

Environment, Geography & Maps

Environment Laws, Acts, Regulation

Wildlife Protection Act 1972

- It is to **protect listed species, birds and plant** and to manage wildlife, which is **binding on states and UTs**.
- It established **National Parks, Sanctuaries etc.**
- It provides for **licenses for sale, transfer and possession of some wildlife species.**

It created 6 schedules for protection to flora and fauna.

- **Schedule I:** It covers **endangered species**, with **absolute protection**.
 - It is **prohibited to trade and hunt** species throughout India, except **under threat to human life**.
 - **The harshest penalties** for violation of the law are under this Schedule.
 - **Eg:** Tiger, blackbuck, Dolphin, Hornbills etc.
- **Schedule II: High protection, trade is prohibited.**
 - **Eg:** Assamese Macaque, Bengal Hanuman langur, Indian Fox, etc.
- **Schedule III & IV: Protected Species (Not Endangered).**
 - Penalty for any violation is less compared to the first two schedules.
 - **Eg:** Hyena, Flying fox etc.
- **Schedule V:** It contains **animals that can be hunted**.
 - **Eg:** Rat, Common Crow, etc.
- **Schedule VI:** It contains **plants that are forbidden from cultivation**.

It forms few organizations too, such as:

- **National Board for Wildlife:** Chairman: Prime Minister.
 - **Statutory organisation.**
 - It advises **Central government** on wildlife conservation.
 - It **reviews and approves** all matters related to wildlife, national parks, sanctuaries, etc.
- **National Tiger Conservation Authority:** To strengthen tiger conservation.
 - It is **statutory body** under Environment, Forest and Climate Change Ministry.
 - It strengthens Tiger conservation in India.

- Wildlife Advisory Boards
- Central Zoo Authority (1992) etc.

Environment (Protection) Act, 1986

- It was **enacted** in the wake of **Bhopal Disaster**, under Article 253.
- It is to **implement** the decisions of the **UN Conference on the Human Environment** (Stockholm, 1972).
- It **protects and improves** the **human environment** and the **prevents** living creatures, plants and property.
- It acts as an **umbrella legislation** for central government schemes and acts.
- **Functions of central government under this Act:**
 - To Plan and execute a nation-wide programme.
 - To **sponsor investigations and research**
 - To establish **environmental laboratories**, standards for the quality of environment, manuals and codes.
 - To issue **directions to any person, officer or any authority**
 - To issue **directions for prohibition, closure, or regulation of any industry.**
- **This act defines few terms in proper way, as:**
 - Environment, Environmental Pollutants, Handling, Environmental Pollution, Hazardous substance, Occupier etc.

National Forest Policy 1988

- It is to **ensure environmental stability and maintenance of ecological balance, including atmospheric equilibrium.**
- **Objectives:**
 - To **Conserve natural heritage**, flora and fauna.
 - To **check soil erosion and denudation in the catchment areas** of rivers etc.
 - To **check extension of sand-dunes** desert.
 - To **increase forest cover** through massive afforestation and social forestry programmes.
 - To **fulfill requirements of fuel wood, fodder, minor forest produce** etc. of rural and tribal populations.
 - To **encourage utilization of forest produce.**

- **Strategy to Implement Policy Provisions:**
 - **1/3 of total geographical area of the country to be brought under forest cover.**
 - **In hills and mountainous regions, about 2/3 of the total area must be kept under forest.**
 - Encourage the planting of trees along roads, railway line etc.
 - **Formation of Green belts** in and urban areas, industrial zones etc.
- **Biological Diversity Act, 2002**
 - It is to preserve biological diversity in India.
 - It was enacted to meet the obligations under the Convention on Biological Diversity (CBD).
 - It provides mechanism for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge.
 - **The benefit sharing out of usage of biological resources can be done in following manner:**
 - Transfer of technology.
 - Location of production, **research development units** in the area of source.
 - **Payment of monetary and non-monetary compensation.**
 - **Setting up of venture capital fund** for aiding the cause of benefit claimers.
 - **Objectives and Functions:**
 - To advise the Government on selection of biological heritage sites.
 - To conserve biological diversity, sustainable use of its components
 - **It envisages a three-tier structure:**
 - National Biodiversity Authority (NBA).
 - State Biodiversity Boards (SBB).
 - Biodiversity Management Committees (BMC), at the local level.
- **Inclusion of new healthcare activities:** Vaccination camps, blood donation camps, surgical camps etc.
- **Pre-treatment of the laboratory waste, microbiological waste, blood samples, and blood bags through disinfection or sterilization on-site.**
- **State Government** to provide land for setting up common bio-medical waste treatment and disposal facilities.
- To establish a **Bar-Code System for bags or containers containing bio-medical waste for disposal.**
- To provide **training to all its health care workers** and immunize all health workers regularly.

Hazardous Waste Management Rules, 2016

- **Hazardous waste:** Any waste, such as physical, chemical, biological, reactive, toxic or anything which is a threat to **health or environment**.
 - **Eg:** Waste generated during petroleum refining, production of pharmaceuticals, paint etc.
- These rules are notified to ensure safe handling, generation, processing, treatment, package, storage, transportation, use reprocessing, collection, destruction and disposal of Hazardous Waste.
- These rules came in 1989 and have been amended various times.
- Responsibilities of State Government related to this act:
 - To set up or allot industrial space or sheds for recycling, of hazardous waste.
 - To register the workers involved in recycling, pre-processing and other utilization activities.
 - To undertake industrial skill development activities and ensure safety and health of workers.

Salient features of the rules:

- **Waste Management hierarchy sequence:** 1. Prevention, 2. Minimization, 3. Reuse, 4. Recycling, 5. Recovery, 6. Co-Processing, 7. Safe disposal.
- **Single window clearance** for setting up of hazardous waste disposal facility and import of wastes.
- **Co-processing** as preferential mechanism over disposal.
- **Import/export of waste:**

Bio-Medical Waste Management Rules, 2016

- **Bio Medical Waste:** It includes **human & animal waste, needles, syringes and other materials used in health care facilities** in the process of treatment and research.

The salient features:

- **Bio-medical waste is classified into 4 categories** to improve the segregation of waste at source.
- **Phase-out:** Use of chlorinated plastic bags, gloves, and blood bags within 2 years.

- It has been streamlined by simplifying the document based procedure and by revising the list of waste regulated for import/export.
 - **Re-use norms simplified:** Import of metal scrap, paper waste and other electrical and electronic equipment for **re-use** purpose has been exempted from the need of obtaining Ministry's permission.
- Hazardous and Other Wastes (Management & Transboundary Movement) Amendment Rules, 2019:**
- **Solid Plastic Waste:**
 - It is prohibited to import into the country including SEZ and by Export Oriented Units (EOU).
 - **Exporters of silk waste:**
 - It does not need permission from Environment, Forest and Climate Change Ministry.
 - **Electrical and electronic assemblies and components:**
 - It is manufactured in and exported from India.
 - If found defective can be imported back into the country, within a year of export, without permission from Environment, Forest Ministry.
 - The industries which do not require consent under Water Act 1974 and Air Act 1981, are **exempted from requiring authorization under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.**

Solid Waste Management Rules, 2016

- It replaces Municipal Solid Wastes (Management and Handling) Rules, 2000.
- It is the 6th category of waste management rules brought out by the ministry.
- It includes plastic, e-waste, biomedical, hazardous and construction and demolition waste management rules.
- **The new rules are applicable beyond municipal areas and includes:**
 - Urban agglomerations, census towns, notified industrial townships.
 - Areas under Railways, Airports, SEZ, Pilgrimage.

Major highlights of these Rules, 2016

- **Segregation at source:**
 - To channelise the waste to wealth by recovery, reuse and recycle.

- **Waste generators have to segregate waste into 3 streams:**
 - **Biodegradables, Dry** (Plastic, Paper, metal, Wood, etc.) and **Domestic Hazardous waste** (diapers, napkins, etc.) before handing it over to the collector.
- **Event organisers** and restaurants etc. are responsible for segregating the waste and manage in partnership with local bodies.
- At any event, or gathering, the organiser will ensure segregation of waste.
- The **local authorities** are responsible for collection, storage, segregation, transportation, processing and disposal of Municipal Soild Waste.
- **Duties of Ministry of Urban Development:**
 - To formulate National Policy and Strategy on Solid Waste Management.
 - To review the measures taken by the States and local bodies
 - To undertake training and capacity building of stake holders.
- **Management of waste in hilly areas:**
 - Construction of landfills on hills shall be avoided.
 - Transfer stations and processing facilities shall be operational in the hilly areas.
- **Central Monitoring Committee**
 - It will be established under the chairmanship of Secretary, MoEF&CC.
 - It is to monitor the overall implementation of the rules.

E-Waste Management Rules, 2016

- It replaces the E-Waste (Management and Handling) Rules 2011.
- **E-waste:** Discarded electronic devices, used electronics which are destined for refurbishment, reuse, resale, salvage recycling through material recovery, or disposal.
- **Object:** To enable the recovery or reuse material from waste e-materials.
- These rules apply to every manufacturer, producer, consumer, e-retailer, recycler involved in the electronics industry directly or indirectly.
- **These rules do not apply to:**
 - **Used lead acid batteries:** Covered under the Batteries (Management and Handling) Rules, 2001.

- **Micro Enterprises:** Covered under Micro, Small and Medium Enterprises Development Act, 2006.
- **Radio-Active Wastes:** Covered under Atomic Energy Act, 1962.

Salient Features:

- **Extended Producer Responsibility (EPR):** The producers have been made responsible for collection of E-waste and for its exchange.
- **Role of State Government:** To ensure safety, health and skill development of the workers involved.
- **Urban Local Bodies:** To collect and channelize orphan products to authorized dismantler or recycler.

Wetlands (Conservation and Management) Rules 2017

- It aims to guide states to identify wetlands.
- It clarifies that all wetlands, irrespective of their location, size, ownership, biodiversity, or ecosystem services values, can be notified under these rules.
- It is to conserve and manage wetlands in the country.
- These rules do not include:
 - River channels, paddy fields, human-made waterbodies, aquaculture, salt production.
 - Wetlands falling within areas covered under the Indian Forest Act, 1927, Forest (Conservation) Act, 1980, Wildlife (Protection) Act, 1972 and the Coastal Regulation Zone Notification, 2011.
- State Wetland Authority in every state and UT will be headed by Environment Minister of the respective state.
- Functions of State Wetland authority:
 - To develop a comprehensive list of activities to be permitted within wetlands.
 - To recommend additional prohibited activities for specified wetlands.
- National wetland Commission:
 - It replaces Central Wetlands Regulatory Authority and will be headed by the secretary to MoEFCC.
 - It will advise the central government on policies and action programmes for conservation and wise use of wetlands.

Provisions under new Wetland Conservation Rules

- **Definition:** An area of marsh, fen, peatland or water, whether:
 - Natural or artificial, permanent or temporary.
 - Static or flowing, fresh, brackish or salt.
 - Marine water, the depth of which at low tide does not exceed 6 meters.
- **Decentralization of Power:** States and UTs can identify and manage wetlands.
- **State Wetlands Authority:** State's environment minister will be the head.
 - It will prepare list of wetlands of the State and UTs within 3 months.
- **National Wetlands Committee:** It replaces Central Wetlands Regulatory Authority (CWRA).
 - It is to monitor implementation new rules.
 - It will advise the Central Government on policies, action programmes for conservation and wise use of wetlands
- **Banned activities in wetland areas:**
 - Setting up industries, dumping of solid, electronic, hazardous and construction wastes, poaching of animals.
 - Conversion of wetlands into non-wetlands, permanent construction.

Coastal Regulation Zone (CRZ), 2011

- It is notified under section 3 of Environment Protection Act, 1986.
- It is to regulate activities in the coastal area by Environment and Forests Ministry.
- It includes only the inter-tidal zone and land part of the coastal area and does not include the ocean part.
- The notification imposes restriction on the setting up and expansion of industries etc.

Coastal Regulation Zone:

- The land area from High Tide Line (HTL) to 500m on the landward side along the sea front.
- A stage of 100m along banks of creeks, lagoons, estuaries, backwater and rivers.
- The land area falling between the hazard line and 500m from HTL on the landward side, in case of seafloor,
 - And between the hazard line and 100 m line in case of tidal influenced water body.
 - **Hazard Line:** the line at which natural hazards like adverse weather incidents and tsunami are likely to impact.

CRZ is divided into 4 categories:

- **CRZ-1: Ecologically sensitive areas**
(Mangroves, Coral reefs, Biosphere reserves etc.).
 - These are **essential in maintaining the ecosystem** of the coast.
 - They lie **between low and high tide line**.
 - **Exploration of natural gas and extraction of salt are permitted.**
 - **No new construction** is permitted here **except** Projects relating to the Department of Atomic Energy.
- **CRZ-2: Urban areas located in the coastal areas.**
- **CRZ-3: Rural and urban localities which fall outside the 1 and 2.**
 - Only certain activities related to **agriculture even some public facilities are allowed in this zone.**
 - **Between 0-200 meters from HTL** is a **No Development Zone.**
- **CRZ-4: It lies in the aquatic area up to territorial limits.**
 - It covers coastal stretches of Andaman & Nicobar and Lakshadweep.
 - **Fishing and allied activities are permitted in this zone.**
 - **No Solid waste** should be let off in this zone.

Paris Agreement, 2016

- It is an **agreement within** the United Nations Framework Convention on Climate Change (UNFCCC), **on climate change.**
- It was **negotiated** at the Paris climate conference (COP21) in December 2015, in which countries adopted the first ever universal, **legally binding global climate deal.**
- **Objectives:**
 - To limit global warming to well below 2°C above pre-industrial levels.
 - To limit the temperature, increase to 1.5°C above pre-industrial levels.
 - It is to achieve a **balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases** in second half of 21st century.
- **India's plans to this agreement:**
 - To reduce its emissions intensity by 33 - 35% between 2005 and 2030.

- To achieve 40% of its **cumulative electric power from non-fossil fuel-based energy resources** by 2030.

- USA **withdrew** from the agreement in 2020 but rejoined in 2021.

Compensatory Afforestation Fund Act, 2016

- This act **sets up** Compensatory Afforestation Fund Management and Planning Authority (CAMPA) at central and state level.
- It ensures transparent utilization of amounts of **forest land diverted for non-forest purpose.**
- It would **reduce the impact of diversion of such forest land.**
- It established National and state Compensatory Afforestation Fund (NCAF) **under the public account of India and State.**
- There is a **constitution** to monitor activities undertaken from **these funds.**
- It also provides for **annual audit** of the accounts by CAG.
- **E-Green Watch:** For online monitoring of afforestation works being carried out using CAMPA funds.

HCFCs Phase out Management plan

- It is effective from 2017-23.
- The **long-term target** is to phase out HCFCs is by 2030.
- India will use \$44. 1 million to help industries to switch over to alternatives.
- **News Context:**
 - India launched the 2nd stage of this to phase out Hydrochlorofluorocarbons (HCFCs).
 - This plan follows **Montreal Protocol** to end use of **Ozone Depleting Substances.**
- **CFCs and HCFCs contain carbon, hydrogen, chlorine, fluorine, produced as volatile derivative of methane, ethane, and propane.**
- **CFCs are used as refrigerants and solvents.**
- **CFCs contribute to ozone depletion in the upper atmosphere.**

Kigali Agreement

- It is an **international agreement to reduce the consumption and production of HFCs.**
- It is a **legally binding** agreement designed to create rights and obligations in international law.
- It amends the 1987 **Montreal Protocol** to include **gases responsible for global warming.**

- As, **Montreal Protocol** was originally created to preserve and restore the ozone layer.

All countries are divided into **3 groups to reduce HFCs.**

- **1st Group:** Developed countries like US and EU etc.
 - They will freeze production and consumption of HFCs by 2018.
 - They will reduce it to about 15% of 2012 levels by 2036.
- **2nd Group:** Countries like China, Brazil etc.
 - They will freeze HFC use by 2024 and cut it to 20% of 2021 levels by 2045.
- **3rd Group:** Countries like India, Pakistan, Iran, Saudi Arabia etc.
 - They will freeze HFC use by 2028 and will reduce it to about 15% of 2025 levels by 2047.
- At present, **115 states and EU have ratified Kigali Amendment.**

Aviation Climate Deal

- It implements **carbon emission tax** on airlines in order to offset emissions in the aviation sector.
- It would **reduce growth of emissions from commercial flights.**
- It expects from **member countries to reduce emission by 2020 and limit it after 2021**(after it comes to effect).
- It is a **voluntary from 2021-2026** and it becomes **mandatory from 2027.**
- **News Context:** International Civil Aviation Organisation approved it.

Notification of Prevention of cruelty to animals (Pet Shop) Rules, 2016

- It is to **make pet shops accountable and to prevent cruelty on animals kept in pet shops.**
- These rules are notified by **Ministry of Environment, Forest and Climate Change.**
- **The proposed Rules provide:**
 - Every pet shop owner has to register themselves with State Animal Welfare Board after inspection.
 - **Space requirement for birds, cats, dogs etc.** in the pet shops.
 - **Basic amenities**, power back-up, general care, **veterinary care etc.** for animals kept in pet shops.
 - To **maintain records** of sale, purchase, death of animals in pet shops etc.

- Submission of **yearly report** by the Pet Shop owners to State Board of animal records.

- Any **violation of rules** could be a ground for **cancellation of registration of pet shop.**

The Prevention of Cruelty to Animals Act, 1960

- It is to **prevent unnecessary pain or sufferings on animals.**
- Under this act, **Animal Welfare Board of India** was constituted in 1962.
- It provides **guidelines relating to experimentation on animals for scientific purposes.**
- **Prevention of Cruelty to Animals (Care and Maintenance of Case Property Animals) Rules, 2017:**
 - It is **framed under** the Prevention of Cruelty to Animals Act, 1960.
 - It **allows Magistrate to forfeit (to lose)** the cattle of an owner facing trial under the Act.
 - Then animals are sent to animal shelters or adoption.

Plastic Waste (Management and Handling) Rules, 2016

- It defines **minimum thickness of plastic carry bags** i.e. 50 microns.
- **Under this,**
 - State Pollution Control Board will not grant or renew plastic bags registration.
 - Shopkeepers with payable registration with local bodies will be allowed to provide plastic carry bags.
 - It is to promote **plastic use for road construction.**
- **Responsibilities of Sections:**
 - **Local bodies:** Gram Sabha will implement it.
 - **Producers and Brand Owner:** They have to collect waste generated from their products.
 - **Waste Generators:** They have to segregate and store their waste as per Solid Waste Management Rules and handover it to authorized waste disposal facilities.
 - **Street Vendor and Retailers:** They are not allowed to provide such carry bags.

Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001

- it provides a system to protect plant varieties, to develop and cultivate new plant varieties.
- It is world's only Intellectual Property Rights legislation on plant varieties that protects breeders, farmers, researcher rights, who have developed any new or extant plant varieties.
- The rights granted under this Act are exclusive to produce, sell, market, distribute, import and export the variety.
- **Objective:**
 - To recognize and protect the rights of farmers in respect of their contributions in conserving, improving, 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.

Blue Flag Certification

- **News Context:** 13 Indian beaches have been shortlisted for the Blue flag certification.
- It is pilot project under Environment ministry under a Unified Coastal Areas Management Programme.
- It is to develop the Indian beaches according to Blue Flag standards.
- **Chandrabhaga Beach, Odisha:** It is 1st Asian beach to get Blue Flag certification.

Blue Flag Standards, 1985

- It was established by Copenhagen-based Foundation for Environmental Education in France.
- It is an environmental award for beaches, sustainable boating tourism operators.
- Only local authorities or private beach operators can apply for a Blue Flag for beaches.
- **There are 4 criteria for Blue Flag Beaches:**
 - Water quality.
 - Environmental management.
 - environmental education.
 - Safety.

