specific criteria based on waterbirds
 - Specific criteria based on fish etc.

3.3.12. INDIA BIODIVERSITY AWARDS, 2018

Why in news

Recently, India Biodiversity Award 2018 was conferred by the **National Biodiversity Authority (NBA)**.

About NBA

- It is a statutory body established under the provisions of the **Biological Diversity Act, 2002**.
- It performs **facilitative and advisory functions** for the Union government on issues of conservation, sustainable use of biological resources and fair and equitable sharing of benefits arising out of the use of biological resources.

Background

- In 2012, the **Government of India**, in partnership with **UNDP India**, initiated **the India Biodiversity Awards**
- **Aim:** To recognize and honour outstanding models of biodiversity conservation, sustainable use and governance at the grassroots level.
- Awards is presented in different categories:
 - Conservation of Wild and Domesticated Species
 - Sustainable Use of Biological Resources
 - Replicable Mechanisms for Access and Benefit Sharing
 - Best Biodiversity Management Committees
- Different awards given in various categories are:
 - **Singchung Bugun Village Community Reserve Management Committee:**

Conservation of Wild Species (Institution) for conservation of the Bugun Liocichla bird.

- **Lemsachenlok Organization: Conservation of Wild Species (Institution)** for successful creation of an **8-10 sq km Community Conserved Area** to encourage coexistence and reduce human-wildlife conflict.
- **Kutch Unt Uchherak Maldhari Sangathan (KUUMS): Conservation of Domesticated Species (Institution)** for working closely with the local community to breed, cure and protect Kharai camels.
- **Kalden Singhi Bhutia (Sikkim): Conservation of Domesticated Species (Individual)** for conservation and propagation of Tibetan sheep.
- **Sangham Women Farmers Group: Sustainable Use of Biological Resources (Institution)** for preserving agrobiodiversity. They also started the **Millet Sisters Network** to conserve and preserve different varieties of millets.
- **Parvathi Nagarajan (Tamil Nadu): Sustainable Use of Biological Resources** for environment protection, wellness and women's empowerment.
- **Raipassa Biodiversity Management Committee, Tripura: Sustainable Use of Biological Resources** for ensuring that bio-resources of the area are traded in a manner, that is both commercially and environmentally viable. This community depends on the cultivation, collection and sale of **broom grass** for its livelihood.
- **Eraviperoor Grama Panchayat, Kerala: Biodiversity Management Committee** - They have rejuvenated a tributary of the river Pampa and have successfully revived the traditional cultural practice of boat racing.
- **Pithorabad Grama Panchayat, Madhya Pradesh: Biodiversity Management Committee** has conserved traditional varieties by establishing a community seed bank and facilitated value addition in the form of marketing for select products like organic wheat.

3.3.13. KAZIRANGA NATIONAL PARK

Why in news?

The Kaziranga National Park (KNP) had been split into two divisions — the existing Eastern Assam Wildlife and the new Biswanath Wildlife park with Brahmaputra flowing in between.

About the Kaziranga National Park

- Kaziranga protected area is located on the edge of the Eastern Himalayan biodiversity hotspot. It is a **UNESCO world heritage site**.
- The park is home to large breeding populations of elephants, wild water buffalo, and swamp deer other than the one-horned rhino.
- Kaziranga is recognized as an '**Important Bird Area**' by Birdlife International.

3.3.14. ECOTOURISM POLICY

Why in news?

The government has brought out a policy for ecotourism in Forest and Wildlife Areas.

Policy for Eco-Tourism in Forest and Wildlife Areas

- **Eco-tourism:** It can be defined as responsible travel to natural areas that conserves the environment and improves the well-being of local people.
- **Prepared by MoEFCC,** it provides livelihood opportunities for the local communities (**homestead-based hospitality enterprises**), educate visitors and enhance their understanding of nature.
- **Coverage:** It will be developed in **Protected Areas** (PAs- wildlife sanctuaries, national parks, conservation reserves and community reserves) and areas outside designated PAs including forests, mangroves, sacred groves, mud flats, wetlands and rivers.
- **Eco-Tourism Development Board to be established** by State/Union Territory, to advise the them on the modalities of eco-tourism and to oversee the implementation of the policy.

4. SUSTAINABLE DEVELOPMENT

4.1. NON-CONVENTIONAL SOURCES OF ENERGY

4.1.1. NATIONAL POLICY ON BIOFUELS-2018

Why in news?

Rajasthan has become the **first State in the country** to implement the national policy on biofuels.

About Biofuels

Biofuel is any hydrocarbon fuel that is produced from organic matter in a short period of time. Different generations of biofuels:

- **First Generation Biofuels:** It uses the food crops like wheat and sugar for making ethanol and oil seeds for bio diesel by conventional method of fermentation.
- **Second Generation Biofuels:** It uses non-food crops and feedstock such as Jatropha, wood, grass, seed crops, organic waste.
- **Third Generation Biofuels:** It uses specially engineered Algae whose biomass is converted into biofuels.
- **Fourth Generation biofuel:** It aims at not only producing sustainable energy but also a way of capturing and storing CO₂.

Different types of Bio Fuels

- **Bio ethanol:** It is an alcohol produced from fermentation of carbohydrate and cellulosic material of crops and other plants and grasses. It is generally used as an additive to increase octane number of fuel.
- **Bio Diesel:** It is a methyl or methyl ester of fatty acids produced by trans esterification of oils and fats obtained from plants and animals. It can be directly used as fuel.
- **Bio gas:** Biogas (primarily a mixture of methane and other gases like CO₂ and N₂) is produced by anaerobic digestion of organic materials. It can be produced either from biodegradable waste materials or by the use of energy crops fed into anaerobic digesters to supplement gas yields.
- **Biojet:** It is a type of biofuel which are produced from biomass resources and used in place of, or blended with air turbine fuel.
 - Recently, India's first ever bio-jet fuel flight taken off by using the fuel

developed by the **CSIR-Indian Institute of Petroleum (IIP)**.

Salient Features of the National Policy on Biofuels, 2018

- **Categorisation of biofuels** to enable extension of appropriate financial and fiscal incentives under each category. The two main categories are:
 - **Basic Biofuels-** First Generation (1G) bioethanol & biodiesel.
 - **Advanced Biofuels** - Second Generation (2G) ethanol, Municipal Solid Waste (MSW) to drop-in fuels, third Generation (3G) biofuels, bio-CNG etc.
- **Thrust on Advanced Biofuels: Viability gap funding scheme for 2G ethanol Bio refineries** in addition to additional tax incentives and higher purchase price as compared to 1G biofuels.
- **Expands the scope of raw material for ethanol production:** by allowing use of sugarcane juice, sugar containing materials like sugar beet, sweet sorghum, starch containing materials like corn, cassava, damaged food grains like wheat, broken rice, rotten potatoes, unfit for human consumption for ethanol production.
- **Allows use of surplus food grains for production of ethanol** for blending with petrol to ensure appropriate price to farmers during surplus. However, it needs the approval of National Biofuel Coordination Committee (headed by the Minister, Petroleum and Natural Gas).
- **Encourages setting up of supply chain mechanisms** for biodiesel production from non-edible oilseeds, used cooking oil, short gestation crops.
- **Synergising efforts** by capturing the roles and responsibilities of all the concerned Ministries/ Departments with respect to biofuels in the policy document itself.

Related Information

International Energy Agency (IEA)

- It was founded in 1974 to help countries collectively respond to oil supply disruptions.
- It is an autonomous body within the OECD framework.
- Only the OECD member states can become members of the IEA.
- India is not a member but has joined IEA as an association country.
- It publishes the **World Energy Outlook (WEO)**.

- To become a member of the IEA, a country must have petroleum product reserves equivalent to 90 days of the previous year's net imports.

Technology Collaboration Programme on Bioenergy

- Recently the India joined IEA Bioenergy TCP as its 25th member.
- It is an international platform with the aim of improving cooperation and information exchange between countries that have national programmes in bioenergy research, development and deployment.
- The primary goal of joining IEA Bioenergy TCP by Ministry of Petroleum & Natural Gas (MoP&NG) is to facilitate the market introduction of advanced biofuels with an aim to bring down emissions and reduce crude imports.
- The R&D work in IEA Bioenergy TCP is carried out carried out within well-defined 3-years programmes called "Tasks".

Drop-in Fuels: are bio feedstock derivatives that are chemically identical to standard gasoline or diesel. They are engineered for blending with, or outright replacement of petroleum fuels without any changes to the fuel infrastructure.

4.1.2. PRADHAN MANTRI JI-VAN (JAIV INDHAN- VATAVARAN ANUKOOL FASAL AWASHESH NIVARAN) YOJANA

Why in news?

Recently government approved Pradhan Mantri JI-VAN yojana.

Details of the scheme

- The scheme under the **Ministry of Petroleum & Natural Gas (MoP&NG)** will provide financial support to Integrated Bioethanol Projects using lignocellulosic biomass and other renewable feedstock.
- 12 commercial scale and 10 demonstration scale Second Generation (2G) ethanol projects will be provided viability gap funding support over the next six years in two phases.
- It also seeks to increase R&D in this area.
- The ethanol produced by the scheme beneficiaries will be mandatorily supplied to Oil Marketing Companies (OMCs) to further enhance the blending percentage under Ethanol Blended Petrol Programme.
- Centre for High Technology (CHT),** a technical body under the aegis of MoP&NG, will be the implementation Agency for the scheme.

Ethanol blending in India

- Government had launched Ethanol Blended Petrol (EBP) programme in 2003, under which OMCs are to blend upto 10% of ethanol in Petrol.

- Despite govt efforts, the highest ever ethanol procurement stands around 150 crore litres during 2017-18 which is sufficient only for around 4.22% blending Pan India.
- Ethanol availability is constrained by procurement price variation, lack of distilleries, limited feedstock availability and lack of an integrated and dedicated supply chain.

Related Information

Lignocellulosic biomass: refers to plant biomass that is composed of cellulose, hemicellulose, and lignin. Lignocellulosic materials including agricultural wastes, forestry residues, grasses and woody materials have great potential for bio-fuel production.

SATAT (Sustainable Alternative Towards Affordable Transportation) initiative

- Launched by **MoP&NG**, it aimed at setting up of Compressed Bio-Gas (CBG) production plants and make it available in the market for use in automotive fuels.
- Objective:** To boost availability of more affordable transport fuels, better use of agricultural residue, cattle dung and municipal solid waste, as well as to provide an additional revenue source to farmers.

GOBAR-DHAN (Galvanising Organic Bio-Agro Resources) scheme: To convert cattle dung and solid waste in farms to CBG and compost.

4.1.3. SCHEME FOR BIOMASS BASED COGENERATION PROJECTS

Why in news?

Ministry of New and Renewable Energy recently approved the scheme namely "**Scheme to support promotion of biomass-based cogeneration in sugar mills and other industries in the country.**"

More about the scheme

- Aim:** To support Biomass based Cogeneration Projects in Sugar mills and Other Industries for power generation in the country.
- Incentives:** It will provide **Central Financial assistance (CFA)** for projects utilizing biomass like bagasse, agro-based industrial residue, crop residues, wood produced through energy plantations, weeds, wood waste produced in industrial operations, etc.
- Registered Companies, Partnership Firms, Proprietorship Firms, Cooperatives, Public Sector Companies, Government owned Firms are eligible for financial support available under the scheme.
- Municipal Solid Waste is not covered under the programme.**

New National Biogas Organic Manure Programme (NNBOMP)

- Objective:** To provide clean cooking fuel for kitchens, lighting and meeting other thermal and small power needs of farmers/dairy farmers/ users including individual households and to improve organic manure system based on bio slurry from biogas plants in rural and semi urban areas by setting up of biogas plants.
- Implementation Authority:** State rural Development Department of States and State offices of Khadi and Village Industries Commission (KVIC).