Plastic Waste Management Rules, 2016 (Amended in 2018)

- This act says about minimum thickness of plastic carry bags i.e. 50 microns.
- This would increase the cost and tendency to provide free carry bags would come down.
- It aims to get rid of single-use plastics by 2022.
- It promotes use of plastic for road construction or energy recovery.

Major Features:

- **Responsibility of local bodies:** Rural areas are brought under these rules.
 - Gram Sabhas have implementation responsibility.
- **Extended Producer Responsibility:**
 - Producers and brand owners are responsible for collecting waste generated from their products.
 - Producers will keep record of their vendors to whom they have supplied raw materials for manufacturing.
- **Responsibility of waste generator:**
 - All of plastic waste generators shall segregate and store their waste as per Solid Waste Management Rules.
 - The waste has to be handover to authorized waste disposal facilities.
- **Responsibility of street vendors and retailers:**
 - Carry bags will not be provided to customers or fine would be imposed.
 - Only registered (to local bodies) shopkeepers on payment can provide plastic carry bags.

CATEGORIES OF PLASTIC

Type	Category	Examples	Recyclable?
Thermoplastics	PS (Polystyrene)	Foam hot drink cups, plastic cutlery, containers, and yogurt	Partially
	PP (Polypropylene)	Lunch boxes, take-out food containers, ice cream containers	Partially
	LDPE (Low-density polyethylene)	Garbage bins and bags	Partially
	PVC (Plasticized polyvinyl chloride or polyvinyl chloride)	Juice or squeeze bottles	Yes
	HDPE (High-density polyethylene)	Shampoo containers or milk bottles	Yes
Thermoset and others	PET (Polyethylene terephthalate)	Fruit juice and soft drink bottles	Yes
	Multi-layer and laminated plastics, polyurethane foam, Bakelite, polycarbonate, melamine, nylon etc.	Car parts, mattresses, circuit boards and electrical insulators	Yes

Conventions and Protocols

Basel Convention, 1989-1992

- It is an international treaty to reduce the movements of hazardous waste between nations.
- It also prevents transfer of hazardous waste from developed to less developed countries (LDCs).
- It minimizes the rate and toxicity of wastes generated, and to assist LDCs in environmentally sound management.
- However, it does not address the movement of radioactive waste.
- Hazardous waste: It can be categorized in 4 ways:
 - Ignitability: Something flammable.
 - Corrosivity: That can rust or decompose.
 - Reactivity: Something explosive.
 - Toxicity: Something poisonous.
- Waste regulated by Basel Convention:
 - Biomedical and healthcare wastes, Electronics waste.
 - Used oils, Used lead acid batteries.
 - Persistent Organic Pollutant wastes (POPs wastes), Polychlorinated Biphenyls (PCBs).
 - Thousands of chemical wastes.
- Members: 187 (As of October 2018), India is a member.
- The Basel Action Network (BAN):
 - It works as a consumer watchdog for implementation of the Basel Convention.
 - Its principal aim is fighting exportation of toxic waste, including plastic waste, from industrialized societies to developing countries.
 - BAN works to curb trans-border trade in hazardous electronic waste, land dumping, use of prison labor.

Rotterdam Convention (Netherlands), 1998-2004

- It is formally known as Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.
- It is a multilateral treaty to promote shared responsibilities in relation to importation of hazardous chemicals.

- It promotes open exchange of information on exporters of hazardous chemicals to use proper labelling.
- It also includes directions on safe handling, inform purchasers of any known restrictions or bans.
- It covers pesticides and industrial chemicals.
- Signatory nations can decide whether to allow or ban the importation of chemicals listed in the treaty.
- Members: 161 (As of October 2018)

Minamata Convention, 2013-2017

- It is the first global legally binding treaty on Mercury to protect human health and the environment from the adverse effects of it.
- This convention requires party nations to:
 - Reduce use and release of mercury from artisanal and small-scale gold mining (ASGM).
 - Control mercury air emissions from coal-fired power plants, coal-fired industrial boilers, waste incineration and cement production.
 - Reduce mercury use in batteries, switches, lights, cosmetics, pesticides etc.
- It also puts a ban on new mercury mines.
- It addresses interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury as well as health issues.
- It controls the trans-boundary movement of mercury.
- It does not include natural emissions of mercury.

Convention on Long-Range Transboundary Air Pollution (LRTAP) or Air Convention, 1979-83

- It is to protect the human environment against air pollution and to reduce and prevent air pollution.
- It includes long-range transboundary air pollution.
- It is implemented by European Monitoring and Evaluation Programme (EMEP), directed by the UN Economic Commission for Europe (UNECE).
- There are 3 main subsidiary bodies of this convention:
 - The Working Group on Effects.
 - The Steering Body to EMEP.
 - The Working Group on Strategies and Review.

- The Convention has been extended by 8 protocols that identify specific measures to be taken by Parties to cut their emissions of air pollutants:
 - Nitrogen Oxide Protocol (1988).
 - Volatile Organic Compounds Protocol (1991).
 - Protocol on Heavy Metals (1998).
 - Aarhus Protocol on Persistent Organic Pollutants (1998) etc.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), 1973-75

- It is also known as **Washington Convention**.
- It is a **multilateral treaty to protect endangered plants and animals**.
- It was drafted as a result of a resolution adopted in 1963 at a meeting of IUCN.
- **Objective:** To ensure that international trade of wild animals and plants does not threaten the survival of the species in the wild.
- **CITES prohibits international trade** except for certain purposes, such as: **Research**.
- It is **Administered** through UN Environment Programme (UNEP).
- **Secretariat:** Geneva, Switzerland.
- It is **Legally binding on the Parties** but does not take the place of national laws.

Species protected under this convention:

- **Appendix I:** Around 1200 species.
 - Most endangered among CITES.
 - Eg: Gorillas, Sea Turtles, Giant pandas.
- **Appendix II:** Around 21,000 species.
 - Not necessarily threatened with extinction at present.
 - Eg: American ginseng, paddlefish, etc.
- **Appendix III:** Around 170 species.
 - Species included at the request of a Party.
 - Eg: Map turtles, Walruses, Cape Stag Beetles.
- **International trade is allowed** only on presentation of the **appropriate permits or certificates**.
- Species may be added to or removed from Appendix I and II, or moved between them, only by the Conference of the Parties.

Convention on the conservation of Migratory Species (CMS) or Bonn Convention, 1979-83

- It is the **only global, UN based, intergovernmental organization established**

exclusively for the conservation and management of terrestrial, aquatic and avian migratory species.

- It was signed under UNEP and is concerned with conservation of wildlife and habitats.
- **Members:** 131 (As of September 2020), India is member.
- The agreements may range from legally binding treaties to less formal instruments.
- **Convention has 2 Appendices:**
 - **Appendix I:** Migratory Species that are endangered or threatened with extinction.
 - **Appendix II:** Migratory Species which have an unfavorable conservation status.
- Species which require international agreements for their conservation and management.
- **Fundamental Principles of Parties:**
 - To promote, cooperate, support in research relating to migratory species.
 - To provide immediate protection for migratory species included in Appendix I.
 - To conclude Agreements covering the conservation and management of migratory species included in Appendix II.

Organizational Structure of CMS:

- **Conference of the Parties (COP):** It is principal decision-making body, composed of all States Parties to the Convention.
- **Standing Committee:** It is responsible for carrying out interim activities on behalf of the COP.
- **Scientific Council:** To advise on scientific matters, such as: **Migratory species, Specific Conservation etc.**

Convention on Biological Diversity (CBD) or Biological Diversity, 1993

- The convention was opened for signature at Earth Summit in Rio de Janeiro in 1992.
- It has **3 main goals:**
 - Conservation of biological diversity (or biodiversity).
 - Sustainable use of its components.
 - Fair and equitable sharing of benefits arising from genetic resources.
- It has **2 supplementary agreements:** the Cartagena Protocol and Nagoya Protocol.

- The **Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2000-03:**
 - It is an **international treaty governing the movements of living modified organisms (LMOs)** resulting from modern biotechnology from one country to another.
 - **Living Modified Organisms:** These are living organisms that possess a new combination of genetic material obtained through the use of modern biotechnology.

- The **Nagoya Protocol**

Aichi Biodiversity Targets:

- **Strategic Goal A:** To address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.
- **Strategic Goal B:** To reduce the direct pressures on biodiversity and promote sustainable use.
- **Strategic Goal C:** To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.
- **Strategic Goal D:** To enhance the benefits to all from biodiversity and ecosystem services.
- **Strategic Goal E:** To enhance implementation through participatory planning, knowledge management and capacity building.
- **Note:**
 - **2010:** International Year of Biodiversity.
 - **2011 to 2020:** UN Decade on Biodiversity.

Rio de Janeiro Earth Summit (Earth Summit), 1992

- It is also known as **UN Conference on Environment and Development (UNCED).**
- It was created as a response for member states to cooperate together internationally on development issues after the Cold War.
- It was held for members state to collaborate to implement Sustainable development.

The issues addressed in the Summit:

- **Systematic scrutiny of patterns of production:**
 - Particularly the production of toxic components, such as: lead in gasoline, or poisonous waste including radioactive chemicals.
 - Alternative sources of energy to replace the use of fossil fuels.
 - New reliance on public transportation systems to reduce vehicle emissions.
 - The growing usage and limited supply of water.

- **Major achievements of Summit:**
 - An agreement on Climate Change Convention which, led to the Kyoto Protocol and the Paris Agreement.
- **Earth Summit resulted in the following documents:**
 - Rio Declaration on Environment and Development.
 - Agenda 21, Forest Principles.
 - Convention on Biological Diversity (CBD): Legally binding
 - UN Framework Convention on Climate Change (UNFCCC): Legally binding
 - UN Convention to Combat Desertification (UNCCD): Legally binding
- **Agenda 21:**
 - It is a non-binding action plan of the UN for sustainable development.
 - The "21" in Agenda 21: It refers to the 21st century.
 - Since 2015, Sustainable Development Goals are included in the Agenda 2030.

International Convention for the Prevention of Pollution from Ships (MARPOL), 1973-83

- It is the main international convention covering prevention of pollution of marine environment by ships from operational or accidental causes.
- It was developed by **International maritime organization.**
- **Members:** 158, India is a signatory.
- **It has 6 technical Annexes:**
 - **Annex I:** Regulations for the Prevention of Pollution by Oil.
 - **Annex II:** Regulations for 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.

Dublin Statement on Water and Sustainable Development (Dublin Principles), 1992

- It took place at **International Conference on Water and Environment (ICWE), Ireland.**

- It recognises increasing scarcity of water as a result of different conflicting uses and overuses of water.

The Dublin Principles:

- It recommends for action at local, national, international levels to reduce scarcity, through following 4 principles:
 - Fresh water is a finite and vulnerable resource, essential to sustain life, development and environment.
 - Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.
 - Women play a central part in the provision, management and safeguarding of water
 - Water has an economic value in all its competing uses and should be recognized as an economic good

Conservation efforts in India

Project Elephant, 1992

- It was launched by Environment and Forest Ministry as **Centrally sponsored scheme**.
- It is to provide **financial and technical support to wildlife specially for wild Asian Elephants**.
- **Objectives:**
 - To protect elephants, habitat, corridors.
 - To address issues of man-animal conflict.
 - Welfare of domesticated elephants.
- **Protection Status:**
 - **IUCN Status:** Endangered.
 - Schedule 1 of Wildlife Protection Act, 1972.
- **Elephant Corridor:**
 - A s narrow strips that connects larger habitats of elephant to make their movement easy and to avoid Man-elephant conflict.
- **Haathi Mere Saathi:**
 - It was **launched by Environment Ministry and wildlife trust of India (WTI)**.
 - It was launched at “Elephant- 8” Ministerial meeting held in Delhi in 2011.

- **E-8 countries:** India, Srilanka, Indonesia, Thailand, Botswana, Republic of Congo, Kenya, Tanzania.

- The campaign mascot: Gajju.

• Elephant 8 Ministerial Meeting:

- It represented regions with all 3 species of elephants:
 - Elephas Maximus (Asian elephant).
 - Loxodonta Africana (African Bush Elephant).
 - Loxodonta Cyclotis (African Forest Elephant).

PROJECT TIGER, 1973

- It funds and helps the ‘tiger range States’, for **in-situ conservation of tigers** in the chosen tiger reserves.
- It also protects **tribal people rights living in and Tiger Reserve** around tiger reserves.
- **The habitats covered under Project tiger are:**
 - Central India conservation unit, Shivalik-terai conservation unit.
 - North East conservation unit, Sariska conservation unit.
 - Sunder bans conservation unit, Eastern Ghats conservation unit.
 - Western Ghats conservation unit.

Core and Buffer Area

- **Core Area:** It has **legal status of Wildlife Sanctuary or National Park**.
 - These areas are free of all forestry operations and human activities.
- **Buffer Area:** These **multi-purpose areas consist of forest and non- land and subjected to conservation-oriented land use**.

National Tiger Conservation Authority (NTCA):

- The **Amendment Act of 2006** provides for the constitution of a statutory authority known as the NTCA to aid in the implementation of measures for the conservation of the tiger.

Important functions:

- To **approve the Tiger Conservation Plan** prepared by the State Government.
- To ensure that tiger reserves and other protected areas are not diverted for ecologically unsustainable uses, except in public interest and with the **approval of the National Board for WildLife**.

International Cooperation

The Global Tiger Forum (GTF)

- It is the only inter- governmental international body established with members from willing

- countries to embark on a global campaign to protect the Tiger.
- focused on saving the remaining 5 sub-species of Tigers distributed over 13 Tiger Range countries of the world.
- HQ: New Delhi

Global Tiger Initiative (GTI), 2008:

- It was launched as a global alliance with:
- Governments, International Organizations, Civil society, private sector.
- Its aim is working together to save wild tigers from extinction.
- Note: It included Snow Leopards in the project in 2013.

St. Petersburg Tiger Summit in Russia, 2010:

- All 13 tiger range countries came together for the first time with the commitment of doubling the number of wild tigers by 2022.

ALL INDIA TIGER ESTIMATE-2018

- Tigers in India has risen to 2967, in 2018 from 2,226 in 2014.
- The census was led by NTCA, Wildlife Institute of India with State Forest Departments.
- **Findings Tiger Estimation:**
 - Biggest increase in tigers: It is in MP from 308 in 2014 to 526.
 - Note: MP has highest number of tigers.
- **Continuing loss of tiger-occupied areas:**
 - The net loss in tiger-occupied area is estimated to be 20% in 4 years.
- **No tiger was recorded in:**
 - Buxa (West Bengal), Dampa (Mizoram), Palamu (Jharkhand) tiger reserves.

Technologies in the report: Monitoring System for Tigers:

- **Intensive Protection and Ecological Status (M-STRIPES):**
 - It is a software-based monitoring system launched across Indian tiger reserves by NTCA.
- **CaTRAT (Camera Trap Data Repository and Analysis Tool):**
 - It is an image processing software used for organizing and geotagging of photo-captures.
- **Spatially explicit capture-recapture (SECR) method:**
 - It is used to estimate population density from camera trap data.

Indian Tiger or Royal Bengal Tiger (*Panthera Tigris*)

- **Protection Status:**

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Environment

- **IUCN Status:** Endangered.
- **Wildlife protection Act:** Schedule I.
- **CITES:** Appendix I.
- **Habitat:** India (80%), Bangladesh, Nepal, Bhutan, China, Burma.
- **Natural Habitat:** Tropical rainforests, marshes, tall grasses.
- **Note:** Tigers are an "umbrella" species.
 - By rescuing them, we save everything beneath their ecological umbrella.
 - Everything connected to them.

Vulture Conservation

- India has nine species of vultures in the wild.
- In India the population of **three species** i.e. **Whitebacked Vulture, Slender billed Vulture and Long billed Vulture** in the wild has declined drastically over the past decade.
- Decline of vulture populations in India was first recorded at the **Keoladeo Ghana National Park, Rajasthan**.
- **Main reason: Bioaccumulation of drug diclofenac.**

Diclofenac Sodium as the Probable Cause

- Diclofenac is a **non-steroidal anti-inflammatory drug (NSAID)**.
 - To reduce inflammation and pain.
- NSAIDs are associated with adverse **kidney (renal) failure**
- Vultures were **unable to break down the chemical diclofenac**.
- **Visceral gout**, an accumulation of uric acid, was observed in 85% of dead vultures found.
- "**Neck drooping**" - vulture exhibit this behaviour for prolonged periods over several weeks before collapsing and falling out of trees or just prior to death.
 - It is the **only obvious behavioural indication** that birds are ill.
 - Neck drooping is **also reported in healthy birds** under hot conditions.

Meloxicam - An Alternative

- Meloxicam is a **second generation NSAID**. It is rated better than **Diclofenac** for the treatment of livestock.
- Reduced risk of side effects and is also approved for **human use** in more than 70 countries.
- Licensed as a veterinary drug in India, Europe and USA.

Diclofenac is banned in India, but **human forms of the drug** are still in use because they are **cheaper than alternative drugs**.

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Vulture Safety Zones

Aim:

- To establish targeted awareness activities surrounding 150 km radius of vultures' colonies
- A safe source of food that is free of contamination from veterinary drugs, poisons and other agricultural chemicals.

Three Zones

1. The zone between Uttarkhand to Nepal: from Jim Corbett to Katriya Ghat, a Tarai belt, covering 30,000 square kilometers. It includes Dudhwa and Kartarniaghata forest reserves in UP.
2. A belt between Dibrugarh in Assam to North Lakhimpur in Arunachal Pradesh.
3. In central India, covering Chhattisgarh.

Vulture Restaurants

- Tables are reserved only for the unique and rare vultures.
- Involvement of local communities in in-situ conservation.
- Initiative by Maharashtra and Punjab forest departments.

Vulture Breeding Centres in India

- Asia's first 'Gyps Vulture Reintroduction Programme' launched at Pinjore, Haryana-2001.
 - Jatayu Conservation Breeding Centre, Pinjore.
- Other centres
 - Rani, Guwahati
 - Buxa, West Bengal
- Managed by the Central Zoo Authority.
- A 'Vulture Captive Care facility' has been established at Panchkula.

India's Role in Conservation

- India moved a motion in IUCN in 2004 for vulture conservation, which was accepted.
 - IUCN resolution: Gyps vulture Range countries to prevent uses of diclofenac in veterinary applications.
- Establishment of IUCN South Asian Task Force.

SAVE - Saving Asia's Vultures From Extinction

To save three species of Gyps vulture

- Oriental white-backed vulture or White-rumped vulture
- Long-billed vulture
- Slender-billed vulture

Partners: Bird Conservation Nepal, Bombay Natural History Society (India), International Centre for Birds of Prey (UK), National Trust for Nature Conservation (Nepal), Royal Society for the Protection of Birds (UK).

Greater One Horned Rhino (Indian Rhinos)

Conservation

- Protection Status:
 - IUCN status: Vulnerable
 - Schedule I of Wildlife Protection Act, 1972.
- Habitat: Nepal, UP, Assam, West Bengal.
- News Context: Assam to set up new Special Protection Force (SPF) for better protection of one-horned rhinos.

Indian Rhino Vision 2020

- It was launched in 2005.
- It was implemented by the Department of Environment and Forests, Assam with The Bodo Autonomous Council as active partner.
- Aim:
 - To increase rhino population in Assam from 2000 to 3000 by 2020.
 - To Translocate Rhinos from Kaziranga National Park and Pobitora WLS: To ensure that these rhinos are distributed over at least 7 protected areas (PA).
 - That is, Manas National Park, Dibru Saikhowa WLS, Laokhowa - Bura Chapor WLS, Orang National Park, Kuch-Mora.

Snow Leopard Conservation

- Protection Status:
 - IUCN status: Vulnerable.
 - Schedule I under Wildlife (Protection) Act 1972
 - Appendix I of Convention on International Trade of Endangered Species (CITES), (trading of animal body parts illegal in signatory countries).
 - Appendix I Convention on Migratory Species (CMS)
- Habitat: Indian Himalaya, China, Mongolia.
- India is home to 10% of the global population in less than 5% of its global range.
- India has ratified international agreements promoting the conservation of high-altitude wildlife species. Eg: Snow Leopard.
- The Global Snow Leopard & Ecosystem Protection Program, GSLEP:
 - It is an inter-governmental alliance of all the 12 Snow Leopard range countries.
 - It unites governments, nongovernmental and inter-

- governmental organizations to conserve snow leopards and their high-mountain ecosystems.
- Under this, snow leopard range countries have committed to securing 20 landscapes across the cat's range by 2020.
- Project Snow Leopard, 2009:**
 - It is to promote knowledge-based adaptive conservation framework with local communities.
 - It is operational in 5 Himalayan regions: J&K, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh.
- Secure Himalaya**
 - It is executed by Forest and environment Ministry and UNDP to conserve snow leopards.

Snow Leopard Population Estimation in India (SLPAI):

- It is prepared by:
 - Wildlife Institute of India, Nature Conservation Foundation.
 - GSLEP committee, Global Tiger Initiative Council.
 - Worldwide Fund for Nature, World Bank.
 - Global Tiger Forum and Wildlife Conservation Trust.
- National-level estimation will be done for Snow leopard, besides Tigers, Rhinos and Elephants.

Indian Turtle Conservation

- Protection Status:**
 - IUCN Status: Hawksbill turtle: Critically Endangered.
 - Green Turtle: Endangered.
 - Olive Ridley, Leatherback and Loggerhead: Vulnerable.
 - Schedule 1 of Wildlife Protection Act, 1972.
- Turtles in India are protected under Biodiversity Conservation and Ganga Rejuvenation programme.
- A Turtle Sanctuary at Allahabad will be established under Namami Gange programme.
- World Turtle Day:** 23rd May.
 - 2020 Theme: Adopt, Don't Shop.
- A large proportion of world's Olive Ridley Turtle population migrates every winter to

Indian coastal waters for nesting mainly at eastern coast.

- Operation Save Kurma:**
 - It was conducted to combat the proliferating illegal trade in live turtles and its parts from the country to destinations abroad.
- Olive Ridley Turtles**
 - Habitat:** Warm waters of the Pacific, Atlantic and Indian oceans
- Arribada:** A Unique mass nesting, where thousands of females come together on the same beach to lay eggs.
- They are carnivores, and feed mainly on jellyfish, shrimp, snails, crabs etc.
- Operation Oliva Exercise:**
 - Launched by Coast Guard as part of its annual mission to ensure the safe breeding.
- Operation Turtsihield:** Central programme to protect endangered turtles.
- Note:** Some other Turtle Species:
 - Assam Roofed Turtle (Sylhet roofed turtle).
 - IUCN Status: Endangered.
 - Habitat:** Brahmaputra-Meghna drainage (Assam), Parts of Eastern Bangladesh.
- Indian Flapshell Turtle and Indian peacock softshell turtles**
 - Protection Status:**
 - IUCN Status: Flapshell Turtle: Least Concerned.
 - Indian Peacock Softshell Turtles: Vulnerable.
 - Schedule-I of the Wildlife Protection Act and Appendix – I of CITES.

Dolphin Conservation

- Protection Status:**
 - IUCN Status: Endangered
 - Schedule-I of the Wild-Life (Protection) Act, 1972.
- There are 4 freshwater dolphins in the world:**
 - Ganges River Dolphin
 - Baiji: Yangtze River
 - Bhulan: Indus, Pakistan
 - Boto: Amazon River.
- Total 15 species** of dolphins have been reported in India.

Ganges Dolphin (susu) (National Aquatic Animal of India)

- Protection Status:**
 - IUCN Status: Endangered.

- **Habitat:** Ganga and Brahmaputra and their tributaries
- Its presence indicates the health of the riverine ecosystem.
- It is known to make strange sounds when it breathes.
- It is also known as blind dolphin because it doesn't have a crystalline eye lens and uses echolocation to navigate and hunt.
- Annual Ganges river dolphin census (2019), by:
 - Worldwide Fund for Nature-India
 - Uttar Pradesh Forest Department.
- **Integrated Development of Wildlife Habitat:**
 - One of the 17 species under Recovery programme of Critically Endangered Species
- **National Mission for Clean Ganga (NMCG):**
 - Initiated dolphin conservation programme in 2016.
 - To ensure long term survival of dolphin and other river fauna.

Irrawaddy dolphins

- **Protection Status:**
 - IUCN Status: Endangered.
 - **Habitat:** Chilika lake (highest single lagoon population).
 - Brackish water near the coasts or mouths of the rivers in South and Southeast Asia.
 - 80% of total population in Bangladesh.

Indian Crocodile Conservation

- Protection Status:
 - IUCN Status: Critically Endangered/ Vulnerable/ Threatened Species.
 - Appendix I: CITES
 - Schedule I: Wildlife Protection Act, 1972
- **Objectives:**
 - To protect the remaining population in natural habitat by creating sanctuaries.
 - To rebuild natural population quickly through 'grow and release' or 'rear and release'
 - To promote captive breeding.
- **Note: CAPTIVE BREEDING**
 - Members of a wild species are captured, then bred and raised.
 - When a population drops dangerously, captive breeding can boost numbers.

- For example: captive breeding of lion tailed macaque in Arignar Anna Zoological park Chennai, and in Mysore Zoo.

Crocodile Conservation in Bhitarkanika

- **News Context:** Increase of salt-water crocodile nests in Bhitarkanika National Park, Odisha.
- Bhitarkanika has 70% of India's estuarine or salt-water crocodiles whose conservation started in 1975.
- It is located in the estuary of Brahmani, Baitarani, Dhamra & Mahanadi river systems.
- This wetland is represented by 3 protected Areas:
 - The Bhitarkanika National Park.
 - The Bhitarkanika Wildlife Sanctuary.
 - The Gahirmatha Marine Sanctuary.
- **In India there are 3 species of Crocodile:**
 - **Gharial:** Critically endangered, Indian subcontinent.
 - **Mugger or Marsh Crocodile:** Vulnerable.
 - **Salt water or Estuarines Crocodile:** Least concern.
- **Crocodile Conservation and breeding project, 1975:**
 - It was launched in Odisha and then in other states FAO and UNDP.
 - It included protection of remaining population, rebuilding natural population, promotion of captive breeding, research and involvement of local people.

Blackbuck Conservation Reserve

- India's first wildlife conservation reserve for blackbuck is approved in Allahabad.
- It is done under Wildlife Protection Act, 1972.
- **Protection Status:**
 - IUCN Status: Least Concern (India: endangered)
 - Schedule I of the Wildlife Protection Act of 1972.
- **Habitat:** Indian Sub-Continent (Extinct in Bangladesh and Pakistan).
 - Grassland and Open forest area.
- **National Parks and Sanctuaries inhabited by blackbuck:**
 - Velavadar Wildlife Sanctuary, Gujarat.

- Ranibennur Blackbuck Sanctuary, Karnataka.

Global Wildlife Programme (GWP)

- It is also known as “**Global Partnership on Wildlife Conservation and Crime Prevention for sustainable development**”.
- It was launched in response to increasing crime against animals in natural habitat.
- India is a partner country.
- **Implementing Agencies of GWP:**
 - World Bank Group.
 - UN Development Programme (UNDP).
 - UN Environment Programme (UNEP).
 - Asian Development Bank (ADB).
- **Other Collaborating Partners:**
 - International Consortium to Combat Wildlife Crime (ICCWC).
 - Wildlife Conservation Society (WCS).
 - The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Secretariat,
 - World Wildlife Fund (WWF),
 - International Union for the Conservation of Nature (IUCN).
- **Priorities of GWP:**
 - To promote community-based resource management.
 - To achieve biodiversity goals and tourism development
 - To increase knowledge sharing and enhance collaboration.
 - To implement monitoring and evaluation framework.

Great Indian Bustard

- **Protection Status:**
 - IUCN Status: Critically Endangered.
 - Schedule I of the Indian Wildlife (Protection) Act, 1972.
 - Annex-I of Conservation of Migratory Species.
- **Habitat: Endemic to Indian Sub-continent** (Central and Western India, Eastern Pakistan).
 - Arid, Semi-arid grasslands, open country with thorn scrub, tall grass cultivation, no irrigated areas.
- **Important Sites:** Desert National Park Sanctuary (Rajasthan), Naliya (Gujarat), Warora (Maharashtra), Bellary (Karnataka).
- **Great Indian Bustard is Rajasthan's State Bird with highest population.**

Conservation Efforts for Great Indian Bustard

- **Project Godawan:**

- **Rajasthan** started it for conservation at Desert National Park in Jaisalmer.

- It is declared as **Endangered Migratory Species** at the COP to the Convention on the Conservation of Migratory Species (CMS) of Wild Animals.
- **Karnataka declared Siraguppa taluk in Karnataka as the Great Indian Bustard Protected Zone.**

Cheetah

- **Protection Status:**
 - IUCN Status: **African Cheetah:** Vulnerable.
 - **Asiatic Cheetah:** Critically endangered (surviving only in Iran).
- **It is a keystone species** of dry forests, scrub forests, and savannahs.
 - **Keystone species: Having extremely high impact on a particular ecosystem** relative to its population.
- **Cheetah was disappeared from India when Maharaja Ramanuj Pratap Singh Deo of Koriya hunted the last 3 recorded Asiatic cheetahs in India in 1947.**
- **It was declared extinct in 1952.**

Cheetah Reintroduction Programme

- **India will receive its first batch of the large cats from Africa (Namibia and South Africa).**
- **Namibia and South Africa have the highest cheetah populations in the world.**
- This is the first time in the world that a large carnivore will be relocated from one continent to another.
- **Dr M K Ranjitsinh committee** has completed an assessment of the sites for relocation.
- **Six Sites:**
 - Mukundara Hills Tiger Reserve and Shergarh Wildlife Sanctuary in Rajasthan.
 - Gandhi Sagar Wildlife Sanctuary, Kuno National Park, Madhav National Park and Nauradehi Wildlife Sanctuary in Madhya Pradesh.
- Kuno National Park is being ready for the relocation. The site has also been identified for relocating the Asiatic Lion too.
- **Asiatic cheetah is much stronger and faster than African cheetah.**

Conservation of Migratory Birds and their Habitats

- **It is based on Central Asian Flyway Action Plan:**

- It provides a **common strategic framework for regional collaboration and affirmative action for protecting, conserving, restoring, and sustainably managing populations of migratory bird species.**
 - It protects habitats in the Indian subcontinent falling under the Central Asian Flyway region.
- **Flyway Region:**
 - It is a geographical region within which a single or a group of migratory species completes its annual cycle - breeding, staging and non-breeding etc.
 - It includes breeding areas, stop-over areas and wintering areas.
- **Central Asian Flyway (CAF):**
 - It is among the 9 flyways in the world.
 - It links their northern most breeding grounds in Russia (Siberia) to the southernmost non-breeding (wintering) grounds in West and South Asia, Maldives, British Indian Ocean Territory.
- India provides a critical stopover sites to over **90% of the bird species known to use this migratory route.**
- At least **370 species of migratory birds visit the Indian Continent from 3 flyways:**
 - Central Asian Flyways.
 - The East Asian – Australasian Flyaway.
 - Asian East African flyway.

REDD+ (Reducing Emissions from Deforestation and forest Degradation)

- It includes **conservation of forest carbon stocks, sustainable management of forests, enhancement of forest carbon stocks in developing countries.**
- It aims to achieve climate change mitigation by incentivizing forest conservation.
- **Carbon pools:**
 - A system that has the capacity to store or release carbon.
 - There are **5 main carbon pools or reservoirs in forests:** Above-ground biomass, below-ground biomass, dead wood, litter and soil organic matter.

- The **Marrakesh Accords** (regulatory framework for the implementation of the Kyoto Protocol) **Recognized these major carbon pools.**
- **REDD+** was first negotiated under UNFCCC in 2005 to reduce net emissions of greenhouse gases through enhanced forest management in developing countries.
- **NATIONAL REDD+ STRATEGY:**
 - It covers all trees within forest areas and tree outside forest.

Phased approach of REDD+:

- **Phase 1: Development of national strategies or action plans, policies and measures, capacity-building.**
- **Phase 2: Implementation of national policies, measures and national strategies or action plans.**
- **Phase 3: Evolvement into results-based actions that should be fully measured, reported and verified.**
- **Sub-national REDD+ Approach (with the involvement of States Government):**
 - The country is divided into 14 physiographic zones by Forest Survey of India.
- **REDD+ Activities for Enhancement of Forest Carbon Stocks includes:**
 - Namami Ganga, Forestry Interventions for Other Major River Catchments.
 - Green Highways (Plantation, Transplantations, beautification & Maintenance) Policy – 2015
 - Green Army of Maharashtra etc.

Bodies and Organizations

International Union for Conservation of Nature (IUCN), 1948

- It is officially also known as **International Union for Conservation of Nature and Natural Resources.**
- It is an **international organization to conserve nature and to use natural resources sustainably.**
- It is involved in **data gathering and analysis, research, field projects, advocacy, and education.**
- **Mission:** "Influence, encourage and assist societies throughout the world to conserve nature and to ensure that any use of natural resources is equitable and ecologically sustainable".
- **Headquarter:** Gland, Switzerland.

- **Functions and Objectives:**
 - To publish IUCN Red List of Threatened Species and IUCN Red list for Ecosystem, which assesses the conservation status of species worldwide.
 - To expand the global network of national parks, protected areas, for greater protection of oceans and marine habitats.
 - To advise to environmental conventions, as: CBD, CITES and to advise UNESCO on natural world heritage.
- **IUCN Programme 2017–2020 identifies 3 priority areas:**
 - To value and conserve nature.
 - To promote and support effective and equitable governance of natural resources
 - To address societal challenges including climate change, food security, economic, social development.

Organizational structure

- **IUCN has 3 components:** Member Organizations, 6 scientific commissions, Secretariat.
- **Major Commissions of IUCN:**
 - Commission on Education and Communication (CEC):
 - Commission on Environmental, Economic, and Social Policy (CEESP):
 - World Commission on Environmental Law (WCEL):
 - Commission on Ecosystem Management (CEM):
 - Species Survival Commission (SSC):
 - World Commission on Protected Areas (WCPA):

Governance

- **The World Conservation Congress (Members' Assembly):**
 - It is IUCN's highest decision-making body.
 - It elects the council, President and approves IUCN's work program and budget.
- **IUCN Council:** It is the principal governing body of IUCN.

- **It includes President, 4 Vice Presidents** (elected by the council among its members), **Treasurer** etc.
- **It appoints Director General:** For overall management of IUCN and Secretariat.

Funding:

- IUCN's funding comes from **Official Development Assistance budgets** of **bilateral and multilateral agencies**.
- Besides this, **membership fees, grants, project funding from foundations, institutions and corporations**.

Note: IUCN has permanent observer and consultative status at the UN.

- It was involved in establishing **World Wide Fund and World Conservation Monitoring Centre**.

World-Wide Fund for Nature (WWF), 1961

- It is an international NGO that works for **wildlife preservation and to reduce human impact on environment**.
- **Mission:** "Stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature."
- **Headquarter:** Gland, Switzerland.
- **Reports by WWF:**
 - The **Living Planet Report since 1998** (with Zoological Society of London).
 - It is based on Living Planet Index and **ecological footprint calculation**.
 - **Earth Hour and Debt-for-nature swap Campaign**.
- **WWF Logo:** Giant panda.
 - It originated from a panda named **Chi Chi** that had been transferred from **Beijing Zoo to London Zoo in 1958**.

Organization and operation

- **Policy making:**
 - **Board of Members:** They decide WWF policies.
 - **Executive Team:** It guides and develops WWF's strategy.
 - **National Council:** It advises to board for conservation.
- **Functions and Objectives:**
 - To help governments to adopt, enforce, strengthen and change policies, guidelines and laws that affect biodiversity and natural resource use.

- To ensure government consent and keep their commitment to international instruments related to protection of biodiversity and natural resources.
- **Regional organisations:**
 - WWF-Australia, 1978;
 - It operates projects throughout Australia and Oceania region.

UN Environment Programme (UNEP) (UN Environment), 1972

- It resolves environmental issues within the UN system.
- It was established by Maurice Strong, its first director, after the UN Conference on the Human Environment in Stockholm.
- It is a member of UNDP.
- **Headquarter:** Nairobi, Kenya
- **Functions and Objectives:**
 - To provide leadership, deliver scientific solutions for climate change issues.
 - To manage marine and terrestrial ecosystems and green economic development.
 - To develop international environmental agreements, publish and promote environmental science.
 - To host secretariats of CBD, CITES, Minamata Convention, Migratory Species convention etc.

Organization:

- **UN Environment Assembly, 2012:** It is UNEP's governing body.
 - Members: 193.
 - It replaced Governing Council.

Structure: UNEP's structure includes 8 divisions.

- **Science Division:**
 - To provide scientific environmental information for sustainable development.
 - Makes reports on global environment, policies, provides warning of emerging environmental threats.
- **Policy and Programme Division:**
 - It makes the policy and programme of UNEP.
- **Ecosystems Division:**
 - It supports countries in conserving, restoring and managing their ecosystems.
- **Economy Division:** It has 3 main branches:

- Chemicals and Health, Energy and Climate, Resources and Markets.
- **Governance Affairs Office:**
 - It works with UN Environment Assembly, which is the governing body of UNEP.
- **Law Division:** It develops environmental law.
 - It improves cooperation between lawmakers around the world who make environmental laws.
- **Communication Division.**
- **Corporate Services Division.**
- **Major activities of UNEP:**
 - Climate Change, Disasters and conflicts.
 - Ecosystem management, Environmental governance.
 - Environment under review, Resource efficiency.
- **Note:** World Meteorological Organization and UNEP established the Intergovernmental Panel on Climate Change (IPCC) in 1988.
- **Awards by UNEP:**
 - Champions of the Earth.
 - United Nations highest environmental honor.
- **SEED Awards**
 - For locally driven entrepreneurs around the globe who integrate social and environmental benefits into their business models.
- **Sasakawa Prize**
 - individuals and organizations for protection of the environment
- **The Faith for Earth Initiative:**
 - UNEP launched it in November 2017.
 - To engage with faith-based organizations to fulfill the SDGs 2030 Agenda.

International Centre for Integrated Mountain Development (ICIMOD), 1983

- It is a regional intergovernmental learning and knowledge sharing center.
- It serves 8 regional member of Hindu Kush Himalayan region.
- **Members:** Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan.
- **Headquarter:** Lalitpur, Nepal.
- **Aim and objectives:**
 - To assist mountain people to understand influence of climate

change on stability of fragile mountain ecosystems.

- It brings together a partnership of its regional member countries to secure a better future for people and environment of the extended Himalayan region.

Central Pollution Control Board (CPCB), 1974

- It is a **statutory organisation and technical wing** of Environment, Forest and Climate Ministry (**MoEFCC**).
- It is an **apex organisation** in the field of pollution control.
- It was **established under Water (Prevention and Control of pollution) Act, 1974.**
- CPCB also has powers and functions under **Air (Prevention and Control of Pollution) Act, 1981 and Environment act, 1986.**
- It Co-ordinates the activities of the State Pollution Control Boards.
- **Chairman:** It is appointed by Appointments Committee of the Cabinet.
- **Head-Office:** New Delhi.
 - 7 zonal offices: Bengaluru, Kolkata, Shilong, Bhopal, Lucknow, Vadodara, Agra.
 - 5 laboratories.
- **Objectives and Functions:**
 - It conducts **environmental assessments and research.**
 - It maintains **national standards of environmental laws**, in consultation with zonal offices, tribal, local governments.
 - It monitors **water and air quality** and maintains monitoring data.
 - It advises **Governments, UTs, Local government** on industrial and other sources of water and air pollution.