4.1.4. OFF-SHORE WIND POWER

Why in news?

The Ministry of New & Renewable Energy (MNRE) recently invited Expressions of Interest (EoI) for the country's first 1 GW offshore wind project in Gulf of Khambat.

About Off-Shore Power

- Offshore wind power** is the use of wind farms constructed in bodies of water, usually in the ocean on the continental shelf, to harvest wind energy to generate electricity.
- In India, there is **yet no commercial production of energy from off-shore wind farm**. Two regions where preliminary studies are conducted are **off coast of Gujarat and Tamil Nadu** which have shown significant potential.
- MNRE has declared medium and long-term target for off-shore wind power capacity additions, which are 5 GW by 2022 and 30 GW by 2030.

Advantages of offshore wind power over the onshore wind power

- Greater area for setting up large projects and higher wind speed** resulting in higher electricity generation per amount of capacity installed.
- Consistent wind speed:** The effective use of wind turbine generating capacity will be higher at sea than on land.
- Less visual impact:** As these sites are located far from land they have less visual impact which helps with public acceptance issues.
- Close to load centers:** The off-shore wind farms are usually located near to the cities and load centers thus transmission losses are minimised.
- Environmental impact:** low global warming potential per unit of electricity generated, comparable to that of onshore wind farms.

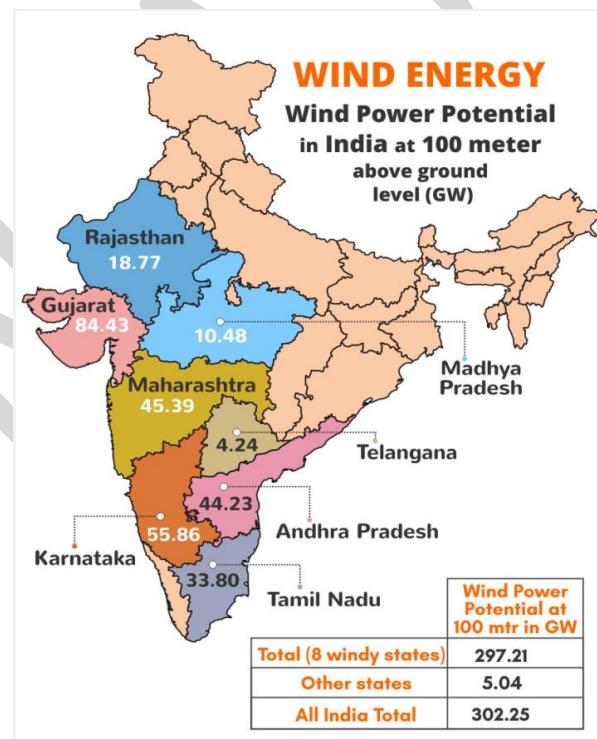
"National Offshore Wind Energy Policy –2015"

- National Institute of Wind Energy (NIWE)** has been authorized as the Nodal Agency for development of offshore wind energy.

Objectives

- To explore and promote deployment of offshore wind farms in the Exclusive Economic Zone (EEZ) of the country, including those under Public Private Partnership.
- To promote Investment in Energy Infrastructure.
- To promote R&D and encourage indigenization of the offshore wind energy technology.
- To create skilled manpower and employment in the offshore wind energy sector.

Related Information map showing wind energy potential in India



4.1.5. GLOBAL SOLAR COUNCIL

Why in news?

Chairman of National Solar Energy Federation - Pranav R. Mehta recently became the **first Indian** to be appointed chief of Global Solar Council.

Details

- Global Solar Council is **international non-profit association** of the national, regional and international associations in solar energy and the world 's leading corporations.
- It was founded at the **2015 Paris Climate Conference**.
- National Solar Energy Federation is a **founding member** of the **Global Solar Council (GSC)**.

- It is an umbrella organization of all solar energy stakeholders of India such as international and national companies.
- It works in a complimentary manner with the Central and State Governments for achieving India's national solar target of 100 GW by 2022.

Related news

World's largest solar plant

- Ladakh will become the world's largest single-location solar photo-voltaic plant with a installed capacity of 5,000 MW Capacity by 2023.
- Other high capacity project In India: **Bhadla Solar Park** (2255 MW capacity in Rajasthan); **Kurnool** (2000 MW capacity in Andhra Pradesh).

Solar Park scheme

- Launched by **Solar Energy Corporation of India (SECI)**, to encourage the construction of solar parks that can generate electricity above between 500 MW and 1000 MW.
- SECI is a **CPSU** under Ministry of New and Renewable Energy.

Solar Charkha Mission

- It is a Ministry of Micro Small & Medium Enterprises (MSME) initiative and Khadi & Village Industries Commission (**KVIC**) is **implementing agency**.
- **Aim:** To employ artisans in 50 identified clusters.
- It entails a **subsidy of Rs 550 crore** in the initial two years for 50 clusters and every cluster will employ 400 to 2000 artisans.
- Solar charkha units have been classified as **village industries**.

4.1.6. WASTE TO ENERGY PLANTS

Why in News?

Recently, residents of Okhla and surrounding areas in Delhi have been protesting against WtE plant in their vicinity.

Advantages of Waste to Energy (WtE) Plants

- **Net Greenhouse Gas Reducer:** WtE facilities avoid the production of methane while producing almost ten times more electricity from each ton of waste compared to landfills.
- **Resource savings and recovery greatly expanded:** Metals left in the municipal solid waste stream can be extracted from the ash resulting from incineration and the metals can be recycled.
- **24*7 Electricity:** WTE facilities, unlike wind and solar, are capable of providing 24*7 renewable electrical power.

- **Landfill usage and expansion greatly reduced:** such facilities typically reduce waste volumes by 90%.
- **Transportation of waste to long distances** can be greatly reduced with a waste to energy facility in a community, resulting in less air pollution.

Types of Technique at WtE

- **Incineration** uses MSW as a fuel, burning it with high volumes of air to form carbon dioxide and heat to make steam, which is then used to generate electricity.
- **Gasification** is a process that converts organic or fossil fuel based carbonaceous materials into carbon monoxide, hydrogen and carbon dioxide. This is achieved by reacting the material at high temperatures (>700°C), without combustion, with a controlled amount of oxygen and/or steam. The syngas produced by gasification can be turned into higher value commercial products.
- **Pyrolysis** involves application of heat with no added oxygen in order to generate oils and/or syngas (as well as solid waste outputs) and requires more homogenous waste streams.
- **Biomethanation** is a process by which organic material is microbiologically converted under anaerobic conditions to biogas. It involves fermenting bacteria, organic acid oxidizing bacteria, and methanogenic archaea.

Government Initiative

- **Program on Energy from Urban, Industrial and Agricultural Waste/Residue** for creating conducive conditions and environment with fiscal and financial regime to develop, demonstrate, and disseminate utilization of wastes and residues for recovery of energy.
 - **Central financial assistance (CFA)** in the form of capital subsidy and grants-in-aid will be provided for biogas production from industrial waste, sewage treatment plants, etc.
- **Swachh Bharat Mission (SBM)**, 100% scientific processing and disposal of municipal solid waste is envisaged by 2019. WTE plants are key to Mission since they lead to the most scientific disposal of waste.

4.2. ELECTRIC VEHICLES

Why in news?

Recently a **panel headed by Y S Malik**, has presented a 15 point plan to aid car manufacturers to switch from Internal Combustion Engines (IECs) to Electric Vehicles (EVs).

Need for electric vehicles

- Fulfilling **INDC 2030 goals** and **combatting increasing air pollution** load in Indian Cities as

- Fossil fuel based transportation is second largest source of carbon dioxide emission.
- **Cut oil imports and generation of jobs** in India both upstream and downstream supply chain.

Government steps

- **National Electric Mobility Mission Plan (NEMMP) 2020** with an aim to achieve national fuel security by promoting hybrid and electric vehicles in the country. It set an ambitious target to achieve 6-7 million sales of hybrid and electric vehicles year on year from 2020 onwards.
- **FAME-India (Faster Adoption and Manufacturing of (hybrid &) Electric vehicles in India) scheme:** To support the hybrid/electric vehicles market development and its manufacturing eco-system to achieve self-sustenance by subsidizing electric vehicle purchases on an annual basis.
 - Scheme is proposed to be implemented till 2020.
 - The scheme has four focus areas viz. technology development, demand creation, pilot projects and charging infrastructure.
- **Automotive Mission Plan 2026:** It aimed at bringing the Indian Automotive Industry among the top three of the world in engineering, manufacture and exports of vehicles & components; growing in value to over 12% of India GDP and generating an additional 65 million jobs.
- **Green Urban Transport Scheme:** It focuses to reduce the emission of harmful carbon gas from the transportation, especially from government owned transport facilities.
 - Under this scheme, government plans to launch the eco-friendly transportation facilities in urban areas across the nation which run without damaging climatic conditions.

Related News - FAME India Phase II

It will be implemented over the period of 3 years from 2019-20 to 2021-22. The main objective of the scheme is to encourage faster adoption of electric & hybrid vehicle by the way of **market creation and indigenization**. FAME-Phase 2 has been introduced to achieve the target of **more than 30% electric vehicles by 2030**, a more realistic goal in comparison to the earlier target of 100% EVs by 2030. Main features are -

- **Electrification of the public & shared transport:** it is planned to support 10 Lakhs e-2W (electric – 2 Wheeler), 5 Lakhs e-3W, 55000 4Ws and 7000 Buses.
- **Local manufacturing:** Special incentives will be given for local manufacturing of critical

components for electric vehicles, especially the **lithium ion batteries**.

- **Establishment of charging infrastructure:** About 2700 charging stations will be established in metros, million plus cities, smart cities and cities of hilly states across the country.

4.2.1. CHARGING INFRASTRUCTURE GUIDELINES

Why in News?

Recently, Government released guideline on **Charging Infrastructure for Electric Vehicles**.

Highlight of Guidelines

- **Promoting Private Participation in charging Infrastructure.**
- **Ease of Setting:** No license will be required for setting up a public charging station and any individual or entity is free to set up one if they follow the standards and guidelines
- **Rollout plan:** Phase I (1-3 years) will cover all mega cities with population above forty lakh, and the associated expressways and highways. **Phase II** (3-5 years) will cover state and UT capitals.
- **Tariff:** The Central or State Electricity Regulatory Commissions will determine the tariff for supply of electricity to the public charging stations.
- **Open access:** Charging station has been allowed to source electricity from any power generation company through open access.

4.3. RIVER BASIN MANAGEMENT

4.3.1. MINIMUM RIVER FLOW FOR GANGA

Why in News?

Recently **National Mission for Clean Ganga (NMCG)** has laid down the flow specifications for river Ganga to maintain a minimum river flow or ecological flow.

Namami Gange Programme

- It is an Integrated Conservation Mission to accomplish the twin objectives of effective abatement of pollution, conservation and rejuvenation of National River Ganga.
- Main pillars of the mission are:
 - River front development
 - Conservation of Aquatic life and biodiversity
 - Improvement of coverage of sewerage infrastructure in habitations on banks of Ganga.
 - River Surface cleaning for collection of floating solid waste from the surface of the Ghats and River

- Afforestation
- Industrial Effluent Monitoring
- Development of Ganga Gram
- Creating Public Awareness
- Under the aegis of National Mission for Clean Ganga (NMCG) & State Programme Management Groups (SPMGs), States and ULBs and PRIs will be involved in this project.