Petroleum and Explosives Safety Organisation (PESO), 1890s

- It is an **apex department to control and administer** manufacture, storage, transport and handling of explosives, petroleum, compressed gases and other hazardous substances in India.
- It comes under **Department of Industrial Policy and Promotion (DIPP), Commerce and industry Ministry.**
- **Headquarter:** Nagpur.
- **It administers the responsibilities under:**
 - Explosives Act 1884.

- Petroleum Act 1934.

- Inflammable substance Act 1952.
- Environment Protection Act 1986.

- **Note: Fireworks raw material does not come under Explosives Act, 1884.**

- The officers are **selected by UPSC** into **Indian Petroleum and Explosives Safety Service (IPESS)**, a central civil services cadre.

- **It has framed various rules:**

- Petroleum Rules 2002.
- Explosive Rules 2008.
- Gas Cylinder Rules 2002.
- Static & Mobile Pressure Vessels (Unfired) 2016.
- Ammonium Nitrate Rules.
- Calcium Carbide Rules 1987.
- Cinematographic Films Rules, 1948 etc.

Central Ground Water Authority (CGWA), 1970

- It comes under **Water Resource Ministry.**
- It is **constituted under Environment (Protection) Act, 1986.**
- It was established by renaming **Exploratory Tube wells Organization** under Agriculture Ministry.
- It **regulates ground water development and sustainable management** in the country.
- It has powers to issue **advisories, public notices**, grant of No Objection Certificates (NOC) for ground water withdrawal.
- **Note:** It was merged with Ground Water Wing of Geological Survey of India during 1972.

National Green Tribunal (NGT), 2010

- It is a **statutory and quasi-judicial body** established under NGT Act, 2010.
- It aims for **disposal of cases relating to environmental protection** and conservation of forests and other natural resources.
- It is **guided by principles of natural justice.**
- **Principal Bench:** New Delhi.
- **Regional Benches:** Pune, Bhopal, Chennai, Kolkata.
- **Chairperson:** Retired Supreme Court Judge.
- **Other Judicial members:** Retired High Courts Judges.
- **Each bench will have at least one Judicial Member and one Expert Member.**
- **Expert members:** Professional Qualification (minimum 15 years of experience in the field of environment).
- **Members are not eligible for reappointment.**

- **Powers of NGT:**
 - To regulate its own procedure.
 - To dispose applications or appeals within 6 months of filing.
 - To provide relief and compensation to the victims.
 - To restitution of property damaged.
- **Jurisdiction of NGT: NGT deals with civil cases under 7 laws:**
 - The Water (Prevention and Control of Pollution) Act, 1974
 - The Water (Prevention and Control of Pollution) Act, 1977
 - The Forest (Conservation) Act, 1980
 - The Air (Prevention and Control of Pollution) Act, 1981
 - The Environment (Protection) Act, 1986
 - The Public Liability Insurance Act, 1991
 - The Biological Diversity Act, 2002

Wildlife Institute of India (WII), 1982

- It is an **autonomous institution under Environment Ministry.**
- It carries out **wildlife research of Biodiversity, Endangered Species, Wildlife Policy, Wildlife Management, Wildlife Forensics etc.**
- It includes **research facility of Forensics, Remote Sensing and GIS etc.**
- **Head Office:** Dehradun.
- **Note:** National tiger census is done by WII with NTCA.
 - The training of India Forest Service Officers is done here itself.

Indian Institute of Forest Management (IIFM), 1982

- It is an autonomous, Natural Resource training institute of Forestry.
- It comes under **Environment Ministry.**
- **Head office:** Bhopal.
- **Objectives:**
 - To fulfill growing need for **human resource in the area of Forest, Environment, and Natural resources Management.**
 - To get engaged in education, research, training and consultancy in the area of Forest, Environment.

Wildlife Crime Control Bureau, 2006-08

- It was **constituted by amending wildlife protection Act, 1972.**
- It is a **statutory body under MoEFCC to combat organized wildlife crime.**

- **Objectives:**
 - To collect **information related to organized wildlife crime.**
 - To **inform it to States and other enforcement agencies.**
 - To **assist and advise Customs authorities** in inspection of the consignments of flora & fauna.

Funds for Environment

Funds by World Bank

World bank provides funds mainly for Mitigation and adaptation strategies to developed countries and developing countries.

Climate Investment Funds (CIFs), 2008

Implemented with the multilateral development banks (MDBs) to bridge the financing and learning gap **between now and the next international climate change agreement.**

World Bank is Trustee of the CIFs.

It includes a "sunset clause" to ensure that the Fund's activities do not prejudice the outcome on the UNFCCC negotiations.

There are two multi-donor Trust Funds within the CIFs:

- a. Clean Technology Fund
- b. Strategic Climate Fund.

(a) Clean Technology Fund

- Administered by The World Bank
- Area of focus - Mitigation – general
- Provides new large-scale financial resources to invest in clean technology projects in developing countries (Mainly low-carbon technologies)
- Money **channelled through various multilateral development banks.** Eg: ADB and AIIB etc.

(b) Strategic Climate Fund

- Administered by the World Bank
- Area of focus - Mitigation – general
- Aim: Help low-income countries use new economic opportunities to increase energy access through renewable energy use
- Supports three targeted programs: FIP, PPCR; and SREP

(i) Forest Investment Program, 2009

- Administered by The World Bank
- Area of focus - Mitigation – REDD
- **Supports developing countries:** reduce deforestation and forest degradation (REDD)

- It is the 1st program under the Strategic Climate Fund.

(ii) Pilot Program for Climate Resilience

- Administered by The World Bank
- Area of focus – Adaptation

(iii) Scaling-Up Renewable Energy Program for Low Income Countries, 2009

- Administered by The World Bank
- Area of focus - Mitigation – general
- in low-income countries

2. Biocarbon Fund

- BioCarbon Fund Initiative for Sustainable Forest Landscapes-supports developing countries' efforts to reduce emissions.
- Administered by The **World Bank**
- Area of focus - Adaptation, Mitigation - general, Mitigation – REDD

3. Forest Carbon Partnership Facility

- Administered by The World Bank
- Area of focus - Mitigation – REDD
- Assists **developing countries**: to reduce emissions from **deforestation** and forest degradation, enhance and conserve forest carbon stocks, and sustainably manage forests
- **(REDD+)**

4. Partnership for Market Readiness

- Administered by The World Bank
- Area of focus - Mitigation – general
- established to use market instruments to scale up mitigation efforts in middle income countries

B. Funds by GEF (Global Environment Facility)

- Mainly for Adaptation.

1. GEF, 1991

- It is an **independently** operating financial organization, **set up under World bank**.
- In 1992, at the Rio Earth Summit, the GEF was restructured and **moved out of the World Bank** system to become a permanent, separate institution.
- Since 1994, however, the World Bank has served as the **Trustee of the GEF Trust Fund** and provided administrative services.
- It is based in **Washington DC**, United States.

The GEF serves as a financial mechanism for the following conventions:

- Convention on Biological Diversity (**CBD**)
- United Nations Framework Convention on Climate Change (**UNFCCC**)
- United Nations Convention to Combat Desertification (**UNCCD**)

- **Stockholm Convention** on Persistent Organic Pollutants (POPs)
- **Minamata Convention** on Mercury

The GEF, although **not linked formally to the Montreal Protocol** for Ozone, **supports implementation** of the Protocol in **countries with economies in transition**.

- It also focuses on international waters.
- India is both **donor and recipient** of GEF

2. Special Climate Change Fund, 2001

- Administered by The Global Environment Facility (GEF)
- Works under UNFCCC
- Area of focus – Adaptation
- It is to finance projects related to: adaptation; technology transfer and capacity building; energy, transport, industry, agriculture, forestry, and waste management; and economic diversification.
- The SCCF is the only adaptation fund open to all vulnerable developing countries.

3. Strategic Priority on Adaptation

- Administered by the Global Environment Facility (GEF)
- Area of focus – Adaptation
- It was a 3-year pilot programme aimed to show how adaptation planning and assessment could be practically translated into fullscale projects. The Fund is now closed.

4. GEF Trust Fund - Climate Change focal area

- Administered by The Global Environment Facility (GEF)
 - Established in 1991 by **World Bank; UNDP + UNEP**
- Area of focus - Adaptation, Mitigation – general
- It supports the implementation of **multilateral environmental agreements**.
- It serves as a **financial mechanism of the UN Framework Convention on Climate Change**.

4. Least Developed Countries Fund

- Administered by GEF
- Area of focus – Adaptation
- Financed the National Adaptation Programs of Action (NAPAs) for LDCs.

C. UNFCCC Funds

1. Green Climate Fund

- First mentioned in the Copenhagen Accord in COP-15
- Formally initiated during **UNFCCC Cancun summit (2010)**
- It was adopted as a **financial mechanism of UNFCCC**

- **Area of focus** - Adaptation, Mitigation - general, Mitigation – REDD for developing countries
- **WB is chosen as a temporary trustee of the fund.**
- **HQ: Songdo, Incheon, South Korea**
- It is intended to be the centrepiece of efforts to raise **Climate Finance of \$100 billion a year by 2020.**
- In 2015, the GCF Board invited the World Bank to continue serving as the **Interim Trustee**
- Expected to become the **main multilateral financing mechanism** to support climate action in developing countries.

2. Adaptation Fund

- A financial instrument under the UNFCCC and its Kyoto Protocol (KP)
- Administered by **Adaptation Fund Board**
- Global Environment Facility (GEF) provides **secretariat**; and the **World Bank serves as trustee** of the Fund.
- Area of focus – Adaptation
- Established to finance concrete adaptation projects and programmes in **developing country Parties to the KP**
- **Implemented by NIE** (National Implementing Agencies)
- Funding source: **2% of Certified Emission Reductions (CERs)** issued for a **Clean Development Mechanism (CDM)** project activity.

D. European Commission funds

1. Global Climate Change Alliance

- Administered by The European Commission
- Area of focus - Adaptation, Mitigation - general, Mitigation – REDD
- Objective: build a new alliance on climate change between the European Union and the poor developing countries that are most affected and that have the least capacity to deal with climate change
- The GCCA does not intend to set up a new fund or governance structure but is working through the European Commission's established channels for political dialogue and cooperation at national and international level.

2. Global Energy Efficiency and Renewable Energy Fund

- Administered by The European Commission (European Investment Bank)
- Area of focus - Mitigation – general
- It is a Public-Private Partnership (PPP).

- Designed to **maximise the private finance leveraged through public funds**
- It is structured as a fund of funds.
- Invests in small and medium-sized project enterprises (SMEs) to implement energy efficiency and renewable energy projects in **Developing countries and Economies in transition.**

E. UNDP funds

UNDP targets mitigation mainly.

1. MDG Achievement Fund (MDG-F)

- **Environment and Climate Change thematic window**
- Established by Spain and UNDP
- Administered by UNDP
- Area of focus - Adaptation, Mitigation – general
- The objective of this part of the fund is to help **reduce poverty and vulnerability** in eligible countries by supporting interventions that improve environmental management.

2. UN-REDD Fund / Programme

- Established by: Three UN Agencies –UNEP +UNDP + FAO
- Administered by UNDP
- Area of focus - Mitigation – **REDD**
- Supports the developing countries in reducing emissions.
- Through its **nine initial country programme** activities in **Africa, Asia and Latin America**, the **UN-REDD Programme** supports the **capacity of national governments** to prepare and implement **national REDD strategies** with the involvement of all stakeholders.

3. Biodiversity finance

- Established at Nagoya (**COP 10 to CBD**)
- In India: MoEFCC. Hosted by **National Biodiversity Authority (NBA)**
 - Managed by **UNDP India**

F. Miscellaneous funds

1. Adaptation for Smallholder Agriculture Program

- Administered by **the International Fund for Agricultural Development**
- Area of focus – Adaptation
- For smallholder farmers, rural areas etc.

2. Congo Basin Forest Fund

- Administered by African Development Bank
- Area of focus - Mitigation – REDD
- to take early action to protect the forests in the Congo Basin region

3. Amazon Fund (Fundo Amazonia)

- Administered by Brazilian Development Bank (BNDES)
- Area of focus - Mitigation – REDD
- Mainly created to raise donations so that investments can be made in efforts to prevent, monitor, and combat deforestation, as well as to promote the conservation and sustainable use of forests in the Amazon Biome.
- Although, Amazon Fund was created by the government; and is managed by a public bank, it is a private fund.

4. Indonesia Climate Change Trust Fund

- Administered by Indonesia's National Development Planning Agency
- Area of focus - Adaptation, Mitigation - general, Mitigation – REDD
- It is a national funding entity which aims to develop innovative ways to link international finance sources with national investment strategies.
- The ICCTF receives non-refundable contributions from bilateral and multilateral donors
- Main funding mechanism: Innovation Fund.

Species in News

IUCN Red List Criteria

- Extinct (EX):
 - The last individual has died. Or
 - Any surveys have been unable to log even a single individual.
- Extinct in the Wild (EW):
 - Survive only in captivity or as artificially supported populations far outside their historical geographic range.
- Critically Endangered (CR):
 - An extremely high risk of extinction, rapid population declines of 80-90 % over previous 10 years (or 3 generations).
 - A current population size of fewer than 50 individuals.
- Endangered (EN):
 - A very high risk of extinction, rapid population declines of 50-70 % over previous 10 years (or 3 generations).
 - A current population size of fewer than 250 individuals.
- Vulnerable (VU):

- A very high risk of extinction, rapid population declines of 30-50 % over previous 10 years (or 3 generations).
- Current population size of fewer than 1,000 individuals.

Near Threatened (NT):

- Species close to becoming threatened in near future.

Least Concern (LC):

- Species that are pervasive and abundant after careful assessment.

Data Deficient (DD):

- The amount of available data related to species risk of extinction is lacking in some way.
- When, a complete assessment cannot be performed.
- This category does not describe the conservation status of a species.

Red pandas

- IUCN Status: Endangered
- Himalayan red panda: Nepal, Bhutan, India, Myanmar, Tibet.
- Chinese red panda: China.



Eurasian Otter

- IUCN Status: Near Threatened
- Semi-aquatic mammal
- Native to Eurasia. Sighted first time in brackish water Chilika lagoon.



Long-tailed macaques

- IUCN: Least Concerned
- It is a crab-eating macaque.
- Associated with freshwater habitat.
- Native to Southeast Asia: also found in

Australasia.



Himalayan Ibex

- IUCN status: **Least Concern**
- **Ibex** is a species of wild goat.
- Found in **Pin Valley National Park** (Himachal Pradesh) and **Kanji Wild Life Sanctuary** (Jammu and Kashmir).
- Under **Schedule 1 of Wildlife Protection Act, 1972.**



Blue-throated Macaw

- IUCN status: **Critically Endangered**
- It is a **large parrot**
- **Habitat:** Forest, Savanna grass lands. (hot, seasonally dry climatic conditions, open tree canopy i.e., scattered trees).



Sal forest tortoise or elongated tortoise

- IUCN status: **Critically Endangered**

synopsisias.in

Environment

- Habitat: Eastern and Northern India and Southeast Asia.



Dugong (sea cow)

- IUCN status: **Vulnerable**
- world's only vegetarian marine mammal.
- Habitat: Warm coastal waters from East Africa to Australia, Red Sea, Indian Ocean, Pacific.



Anthurium

- A domestic flowering plant known for purifying surrounding air.
- Beautiful inflorescence (process of flowering).
- NASA placed it in list of **air purifier plants**.



Gangetic dolphin

- IUCN Status: **Endangered**
- National Aquatic Animal of India.
- **Habitat:** Nepal, India, and Bangladesh: the Ganges- Brahmaputra-Meghna.
- They can only live in freshwater.
 - They prefer deep waters, in and around the confluence of rivers.

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- Indicator of the health of the entire river ecosystem.
- These are **one among the 21 species** identified under the centrally sponsored scheme, **Development of Wildlife Habitat.**
 - Conservation Action Plan for the Gangetic Dolphin (2010-2020)



Indus River Dolphin

- IUCN Status: **Endangered**
- Habitat: **Lower Indus in Pakistan and Beas in India.**
- Adapted to life in the **muddy river** and are **functionally blind.**
- **State aquatic animal of Punjab.**

Irrawaddy Dolphin (Snubfin dolphin)

- IUCN Status: **Endangered**
- Habitat: Irrawaddy River, **Ganga river, Chilka Lake, Mekong River.**
- Prefer to live in **estuaries and brackish water** near coasts.

Indian Ocean humpback dolphin

- IUCN Status: **Endangered**
- Prefer near shore waters, ideally with a **freshwater input.**

Gharial

- IUCN status: **Critically Endangered.**
 - **Schedule I of Wildlife (Protection) Act, 1972**
- **Habitat:** Bangladesh, India, Nepal (**majorly in Chambal river).**
- **World Crocodile day: June 17.**



White Giraffe

- **IUCN Status: Vulnerable**
- Poachers killed two of them in Kenya. **Just one is left in the world.**
- Appearance of the giraffe is **due to leucism.**
- Giraffes are most often found in savanna/woodland habitats.

Golden Tiger (Kazi 106F)

- It is **India's only Golden Tiger.**
- Found in Kaziranga National Park of Assam.
- They have **golden stripes in place of black** in normal tigers.



Pied Cuckoo

- **IUCN status: Least Concern**
- It is one of the few species that **come to India in the summer: migration from Africa.**
- Arrival of pied cuckoos is traditionally **seen as onset of the monsoon.**



Gaur or Indian Bison

- IUCN status: **Vulnerable**
- Gaur is the world's largest and tallest bovine (connected to cow).
- **Habitat:** Indian Subcontinent.
- **News Context:** First population estimation was carried out in the Nilgiris Forest.



Asiatic Lion

- **Asiatic Lion IUCN status:** Endangered.
 - **African lion IUCN status:** Vulnerable.
- Found in **Gir forest** of Gujarat.
- **Asiatic lions and African lions** are subspecies of the same species.
 - Asiatic lions are slightly smaller than Africans.
- **2020 census:** 674 Asiatic lions (increased by 30% in last 5 years) in Gir forest, Gujarat.



Polar bears

- IUCN Status: **Vulnerable**
- **Can become extinct by 2100 if GHG emissions are not reduced.**
- Global warming caused Arctic sea ice to melt. Hence, polar bears are left with smaller habitats.
- They rely on **Arctic sea ice** to hunt for seals.
- They are symbol of impacts of climate crisis.



Narcondam hornbill

- IUCN status: Endangered
- These are **frugivores:** primarily eat fruits and berries.
- Endemic to Narcondam Island in Andamans. (volcanic island)
- Narcondam Island is **Important Bird Area by BirdLife International and the Bombay Natural History Society.**



Dhole (Asiatic Wild Dog)

- IUCN status: **endangered.**
- Tiger and dhole are the only two large carnivores in India which are endangered.
- Habitats: Deciduous and Evergreen forests (Karnataka, Maharashtra, MP).
- India perhaps has the highest number of dholes.



Golden Birdwing

- A Himalayan species: **India's largest butterfly.**
- It has a wingspan of approx. 200 mm.
- Largest female: Uttarakhand
- Largest male: Wankhar Butterfly Museum in Shillong.



Duck-billed Platypus

- **Protection status:**
 - **IUCN Status:** Near Threatened.
 - **Habitat:** Endemic to eastern Australia and Tasmania region.



Pangolins

- **Protection Status:**
 - **IUCN Status:** Indian Pangolin: Endangered
 - **Habitat:** Across India besides Extreme arid zone, Himalaya, North East.
 - **Chinese Pangolin:** Critically Endangered
 - **Habitat:** North East India.
 - **Both species:** Schedule I of Wildlife Protection Act, 1972.
- **Pangolins are the most trafficked wildlife species** (Mammals) in the world (CITES Appendix 1).

- There are total 8 species of Pangolin.
- The **Indian Pangolin** and the **Chinese Pangolin** are found in India.