Under the Environment (Protection) Act, 1986, a five tier structure has been envisaged at national, state and district level to take measures for prevention, control and abatement of environmental pollution in river Ganga and to ensure continuous adequate flow of water so as to rejuvenate the river Ganga as below;

- **National Ganga Council** under chairmanship of Prime Minister of India (replaced National Ganga River Basin Authority).
- **Empowered Task Force (ETF)** on river Ganga under chairmanship of Union Minister of Water Resources, River Development and Ganga Rejuvenation.
- **National Mission for Clean Ganga (NMCG).**
- **State Ganga Committees** and
- **District Ganga Committees** in every specified district abutting river Ganga and its tributaries in the states.

National Mission for Clean Ganga (NMCG)

- It is the **implementing wing** of National Council for Rejuvenation, Protection and Management of River Ganga.
- It is registered as a society under the Societies Registration Act 1860.
- Aims of NMCG –
 - To ensure effective **abatement of pollution** and rejuvenation of Ganga basin approach to promote inter-sectoral co-ordination for comprehensive planning and management
 - To **maintain minimum ecological flows** in the river Ganga with the aim of ensuring water quality and environmentally sustainable development.
- To achieve the objectives, NMCG shall carry out the following key functions namely:
 - Implement the work programme of National Ganga River Basin Authority (NGRBA).
 - Implement the World Bank supported National Ganga River Basin Project.
 - Coordinate and oversee the implementation of projects sanctioned by Government of India under NGRBA.
 - Undertake any additional work or functions as may be assigned by MoWR, RD & GR in the area of conservation of river Ganga.

More on news

- **Central Water Commission** would be the designated authority to collect relevant data and submit reports on a quarterly basis to the NMCG.

- **Applicability:** The compliance of minimum environmental flow is applicable to all existing, under-construction and future projects **except** the mini and micro projects which do not alter the flow characteristics of the river significantly.
- The existing projects would have to comply with the norms within a **period of three years**.
- The very purpose of e-flow is to ensure free **migration of various species**. But the notification is **completely silent on this aspect**.

Central Water Commission (CWC)

- It is premier technical organization under **Ministry of Water Resources, River Development and Ganga Rejuvenation**.
- It undertakes measures for control, conservation and utilization of water resources throughout the country and has been monitoring water quality of river water since year 1963.

About Minimum River Flow

- Minimum River Flow or Minimum Environmental Flow or E-flow is a regime of flow in a river that mimics the **natural pattern**. It refers to the water considered **sufficient for protecting the structure and function of an ecosystem** and its dependent species.
- It means **enough water is to be released in the downstream** of the river system after utilizing the water for the development projects in order to ensure downstream environmental, social and economic benefits.
- It will also **ensure demand side management of water** as it will help to reduce water withdrawal from the river by adopting scientific practices in irrigation, reusing and recycling of water and regulating groundwater withdrawals for various purpose.

4.3.2. GANGA VRIKSHAROPAN ABHIYAN

Why in news?

NMCG has started “Ganga Vriksharopan Abhiyan” in five main stem Ganga basin states – Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal.

More on news

- The campaign has been initiated as **part of the Forest Interventions in Ganga component of Namami Gange programme**.
- It aims to **bring greater awareness among people and other stakeholders** regarding the

- importance of afforestation for the task of Ganga Rejuvenation.
- Schools, colleges and departments have been requested to “Adopt a Plant” to make this campaign into a people’s movement.
 - State Forest Departments of respective states have been made the nodal agencies for the smooth and effective execution of the campaign.
 - In Uttar Pradesh, the programme is dovetailed with the **Ganga Haritima Abhiyan** (to enhance the green cover in the catchment areas of the river Ganga and to control the land erosion).

4.3.3. GANGA PRAHARIS (GUARDIANS OF THE GANGA)

Why in news?

Recently, a grassroot-level workforce – Ganga Praharis, was launched by the Ministry of Water Resources.

About Ganga Praharis

- To conserve the biodiversity of River Ganga and reduce the direct dependency of local communities on the river, **Wildlife Institute of India** (an autonomous institution of the MoEFCC) and **National Mission for Clean Ganga** under the “Biodiversity Conservation and Ganga Rejuvenation” have roped in the local community of five Ganga states (Uttar Pradesh, Bihar, Jharkhand, West Bengal and Uttarakhand) known as **Ganga Praharis**.
- They are a cadre of **self-motivated and trained volunteers** from local communities working for biodiversity conservation and cleanliness of Ganga with an objective of **Nirmal and Aviral Ganga**.
- They will **create awareness** about the benefits of the clean and vibrant Ganga thus creating a mass-movement to clean Ganga and create a convergence point at grassroot level by linking livelihood of local communities with overall efforts of various agencies working for clean Ganga.
- Ganga Praharis of all the five Ganga basin states will be **connected through** Bhuvan Ganga App, mygov App and Swachhta app thus creating a broadband network among them.

Ganga Gram

- It's a concept to **transform the villages** on the bank of river Ganga into ideal villages with emphasis on Open Defecation Free, Solid and Liquid Waste Management, Water Conservation, Ground Water Recharge, modern crematorium,

tree plantation, organic and medicinal plants.

- **Ministry of Drinking Water and Sanitation** is the nodal agency for its implementation.

Asita Project (Asita is another name of Yamuna)

- It's a **Yamuna River Front Development Project**, aims to restore, revive and rejuvenate the river's floodplains and make them accessible to the people of Delhi.
- **Reviving Ecosystem** by creating a wetlands, to store the flood waters and to improve the groundwater recharge which will eventually result in flourishing of biodiversity in the floodplains.
- **NMCG** is monitoring the development of project.

4.4. COASTAL REGULATION ZONE (CRZ) NOTIFICATION 2018

Why in news?

The Union Cabinet has approved the Coastal Regulation Zone (CRZ) Notification, 2018 (under **the Environment Protection Act, 1986**), based on the recommendations of **Shailesh Nayak Committee report** (2016).

Salient Features

- **Easing FSI norms:** This notification de-freezes the restrictions imposed on Floor Space Index (FSI) or the Floor Area Ratio (FAR) under CRZ, 2011 in accordance to 1991 Development Control Regulation (DCR) levels.
- **No development zone (NDZ) reduced for densely populated areas:** For CRZ-III areas
 - CRZ-III A areas shall have a NDZ of **50 meters from the HTL** on the landward side as against 200 meters from the HTL stipulated in the CRZ Notification, 2011.
 - CRZ-III B areas shall continue to have an **NDZ of 200 meters from the HTL**.
- **Temporary Tourism infrastructure for basic amenities to be promoted** at a minimum distance of 10 metres from HTL. Such temporary tourism facilities are also now permissible in the NDZ of the CRZ-III areas.
- **CRZ Clearances streamlined:**
 - CRZ clearances are needed only for projects located in CRZ-I and CRZ IV.
 - States to have the powers for clearances w.r.t. CRZ-II and III with necessary guidance.
- **NDZ of 20 meters has been stipulated for all Islands:** in the wake of space limitations and unique geography and to bring uniformity in treatment of such regions.
- **All Ecologically Sensitive Areas have been accorded special importance:**

Through Specific guidelines related to their conservation and management plans.

- **Pollution abatement has been accorded special focus:** By permitting construction of treatment facilities in CRZ-I B area subject to necessary safeguards.
- **Defence and strategic projects have been accorded necessary dispensation.**

Classification of the CRZ

- **CRZ-I**: areas are environmentally most critical and are classified as under:
 - **CRZ-I A:** The ecologically sensitive areas and the geomorphological features which play a role in the maintaining the integrity of the coast viz. **Mangroves; Corals and coral reefs; Sand Dunes; Turtle nesting grounds; protected areas** etc.
 - **CRZ-I B:** The intertidal zone.
- **CRZ-II:** The developed land areas up to or close to the shoreline, within the existing municipal limits or in other existing legally designated urban areas.
- **CRZ-III:** Land areas that are relatively undisturbed (viz **rural areas** etc) and those do not fall under CRZ-II. CRZ-III is further classified as:
 - **CRZ-III A:** Areas with population density more than 2161 per sq km as per 2011 census.
 - **CRZ-III B:** areas with population density of less than 2161 per sq km, as per 2011 census.
- **CRZ- IV:** It constitutes the **water area** and further classified as:
 - **CRZ- IV A:** The water area and the sea bed area between the LTL up to 12Nm on the seaward side.
 - **CRZ- IV B:** the water area and the bed area between LTL at the bank of the tidal influenced water body to the LTL on the opposite side of the bank, extending from the mouth of the water body at the sea up to the influence of tide, i.e., **salinity of five parts per thousand (ppt) during the driest season of the year.**

pollution and unregulated development. The **government can prohibit industrial operations** such as mining, sand quarrying and building thermal power plants in sensitive areas.

- The Act does not mention the word 'Eco Sensitive Zone'. However, section 3(2)(v) gives authority to the central government to restrict areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards.
- To **categorise an area as ecologically sensitive**, the government looks at topography, climate and rainfall, land use and land cover, roads and settlements, human population, biodiversity corridors and data of plants and animal species.
- As per orders of the Supreme Court, no project can be allowed within 10 km of the boundary of national parks and sanctuaries without the approval of the **National Board of Wildlife (NBWL)**, unless a site-specific ESZ is notified around that park or sanctuary.
- **Purpose:** They would also act as **transition zone** (shock absorber) from areas of high protection to areas involving lesser protection.
- **Nature of Activities in ESZ:** While some of the activities could be allowed in all the ESAs, others will need to be regulated/ prohibited:
 - **Prohibited-** commercial mining, polluting industries, major hydroelectric projects etc.
 - **Restricted with safeguards (Regulated) -** Felling of trees, Establishment of hotels and resorts, Drastic change of agriculture system, widening of roads, introduction of exotic species etc.
 - **Permissible-** Rain Water Harvesting, Organic farming, Ongoing Agricultural Practices etc.

4.5. EARMARKING ECO-SENSITIVE AREA

Why in news?

- Centre has released a draft notification for earmarking Eco-Sensitive Area (ESA) in Western Ghats.
- It proposes nearly 37% of Western Ghats as 'no go' zone, as recommended by Kasturirangan Committee. (The Madhav Gadgil panel had recommended 64% of western ghats as ESA).

Eco Sensitive Zones (ESZ)/Eco-Sensitive Area (ESA)

- These are ecologically important areas notified **under the Environment Protection Act, 1986**, to be protected from industrial

Related Information on Western Ghats

- The hill ranges of the Western Ghats (sometimes called the **Great Escarpment of India**), a global **biodiversity hotspot**, extend along the west coast of India from the river Tapti in the north to the southern tip of India.
- It is **spread through** Kerala, Tamil Nadu, Karnataka, Goa, Maharashtra and Gujarat.
- Though covering an area of just **6% of the land area** of India, the Western Ghats contain more than **30% of all plant, fish, herpeto-fauna, bird, and mammal species found in India**.
- Many **species are endemic**, such as the Nilgiri tahr (*Hemitragus hylocrius*) and the Lion-tailed

macaque (*Macaca silenus*), in fact 50% of India's amphibians and 67% of fish species are endemic to this region.

- They include a **diversity of ecosystems** ranging from tropical wet evergreen forests to montane grasslands containing numerous medicinal plants and important genetic resources, the **unique shola ecosystem** (montane grasslands interspersed with evergreen forest patches).

4.6. GREEN BONDS

Why in news?

Green bonds of huge amounts from India are stuck because of rising interest rates and global uncertainties.

What is Green Bond?

- Green bonds are **debt instruments** like normal bonds, but the **proceeds are used for renewable energy projects**, or for services that are ecologically sustainable.
- The bond is **voluntary** and may be issued by a financial institution, the government or even a company to raise funds for a defined period.
- The **first Green bond was issued by the European Investment Bank (EIB)** in 2007.

The Indian Green Bond Market

- In 2015, **YES Bank issued the first green bond in India** for financing the renewable and clean energy projects particularly, for wind and solar.
- Gradually, the market has expanded to several public sector undertakings, state-owned commercial banks, state-owned financial institutions, corporates, and the banking sector.
- SEBI published its official green bonds requirements for Indian issuers making India the second country (after China) to provide national level guidelines.

4.6.1. SOVEREIGN BLUE BOND

Why in News?

Recently, Republic of Seychelles launched the world's first sovereign blue bond (SBB).

About SBB

- The Bond and the programs of marine activities have been developed by the support of **World Bank** and **Global Environment Facility**.
- It is part of the project under the World Bank's **South West Indian Ocean Fisheries**

Governance and Shared Growth Program (SWIOFish).

- They are debt instruments issued by the governments, development banks etc. to raise capital from impact investors to finance marine and ocean-based projects that have positive environmental, economic and climate benefits.

4.7. STATE ENERGY EFFICIENCY PREPAREDNESS INDEX 2018

Why in news?

The Alliance for an Energy Efficient Economy (AEEE) under the leadership of the Bureau of Energy Efficiency (BEE) and NITI Aayog has recently released the first Nationwide '**State Energy Efficiency Preparedness Index**'.

Alliance for an Energy Efficient Economy is an industry led, membership based not-for-profit organization that drives energy efficiency (EE) markets and policies in India.

Energy Efficiency Services Limited (EESL):

- It is a **joint venture** of four national Public-Sector Undertakings under Ministry of Power- NTPC Limited, Power Finance Corporation Limited, Rural Electrification Corporation Limited and POWERGRID Corporation of India Limited.
- It leads the **market-related activities** of the **National Mission for Enhanced Energy Efficiency (NMEEE)**, one of the eight national missions under **National Action Plan on Climate Change**.
- It also aims to provide consultancy services in the field of Clean Development Mechanism (CDM) projects, carbon markets, demand side management, energy efficiency, climate change and related areas.
- Its other programs include:
 - Unnat Jyoti by Affordable LEDs for All (UJALA)**
 - Street Light National Programme (SNLP)**
 - Agriculture Demand Side Management (AgDSM) Programme
 - Energy efficient Buildings Program
 - Smart Meter National Program

About Bureau of Energy Efficiency (BEE)

- It was **set up in 2002 by Ministry of Power**, under **Energy Conservation Act, 2001**.
- It assists in developing policies and strategies based on self-regulation to reduce energy intensity of the Indian economy.
- Functions of BEE includes** Conducting energy audit, developing Energy Conservation Building Codes, implementing Standards and Labeling Program.

National Mission for Enhanced Energy Efficiency (NMEEE), 2011.

It is one of the eight national missions under the National Action Plan on Climate Change (NAPCC).

NMEEE consist of four initiatives to enhance energy efficiency in energy intensive industries which are as follows:

- **PAT (perform, achieve & trade) scheme:** Improving efficiency in energy intensive sector.
- **Energy Efficiency Financing Platform (EEFP):** provides a platform to interact with financial institutions and project developers for implementation of energy efficiency projects
- **Framework for Energy Efficient Economic Development (FEEED):** focuses on developing appropriate fiscal instruments to promote energy efficiency financing.
- **Market transformation for Energy Efficiency (MTEE):** Accelerating shift toward energy efficient appliances.

About State Energy Efficiency Index

- It examines states' policies and regulations, financing mechanisms, institutional capacity, adoption of energy efficiency and energy savings.
- The Index has 63 indicators in all - 59 across buildings, industry, municipalities, transport, agriculture and DISCOMs; and 4 cross-cutting indicators.
- The 'Front runner' states in the inaugural edition of Index are Andhra Pradesh, Kerala, Maharashtra, Punjab and Rajasthan.

Related news

Eco Nivas Samhita, 2018

- Recently **Ministry of Power** has launched Energy Conversation Building Code for residential buildings named Eco Nivas Samhita, 2018 in order to **promote energy efficiency** in design and construction of homes and generate awareness towards conservation.
- This new code is applicable to **all residential buildings built on a plot area of ≥500 m²**. However, states and municipal bodies may reduce the plot area.
- Energy Conversation Building Code is formulated and implemented by **Bureau of Energy Efficiency**.

4.8. PARIVESH

Why in News?

Recently, government launched an integrated environmental management system named **PARIVESH** (Pro-Active and Responsive facilitation by Interactive, Virtuous and Environmental Single-window Hub).

About PARIVESH

- **Ease of Process:** It is a web based, role-based workflow application which has been developed for online submission and monitoring of the proposals submitted by the proponents for seeking Environment, Forest,

Wildlife and CRZ Clearances from Central, State and district level authorities.

- **Enhance transparency:** It automates the entire tracking of proposals which includes online submission of a new proposal, editing/updating the details of proposals and displays status of the proposals at each stage of the workflow.
- The system includes **monitoring of compliance reports** including geo-tagged images of the site by regulatory body or inspecting officers even through the Mobile App for enhanced compliance monitoring.
- It provides access to previous **Environment Impact Assessment Reports**, which is a valuable reservoir of information.

4.9. NATIONAL COMPENSATORY AFFORESTATION FUND MANAGEMENT AND PLANNING AUTHORITY (NCAFMPA)

Why in News?

- Recently, Supreme Court directed the transfer of Rs 53,852 crore lying with the **ad-hoc Compensatory Afforestation Fund Management and Planning Authority (CAMPA)** to NCAFMPA for its utilisation.
- NCAFMPA has been created under the **Compensatory Afforestation Fund Act 2016**.

About Compensatory Afforestation Fund Act 2016

- It established **National Compensatory Afforestation Fund (NCAF)** under the **Public account of India** and State Compensatory Afforestation Funds under public accounts of states.
- These funds will receive payments for:
 - Compensatory afforestation,
 - Net present value of forest (NPV),
 - Other project specific payments.
- The **National Fund** will receive 10% of these funds, and the State Funds will receive the remaining 90%.
- The funds will be in the interest-bearing, non-lapsable and interest bearing by the rate decided by central government on a yearly basis.
- **Usage of Fund:** The fund will be used for compensatory afforestation, additional compensatory afforestation, penal compensatory afforestation, net present value, catchment area treatment plan or any money for compliance of conditions stipulated by the Central Government while

according approval under the provisions of the **Forest (Conservation) Act, 1980**.

- Act provides statutory status for two ad-hoc institution, namely;
 - **National Compensatory Afforestation Fund Management and Planning Authority (NCAFMPA)** for management and utilisation of NCAF.
 - **State Compensatory Afforestation Fund Management and Planning Authority** for

utilisation of State Compensatory Afforestation Fund.

- The act also seeks to provide for **constitution of a multidisciplinary monitoring group** to monitor activities undertaken from these funds.
- The act also provides for annual **audit of the accounts by the Comptroller and Auditor General**.

फाउंडेशन कोर्स सामान्य अध्ययन

प्रारंभिक एवं मुख्य परीक्षा **2020**

इनोवेटिव क्लासरूम प्रोग्राम के घटक




- प्रारंभिक परीक्षा, मुख्य परीक्षा और निबंध के लिए महत्वपूर्ण सभी टॉपिक का विस्तृत कवरेज
- मौलिक अवधारणाओं की समझ के विकास एवं विश्लेषणात्मक क्षमता निर्माण पर विशेष ध्यान
- एनीमेशन, पॉवर प्याइंट, वीडियो जैसी तकनीकी सुविधाओं का प्रयोग
- अंतर - विषयक समझ विकसित करने का प्रयास
- योजनाबद्ध तैयारी हेतु करेंट ओरिएंटेड अप्रोच
- नियमित क्लास टेस्ट एवं व्यक्तिगत मूल्यांकन

- सीसैट कक्षाएं
- PT 365 कक्षाएं
- MAINS 365 कक्षाएं
- PT टेस्ट सीरीज
- मुख्य परीक्षा टेस्ट सीरीज
- निबंध टेस्ट सीरीज
- सीसैट टेस्ट सीरीज
- निबंध लेखन - शैली की कक्षाएं
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5. DISASTER MANAGEMENT

5.1. NATIONAL DISASTER RISK INDEX

Why in news?

The Union ministry of home affairs with the support of United Nations Development Programme (UNDP) have prepared for the first time a **national disaster risk index** for India.

More about the Index

- It mapped hazards and vulnerabilities including economic vulnerabilities across 640 districts and all states including UTs.
- The index factors in exposure of population, agriculture and livestock and environmental risk.
- It will be used to prepare a **composite disaster scorecard (DSC)**.
- The index is in line with India's commitment to the **Sendai Framework**.



Sendai Framework for Disaster Risk Reduction

- It is a **15-year (2015-30), voluntary, non-binding agreement** which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders.
- It is the **successor instrument to the Hyogo Framework for Action (2005-15)**
- India is a signatory** of Sendai Framework.
- UN Office for Disaster Risk Reduction (UNISDR)** has been tasked to support the implementation, follow-up and review of the Sendai Framework.
 - UNISDR was established in 1999 as a dedicated secretariat to facilitate the implementation of the **International Strategy for Disaster Reduction (ISDR)**.
 - ISDR is a global framework established within the United Nations for the promotion of action to reduce social vulnerability and risks of natural hazards and related technological and environmental disasters.

5.2. STATE DISASTER RESPONSE FUND (SDRF)

Why in news?

Central Government enhanced its Contribution in SDRF from 75% to 90%. w.e.f. 1st April 2018.

About SDRF

- SDRF at state level and National Disaster Response Fund (NDRF) at national level** has been setup under **Disaster Management Act, 2005** as a fund for meeting the expenses for emergency response, relief and rehabilitation during any notified disaster.
- Disaster (s) covered under SDRF:** Cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloudburst, pest attack, frost and cold waves.
- NDRF** is constituted to **supplement the funds of the SDRF** of the states to facilitate immediate relief in case of calamities of a severe nature.
- Department of Agriculture and Cooperation under Ministry of Agriculture (MoA)** monitors relief activities for calamities associated with drought, hailstorms, pest attacks and cold wave /frost while rest of the natural calamities are monitored by **Ministry of Home Affairs**.

Other bodies constituted under Disaster Management Act 2005

- National Disaster Management Authority** with the Prime Minister of India as its Chairman.
 - National Executive Committee (NEC) of NDMA takes decisions on the expenses from NDRF. Members of NEC comprise of secretaries of the concerned central government ministries and departments.
- National Disaster Response Force (under Ministry of Home Affairs)**
 - It is a specialised force constituted for the purpose of specialist response to a threatening disaster situation or disaster.
 - It consists of 12 battalions, three each from the BSF and CRPF and two each from CISF, ITBP and SSB.

5.3. REPEATED EARTHQUAKES IN PALGHAR

Why in news?

The Palghar district in northern Maharashtra has been witnessing an unusual frequency of earthquakes since November, 2018.

More in news

- Palghar falls in **seismic zone III**.
 - Bureau of Indian Standards** has grouped the country into four seismic zones, viz. Zone II, III, IV and V. Of these, Zone V is seismically the most active region, while zone II is the least.
- National Centre for Seismology (NCS) has categorized the unusual tremors as an '**earthquake swarm**'.
- Earthquake swarms can occur through the process of **Reservoir Induced Seismicity (RIS)** when large amount of seismic energy gets concentrated in a small area due to the weight of the large structure and the water that it holds.
- Hydro-seismicity** is being hypothesized as the reason for swarms in peninsular India.
 - Water from heavy rainfall enters the small fractures in the rocks creating pressure between them.
 - With every 10 meter rise in groundwater, pore pressure increases by 1 bar. This pressure is released in the form of earthquake swarms.