Philippine Eagle

- **Protection Status:**
 - **IUCN Status:** Critically Endangered (CR)
 - **Habitat:** Endemic to Philippines.
- **Note:** National Bird of Philippines.



Steppe Eagle (Aquila nipalensis) (Booted Eagles)

- **Protection Status:**
 - **IUCN Status:** Endangered.
 - **Habitat:** Northern Eurasia, stretching from Black Sea coast to the hills in Eastern Kazakhstan.
- It is the **2nd largest migratory eagle species to India.**
- **Note:** It is **on the flag of Kazakhstan** and is also **national bird of Egypt.**



Flame Throated Bulbul (Rubigula)

- **Protection Status:**
 - IUCN Status: Least Concern.
 - Schedule – IV bird, Wildlife (Protection) Act, 1972
- **Habitat:** Southern Peninsular India, Eastern Ghats, Central India.
- **Note:** It is State bird of Goa.
 - It was Mascot for 36th National Games, Goa.



Namdapha Flying Squirrel

Protection Status:

- IUCN Status: Critically Endangered.
- Habitat: Endemic to Arunachal Pradesh.



The Siberian crane (Siberian White Crane or Snow Crane)

- **Protection status:**
 - IUCN Status: Critically Endangered.

- **Habitat:** Breeding area: Extended between the Urals and Ob river.



Pink-Headed Duck (*Rhodonessa caryophyllacea*)

- **Protection Status:**
 - IUCN Status: Critically Endangered.
- **Habitat:** North of Ganges and West of Brahmaputra.



Munnar Bush Frog (*Raorchestes Munnarensis*)

- **Protection Status:**
 - IUCN Status: Critically Endangered.
- **Habitat:** Southern Western Ghats.



White-Throated Redstart (*Phoenicurus schisticeps*), Bird

- **Protection Status:**
 - IUCN Status: Least Concerned.
 - Schedule IV of the Wildlife (Protection) Act, 1972.
- **Habitat:** Nepal, Bhutan, China, Myanmar, Northeast India (Temperate Forests).



Grey-Chinned Minivet (*Pericrocotus Solaris*), Bird

- **Protection Status:**
 - IUCN Status: Least Concerned.
- **Habitat:** Himalayas, China, Taiwan, Southeast Asia.



Sri Lanka Frogmouth (Ceylon Frogmouth)

- **Protection Status:**
 - IUCN Status: Least Concerned.
- **Habitat:** Western Ghats of south India, Sri Lanka.



**Coppersmith Barbet (*Psilopogon haemacephalus*)
(Crimson-Breasted barbet/ coppersmith/ Asian Barbet)**

- **Protection Status:**
 - IUCN Status: Least Concerned.
- **Habitat:** Indian peninsula, South east Asia.



Barasingha (*Rucervus duvaucelii*) (Swamp Deer)

- **Protection Status:**
 - IUCN Status: Vulnerable.
 - Schedule I of the Wildlife Protection Act of 1972.
 - CITES Appendix I.
- **Habitat:** Northern-Central India, southwestern Nepal.
 - Extinct in Pakistan and Bangladesh.
- **Note:** Swamp Deer is State animal of M.P. and U.P.



**White-Bellied Musk Deer (Himalayan Musk Deer/
Moschus Leucogaster/ Musk Deer)**

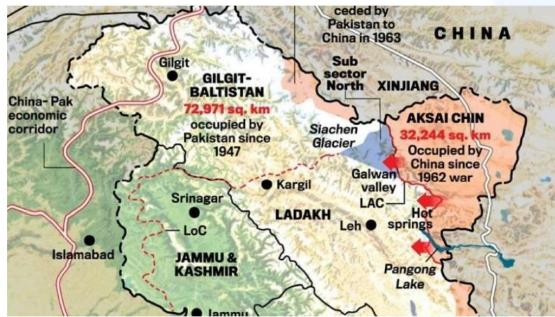
- **Protection Status:**
 - IUCN Status: Endangered.
 - Schedule I of Wildlife Protection Act, 1972.
 - CITES Appendix I.
- **Habitat:** Himalayas of Nepal, Bhutan, India, Pakistan, China.



PLACES IN NEWS

Galwan Valley

- Land between steep mountains that buffet Galwan River.
- Galwan river: source in Aksai Chin, on China's side of Line of Actual Control (LAC), and it flows east to Ladakh, where it meets the Shyok river on India's side of LAC.
- Location: strategic between Ladakh in the west and Aksai Chin in the east.



Nagorno-Karabakh region

- Disputed region between Armenia and Azerbaijan.
- Location: South Caucasus region, in the area between the Black Sea and the Caspian Sea.



Belarus

- Landlocked country in Eastern Europe
- Location:
 - Russia to the east.
 - Ukraine to the south.
 - To the north and west lie EU and NATO members Latvia, Lithuania and Poland.



Beirut

- Beirut is the capital and largest city of Lebanon.
- Location: Mediterranean coast at the foot of the Lebanon Mountains.



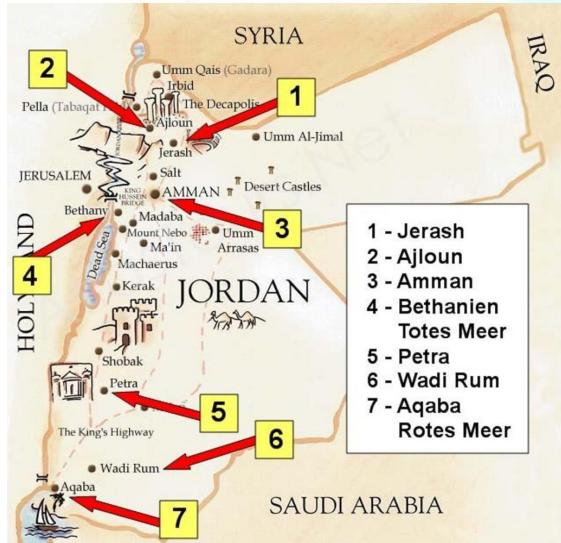
Mali

- Landlocked country of western Africa, mostly in the Saharan and Sahelian regions.
- Niger River - functioning as the main trading and transport artery in the country, flows in the interior.



Wadi Rum

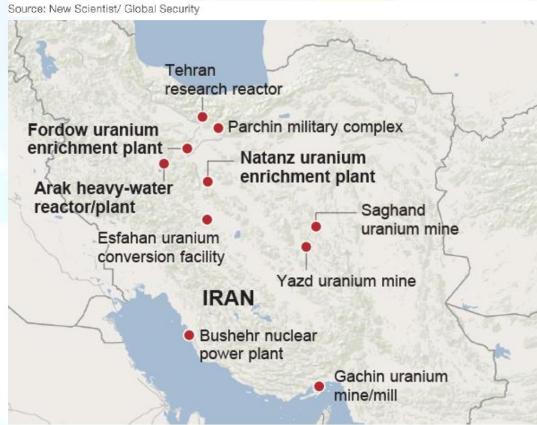
- Desert in far south of Jordan.
- It is also called valley of Moon.
- Set on a high plateau at western edge of Arabian Desert.
- Wadi - bed or valley of a stream that is dry except during rainy season.



Natanz, Iran

- Natanz – where Iran's main nuclear facility is located.

Iran's nuclear facilities



Hong Kong

- Hong Kong National Security Law passed by China.
- Criminalize secession, subversion, terrorism, and foreign interference in Hong Kong.
- China could have its own law enforcement agencies in Hong Kong.
- Concerns: it could lead to prosecution of Hong Kongers for
 - Criticizing their or the mainland's leadership.
 - Joining protests.
 - Exercising their current rights under local laws.



Black Sea

- Natural gas reserve discovered in Black Sea.
- Black Sea (Euxine Sea) - located between Eastern Europe and Western Asia.



Bandar Abbas port, Iran

- Operation Samudra Setu - launched by Indian Navy as a part of national effort to repatriate Indian citizens from overseas.
- Location: Strait of Hormuz (connecting Persian Gulf and Gulf of Oman).

Natura Islands

- Natuna Islands: 272-island archipelago of Indonesia.
- China claims much of the South China Sea, including the waters near the Natunas.



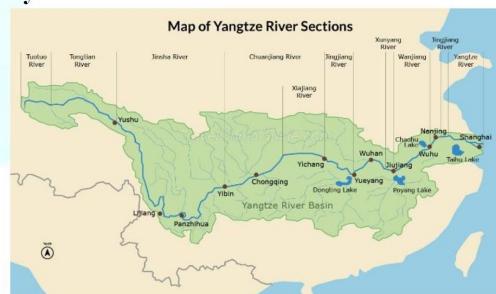
Senkaku islands

- Group of uninhabited islands in the East China Sea, claimed by Japan, China and Taiwan.
- Japan changed the name of the southern Japan area containing Senkaku Islands from "Tonoshiro" to "Tonoshiro Senkaku," seen as an attempt to cement its claim.



Yangtze river, China

- Yangtze is **Asia's longest and world's 6th longest river.**
- Three Gorges dam: **World's largest hydroelectric**



Kuril Islands

- Kurils island chain: **Stretches north across Pacific Ocean** from Japanese island of Hokkaido to southern tip of Russia's Kamchatka Peninsula.
- Chain: consists of **22 main islands, volcanically active.**
 - Islands form part of 'Pacific Ring of Fire'.
- **Kuril Trench:** Parallel to the chain, in Pacific floor.
- Its 4 southernmost islands are disputed territories claimed by Russia and Japan.

Kuril Islands

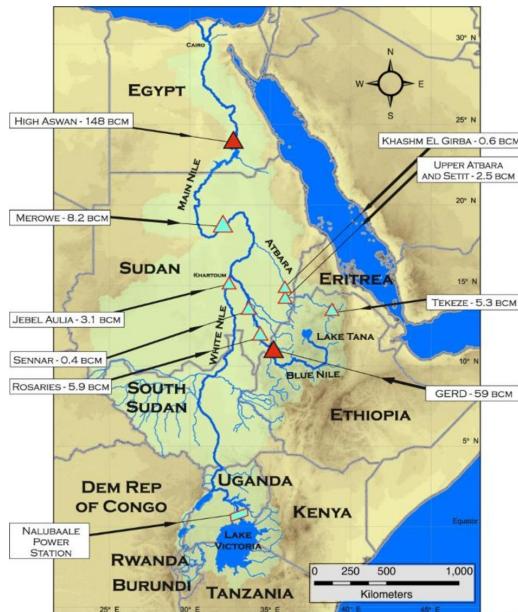


Anak Krakatau Volcano

- **Volcanic island in Sunda Strait between Java and Sumatra, Indonesia** that witnessed longest eruption since its explosive collapse in 2018.

Grand Ethiopian Renaissance Dam (GERD)

- Ethiopia, Egypt, and Sudan have disputes over GERD.
- **GERD:** 6,450 MW hydropower project on the Blue Nile River in Ethiopia.
- **Two major tributaries of the Nile:** White Nile River and Blue Nile River
- **Millennium Dam:** will be the largest dam in Africa.
- It will not only serve Ethiopia, but Sudan and Egypt as well.



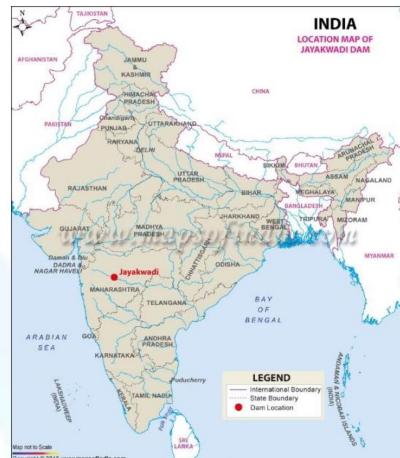
Kaleshwaram Lift Irrigation Project (KLIP)

- It is a **multi-purpose irrigation project** on Godavari River in Kaleshwaram, Telangana.
- It is world's largest multi-stage lift irrigation project.



Jayakwadi Dam

- It is located near Aurangabad, Maharashtra.
- It is built across the Godavari River to solve the irrigation problem in the region.



MISC.

Climate Change Performance Index -2020

- Published by: **Germanwatch, Climate Action Network International and the New Climate Institute**, annually.
- To enhance transparency in international climate politics
- Covers 57 countries and the EU.

Takeaways

- **No Top 3 Performers** as none was compatible with Paris Climate Targets
- **Sweden, with the 4th position, is the frontrunner**
- India's ranking improved two places, from 11th to 9th

Related Information

- **Global Climate Risk Index 2020**
 - Released by **Germanwatch**.
 - India's rank has **worsened** from 14th spot in 2017 to **5th most vulnerable country** to climate change in 2018.
 - **Japan** topped the list followed by the Philippines and Germany.

IPCC Reports

- Released two special reports:
 - **Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)**
 - **Special Report on Climate Change and Land (SRCCL)**.

Takeaways

- **SROCC**
 - **“Arctic amplification”**
 - Increase in Arctic surface air temperatures

- resulting into **loss of ice cover** and **decreasing albedo**.
- Antarctic continent has seen **less uniform air temperature changes**
- **Human-caused warming at the surface in Antarctica** is delayed by the **Southern Ocean circulation**
 - transports heat downwards into the deep ocean.
- **Greenland** became the largest terrestrial contributor to global sea level.
- **Twice the amount of carbon in permafrost than is currently in the Earth's atmosphere**.
- **Carbon Sequestration** through stimulated plant growth in permafrost areas and CO₂ fertilization.
- Rapid increase in sea level rise
- Surface warming combined with freshwater runoff make oceans more stratified.
- Growth in **oxygen minimum zones**
- **SRCC**
 - first time that the IPCC has focused its attention **solely on the land sector**
 - Reduction in **nutritional quality of staple crops**
 - “bioenergy with carbon capture and storage” (**BECCS**) **technique** to limit global warming to 1.5°C
 - Growing crops, using them to produce energy
 - Capturing the resulting CO₂ emissions before storing them in the ground or sea.

Related Information

- **Negative emissions** are a group of methods that aim to remove CO₂ from the atmosphere and **store it in the land or ocean**.

IPCC: Refer static

Ocean Deoxygenation

- ‘**Ocean deoxygenation: Everyone’s problem**’ report was released IUCN.
- Released at the 25th session of the Conference of the Parties (COP25) to the UNFCCC.
- It highlights that oceans are increasingly experiencing **low levels of oxygen**

Ocean deoxygenation

- Refers to the loss of oxygen from the oceans.
- Ocean loses oxygen:

- **At the surface-** due to the **outgassing of oxygen** to the atmosphere in oversaturated waters
- **From the surface to depths-** due to the **respiration** of aerobic organisms and **oxidation** of reduced chemical species

- Examples: **Black sea and Baltic sea**

Reasons

- Ocean warming driven deoxygenation.
 - **Warmer ocean water holds less oxygen** and is **more buoyant** than cooler water.
- Warmer water also raises oxygen demand from living organisms
 - increases the **metabolic rates**
- Enhanced **destabilization of methane gas hydrates**
- Nutrient pollution: Eutrophication

Impact

- It will increase greenhouse gas emission with increased release of methane and N₂O.
- Oxygen loss and increase in other nutrients availability can contribute to further deoxygenation

Related Information

- **Eastern boundary upwelling systems (EBUS)**
 - **Ocean’s productive biomes**.
 - Ocean currents bring **nutrient rich but oxygen-poor water** to the eastern edges
 - They host **Oxygen Minimum Zones (OMZs)**
 - ✓ responsible for the world’s largest fraction of water column denitrification
 - ✓ largest estimated emission of the greenhouse gas nitrous oxides
 - naturally oxygen poor systems

IUCN: refer static

WMO Statement On The State Of The Global Climate In 2019

- Increase in Green House Gases concentration: Carbon Dioxide, Methane, Nitrous Dioxide etc
- Rise in global mean temperature
- **Low sea-ice extent** in both the Arctic and the Antarctic
- Increased ocean acidification
CO₂ absorbed in sea water decreases its pH, a process called ocean acidification.
- **WMO:** Refer static

Related Information

- **High Mountain Summit**
 - Organised by WMO at Geneva, Switzerland
 - to develop a roadmap to a science based and user driven knowledge and information system
 - support sustainable development and risk reduction in mountain and downstream regions.
- **Mauna Loa Observatory**
 - It takes measurement of accumulation of carbon dioxide in the Earth's atmosphere on a graph called **Keeling graph**
 - Oldest continuous carbon dioxide (CO₂) measurement station in the world
 - Situated in **Hawaii**
 - Part of the National Oceanic and Atmospheric Administration (NOAA) - Earth System Research Laboratory (ESRL) - Global Monitoring Division (GMD).

Emissions Gap Report

- UN Environment Program (UNEP) launched its 10th edition of Emissions Gap Report 2019.

Takeaways

- The report assesses the gap between anticipated emissions in 2030 and levels consistent with the 1.5°C and 2°C targets of the Paris Agreement.
- GHG emissions have risen at a rate of 1.5% per year in the last decade.
- G20 nations collectively account for 78% of all emissions.
- The top four emitters (**China, USA, EU and India**) contribute to over 55%
- World has to cut its emissions by 7.6% each year between 2020 and 2030 to get on track towards the 1.5°C temperature goal of the Paris Agreement.
- Even if all current unconditional commitments under the Paris Agreement are implemented, temperatures are expected to rise by 3.2°C.
- Collective ambition in NDCs must increase more than fivefold over current levels to deliver the cuts needed over the next decade for the 1.5°C goal.

UNEP, NDC targets of India: Refer static

Related info:

Additional Information

- U.N. Environment Finance Initiative (UNEP FI)

- It is a partnership between United Nations Environment and the global financial sector
- created in the wake of the 1992 Earth Summit
- To promote sustainable finance.
- The UNEP 'Statement of Commitment by Financial Institutions on Sustainable Development' holds the prime importance.

Composite Water Management Index

- It is released by NITI Aayog.
- It is to assess and improve performance in efficient management of water resources.
- It measures different dimensions of water management and use across the lifecycle of water.
- Index is divided into 3 categories:
 - Non-Himalayan states.
 - North-Eastern and Himalayan states.
 - Union Territories (UTs).

Bioremediation and Biomining

- **Bioremediation:** It is the treatment of pollutants or waste by use of microorganisms (such as bacteria) that break down the undesirable substances.
 - It includes pollutants such as: Oil spill, contaminated groundwater etc.
- **Biomining:** It is the process of using microorganisms (microbes) to extract metals of economic interest from rock ores or mine waste.
 - It can also be used to clean up sites that have been polluted with metals.
 - It involves use of separator machines to separate waste material of different sizes.

Microplastics or Microbeads

These are plastic pieces or fibre, which is very small, generally measuring less than 1mm.

They enter water bodies as carriers for other pollutants. They carry carcinogenic chemical compounds in the food chain.

They are present in a variety of products as: cosmetics, synthetic clothing, plastic bags, bottles etc.

Plasticrust: New Kind of Pollution

It is a new type of rock formation.

It is a thin coating of plastic growing on the rocks at the seashore.

It's composed of polyethylene, which is the most commonly used plastic (food and product packaging).

Geography

Static Topic

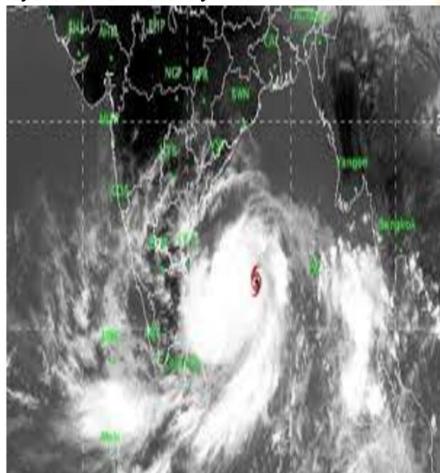
Coastal erosion.
Shadow Zone.
El-Nino, La- Nina.
Tropical and temperate Cyclones.