Earthquake swarm

- It is a **series of low magnitude earthquakes** that occur in a localized region and over a period of time ranging from days, weeks to even months.
- But earthquake swarms are **not limited to the Peninsula**. In 2016, a series of 58 earthquakes were recorded in the Rampur area of Himachal Pradesh. This Himalayan swarm was attributed to low strength of the earth's crust in the area which could not hold the tectonic energy.

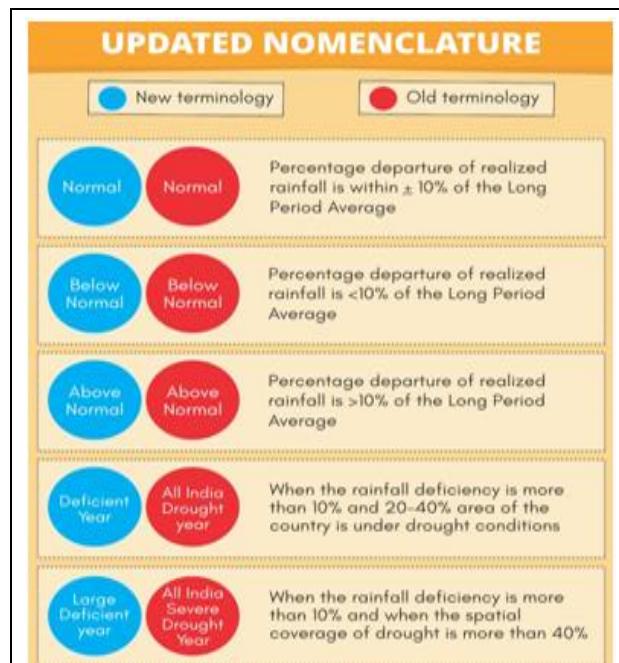
5.4. DROUGHT DECLARATION IN INDIA

Why in news?

Despite persisting drought like conditions, many states did not officially declare the drought.

According to IMD's earlier classification, "when the rainfall deficiency is more than 10% and when 20-40% area of the country is under drought conditions, then the year is termed as an All India Drought Year".

However, in 2016, IMD replaced the word "drought" to describe poor rainfall with "deficient year" and "large deficient year" as described below:



Declaration of Drought

- The **Manual for Drought Management, released in 2016** by the **Union Ministry of Agriculture and Farmers Welfare**, prescribes "new scientific indices and parameters" for a "more accurate assessment of drought" in the country.
- The manual lists **five categories of indices**, which include rainfall, agriculture, soil moisture, hydrology, and remote sensing (health of crops).
- The **State Governments declare drought** through a notification specifying clearly the geographical extent and administrative units such as Gram Panchayats, Blocks, Mandals, Taluks, Subdivision, Districts. Such notification should also indicate the level of severity of the drought (moderate or severe).

According to the National Commission on Agriculture the 3 types of droughts are:

- Meteorological drought:** This happens when the actual rainfall in an area is significantly less than the climatological mean of that area.
- Hydrological drought:** A marked depletion of surface water causing very low stream flow and drying of lakes, rivers and reservoirs.
- Agricultural drought:** Inadequate soil moisture resulting in acute crop stress and fall in agricultural productivity.
- IMD can define a meteorological drought, but agricultural and hydrological droughts are different and states are better equipped to declare them.

5.5. RAT-HOLE MINING

Why in News?

Recently, the collapse of a coal mine in Meghalaya's East Jaintia Hills in which 15 workers were trapped, has thrown the spotlight on a procedure known as "rat-hole mining".

About rat-hole mining

- It involves **digging of very small tunnels**, usually only 3-4 feet high, **without any pillars** to prevent collapse, in which workers (often children) enter and **extract coal**.
- The National Green Tribunal (NGT) banned it **in 2014** on grounds of it being **unscientific and unsafe** for workers.
- Even after ban, it remains the **prevalent procedure for coal mining in Meghalaya as no other method would be economically viable in Meghalaya**, where the coal seam is extremely thin.
- Further, mining activities **are a state subject**, but safety of mine workers is a central subject which creates problems in implementation of safety policies.

5.6. KERALA FLOOD

Why in news?

Recently, Kerala witnessed their worst flood since 1924.

More on news

- Some of the Reasons for Kerela floods include:** Incessant rainfall; **Dam Mismanagement** (sudden releases of water from the Mullaperiyar dam - located in Kerala, but operated by Tamil Nadu); Stone quarrying, Deforestation, Uncontrolled sand mining; Large expanse of low-lying areas etc.
- Operation "Madad"** by the Southern Naval Command (SNC) and **Operation Sahayog** by Army was launched for assisting Kerela's administration in undertaking disaster relief.

Related Information

Dam Rehabilitation and Improvement Plan (DRIP)

- It is being implemented by **Ministry of Water Resources** with assistance from the **World Bank**.
- 80% of the total project is provided by the **World Bank as loan/credit** and remaining 20% is borne by the States / Central Government (for Central Water Commission).
- It originally envisaged the rehabilitation and improvement of about 223 dams in four states namely, Kerala, Madhya Pradesh, Odisha, and Tamil Nadu and later Karnataka, Uttarakhand and Jharkhand joined the project.

• Objective of DRIP:

- To improve the safety and operational performance of selected existing dams and associated appurtenances in a sustainable manner, and
- To strengthen the dam safety institutional setup of participating States / Implementing Agencies.

Emergency Action Plan

- It is a formal plan proposed under DRIP that identifies potential emergency conditions at a dam and prescribes the procedures to be followed to minimize loss of life and property damage.

5.7. GLACIAL LAKES OUTBURST FLOODS

Why in news?

Disaster managers and scientists in Sikkim are siphoning out excess water from South Lhonak lake to prevent it from **Glacial Lakes Outburst Floods**.

What is Glacial Lakes Outburst Floods (GLOFs)?

- Floods caused due to outburst of glacial lakes is known as GLOF.
- The moraine wall act as a natural dam, trapping the melt water from the glacier and leading to the formation of a glacial lake.

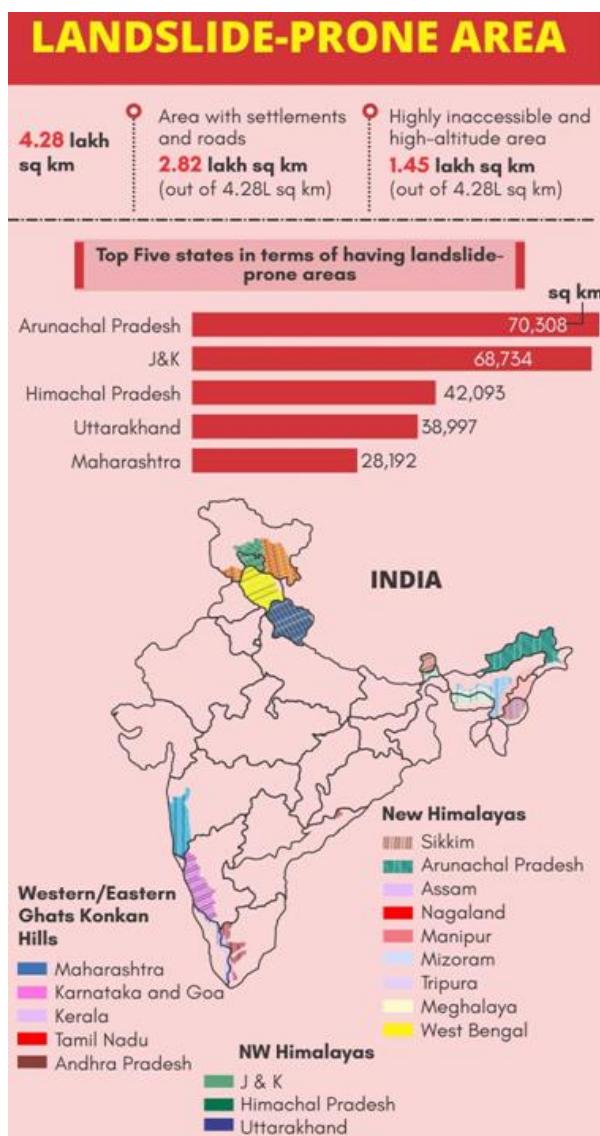
Factors triggering GLOFS

- Retreat of glaciers and change in radiative balance in the region in the wake of **global warming**.
- Increasingly erratic and **unpredictable monsoon rainfall patterns** and increased climate variability.
- Anthropogenic activities such as **mass tourism; developmental interventions** such as roads and hydropower projects; and the **practice of slash and burn type of farming** in certain pockets of the Indian Himalayan region.
- Black carbon** also plays important factor which melts the ice on the mountain due to albedo effect.
- Other Factors** like cascading processes (flood from a lake situated upstream), earthquake, blocking of subsurface outflow tunnels, long-term dam degradation also trigger GLOFS.

5.8. LANDSLIDE WARNING SYSTEM

Why in news?

Recently, a **real-time landslide warning system** has been set up in the Sikkim-Darjeeling belt of north-eastern Himalayas.



Background

- As per global database on landslides, the world's top two **landslide hotspots exist in India**: the southern edge of the Himalayan arc, and the coast along south-west India where the Western Ghats are situated.
- According to **Geological Survey of India (GSI)**, about 12.6 % of the total land mass of India falls under the landslide-prone hazardous zone.

About Landslide

- Definition:** Landslides are downward and outward movement of slope materials such as

rock debris and earth, under the influence of gravity.

- Major reason for triggering of Landslides**
 - Natural causes** like vibrations from earthquakes and the build-up of water pressure between soil layers due to prolonged rainfall or seepage.
 - Manmade causes** include removal of vegetation from the slopes, interference with natural drainage, leaking water or sewer pipes, modification of slopes by construction of roads, railways, buildings, mining etc.
- Weather Induced Landslide:** Landslide occurrence peaks during the northern hemisphere summer, when cyclones, hurricanes and typhoons are more frequent and the monsoon season brings heavy rain to parts of Asia.
- Flash Flood Phenomenon:** Landslide Lead to formation of artificial lake, which can trigger flash flood in the region affected.

Geological Survey of India (GSI)

- GSI is the “nodal agency” for the Indian government for landslide data repository and landslide studies and it is engaged in all types of landslide and slope stability investigations.
- It functions under **Ministry of Mines**.
- It initiated the national programme **National Landslide Susceptibility Mapping (NLSM), 2014** to offer seamless landslide susceptibility maps and landslide inventory maps of the entire landslide-prone areas of India

Other schemes/projects associated with Landslide

- A National Landslide Risk Mitigation Project (NLRMP)** is being run at NDMA. Under this project a landslide site in Mizoram has been selected.

5.9. ACROSS SCHEME

Why in News?

The Cabinet Committee on Economic Affairs (CCEA) has approved continuation of the scheme "**Atmosphere & Climate Research-Modelling Observing Systems & Services (ACROSS)**" during 2017-2020 and establishment of **National Facility Airborne Research** during 2020-21 and beyond.

What is ACROSS?

- It pertains to the atmospheric science programs of the **Ministry of Earth Sciences (MoES)** and addresses different aspects of weather and climate services, which includes warnings for cyclone, storm surges, heat waves, thunderstorms etc.

- Each of these aspects is incorporated as nine sub-schemes under the umbrella scheme "**ACROSS**"
 - Atmospheric, Climate Science and Services.
 - Numerical Modeling of Weather & Climate.
 - Physics and Dynamics of Tropical Clouds.
 - Agro Meteorology.
 - Aviation Services.
 - Center for Atmospheric Technology.
 - High Impact Severe Weather Warning System.
 - Metropolitan Air Quality and Weather Service.
 - Monsoon Mission of India.
- It is implemented in an integrated manner through the **four institutes** - India Meteorological Department (IMD), Indian Institute of Tropical Meteorology (IITM), National Centre for Medium Range Weather Forecasting (NCMRWF) and Indian National Centre for Ocean Information Service (INCOIS).

National Facility for Airborne Research (NAFR)

- NAFR comes under **Indian Institute of Tropical Management (IITM), Pune**. Under this a state-of-the-art research aircraft equipped with instruments will be used for atmospheric research.
- It will take simultaneous measurements of aerosols, trace gases, cloud microphysics and large-scale meteorological parameters at high temporal resolution and at different altitudes in different seasons over the Indian sub-continent.

5.10. LARGE FOREST FIRE MONITORING PROGRAMME

Why in news?

Recently, **Forest Survey of India (FSI)** launched beta-version of the Large Forest Fire Monitoring Programme.

About Large Forest Fire Monitoring Programme

- It aims to improve tactical as well as strategic response to large forest fires by **disseminating specific Large Fire alerts** with the objective to identify, track and report serious forest fire incidents.
- It is part of the **Fire Alert System (FAST) Version 3.0**, where the FSI will **monitor forest fire events** using real time data from the **satellite sensors**.

Related Scheme

Forest Fire Prevention & Management Scheme

- Intensification of Forest Management Scheme was revised and replaced as Forest Fire Prevention & Management Scheme in December 2017.
- It is a **centrally sponsored scheme** with an aim to focus solely on the issue of forest fire prevention & management and related activities, to address growing concern over adverse effects of forest fire.
- **Funding Pattern:**
 - For Normal States: 60:40 between center and states.
 - NE and Himalayan states: 90:10 between center and states
 - For Union Territory: 100% central funding
- **Monitoring and Evaluation**
 - At **National level**, MoEFCC will review the scheme and will also carry out third party evaluation after every 3 years.
 - At **State Level**, State Forest Department will be responsible for regular monitoring and review of achievement under the scheme.

About FSI

- It is an organisation **under the MoEFCC**.
- Its principal mandate is to conduct survey and assessment of forest resources in the country.
- It publishes biennial "**The State of Forest Report**".

5.11. INDIAN OCEAN WAVE EXERCISE 2018 (IOWAVE18)

Why in news?

India along with 23 countries participated in this major Indian **ocean-wide tsunami mock drill**, namely **IOWAVE18**.

More on news

- It is being organised by the **Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO)**.
- The **Indian Tsunami Early Warning Centre (ITEWC)**, based out of the Indian National Centre for Ocean Information Services (**INCOIS**), **Hyderabad**, participated in it.
 - INCOIS is an autonomous institution under the Union **Ministry of Earth Sciences**.
 - ITEWS acts as a Regional Tsunami Advisory Service Provider along with Australia and Indonesia for the Indian Ocean region.

About IOC-UNESCO, 1960

- It is the **only competent organization** for marine science within the UN system.
- Purpose:** To promote international cooperation and to coordinate programmes in research, services and capacity-building, in order to learn more about the nature and resources of the ocean and coastal areas.
- It coordinated in setting up of the **Indian Ocean Tsunami Warning and Mitigation System (IOTWMS)**.

5.12. TITLI CYCLONE ‘RAREST OF RARE’

- Titli Cyclone is a severe cyclonic storm that devastated Odisha in October.
- Titli cyclone is the rarest of rare in terms of its characteristics such as **recurvature after landfall** and **retaining its destructive potential after landfall** and **recurvature away from the coastal areas** for more than two days.
- Naming of cyclone in Indian Ocean**
 - World Meteorological Organisation (WMO) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) started the tropical cyclone naming system in 2000.
 - Eight north Indian Ocean countries — Bangladesh, India, the Maldives, Myanmar, Oman, Pakistan, Sri Lanka and Thailand, gave eight names each which was combined into a list of 64 names.

Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES)

- It is an **international organisation** on disaster warning, formed in the aftermath of 2004 Indian Ocean Tsunami by the efforts of African and Asian countries.
- It operates from the early warning centres located at the campus of the **Asian Institute of Technology in Pathumthani, Thailand**.
- It is registered with **United Nations** and is also supported by UNESCAP and Danish International Development Agency (DANIDA).
- Member Countries:** Bangladesh, Cambodia, Comoros, India, Lao PDR, Maldives, Mongolia, Papua New Guinea, Philippines, Seychelles, Sri Lanka and Timor-Leste.

Re-curvature of cyclones

- Their normal behaviour is to derive strength from the moisture in waters such as the Bay of Bengal, move west, incline in a northerly direction and weaken out into the sea or land, depending on their origin.
- In a re-curving cyclone, the cyclone gets a sort of second wind when it is on the wane.
- In northern hemisphere, it is deflected right or eastwards. This is due to air currents in the local atmosphere that push cold air from the poles towards the equator and interfere with cyclone formation. That's what make them 're-curving.'
- This re-curving frequently happens during the El Nino years but at times it has occurred when an El Nino had not taken shape.
- A challenge with re-curving cyclones is that it is hard for weather models to pick them early on.

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6. GEOGRAPHY

6.1. INDIA'S 1ST SOIL MOISTURE MAP

Why in news?

India Meteorological Department (IMD), for the first time, has provided a country-wide soil moisture forecast termed '**Experimental Forecasts Land Surface Products**'. It has been developed using the '**Variable Infiltration Capacity**' model that takes into consideration soil, vegetation, land use and land cover among other parameters.

India Meteorological Department

- IMD established in 1875, is a principal government agency in all matters related to meteorology, seismology and allied subjects.
- Along with Indian Institute of Tropical Meteorology (IITM) and National Centre for Medium Range Weather Forecasting (NCFMRWF), is under the administrative control of Ministry of Earth Sciences (MoES).

Importance of Soil moisture

- It acts as a nutrient itself and regulates soil temperature.
- It serves as a solvent and carrier of food nutrients for plant growth.
- Yield of crop is more often determined by the amount of water available rather than the deficiency of other food nutrients.
- Soil forming processes and weathering depend on water.
- Microorganisms require water for their metabolic activities.

6.2. HINDU KUSH HIMALAYA ASSESSMENT REPORT

Why in news?

The Kathmandu-based **International Centre for Integrated Mountain Development's (ICIMOD)** "Hindu Kush Himalaya Assessment" reveals that more than one-third of the glaciers in the region could retreat by 2100, even if the global temperature rise is capped at 1.5°C.

MAY DAY IN THE WORLD'S THIRD POLE

Hindu Kush Himalayas, along with the Tien Shan mountains in Central Asia, represents the largest area of permanent ice cover outside the two poles of our globe, and is thus also referred to as the 'third pole'.

The Climate Prognosis		
Best Case Scenario	Limited Public Action	Business as Usual
If Emissions are:		
Slashed	Contained	Not Checked
1.5°C Global average surface warming	2°C Global average warming	4-5°C Global average warming
2.1°C temperature rise in Hindu Kush Himalaya	2.7°C temperature rise in Hindu Kush Himalaya	5-6°C temperature rise in Hindu Kush Himalaya
A third of ice lost by 2100	Half of the ice lost by 2100	At least 2/3 of ice lost by 2100

River Basin Population (in million)
 580 Ganga | 268 Indus
 68 Brahmaputra

Biodiversity
 4 Global hotspots
 35,000+ plant species | 200+ animal species

Overview of The Hindu Kush Himalaya

Total Area	4.2 Million Sq. km
Countries	Afghanistan, Pakistan, India, China, Nepal, Bhutan, Myanmar, Bangladesh
Major River Basins	Amu Darya, Indus, Brahmaputra, Irrawaddy, Ganga, Salween, Tarim, Yangtze, Yellow River, Mekong
Estimated number of People at disaster risk in India	
337.8 Million	

Some findings of the Assessment Report w.r.t. Glaciers

- Area Changes**
 - Since 1970s, nearly 15% of the glaciers in the HKH has disappeared. **Eastern Himalaya glaciers have tended to shrink faster** than glaciers in the central or western Himalaya.
 - In contrast to the Himalayan glaciers, on average, **glacier areas in the Karakoram have not changed significantly**. Given the

context of glacier retreat throughout the rest of the extended HKH region, this behaviour has been designated the '**Karakoram anomaly**'.

- Area loss also leads to glacier fragmentation**; the number of glaciers in the Himalaya is reported to have increased over the past five decades.
- Glacier Projections**
 - Glacier volumes are projected to decline by up to 90% through the 21st century **in**

response to decreased snowfall, increased snowline elevations, and longer melt seasons.

- Even if warming can be limited to the ambitious target of +1.5 °C (Paris Climate Deal), this will lead to a 2.1°C rise in the HKH region due to **elevation-dependent warming**.

About International Centre for Integrated Mountain Development (ICIMOD)

- It is a regional **intergovernmental** learning and knowledge sharing centre based in Kathmandu, Nepal
- It is serving the **eight regional member countries of the Hindu Kush Himalaya – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan.**
- It aims to **assist mountain people** to understand the influence climate change have on the stability of fragile mountain ecosystems, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues.

Elevation-dependent warming (EDW)

- It is one of the expressions of global warming wherein there is an enhancement of warming rates with elevation.
- One of the possible reasons could be that reductions in mountain snow cover exposes the dark coloured earth beneath. This reduces the surface albedo and increases the absorbed solar radiation that can lead to elevation-dependent amplification of warming via the **snow albedo feedback (SAF)**

Impact of HKH Warming

- **River flows and water availability:** Melting glaciers will increase river flows, pushing up risks of high-altitude lakes bursting their banks causing floods (glacial lake outburst floods (GLOFs)).
- **Drying Springs:** 30% of springs in the Indian Himalaya have dried up due to reasons including receding glaciers.
- **On Western Disturbances:** These are also likely to see increased variability.
- **Impact on Monsoon:** Shifting monsoon patterns will lead to intense precipitation which would increase the risk of floods, landslides and soil erosion.
- It may also cause **sea level rise** with its own consequences.

6.3. KELP FORESTS

Why in News?

According to a recent study, **Climate change** could lead to **decline of underwater kelp forests**.



About Kelps

- They are large brown algae seaweeds. They grow in "underwater forests" (kelp forests) in shallow oceans.
- Generally speaking, **kelps live further from the tropics** than coral reefs, mangrove forests, and warm-water seagrass beds.
 - Although kelp forests are unknown in tropical surface waters, a few species have been known to **occur exclusively in tropical deep waters**.
 - Kelps and coral reefs are composed of algae that grow in the shallow parts of the ocean in warm and sunny waters. However, kelp forest grows in nutrient-rich waters while corals can develop in low nutrient waters.
- The environmental **factors necessary for kelp to survive** include hard substrate (usually rock), high nutrients, clear shallow coastal waters and light.
- The productive kelp forests tend to be associated with areas of significant **oceanographic upwelling**.
- They are known for their **high growth rate**. Some varieties grow as fast as half a metre a day, ultimately reaching 30 to 80 metres.
- Kelp forests are recognized as one of the most **productive and dynamic ecosystems** on Earth. Smaller areas of anchored kelp are called **kelp beds**.