Naming of Tropical Cyclones

- Generally once storms produce sustained wind speeds of more than 33 knots (61 km/h), names are assigned from predetermined lists depending on which basin they originate.
- However, standards vary from basin to basin.
- Before the formal start of naming, tropical cyclones were named after places, objects, or saints' feast days on which they occurred.
- Worldwide there are six regional specialised meteorological centres (RSMCs) and five regional Tropical Cyclone Warning Centres (TCWCs) mandated.
- IMD is a RSMCs.** It names the Tropical Cyclones over the **north Indian Ocean**.
- The new names were contributed by **13 member countries of WMO/ESCAP panel on tropical cyclones (PTC)**.
- Names of cyclones provided by India** are Gati, Tej, Murasu, Aag, Vyom, Jhar, Probaho, Neer, Prabhanjan, Ghurni, Ambud, Jaladhi and Vega.
- Naming for **north Indian Ocean started** from **2004**.
- News:** IMD released a **list of 169 new names** for tropical cyclones in the north Indian Ocean region.

Cyclone Fani

- Cyclonic Fani recently hit the **Odisha coast**.



- Category 4 hurricane on the SSHWS.**
- The Saffir-Simpson Hurricane Wind Scale estimates potential property damage.

WEATHER SAFFIR-SIMPSON HURRICANE WIND SCALE		
CATEGORY	WINDS (MPH)	DAMAGE
1	74-95	SOME
2	96-110	EXTENSIVE
3	111-129	DEVASTATING
4	130-156	CATASTROPHIC
5	157+	CATASTROPHIC

Related Information

- 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 it in 2000.
 - Eight **north Indian Ocean countries** gave 8 names each
 - Bangladesh, India, the Maldives, Myanmar, Oman, Pakistan, Sri Lanka and Thailand,
 - Fani was named by Bangladesh.**

Static topics to refer: Cyclones

Simultaneous Cyclones In Arabian Sea

- Cyclone Kyarr and Cyclone Maha** have prevailed simultaneously over the Arabian Sea.
- Occurred for the first time since 1965.
- 2019:** Most active North Indian cyclone season based on ACE
- Accumulated Cyclone Energy (ACE)** is a measure of the **total destructive power of a cyclone season** based on the number of days strong winds are observed.

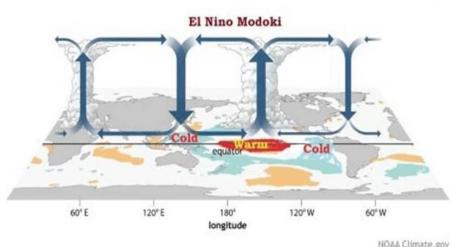
Reasons of cyclogenesis:

- Increased **carbon emissions** have led to warming up of Arabian Sea waters.
- It receives very **less fresh waters** from the rivers which is preventing the cooling effect.
- More **enclosed nature** of the sea is promoting more evaporation and cloud formation

- Wind Shear or the change in direction and speed of the winds from bottom to the top of the atmosphere.
- El-Nino Modoki conditions witnessed change in the atmospheric circulation over the north Indian Ocean

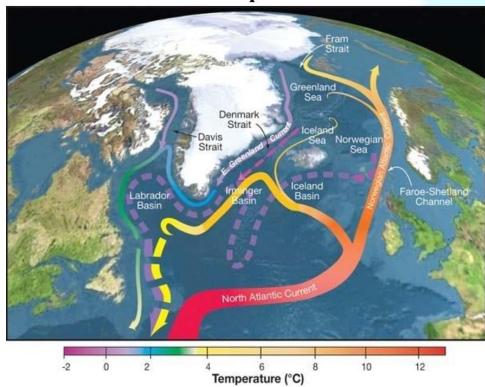
El Niño Modoki

- It is associated with strong anomalous warming in the central tropical Pacific Ocean and cooling in the eastern and western tropical Pacific Ocean.



Atlantic Meridional Overturning Circulation (AMOC)

- It is also known as Atlantic Conveyor Belt.
- It is part of the Earth's largest water circulation system known as Thermohaline circulation.
- It transports a substantial amount of heat from the Tropics and Southern Hemisphere towards the North Atlantic.
- It also aids in absorbing and storing atmospheric carbon.



Deep Ocean Mission

- It aims to explore the depths of the Ocean for the possibilities of deep-sea mining.
- India plans to launch 'Deep Ocean Mission'.

- Two key projects planned under DOM include:
 - a desalination plant, powered by tidal energy
 - submersible vehicle (**Samudrayaan Project**): to explore depths

- Central Indian Ocean allotted area to India for deep sea mining by International Seabed Authority (ISA).

Related Information

- Samudrayaan Project by National Institute of Ocean Technology**

- an autonomous society
- under the Ministry of Earth Sciences
- It proposes to send a submersible vehicle with 3 persons to a depth of about 6000 metres
- To carry out deep underwater studies.
- The indigenously developed vehicle is capable of crawling on the seabed for 72 hours
- It is expected to be undertaken by 2021-22.

To be covered in static portion

- International Seabed Authority (ISA)
- Poly-Metallic Nodules (PMN)

INCOIS Launches Services For Marine-Based Users

- Indian National Centre for Ocean Information Services launched three products :
 - Small Vessel Advisory and Forecast Services System (SVAS):**
 - It is to improve operations of the numerous small marine vessels
 - 10 days advance warning about potential zones where vessel can overturn
 - The warning system is based on 'Boat Safety Index' (BSI)
 - The Swell Surge Forecast System:**
 - Designed for the prediction of Kallakkadal or Swell Surge that occurs along the Indian coast, particularly the west coast.
 - Kallakkadal (term used by Kerala fishermen) are flash-flood events that take place without any noticeable advance change in local winds or any other apparent signature in the coastal environment.
 - Algal Bloom Information Service (ABIS):**
 - It provides near-real time information on spatio-

- temporal occurrence** and spread of phytoplankton blooms over the **North Indian Ocean**
- For this, four regions have been identified as bloom hotspots
 - ✓ North Eastern Arabian Sea
 - ✓ Coastal waters off Kerala
 - ✓ Gulf of Mannar
 - ✓ Coastal waters of Gopalpur (Odisha)

Related Information

- **(INCOIS): Refer static**

Indian Scientific Expedition To The Southern Ocean 2020

- Indian mission to the **Antarctic ocean**
- It is a part of the **Indian Southern Ocean Research Program** which was initiated in 2004
- The pilot was onboard **ORV Sagar Kanya**.
- This one is 11th Expedition.
- This program was initiated by the **Ministry of Earth Sciences (MoES)**
- Operated under **National Centre for Polar and Ocean Research (NCPOR)**.
- **Quantify** changes that are occurring and the impact of these changes through tele-connection.

India's permanent stations at Antarctica

- **Dakshin Gang**
 - It was **established in 1983** over the Ice shelf in Central Dronning Maud Land region.
 - The station was **abandoned in 1990** as it got buried under snow.
- **Maitri** –
 - It was established in **1988** on an ice free, rocky area on the Schirmacher Oasis.
- **Bharati**
 - It was commissioned in **2012**
 - Located between Thala Fjord & Quilty bay, east of Stornes Peninsula in Antarctica.

Related Information

- **NCPOR**

- It was established as an **autonomous** Research and Development Institution of the Ministry of Earth Sciences
- Established in **1998**.

- Responsible for the country's research activities in the Polar and Southern Ocean realms.
- **Maintenance of Maitri & Bharati**

• **Thwaites Glacier**

- It is a glacier in **Antarctic** which contains enough water to **raise world sea level** by more than half a metre.
- **Important for Antarctica** as it slows ice behind it from freely flowing into ocean.
- Researchers have **detected warm water** at Thwaites's grounding zone.

Mosaic Expedition

- **One-year-long** expedition into the Central Arctic, planned to take place from 2019 to 2020.
- **Largest ever Arctic expedition** in history.
- To measure possible variables in the Arctic

Related Information

- India has set up an **underground** observatory called **IndARC**, at the Kongsfjorden fjord, halfway between Norway and the North Pole.
- Indian Arctic station '**Himadri**' is located at **NyAlesund**, Spitsbergen Island, Norway
 - serves as a hub of Indian scientific investigations.

Mount Etna & Mount Sinabung Eruptions

- **Mount Etna**: is an active **composite volcano** on the east coast of Sicily, **Italy**.
- **Mount Sinabung**: It is a composite volcano in the Karo plateau of Karo Regency, North Sumatra, **Indonesia**.
- **Indonesia** has largest number of active volcanoes

Other recent volcanic eruption

- **Mayotte Island** France- Western Indian Ocean
- **Mount Agung**- Indonesia
- **Mount Soputan**- Indonesia
- **Anak Krakatau island**- Indonesia

Northern European Enclosure Dam (NEED)

- It is a set of two proposed dams by **Dutch** in **English Channel** between:
 - Scotland and Norway: NEED-North France
 - England: NEED-South
- It would cut off the North and Baltic Seas from the Atlantic Ocean.

- It would be the **longest dam in the world** once completed.
- NEED would **lock Europe's four busiest ports**—Rotterdam, Antwerp, Bremerhaven, Hamburg.

Anthropogenic Mineral

- Substances formed as a result of human activities such as mining and mineral processing.
 - 208 man-made minerals
 - Approved by International Mineralogical Association.
 - Example of Anthropogenic mineral:
 - **Hydrotalcite**
- True mineral:** Naturally occurring and formed by geological processes either on Earth or in outer space.
- 5200 such minerals are known.

Related Information

Edscottite- Recently in news

- It is made of **iron and carbon** and was likely formed within the core of another planet.
- Discovered during examination of **Wedderburn meteorite**.
- **WM:** a metallic-looking rock found in Central Victoria back in 1951.

Kelp Forest

- They are **large brown algae seaweeds**.
- They grow in "underwater forests" (kelp forests) in shallow oceans.
- Kelps and coral reefs are composed of algae that grow in the shallow parts of the ocean in warm and sunny waters.
- The environmental factors necessary for kelp to survive include:
 - Hard substrate (usually rock), High nutrients.
 - Clear shallow coastal water and light.
- Kelp forests are one of the **most productive and dynamic ecosystems**.
- Smaller areas of anchored kelp are called **kelp beds**.

Importance of Kelp Forests

- They are considered as **Keystone Species**.
- Its removal will result in a significant shift in the composition of community and perhaps in the **physical structure of the environment**.
- It provides as an **important source of food for many marine species**.
- Up to 60% of carbon found in coastal invertebrates is attributable to kelp productivity.
- It may be consumed directly by bacteria.

- 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.**
- 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 **alginate**, a complex carbohydrate useful in industries such as tire manufacturing, ice-cream industry.

Polar Vortex

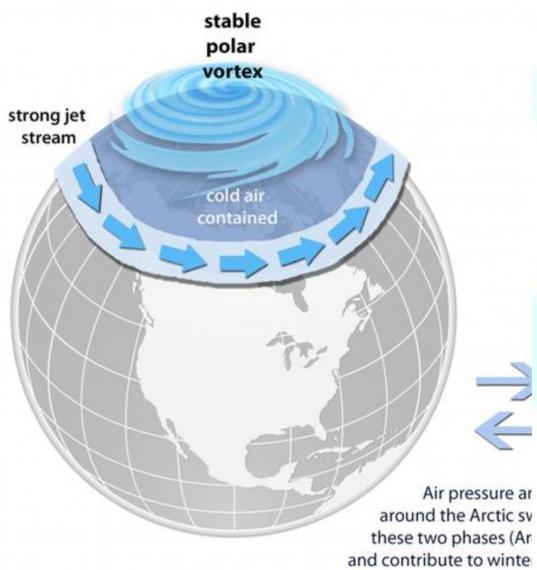
- It is a **large area of low pressure and cold air surrounding the Earth's North and South Pole**.
- The term refers to the **counter-clockwise flow (clockwise over south pole)** of air that helps keep the colder air close to the poles.
- There are 2 **polar vortexes in each hemisphere**:
 - **Tropospheric polar vertex:** It affects our weather.
 - **Stratospheric Polar vertex:** It is much more compact than tropospheric counterpart.
- Note: If both polar vortexes line up just right, deep freeze conditions may occur.
- **Polar vortex boundary:** It is between cold polar air to the north, and the warmer subtropical air (considering Northern Hemisphere).
- This boundary is defined by **polar front jet stream**.
 - **Jet stream:** Its a narrow band of fast-moving westerly.
- **This boundary shifts all the time**.
- **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)**.

Break in polar vortex is linked to long and chilly winter in north India.

The Science Behind

The polar vortex is a large area of low pressure and cold air surrounded by a strong jet stream. As the air rotates clockwise, it creates a stable polar vortex. If the polar vortex becomes less stable and expands, sending cold Arctic air southward, it can lead to a long and chilly winter in North America and Eurasia.

The polar vortex is nothing new — in fact, it's thought that it has been around for millions of years.



Meghalayan Age

- News Context:** Scientists have identified a **new phase** in Earth's geological history.
- This age is **subdivision of Holocene Epoch**, began about **4,200 years ago**.
- It is **most recent unit of the Geologic Time Scale by International Union of Geological Sciences**, an international NGO.
- International Commission on Stratigraphy:**
 - It is responsible for standardising the **Geologic Time Scale**.
 - It has approved definition of beginning of the youngest unit of **Geologic Time Scale**.
- Other 2 approved subdivisions of Holocene Epoch:**
 - Early Holocene Greenlandian (11,700 years ago).

- Middle Holocene Northgrippian (8300 years ago).

- Note:** Meghalayan Stage is **defined at a specific level in a stalagmite in the Mawmluh caves** (India's longest and deepest, Cherrapunji-Meghalaya).
- The onset of the age was marked by a 200-year drought that resulted in the collapse of civilisations and human migrations in Egypt, Greece, Syria, Palestine, Mesopotamia, Indus Valley, Yangtze River Valley.

Polymetallic nodules (Manganese Nodules)

- They are **rock concretions**, formed of **concentric layers of iron and manganese hydroxides** around a core.
- Along with manganese and iron, they contain **nickel, copper, cobalt, lead, molybdenum, cadmium, vanadium, titanium and rare earth metals** etc.
- Distribution:** 3 areas have been selected by industrial explorers:
 - Centre of North Central Pacific Ocean.
 - Peru Basin in South-East Pacific Ocean.
 - Centre of north Indian Ocean.
- They **occur at all depths**, but **highest concentration** is found between **4,000-6,000m**.
- Polymetallic Nodules Programme (PNP):**
 - It is for **exploration and development of technologies** for extraction of nodules from Central Indian Ocean Basin (**CIOB**) allocated to India.
- It consists of 4 components:**
 - Survey and Exploration.
 - Environmental Impact Assessment (EIA) Study.
 - Technology Development (Mining).
 - Technology Development (Extractive Metallurgy).
- News Context:** India's exclusive rights to explore **polymetallic nodules** from seabed in Central Indian Ocean Basin (CIOB) is **extended by 5 years** by International Seabed Authority (ISA), till 2022.

International Seabed Authority (ISA), 1994

- It is a UN body to regulate exploration of marine non-living resources of oceans in international waters.
- It is established by UN Convention on the Law of the Sea (UNCLCS).
- Headquarter:** Kingston, Jamaica.

- **Members:** 167 (All members of UNCL) and EU.
 - India was elected as a member in 2020.

Sedimentary Basins

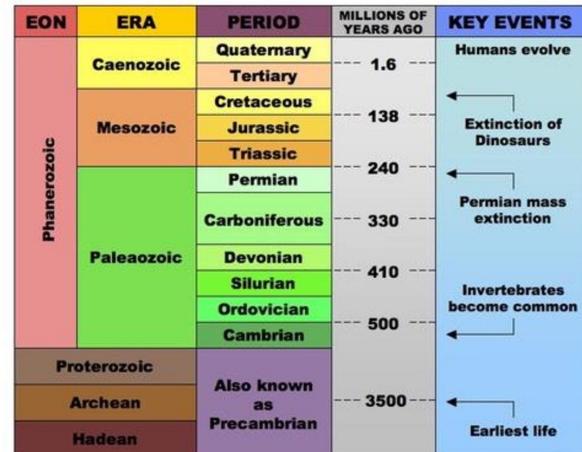
- They are regions where considerable thicknesses of sediments have accumulated (in places up to 20 km).
- They are Earth's region where long-term subsidence creates accommodation space for accumulation of sediments.
- Sedimentary basins are associated with plate tectonic activity.
- Basins are formed in different tectonic regimes vary in their preservation potential:
 - **Oceanic crust:** Basins are likely to be subducted.
 - **Marginal Continental Basins:** It may be partially preserved.
 - **Intra-cratonic Basins:** High probability of preservation.
- Sedimentary basins are widespread both onshore and offshore.
- **Importance:**
 - Almost all of the world's hydrocarbon reserves, natural gas, petroleum, coal, metal ore etc are found at Sedimentary Basins.
 - **Other Minerals:** Uranium, Phosphate, limestone, kaolinitic clays, gypsum, salts.
- **There are 26 sedimentary basins in India of which:**
 - 7 are operational:
 - Assam-Arakan Fold Belt, Cambay, Cauvery, Krishna-Godavari Offshore.
 - Mumbai Offshore and Rajasthan, Assam shelf.
- **News Context:** ONGC to open a new sedimentary basin in Kutch offshore.

Anthropocene

- It is a proposed epoch that begins when human activities started to have a significant global impact on Earth's geology and ecosystems.
- It was coined in 2000 by Paul Crutzen (Not approved officially).
- We are currently living in the Holocene Epoch of Quaternary Period.
- Holocene epoch began 12,000 years ago at the end of the last ice age.
- **Note:** All human civilisations have developed during this climatically and geologically stable period.

Epoch

- It is a subdivision of the geologic timescale that is longer than an age and shorter than a period.
- Epochs are most commonly used for the younger Cenozoic Era, where a greater collection of fossils has been found.



Paleo-Channel

- It is a remnant of an inactive river or stream channel that has been either filled or buried by younger sediment. (or)
- It is deposits of unconsolidated or semi-consolidated sedimentary rocks.
- It is generally deposited in ancient, currently inactive river and stream channel systems.

Importance of Palaeochannel:

- **Geological importance:**
 - Understanding movement of faults.
 - Preserving sediments and fossils useful for understanding past rainfall, temperature, climate.
 - It helps in understanding global warming, climate change, Preserving evidences of older erosional surfaces and levels.
- **Economic importance:**
 - Old sediments contain Uranium, lignite, gold, platinum etc.

Valdiya Committee

- It released a report on paleo channel of North-western India.
- It is about piles of sediments, their shapes and features of Ghaggar, Ganga and Yamuna.
- The report is an assertion of assumption that River Saraswati originated from Adibadri in

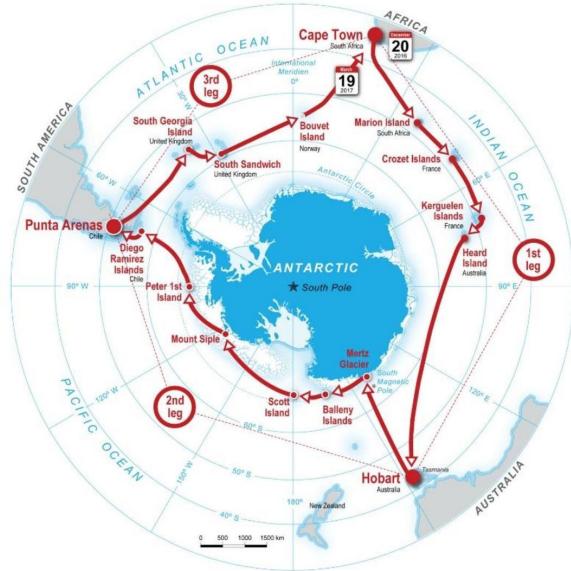
Himalaya to culminate in Arabian Sea through Runn of Kutch.