Importance of Kelp Forests

- They are **considered as Keystone Species** and their removal is likely to result in a relatively significant shift in the composition of the community and perhaps in the physical structure of the environment.
- It provides as an **important source of food** for many marine species. In some cases, up to 60% of carbon found in coastal invertebrates is attributable to kelp productivity. It may be consumed directly or colonised by bacteria that in turn are preyed upon by consumers.

- It increases productivity of the near shore ecosystem and dumps carbon into that ecosystem. Kelp primary production results in the **production of new biomass, detrital material etc.**
- It slows down the flow of the water** which is important in situations where animals are spawning and releasing their larvae.
- They are **natural breakwaters** and **prevent coastal erosion.**
- They can **influence coastal oceanographic patterns** and provide many **ecosystem services.**
- It is an important source of **potash** and **iodine**. Many kelps produce **algin**, a complex carbohydrate useful in industries such as **tire manufacturing, ice-cream industry.**

Climate Change and Kelp Forest

- Ocean warming and ocean acidification can cause **changes in the microbiome on the surface of Kelp**, leading to disease-symptoms like blistering, bleaching and eventually **degradation of the kelp's surface.**
- This will affect the **Kelp's ability to photosynthesize and potentially survive.**

6.4. POLAR VORTEX

Why in news?

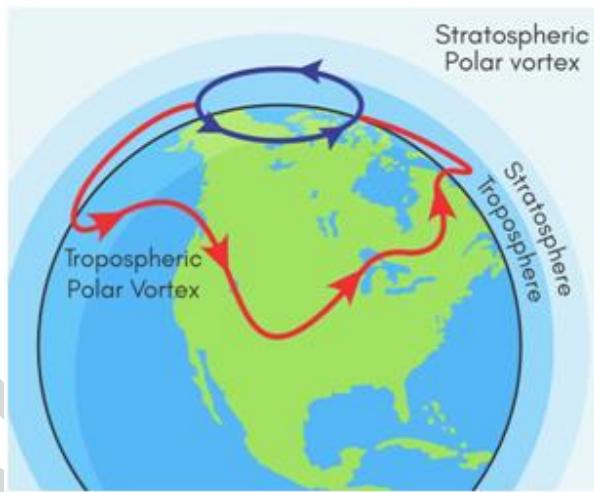
Recently, US mid-west experienced sub-zero temperatures due to a breakdown in the polar vortex.

What is a polar vortex?

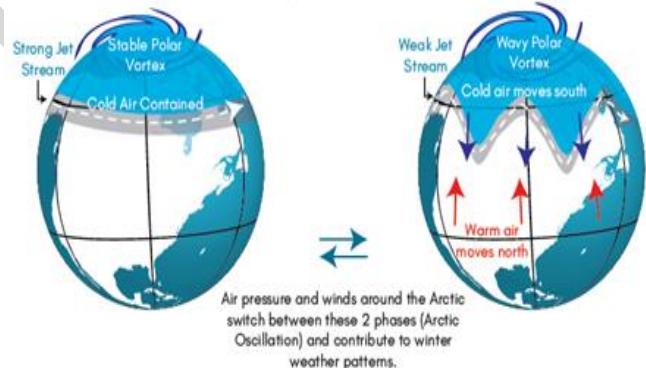
- It is a large area of **low pressure and cold air surrounding the Earth's North and South Pole.**
- The term refers to the **counterclockwise flow (clockwise over south pole)** of air that helps keep the colder air close to the poles.
- There are not one but **two polar vortexes in each hemisphere.**
 - One exists in the lowest layer of the atmosphere, the **troposphere**. The tropospheric polar vortex is the one that affects our weather.
 - The other exists in the second-lowest, called the **stratosphere**. It is much more compact than its tropospheric counterpart.
 - If the two polar vortexes line up just right, very deep freeze conditions may occur.
- The boundary of the polar vortex is really the boundary between the cold polar air to the north, and the warmer sub-tropical air (considering Northern Hemisphere). And that

boundary is actually defined by the **polar front jet stream**- a narrow band of very, very fast-moving air, moving from west to east.

- But that boundary shifts all the time. It shrinks in summer, pole-ward while **in winter, the polar vortex sometimes becomes less stable and expands**, sending cold air southward with the jet stream. This is called a **polar vortex event** (“breaking off” of a part of the vortex).
- The break in polar vortex appears to be linked to the long and chilly winter in the north India this year.



The Polar Vortex is nothing new – In fact it's thought that the term first appeared in an 1855 issue of E. Littell's Living Age.



Why cold air plunges south (in Northern Hemisphere)?

- Greenhouse gas emissions has **amplified Arctic warming** resulting into dramatic melting of ice and snow in recent decades, which exposes darker ocean and land surfaces that absorb a lot more of the sun's heat.
- Because of rapid Arctic warming, the north-south temperature difference has diminished. This **reduces pressure differences between the Arctic and mid-latitudes**, weakening jet stream winds which tend to meander.
- Large north-south undulations in the jet stream generate wave energy in the atmosphere. If they are wavy and persistent enough, the energy can travel upward and

disrupt the stratospheric polar vortex. Sometimes this upper vortex becomes so distorted that it splits into two or more swirling eddies.

- These “daughter” vortices tend to wander southward, bringing their very cold air with them and leaving behind a warmer-than-normal Arctic.

6.5. ENSEMBLE PREDICTION SYSTEMS (EPS)

Why in News?

IMD recently launched the Ensemble Prediction Systems (EPS) to provide probabilistic weather forecasts upto next 10 days.

About EPS

- It has been developed jointly by the **IMD, National Centre for Medium Range Weather Forecasting (NCMRWF) and the Indian Institute of Tropical Meteorology**.
- Under this, **the area of spatial resolution**, which is 23 km presently, **will reduce to 12 km**, enabling the meteorological department to give **district-level warning**.
- With this new model, **India joins the US** with a model that predicts with a 12 km resolution. Only the '**European Center for Medium Range Weather Forecast**' has a better 9km resolution.

6.6. DEEP OCEAN MISSION

Why in News?

In a recently unveiled Deep Ocean Mission (DOM) blueprint, Centre has drawn up a five year, Rs. 8000 Crore plan on lines of ISRO in designing and launching satellite.

About the DOM blueprint

- Its focus will be on technologies for deep-sea mining, under water vehicles, under water robotics and ocean climate change advisory services, among others.
- Key deliverables to achieve these goals:
 - **Offshore tidal energy desalination plant** that will work with tidal energy.
 - **Developing a submersible vehicle** to explore depths of at least 6000 Meters with three people on board.
- It will promote exploration by India in its **Exclusive Economic Zone (EEZ)**. EEZ are boundaries prescribed by the UNCLOS which

give special rights to a state regarding the exploration and use of marine resources.

- It will also help India in exploration of site allotted to it in the Central Indian Ocean Basin (CIOB) by the **UN ISBA** for exploitation of Poly-Metallic Nodules.

UN International Sea Bed Authority (UN ISBA)

- The ISBA is an autonomous international organization situated at Kingston, Jamaica.
- It was established under the **UN Convention on the Law of the Sea (UNCLOS)** in 1994 to regulate the exploration and exploitation of marine non-living resources of oceans in international waters.

Poly-Metallic Nodules (PMN)

- Polymetallic nodules, also called manganese nodules, are rock concretions formed of concentric layers of iron and manganese hydroxides around a core.
- India is the first country to have received the status of a pioneer investor in 1987 and was allocated an exclusive area in Central Indian Ocean Basin by UN for exploration and utilization of nodules.

6.7. MEGHALAYAN AGE

Why in news?

Scientists have identified a new phase in Earth's geological history called the Meghalayan age.

Geological Time Scale

- The geological time scale is the “calendar” for events in Earth history.
- It subdivides all time into named units of abstract time called—in descending order of duration—**eons, eras, periods, epochs, and ages**.
- **Eons** are the largest intervals of geologic time and are hundreds of millions of years in duration. For e.g. Phanerozoic Eon is the most recent eon and began more than 500 million years ago.
- Eons are divided into smaller time intervals known as **eras**. For e.g. the Phanerozoic is divided into three eras: Cenozoic, Mesozoic and Paleozoic.
 - The names of eras were chosen to reflect major changes of the development of life on the Earth: Paleozoic (old life), Mesozoic (intermediate life), and Cenozoic (recent life).
- Eras are subdivided into **periods**. For e.g. the Paleozoic is subdivided into the Permian, Pennsylvanian, Mississippian, Devonian, Silurian, Ordovician and Cambrian periods.
- Periods are further subdivided into epochs which are further divided into ages.

- Each period corresponds to significant events such as the break-up of continents, shifts in climate, and the emergence of particular types of animals and plant life.
- These units of the geologic time scale are based on sedimentary strata that have accumulated over time.

Eonothem / Eon	Era	System / Period	Series / Epoch	Stage / Age	Numerical age (Ma)
PHANEROZOIC	CENOZOIC	QUATERNARY	Holocene	U/L	Meghalayan present
				M	Northgrippian 0.0042
				L/E	Greenlandian 0.0082
			Pleistocene	Upper	0.0117
				Middle	0.126
				Calabrian	0.781
				Gelasian	1.80
			Pliocene	Piacenzian	2.58
				Zanclean	3.600
				Messinian	5.333
				Tortonian	7.246
NEOGENE	NEOGENE	NEOGENE	Miocene	Serravallian	11.63
				Langhian	15.82
				Burdigalian	15.97
				Aquitanian	20.44
					23.03

Meghalayan Age

- The Meghalayan Age, which is the subdivision of the Holocene Epoch, began about 4,200 years ago.

- It has been officially ratified as the most recent unit of the Geologic Time Scale by the **International Union of Geological Sciences**, an international NGO.
- The **International Commission on Stratigraphy**, which is responsible for standardising the Geologic Time Scale, approved the definition of the beginning of the youngest unit of the Geologic Time Scale based on the timing of this event and forwarded its proposal to IUGS.
- The **other two subdivisions of the Holocene Epoch** — the Early Holocene Greenlandian (11,700 years ago), Middle Holocene Northgrippian (8300 years ago) were also approved.
- The Meghalayan Stage has been defined at a specific level in a stalagmite in the **Mawmluh caves** — one of the India's longest and deepest — in Cherrapunji, Meghalaya.
 - The onset of the age was marked by a severe 200-year drought that resulted in the collapse of civilisations and human migrations in Egypt, Greece, Syria, Palestine, Mesopotamia, the Indus Valley, and the Yangtze River Valley.
- The International **Chronostratigraphic Chart**, the famous diagram depicting the timeline for Earth's history will be updated.

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7. MISCELLANEOUS TIT BITS

7.1. SOUTH ASIA WILDLIFE ENFORCEMENT NETWORK (SAWEN)

- Recently the fourth meeting of SAWEN (first in India) was held in Kolkata.
- SAWEN is an **inter-governmental wildlife law enforcement support body** of South Asian countries namely- Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.
- It aims at working as a strong regional inter-governmental body for combating wildlife crime by attempting common goals and approaches for combating illegal trade in the region.
- It was officially **launched in January, 2011** in **Paro, Bhutan**. It operates its activities from the Secretariat based in **Kathmandu, Nepal**.