Zealandia

- It is about **half the size of Australia**, but only **7% of it is above sea level**.
- Most of that **terrestrial land makes up 2 large islands** of the country of New Zealand.
- **Zealand North Island** and South Island.
- It is **tectonically active region**.
- One part of it is on **Australian plate**, while the other part is on **Pacific plate**.
- **Study of Geological Society of America:**
 - It found that New Zealand and New Caledonia are part of a huge 4.9 million sq. km single slab of continental crust that is separated from Australia.
 - It says that **Zealandia should be considered a geological continent**.
- **Criteria for continents:**
 - Elevation above surrounding area.
 - Distinctive Geology.
 - Well defined area.
 - Crust much thicker than that found on ocean floor.

Antarctica Circumpolar Expedition (ACE)

- It is the **1st project of newly created Swiss Polar Institute (SPI)**.
- It to enhance **international relations and collaboration between countries**.
- It will also spark interest of young scientist generation in polar research.
- **Significance:**
 - ACE will be **1st scientific mission to study all major islands in Antarctic ocean and Antarctic land mass**.
 - **Antarctica acts as global thermometer** for any ecological change.
 - A better understanding of Antarctica is critical, not just for its preservation, but for whole planet.
- **Pollution and biodiversity:** Strategies to reduce pollution in Antarctic region.
- It will collect **information on whales**.
- To investigate the **extent of micro plastics**, whether they have **entered the food web**.



Volcanoes in India

- Barren Island is the **only active Volcano in India**.
- It is along the **volcanic chain from Sumatra to Myanmar**.
- It is **situated in Andaman Sea**, of the north-eastern part of Port Blair.
- It is a **Submarine emergent Volcano**, which lies above the subduction zone of India and Burmese plate.
- The Island is uninhabited and devoid of any significant vegetation and wildlife.

Other volcanoes in India

- **Doshi Hill:**
 - It is an **extinct volcano** in north-west part of Aravalli range of Mahendergarh (Haryana).
- **Dhinodhar Hills:**
 - It is an **extinct volcano** in Kutch district of Gujarat.
 - **Narcondam Island (Andaman and Nicobar):**
 - It is a volcanic island and classified as **dormant volcano**.
 - **Note:** It is a UNESCO World Heritage Site.
 - It is famous for its **endemic Narcondam Hornbill**.
- **Baratang Island:** It is famous for Mud volcanoes.



Pollution

Static Topics

Ozone Protection

Regulations for pesticide in India

- **Insecticide Act, 1968:**
 - It was enacted to regulate imports, manufacture, storage, transport, sale, distribution and use of insecticides.
- **Central Insecticide Board and Registration Committee (CIBRC):**
 - It approves the use of pesticides in India.
- **Strengthening and Modernization of Pest Management Approach in India:**
 - It is to promote **Integrated Pest Management (IPM)**.
 - It comes under department of Agriculture, Co-Operation & Farmers Welfare.
- **“Grow Safe food” Campaign:**
 - It is to create awareness about **safe and judicious use of pesticides**.
- **Stockholm Convention for Persistent Organic Pollutants and Rotterdam Convention, 2004:**
 - It promotes **open exchange of information** and calls on exporters of **hazardous chemicals**.
 - It encourages proper labelling, directions on safe handling, inform purchasers of any known restrictions or bans.

- It is led by UNEP, India is signatory of this.

- **Draft Pesticides Management Bill, 2017:**
 - It regulates manufacture, imports, storage, transportation, inspection, testing, distribution of pesticides.
- **Anupam Verma committee:** Recommended to ban 18 pesticides.

Endosulfan

- Endosulfan is a hazardous pesticide which is banned in 80 countries.
- It was used by the Karnataka Cashew Development Corporation and Kerala Government over cashew plantation to combat tea mosquito after 1970s.
- It has been found to be responsible for various mental and physical deformities among the population of the two respective states.
- In 2011, Supreme Court banned Endosulfan pan-India.

Bioindicator

- It is a living organism that gives an idea of health of an ecosystem.
- Some organisms are very sensitive to pollution in their environment.
- So, if pollutants are present, the organism may change its morphology, physiology or behaviour, or could die.

Examples:

- **To monitor Air Pollution:**
 - **Lichens** (a symbiosis among Cyanobacteria, algae, and/or fungi).
 - **Bryophytes** (a collective term for mosses, hornworts and liverworts).
- **To monitor water pollution:**
 - **Algae blooms:** They are often used to indicate large increases of nitrates and phosphates (Eutrophication) in lakes and rivers.
- **Other Bio-indicators:** Bacteria, Sparrow, Butterflies etc.

Initiatives

Jal Shakti Abhiyan

- It is a **time bound campaign** with a mission mode approach.
- It runs through **citizen participation** in two phases.

- The focus of the **campaign** is on water stressed districts and blocks.
- Successful Case Studies on Water Conservation**
- Bhagirath Krishak Abhiyan (M.P.):**
 - Construction of thousands of **farm ponds** to boost irrigation.
- Dong Bundh System (North East):** To ensure availability of drinking and irrigation water.
- Note:** Samagra Shiksha-Jal Suraksha: It creates awareness about water conservation among all school students in the country.

National Water Mission (NWM) Award

- It is initiated by:
 - National Water Mission and Department of Water Resources.
 - River Development & Ganga Rejuvenation.
 - Ministry of Jal Shakti.
- It is for **water conservation, efficient water use, sustainable water management.**
- The awards are given in 10 categories defined under 5 goals of NWM.

National Water Mission (NWM):

- It is one of the **8 missions** under the **National Action Plan for Climate Change.**
- It envisages following 5 goals:**
 - Comprehensive water data base in public domain and assessment of the impact of climate change on water resource.
 - Promotion of citizen and state actions for water conservation, augmentation and preservation.
 - Focused attention to vulnerable areas including over-exploited areas.
 - Increasing water use efficiency by 20%.
 - Promotion of basin level integrated water resources management.

Global Clean Seas Campaign, 2017

- It is a global **UN Environment initiative.**
- It increases **global awareness** of the need to **reduce marine plastic litter.**
- It is inspired from Mumbai's Versova beach clean-up programme.
- News Context:** Indonesia declared a "Garbage emergency" as part of Global Clean Seas campaign.

Champions of the Earth award, 2005

- It is **UN's highest environmental honour.**

- It recognizes **individuals and organizations**, whose actions have had a **transformative positive impact on the environment.**

National Ganga Council

- News Context:** Union Cabinet has cleared the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016.
- It empowers National Mission for Clean Ganga (NMCG)** to discharge its functions in an independent and accountable manner.
- Its authority will be under the Environment (Protection) Act, 1986.**
- Major Highlights:**
 - NMCG will replace existing National Ganga River Basin Authority (NGRBA)** for pollution prevention and rejuvenation of Ganga.
 - Task Force will be set up** to ensure **implementation of an action plan.**
 - NMCG will have 2 tier structure with a Governing Council and an Executive Committee.
 - NMCG will comply to the decisions of the National Ganga Council.**
- State Ganga Committees:** At state level.
- District Ganga Committees:** At district level, monitored by the State Committees.
- National Ganga River Basin Authority (NRGBA), 2009:**
 - It was established under **Section 3 of the Environment Protection Act, 1986.**
 - It declared Ganga as "**National River**" of India.
- Significance**
 - NMCG can issue orders** and have powers under Environment Protection Act.
 - It can fine polluters.**
 - It takes action only in case of non-compliance when CPCB does not do so.**
 - CPCB can take action jointly with NMCG.

Swachh Yug Campaign

- It is **implemented in 52 districts of 5 states:**
 - UP, Uttarakhand, Bihar, Jharkhand and West Bengal.
- It is **implemented by 3 ministries:**
 - Drinking Water and Sanitation Ministry.
 - Youth Affairs and Sports Ministry.

- Water Resources, River Development and Ganga Rejuvenation Ministry.
- It is to make villages located along Ganga open defecation-free and to bring behavioural change among people.

Atal Bhujal Yojana

- It is launched by Jal Shakti Ministry to improve ground water management through community participation in identified priority areas.
- **It covers seven States:**
 - Gujarat, Haryana, Karnataka, MP, Maharashtra, Rajasthan and UP.
- It is sponsored by World Bank.

E-Flow (Environmental Laws) Norms for Ganga

- It is notified by National Mission for Clean Ganga (NMCG).
- The e-flow norms stipulate volume of water that dams and barrages must release to allow the river to naturally clean itself and protect its aquatic biodiversity.
- **About the e-flow norms:**
 - It refers to minimum flow of water considered necessary for protecting the structure and function of an ecosystem and its dependent species.
 - Ecological quality of rivers must be maintained by minimum flow.
 - Rivers must not dry-up or have their physical regimes significantly altered in order to conserve the hydrological and ecological functions of their drainage networks.
 - **News Context:** According to Central Water Commission (CWC), 4 of the 11 hydro power projects on the upper reaches of the river Ganga's tributaries are violating Ganga ecological flow (e-flow) norms.

Traditional Methods of Rainwater Harvesting

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

National Water Informatics Centre, 2018

- It maintains nation-wide water resources data.
- It comes under Water Resources, River Development and Ganga Rejuvenation Ministry.
- **It has an objective:**
 - “conservation of water, minimizing wastage and ensuring its more equitable distribution through integrated water resources development and management”.

Pesticides Management Bill, 2020

- It regulates the manufacture, import, sale, storage, distribution, use, disposal of pesticides.
- It replaces Insecticides Act, 1968.

Key Features of the Bill

- **Defines Pest & Pesticide:**
 - Pest is any species of animal, plant, pathogenic agent which is injurious to plants, humans, animals, environment.
 - Pesticide is any substance of chemical or biological origin intended to prevent any pest in agriculture, industry, public health, pest control operations, or for ordinary use.
 - It also promotes organic pesticides.
- **Constitution of Central Pesticides Board:**
 - It advises governments on scientific and technical matters arising under the Act.
- **It also focuses on:**
 - Recall and disposal of pesticides.
 - Working conditions and training of workers.
 - Pesticide manufacturers, laboratories, and pest control operators.
- **Other Provisions related to:**
 - Registration of pesticides.
 - Procedure for obtaining licence to manufacture, distribute, stock pesticides.
 - Regulating prices if necessary.
 - Prohibition on certain pesticides.
 - Offences and penalties.

Key Issues/Concerns

- **Export of pesticides:**
 - The bill does not allow export of pesticides that are banned in India.

- Even if those are approved for use in other countries.
- There is no requirement for the registration of a technical grade pesticide before importing in India.
- Encouraging the import of formulations:
 - Bill seeks to encourage the import of formulations, ultimately damaging the crop, health of farmers, and the environment.
- Prescription:
 - The farmers will have to obtain the prescription before they can buy certain pesticides, which will pose a huge obstacle.
- Power of licensing & registration:
 - Too much power in hands of bureaucracy.

Air Pollution

Context: Delhi Air Pollution

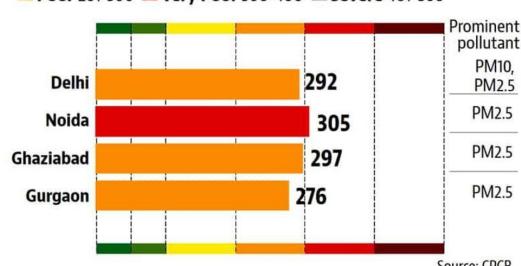
Current Schemes

- Graded Response Action Plan (GRAP)
 - Environmental Pollution (Prevention and Control) Authority (EPCA) enforces it.
 - EPCA under Environment Protection Act, 1986 was constituted with the objective of protecting and improving the quality of the environment in the NCR region.
 - EPCA identifies graded measures and implementing agencies for response to four AQI categories, namely, Moderate to Poor, Very Poor, Severe and Severe + or Emergency.

Air Quality Index

The AQI is an index for reporting daily air quality

Good 0-50 **Satisfactory** 51-100 **Moderate** 101-200
Poor 201-300 **Very Poor** 300-400 **Severe** 401-500



WAYU (Wind Augmentation Purifying Unit)

- Air pollution control device
- Developed by Council of Scientific and Industrial Research – National

Environmental Engineering Research Institute (CSIR-NEERI)
 funded by Department of Science and Technology

- Two working Principles: Wind generation and Active Pollutants removal



SAMEER app
 ▪ launched wherein air quality information is available to public along with provision for registering complaints against air polluting activities.

Related Information

- Fugitive Particulate Matter (PM) Emissions
 - Air pollutants originating from spatially distributed sources - non-point sources

Green Crackers

- Developed by: National Environmental Engineering Research Institute (NEERI)
- The green crackers are named as
 - ✓ Safe Water Releaser (SWAS)
 - ✓ Safe Thermite Cracker (STAR)
 - ✓ Safe Minimal Aluminium (SAFAL)
- using Potassium Nitrate (KNO₃) as oxidant replacing barium nitrate
- They release water vapour, air as a dust suppressant
- Green logo as well as a Quick Response (QR) coding system
 - ✓ for differentiation of green crackers from conventional crackers
- Firecrackers are regulated by Petroleum and Explosives Safety Organisation (PESO).
 - It is a regulatory authority under Department for the Promotion of Industry and Internal Trade (DPIIT) under Ministry of Commerce and Industry.

Taj Trapezium Zone (TTZ)

- ‘Eco-sensitive area’ having three world heritage sites namely **Taj Mahal, Agra Fort and Fatehpur Sikri**.
- Around the Taj Mahal to protect the monument from pollution

Context: Supreme Court lifted the ban on construction activities, industrial activities and felling of trees in the TTZ.

Sulphur Dioxide Emissions

- **Greenpeace report:** India is the largest emitter of sulphur dioxide (SO₂) in the world
- Largest source of SO₂ in the atmosphere is the burning of fossil fuels
- Other sources: extracting metal from ore; natural sources such as volcanoes; and locomotives, ships and other vehicles

Reasons for India’s high emission:

- Coal based electricity generation
- Most of the power plants lack of flue-gas desulfurization technology
- The SO₂ gas forms high resistance, visible layers of corrosion on almost all metals
- The SO₂ gas contributes to the formation of acid rain

Black Carbon

- It is a **solid particle or aerosol** (not a gas).
- It results from **incomplete combustion** of fossil fuels and biomass.
- They absorb light and energy, a million times more than CO₂.
- **Second largest contributor** to climate change after CO₂.
- It is **short-lived** and remains in the atmosphere only for days to weeks.
- When it falls to earth, it darkens the surface of snow, reducing their albedo, warming the snow and increases melting.
- It **accelerates melting of glaciers** in the Himalayas and Tibet.
 - **Reasons:** emissions from agriculture burning, forest fires, and long-range transport of pollutants in winter.

Note: **Third Pole (TP):** Himalaya-Hindu-Kush and Tibetan Plateau are collectively referred to as the **Third Pole (TP)**.

- **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.

Pet Coke (Petroleum Coke)

- It is a **solid carbon rich** (90% carbon, 3-6% sulfur) material derived from oil refining.
- It is categorized as a “bottom of the barrel” fuel.
- It is an **alternative to coal**.
- It emits **11% more greenhouse gases** and **17 times more sulphur than coal**.
- It is a **source of fine dust** which can get lodged in the lungs.
- It may contain **vanadium** which is a **toxic metal**.
- **It is used in:** Cement factories, Dyeing units, Paper Mills, Brick kilns etc.
- **India is world's largest consumer of pet coke and maximum imported from USA**.
- **News Context: Government had banned the import of pet coke for use as fuel**.
- It is allowed only for cement, lime kiln, calcium carbide, gasification industries.

LIDAR (Light Detection and Ranging)

- It is a **monitoring system** for **mapping and modelling in micro-topography, forestry, agriculture, meteorology and environmental pollution**.
- It is an optical analog of radar that **uses light in the form of a pulsed laser to carry out remote sensing**.
- This technology **generates precise, 3-D information** about the object under study.
- **LIDAR instrument consists** of laser, scanner, specialized GPS receiver.
- LIDAR projects **laser beams towards the sky** to **study the composition of pollutants** present in the upper layers.

Air Pollution Initiatives

System of Air Quality and Weather Forecasting and Research (SAFAR)

- It is under **Earth Sciences Ministry** to measure **air quality** of a metropolitan city.
- It is developed by **Indian Institute of Tropical Meteorology (IITM), Pune** and is **operationalized** by **India Meteorological Department (IMD)**.

- **SAFAR** is an integral part of India's first Air Quality Early Warning System operational in Delhi.
- **It monitors all weather parameters:** temperature, rainfall, humidity, wind speed, wind direction, UV radiation, solar radiation.
- **Pollutants Monitored:** PM2.5, PM10, Ozone, Carbon Monoxide (CO), Nitrogen Oxides (NOx), Sulfur Dioxide (SO₂), Benzene, Toluene, Xylene, Mercury, UV-Index, Mercury, Black Carbon, Carbon Monoxide, Benzene etc.
- It is **implemented in 4 cities:** Delhi, Pune, Mumbai, Ahmedabad.

National Air Quality Index

- It transforms complex air quality data of various pollutants into a single number (index value) nomenclature and colour.
- **There are 6 AQI categories:**
 - Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe.
- **AQ sub-index and health breakpoints are evolved for 8 pollutants:**
 - PM10, PM2.5, Nitrogen oxide, Sulphur Dioxide, Carbon monoxide, Ozone, Amonia, Lead.
- **SAMEER App:** It displays AQI at a city and receive complaints.

Comprehensive Environmental Pollution Index (CEPI)

- It is measured by Central Pollution Control Board for Monitoring Polluted Industrial Areas (PIAs).

Categorization of industrial sectors based on CEPI score:

- **Red Category:** Industrial Sectors having Pollution Index score of 60 and above.
- **Orange Category:** Industrial Sectors having Pollution Index score of 41 to 59.
- **Green Sector:** Industrial Sectors having Pollution Index score of 21 to 40.
- **White Category:** Industrial Sectors having Pollution Index score upto 20.

Wayu (Wind Augmentation Purifying Unit)

- It is developed by Council of Scientific and Industrial Research- National Environmental Engineering Research Institute (CSIR-NEERI).
- **The device works on 2 principles:**
 - Wind generation for dilution of air pollutants.
 - Active Pollutants removal.
- It has filters for **Particulate Matter removal and activated carbon (charcoal) and UV**

lamps for poisonous gases removal such as VOCs (volatile Organic Compounds) and Carbon Monoxide.

- It purifies air in an area of 500m. square.

Environment Pollution (Prevention and Control Authority (EPCA))

- It was constituted under **Section 3(3) of Environment (Protection) Act, 1986.**
- It **protects and improves quality of environment in NCR and enforces Graded Response Action Plan (GRAP).**

Smog (Smoke Fog)

- It is mix of **smoke and fog**.
- There are majorly **two types of smog:**
 - Classical Smog: It occurs in cool humid climate.
 - It is a **mixture of smoke, fog and sulphur dioxide**.
 - Chemically it is a **reducing mixture** and so it is also **called as reducing smog**.
 - Photochemical Smog: It occurs in warm, dry and sunny climate.
 - Its main components result from action of sunlight on unsaturated hydrocarbons and nitrogen oxides produced by automobiles and factories.
 - It has **high concentration of oxidising agents**, therefore, called as **oxidising smog**.
- **Formation of photochemical smog:**
 - When unburnt hydrocarbons and nitric oxide (NO) are built up to sufficiently high levels, a chain reaction occurs from their interaction with sunlight.
 - In this, Nitric Oxide is converted into nitrogen dioxide (NO₂) and Ozone.
 - it leads to production of chemicals such as formaldehyde, acrolein.
- **It causes serious health problems:**
 - Eye, nose, throat irritation and dryness.
 - High concentration causes headache, chest pain, cough and difficulty in breathing.
 - Extensive damage to plant life.
 - Corrosion of metals, stones, building materials, rubber, painted surface.

Sulphur Dioxide (SO₂) Emission

- **News Context:** India's SO₂ emission is among highest in world.