7.2. STAPCOR-2018

- The International Conference on Status and Protection of Coral Reefs (STAPCOR)-2018 took place recently at Bangaram Coral Island of Lakshadweep. Theme of the conference was “Reef for Life”.
- It **takes place every 10 year** after the foundation of STAPCOR in 1998 when heavy bleaching of corals was observed internationally because of Global warming, climate change and El-Nino effect.
- Other prominent developments-
 - Year 2018 has been declared as 3rd decadal International year of Reefs.
 - An International Atoll Research Centre for scientific research on corals will be established in Lakshadweep.
 - World's largest artificial coral reef installed in Maldives.**

7.3. WILDLIFE CRIME CONTROL BUREAU (WCCB)

- Recently, **United Nation Environment Program** has awarded **Wildlife Crime Control Bureau (WCCB)** with **Asia Environment Enforcement Awards, 2018**.
- Wildlife Crime Control Bureau is a **statutory body**, under the **Ministry of Environment and Forests**, to combat **organized wildlife crime** in the country and was constituted in 2007 by amending the Wildlife Protection Act, 1972.
 - It coordinated “**Operation Thunder Bird**” (INTERPOL’s multi-national and multi-species enforcement operation) in India.
 - It has launched **Operation wildnet** to counter the menace of the illegal trade through internet.

7.4. INTERNATIONAL WHALING COMMISSION

- Recently **Japan** announced its withdrawal from **International Whaling Commission (IWC)** to resume commercial whale hunting.
- The IWC was constituted under the **International Convention for the Regulation of Whaling in 1946** with an aim for orderly development of the whaling industry by putting catch limit, designating whale sanctuaries, coordinating conservation work etc.
- Currently a complete ban is applied on commercial whaling**, while whaling under the scientific-research and aboriginal-subsistence provisions are allowed.

7.5. ASIAN WATERBIRD CENSUS, 2019

- It was held recently in various parts of India. It is part of the global **International Waterbird Census (IWC)** carried out each January as a voluntary activity.
- In India, the AWC is jointly coordinated by the **Bombay Natural History Society** and **Wetlands International**.
- Wetlands International is a non-profit organization established in 1937 as ‘**International Wildfowl Inquiry**’ and HQ in Netherlands.
- Bombay Natural History Society (BNHS):** Non-governmental organization in India engaged in conservation research.
 - Collaborated with technology company **Accenture** to create **Internet of Birds**, which is an online tool for birdwatchers that identifies birds based on their photos.

7.6. GREEN AGRICULTURE (GREEN-AG) PROJECT

- Government of India in collaboration with the **Food and Agriculture Organization (FAO)**, launched a **Global Environment Facility (GEF)** assisted project, **Green-Ag: Transforming Indian agriculture** for global environment benefits and the conservation of critical biodiversity and forest landscapes.
- It was launched in **high-conservation-value landscapes of five states**, namely Madhya Pradesh (Chambal landscape), Mizoram (Dampa landscape), Odisha (Simlipal landscape), Rajasthan (Desert National Park landscape) and Uttarakhand (Corbett-Rajaji landscape).
- Executive Agencies:** Ministry of Agriculture and Ministry of Environment, Forests, and Climate Change.



About FAO

- It is a specialized agency of the United Nations that leads international efforts to defeat hunger.
- Its 5 strategic objectives include:
 - Help eliminate hunger, food insecurity and malnutrition
 - Make agriculture, forestry and fisheries more productive and sustainable
 - Reduce rural poverty
 - Enable inclusive and efficient agricultural and food systems
 - Increase the resilience of livelihoods to threats and crises
- Its major initiatives and achievements include:
 - Created international standards, **Codex Alimentarius**, to ensure safe, good food for everyone.
 - Created and led adoption of the first ever binding international accord to combat illegal fishing, the **Port State Measures Agreement**.
 - **Globally Important Agricultural Heritage Systems**
 - These are outstanding landscapes of aesthetic beauty that combine agricultural biodiversity, resilient ecosystems and a valuable cultural heritage.
 - **GIAHS from India:** Saffron Heritage of Kashmir; Koraput Traditional Agriculture; Kuttanad Below Sea Level Farming System.

7.7. GREEN SKILL DEVELOPMENT PROGRAMME (GSDP)

- Launched by **MoEFCCC in 2017**, it is an initiative for skill development in the environment and forest sector to enable India's youth to get gainful employment and/or self-employment.
- All courses are **National Skills Qualifications Framework (NSQF) compliant**.
- GSDP utilises vast network of Environmental Information System (ENVIS) hubs and Resource Partners (RPs).

Green Skills

- According to OECD, Green skills are needed to adapt products, services and processes to climate change and the related environmental requirements and regulations. They include the knowledge, abilities, values and attitudes needed to live in, develop and support a sustainable and resource-efficient society.

Environmental Information System (ENVIS)

- It is a central sector scheme, being implemented by MoEF&CC since 1982-83.
- It is a decentralized network of centres of which-
 - some centres dealing with "State of the Environment and Related Issues" are hosted by State Government /UT Administrations, called **ENVIS Hubs**.

- some are hosted by environment-related governmental and non-governmental organisations/ institutes of professional excellence, with varied thematic mandates pertaining to environment, called the **ENVIS Resource Partners (RPs)**.
- ENVIS will conduct **India's first ever National Environment Survey (NES)** in 55 districts across 24 states and three Union Territories.
 - It will collect comprehensive data on various environmental parameters such as air, water, soil quality; emission inventory; solid, hazardous and e-waste; forest & wildlife; flora & fauna; wetlands, lakes, rivers and other water bodies.
 - It will also **assess carbon sequestration potential** of all the districts across the country.
 - It will **rank all the districts** on their environmental performance and document their best green practices.

7.8. IRAN SEES 'REVIVAL' OF LAKE URMIA

About Lake Urmia

- It is an **endorheic** (which do not drain to the sea) salt lake in Iran.
- The lake **has shrunk to 10%** of its former size due to damming of the rivers that flow into it, and the pumping of groundwater from the surrounding area.
- Lake Urmia is designated as a **site of international importance** under the UN Convention on Wetlands.

7.9. OTHER SHORT NEWS

- India's first **ESG (environment, social and governance) based fund** – **Avendus India ESG Fund** has been launched by Avendus Capital Public Markets Alternate Strategies. ESG investing is an **umbrella term** for investments that also consider and evaluate the long-term impact that business practices have on society and the environment.
- **Environmental Fund - Madras High Court** became first to set up 'Environmental Fund' where amounts received from various courts, in the form of costs ordered to parties, would be used for planting and nurturing trees as well as cleaning water bodies
- **Green Good Deeds campaign** - launched by the MoEFCC, it's a social movement to protect environment and promote healthy living.
- **South Asia's Hotspots: The Impact of Temperature and Precipitation changes on living standards** – published by World Bank, identifies "**hotspots**" as the states /districts where these changes will have a **notable effect on living standards**.
 - States in central, north and northwestern parts of India will be the most vulnerable to

- climate change, with **Chhattisgarh and Madhya Pradesh** likely to be the top two climate hotspots.
- Laboratory for Conservation of Endangered Species (LaCONES) – Recently, **National Wildlife Genetic Resource Bank (NWGRB)** was established at Laboratory for Conservation of Endangered Species (LaCONES).
 - LaCONES is a dedicated laboratory of the CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad. It is the **only institute in the country working towards conservation of endangered wildlife** using modern biotechnologies to save endangered wildlife species of India.
 - Recently, **Indian Ocean Research Vehicle (IORV Sagar Nidhi)** as part of India-US expedition seeking to find answers to **vagaries of Bay of Bengal fed South-West Monsoon** was set out in Indian Ocean. The project is funded by the Ministry of Earth Sciences and the US Office on Naval Research.
 - CUSAT Stratosphere Troposphere-205 Radar:** Situated at Cochin, it is fully indigenously built radar to scan stratosphere over the Indian Ocean for movement of air and monsoon winds.

7.10. REPORT AND INDICES

REPORT	Published by	KEY FINDING/FEATURES
Emissions Gap Report	United Nations Environment Programme (UNEP). Other Reports/Publications Published <ul style="list-style-type: none"> Global Environment Outlook. Actions on Air Quality. The Rise of Environmental Crime (By UNEP & INTERPOL) Environmental Rule of Law – 1st global assessment of environmental laws. Inclusive Wealth Report 2018: <ul style="list-style-type: none"> About: It's a biennial report that seeks to evaluate a country's wealth and wellbeing through the Inclusive Wealth index (IWI). Inclusive Wealth = Manufactured Capital + Human Capital+ Natural Capital 	<ul style="list-style-type: none"> About: It focuses on the “gap” between the emissions reductions necessary to achieve the agreed targets at lowest cost and the likely emission reductions from full implementation of the Nationally Determined Contributions (NDCs), which form the foundation of the Paris Agreement. Pathways reflecting current NDCs imply global warming of about 3°C by 2100, with warming continuing afterwards. Global greenhouse gas emissions show no signs of peaking. Global CO₂ emissions from energy and industry increased in 2017, following a three year period of stabilization.
Greenhouse Gas Bulletin-2018	World Meteorological Organization (WMO) Other Reports/Publications Published <ul style="list-style-type: none"> WMO Statement on the state of the Global Climate 	<ul style="list-style-type: none"> About: Published annually, it reports on atmospheric concentrations of greenhouse gases. It is based on observations from the WMO Global Atmosphere Watch Programme (GAW), which tracks the changing levels of greenhouse gases as a result of industrialization, energy use from fossil fuel sources, intensified agricultural practices, increases in land use and deforestation. Carbon dioxide is the main long-lived greenhouse gas in the atmosphere. Concentrations reached 405.5 ppm in 2017, 146% of the pre-industrial era (before 1750). Methane (CH₄) is the second most important long-lived greenhouse gas and is now 257% of the pre-industrial level. Atmospheric concentration of Nitrous oxide (N₂O) is 122% of pre-industrial levels. CFC-11 (trichlorofluoromethane): Since 2012 its rate of decline has slowed.
Climate Change Performance Index (CCPI),	Germanwatch, the New Climate Institute and the Climate Action Network. Global Climate Risk Index 2019 by Germanwatch.	<ul style="list-style-type: none"> Countries are ranked across four categories — Greenhouse Gas Emissions, Renewable Energy, Energy Use and Climate Policy.

2019.	<ul style="list-style-type: none"> About: analyses to what extent countries and regions have been affected by impacts of weather-related loss events. For the examination of the CRI, the following indicators were analysed: <ul style="list-style-type: none"> Number of deaths Number of deaths per 100 000 inhabitants Sum of losses in US\$ in purchasing power parity (PPP) Losses per unit of Gross Domestic Product (GDP) Puerto Rico, Sri Lanka and Dominica were at the top of the list of the most affected countries in 2017. India moved from 6th rank to 14th rank as a result of efficient cyclone prediction system and gradual improvement in its disaster response system. 	<ul style="list-style-type: none"> The report ranks 56 countries and the European Union, which together are responsible for 90% of global greenhouse gas emissions. India ranked 11th in CCPI, improving from the previous 14th as a result of an improved performance in renewable energy, comparatively low levels of per capita emissions and a relatively ambitious mitigation target for 2030. Sweden and Morocco were the leading countries with 4th and 5th rank respectively. First three positions were unoccupied, because none of the 56 countries or the EU were clearly on a well below two degrees Celsius pathway in their overall performance.
Living Planet Report, 2018	<p>World Wide Fund for Nature Global Soil biodiversity Atlas</p> <ul style="list-style-type: none"> It is a joint venture of the Global Soil Biodiversity Initiative and the European Commission Joint Research Centre. It placed India among countries whose soil biodiversity faces the highest level of risk. Atlas findings were published as part of the Living Planet Report, 2018 	<ul style="list-style-type: none"> Released every two years, it is a comprehensive study of trends in global biodiversity and the health of the planet. The current rate of species loss is 100 to 1,000 times higher than only a few hundred years ago. The report says that the Earth has entered the sixth mass extinction event in the last half-a-billion years.

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