- **Major reason:** Harmful pollutant by **burning coal**, which contains about 3% of Sulphur to generate electricity.
- **Sulphur Dioxide (SO₂):**
 - It is a **colourless reactive gaseous air pollutant**.
 - It impacts **visibility and causes haze**.
- **Natural Sources:** It is naturally produced by volcanoes.
- **Man-made Sources:** Burning fuels: coal, oil and gases containing sulphur.
 - By smelting metals like copper, zinc, lead, nickel and motor vehicle emission.

Major Impacts:

- **Acid Rain:** When SO₂ combines with water and air, it forms **sulfuric acid**.
 - It is main **component of acid rain**.
 - It can cause deforestation, acidify waterways to the detriment of aquatic life.
- **Health:** It affects **human respiratory system** and makes **breathing difficult**.

Government Action on SO₂:

- **Implementation of Bharat Stage Norms:**
 - BS IV-compliant fuel currently in use has 50 parts per million (ppm) sulphur.
 - BS VI stipulates a low 10 ppm.

Nitrogen pollution

- **Agriculture is the main source of nitrogen pollution**, followed by **Sewage and organic solid wastes**.
- **Ammonia concentration in the atmosphere over India is the highest in the world due to cattle population and excessive fertilizer use**.
- Note: Nitrous oxide is 300 times more potent as a greenhouse gas than CO₂.
- **Impact of nitrogen pollution:**
 - Reducing Food productivity, Smog Formation.
 - Polluting Groundwater, Acid rain.
- **Health impact:** Blue Baby Syndrome, reduced functioning of the thyroid gland, Vitamin A shortages etc.
- **Ozone Depletion:** Nitrous oxide is considered as a dominant ozone-depleting substance emitted by humans.

Steps taken to control Nitrogen Pollution

- **Mandatory neem-coated urea production:**
 - Neem-coated urea releases nitrogen at a slower pace giving plants time to absorb it.

- **Soil Health Card:**
 - It provides information to farmers on nutrient status of their soil.
 - It includes recommendations on appropriate dosage of nutrients for improving soil health and its fertility.

Biodiversity

Tiger Reserves, Wildlife Sanctuary in News

Andhra Pradesh

- **Nagarjunasagar Srisailam Tiger Reserve:**
 - Guntur, Prakasam, Kurnool districts in Andhra Pradesh.
 - Nalgonda and Mahabubnagar districts in Telangana.
- **Atapaka bird sanctuary:**
 - It has become a safe breeding ground for **2 migratory bird species: Grey pelicans and Painted storks**.
 - It has **Kolleru Lake**: It is a sanctuary under Wildlife Protection Act,1972.
 - It is a Ramsar site.

Odisha

- **Nalbana Bird Sanctuary (Nalbana Island):**
 - It is the **core area of Ramsar designated wetlands of Chilika Lake**.

Arunachal Pradesh

- **Tally Valley Wildlife Sanctuary**
 - A new snake species (**Trachischium apteii**), which is non-venomous was found here.
- **Namdapha National Park**
 - It is the **largest protected area in Eastern Himalaya biodiversity hotspot**.
 - It is **3rd largest national park** in India area-wise.
 - **It has 4 big cat species:** snow leopards, clouded leopards, common leopards, tigers.

Madhya Pradesh

- **Bandhavgarh reserve forest: Vindhyan hills.**
 - National park declared: 1968.
 - Tiger Reserve declared: 1993.
 - It has a colony of elephants.
- **Nauradehi Sanctuary**
 - It spreads across 2 major river basins: **Narmada and Ganges**.
 - It is also a **potential site for Cheetah Reintroduction** in India from Africa.
- **Van Vihar National Park, Bhopal:**

- **Species:** Tiger, White tiger, leopard, hyena and sloth bear.
- Chital, sambhar, black buck, blue bull, gharial, crocodile etc.
- **Satpura Tiger Reserve:**
 - **It comprises of 3 protected areas:**
 - Satpura National Park.
 - Bori Sanctuary.
 - Pachmarhi Wildlife Sanctuary.
 - **Denwa river** is the main water source here.
 - **Species:** State bird of MP (Paradise Flycatcher) is found here.
 - Tigers, Black Buck, Leopard, Malabar Pied Hornbill, Malabar Whistling Thrush.

Telangana

- **Papikonda National Park:** Bird and Biodiversity area.
- **Amrabad Tiger Reserve:** Nallamal Hills
 - Earlier, it was part of 'Nagarjunasagar-Srisailam Tiger reserve'.
 - Post-bifurcation, the northern part of the reserve is vested with Telangana and renamed as 'Amrabad Tiger Reserve'.
 - **Note:** It is dominated by the **Chenchus**, a PVTG which coexist with tigers and wild animals.
 - **Endangered “mouse deer” was reintroduced here in 2017.**
- **Kawal Tiger Reserve:** Sahyadri Mountain Ranges.
 - Godavari and Kadam rivers flow towards the south of the sanctuary.

Goa

- **Mahadayi Wildlife Sanctuary:**
 - It is in **Western Ghats** lying in **Mahadayi river basin**.
 - It could be made tiger reserve because of the presence of Royal Bengal Tigers.

Karnataka: 2nd highest tiger population in India.

- **Bandipur Tiger Reserve**
 - It is the part of **Nilgiri Biosphere Reserve**.
 - It shares its **boundary with 3 National parks:**
 - Nagarhole National Park.
 - Wayanad wildlife sanctuary.
 - Mudumalai National park.

Assam

- **Kaziranga National Park**
 - It is located on the edge of the **Eastern Himalayan biodiversity hotspots**.
 - **Brahmaputra** forms its northern boundary.
 - **Species:** one-horned rhinoceros, elephants, wild water buffalo, swamp deer.
 - **Note:** It was declared as a **World Heritage Site by UNESCO in 1985**.
 - It was declared Tiger Reserve in 2006.

Protected area Definitions

Wildlife Sanctuary

- It is an **area where animal habitats and their surroundings are protected** from any sort of disturbance.
- **Wildlife (Protection) Act of 1972** gives State Government power to declare certain areas as **wildlife sanctuaries**.
- There are more than 500 wildlife sanctuaries in India.

National Park

- It is **used for conservation purposes**.
- Wildlife (Protection) Act of 1972 gives State Government power to declare areas as national parks.
- There are more than 100 national parks in India.

Community Reserve or Conservation Reserves:

- These areas act as **buffer zone to connectors and migration corridors between established national parks, wildlife sanctuaries, reserved and protected forests**.
- State Government (after consulting central government and local communities) can declare any area as community or conservation reserve.
- These are **maximum in Meghalaya**.
- **Note:** These protected areas were introduced under Wildlife (Protection) Amendment Act of 2002.

Biosphere Reserve

- It is an **international designation by UNESCO comprising terrestrial, marine and coastal ecosystems**.
- **It is divided into:** Core, Buffer zone, Transition zone. (decreasing order of protection).
- There are 18 biosphere reserves in India.

- 11 are part of World Network of Biosphere Reserves, based on UNESCO Man and Biosphere (MAB) Programme.

Tiger Reserve

- **National Park or Wildlife Sanctuary that is considered significant for protecting tigers** can be additionally designated as a Tiger Reserve.
- It consists of a 'Core' or 'Critical Tiger Habitat'.
- They are governed by Project Tiger which is administrated by NTCA.

Bird Sanctuary

- It is a nature facility to ensure conservation of birds and their natural habitats.

Not All Animals Migrate by Choice Campaign

- **News context:** It is campaign launched by UN Environment India and Wildlife Crime Control Bureau (WCCB).
- **It aims at creating awareness and garnering public support for:**
 - Protection and conservation of wildlife.
 - Prevention of smuggling, reduction in demand for wildlife products.
- The 1st phase of the campaign will focus on: **Tiger, Pangolin, Star Tortoise, Tokay Gecko.**

India State of Forests Report 2019

- It is released by **Forest Survey of India (FSI)**.
- FSI comes under MoEFCC to assess and monitor forest resources.

Major Points of the report

- **Forest and Tree Cover at national level:** 24.56% of total geographic area.
- **Highest Forest Cover in States area-wise:** MP, Arunachal Pradesh, Chhattisgarh, Odisha, Maharashtra.
- **Percentage wise:** Mizoram (85.41%), Arunachal Pradesh (79.63%), Meghalaya (76.33%), Manipur (75.46%), Nagaland (75.31%).
 - **Forest cover in the North-East:** 65.05%.
- **Wetlands:** 4.7% of the total area.
 - Largest wetland areas in States: Gujarat, West Bengal.
- **Mangrove Cover:**

- **Maximum Mangrove Cover among states:** West Bengal, Gujarat, Andaman & Nicobar.

Related Facts

- **Forest Cover:** It refers to all lands more than one hectare in area, with a tree canopy density of more than 10% irrespective of ownership and legal status.
 - Such lands may not necessarily be a recorded forest area.
 - It also includes orchards, bamboo and palm.
- **Recorded Forest Area (RFA):** It refers to all the geographic areas recorded as 'Forests' in government records.
 - It consists of Reserved Forests and Protected Forests which have been constituted under Indian Forest Act, 1927.
- **Green Wash:** The extent of wooded areas generally shown in light green colour on the Survey of India topographical sheets.
- **Tree Cover:** Tree patches outside recorded forest areas exclusive of forest cover and less than the minimum area of one hectare.
- **Open Forest (OF):** Lands with forest cover having a canopy density between 10 to 40%.
- **Dense Forest:** All lands with a forest cover having a canopy density of 40% and above.

Deemed Forest

- The areas which are like forests but are **neither recorded, nor notified either under forest department or revenue department.**
- They **constitute about 1% of country's forests.**
- However, they have a **legal category** of forests in **MP and Odisha.**
- **News Context:** Forest Advisory Committee recently asked states about the status of deemed forest.

New Ramsar Sites in India

- 10 new Ramsar sites has been declared in India, now with total number of 37.
- **Nandur Madhameshwar:** It is the 1st Ramsar site of Maharashtra.
 - **Species:** Deolali minnow (a fish), Indian vulture and white-rumped vulture.
- **Saman Bird Sanctuary (Mainpuri, UP):** Seasonal oxbow lake on Ganges floodplain.
 - It is a wintering site for many migrants including **Greylag goose**.

- **Nawabganj Bird Sanctuary (Unnao, UP):** A shallow marshland.
 - It is winter migratory venue for Siberian cranes.
- **Samaspur Bird Sanctuary (Raebareli, UP):** A lowland marsh.
 - **Species:** Egyptian vulture and Pallas's fish eagle.
- **Sandi Bird Sanctuary or Dahar Jheel (Hardoi, UP):** A freshwater marsh.
- **Parvati Arga Bird Sanctuary:** A freshwater body consisting of 2 oxbow lakes.
 - **Species:** Critically endangered white-rumped vulture, Indian vulture, endangered Egyptian vulture.
- **Sarsai Nawar Jheel (Etawah, UP):** Vulnerable sarus crane, Critically endangered white-rumped vulture, Endangered woolly-necked stork.
- **Beas Conservation Reserve (Punjab):** Endangered Indus river dolphin, endangered masheer and hog deer, vulnerable smooth-coated otter.
- **Nangal Wildlife Sanctuary (Punjab).**

Recovery Programme for Wildlife Species

- National Board for Wildlife added 4 species to a **Recovery Programme for Critically Endangered Species:**
 - Northern River Terrapin, Clouded Leopard, Arabian Sea Humpback Whale, Red Panda
- **Recovery Programme:**
 - It is centrally sponsored scheme to provide assistance to State/UT for activities aimed at wildlife conservation.
- **Other major Species Identified under this:** Snow Leopard, Bustard, Dolphin, Nilgiri Tahr, Marine Turtles, Asian Wild Buffalo, Indian Rhinoceros, Asiatic Lion, Swamp Deer.

Asian Waterbird Census Data

- It happens every **January across Asia and Australia.**
- It is coordinated by **Bombay Natural History Society (BNHS)** with **Wetlands International in India.**
- It began in **Indian subcontinent in 1987.**
- **Water Birds**
 - They are defined as **species of birds** that are **ecologically dependent on wetlands.**
 - These are important health indicator of wetlands region.

- **Wetlands International, 1937:**
 - It is a non-profit organization established in Netherlands.
- **News Context:** It became the world's longest running biodiversity monitoring programme in 2016 with 50th global International Waterbird Census.

Sustainable Development

Ocean Energy

- **News Context:** New and Renewable Energy Ministry declared Ocean Energy as renewable energy.
- **Technologies to Harness Ocean Energy:**

Tidal Energy

- **Tidal cycle** occurs every 12 hours due to **gravitational force of moon.**
- The difference in water height from low tide and high tide is **potential energy.**
- Similar to traditional hydropower generated from dams, **tidal water can be captured in a barrage across an estuary during high tide.**
- Then, it can be **forced through a hydro-turbine during low tide.**
- **Gulf of Cambay** and **Gulf of Kutch** in Gujarat are potential locations.

Wave Energy

- It is generated by the **movement of a device** either **floating on the surface** of the ocean or moored to the **ocean floor.**

Current Energy

- **Marine current** is ocean water moving in one direction.
- **Tides** also **create currents** that flow in two directions.
- **Kinetic energy** can be captured from marine and **other tidal currents** with **submerged turbines** that are similar in appearance to miniature wind turbines.
- Similar to wind turbines, **movement of the marine current moves the rotor blades to generate electric power.**

Ocean Thermal Energy Conversion (OTEC)

- **Ocean temperature** is used from the surface to depths lower than 1,000 meters, to extract energy.
- A temperature difference of only 20°C can yield usable energy.
- There are 2 types of OTEC technologies to extract thermal energy and convert it to electric power.

Closed Cycle Method:

- A **working fluid**, such as ammonia, is pumped through a heat exchanger and vaporized.
- This vaporized steam runs a turbine.
- Cold water found at depths of the ocean condenses the vapor back to a fluid where it returns to the heat exchanger.

Open Cycle System:

- Warm surface water is pressurized in a **vacuum chamber** and converted to steam to run the turbine.
- The steam is then condensed using cold ocean water from lower depths.

PM KUSUM (Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Scheme)

- It provides **energy security** along with **financial and water security to farmers**.
- It encourages **farmers to generate solar power in their farms** and replace their diesel water pumps.
- It targets to add **decentralised solar power capacity of 25,750 MW by 2022**.

Enforcement & Monitoring Guidelines for Sand Mining

Sand Mining in India

- **Sand is a minor mineral defined under Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act).**
- **The present guidelines list following as major sources:**
 - Riverbed and flood plain, Lakes and reservoirs.
 - Agricultural fields, Coastal/ marine sand.
 - Palaeo-channels and Manufactured Sand (M-Sand).
- **MMDR Act empowers state governments to frame rules to prevent:**
 - Illegal mining, transportation.
 - Storage of minerals (both major minerals and minor minerals).

New Guidelines

- **District Survey Report (DSR)** will be prepared to identify and define mining and no mining zones.
- All district to prepare a **comprehensive mining plan**.
- No riverbed mining operation allowed in monsoon period.
- To use **drones, mobile application etc.** to check illegal mining, reserves estimation etc.
- Annual audit of each mining.

- State should **develop an online portal for sale and purchase of sand and river- bed material**.
- State to constitute a **District Level Task Force (DLTF)**.

National Policy on Biofuels, 2018

Salient Features of Policy:

- **Categorisation of biofuels for appropriate financial and fiscal incentives under each category.**
- **There are 2 main categories are:**
 - **Basic Biofuels:** 1st Generation (1G): Bioethanol & Biodiesel.
 - **Advanced Biofuels:** 2nd Generation (2G): Ethanol, Municipal Solid Waste
 - **3rd Generation (3G) biofuels:** Bio-CNG etc.
- **To expands the scope of raw material for ethanol production** by allowing use of:
 - Sugarcane juice, **Sugar containing materials:** Sugar beet, sweet sorghum.
 - **Starch containing materials:** Corn, Cassava etc.
 - **Damaged food grains** like wheat, broken rice, Rotten potatoes.
- **To 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 approval of National Biofuel Coordination Committee**, Headed by Petroleum and Natural Gas Minister.

Biofuels:

- Any hydrocarbon fuel that is produced from organic matter in a short period of time.

Different generations of biofuels:

- **1st Generation Biofuels:**
 - It uses **food crops** like wheat and sugar for making ethanol and oil seeds for bio diesel by fermentation.
- **2nd Generation Biofuels:**
 - It uses **non-food crops and feedstock such as Jatropha, wood, grass, seed crops, organic waste etc.**
- **3rd Generation Biofuels:** It uses specially engineered Algae whose biomass is converted into biofuels.
- **4th Generation biofuel:** It not only produces sustainable energy but also captures and storing CO₂.

Different types of Biofuels:

- **Bio ethanol:** It is an alcohol, produced from **fermentation of carbohydrate** and cellulosic material of crops and other plants and grasses.
 - It is used as an **additive to increase octane number of fuel.**
- **Bio Diesel:** It is a **methyl or methyl ester of fatty acids.**
 - It is produced by **trans esterification of oils** and fats obtained from plants and animals.
 - It can be **directly used as fuel.**
- **Biogas:** It is a **mixture of methane and other gases like CO₂ and N₂.**
 - It can be **produced from biodegradable waste materials.**
- **Bio Jet:** It is produced from biomass resources and used in place of or blended with air turbine fuel.

Pradhan Mantri Ji-Van (Jaiv Indhan- Vatavaran Anukool Fasal Awashesh Niyantran) Yojana

- It comes under **Petroleum and Natural Gas Ministry.**
- It will provide **financial support to Integrated Bioethanol Projects.**
 - It includes **12 commercial and 10 demonstration scale 2nd Generation (2G) ethanol projects.**
- It seeks to increase **R&D** in this area.
- **Ethanol blending in India:**
 - Ethanol Blended Petrol (**EBP**) programme was **launched in 2003.**
 - It is to blend upto 10% of ethanol in Petrol.
- **Ethanol availability is constrained by:**
 - Procurement price variation, lack of distilleries.
 - Limited feedstock availability, lack of an integrated and dedicated supply chain.

Global Solar Council

- It is an **international Non-profit association.**
- It was **founded at 2015 Paris Climate Conference.**
- **National Solar Energy Federation** is a founding member.
- It is an **umbrella organization** of all solar energy stakeholders of India.
- It works with Government to achieve India's **national solar target of 100 GW by 2022.**

World's largest solar plant

- **Ladakh** will be **world's largest single location solar photo-voltaic plant.**
- It will have an **installed capacity of 5,000 MW by 2023.**
- **Other High-Capacity Projects in India:**
 - Bhadla Solar Park (2255 MW capacity in Rajasthan).
 - Kurnool (2000 MW capacity in Andhra Pradesh).

Solar Park scheme

- It is launched by **Solar Energy Corporation of India (SECI).**
- It encourages **Solar Parks construction to generate electricity** around 500-1000 MW.
- It comes under **New and Renewable Energy Ministry.**

Solar Charkha Mission

- It is an initiative of **MSME Ministry.**
- Khadi & Village Industries Commission (**KVIC**) is the **implementing agency.**
- **Aim:** To employ artisans in 50 identified clusters.
- It gives **subsidy of 550 crore** in initial 2 years for 50 clusters.
 - Every cluster employs 400-2000 artisans.
- **Solar charkha units** are classified as **village industries.**

Charging Infrastructure Guidelines

Key points of Guidelines

- To Promote Private Participation in charging Infrastructure.
- **Ease of Setting:** No license will be required for setting up a public charging station.
- **Rollout plan:**
 - **Phase I (1-3 years):** It will cover all mega cities with population above 40 lakh and associated expressways and highways.
 - **Phase II (3-5 years):** It will cover state and UT capitals.
- **Tariff:** Central or State Electricity Regulatory Commissions will determine the tariff for supply of electricity to public charging stations.
- **Open access:** Charging station are allowed to source electricity from any power generation company through open access.

Coastal Regulation Zone (CRZ) Notification 2018

- **News Context:** Union Cabinet has approved **CRZ Notification, 2018** (under Environment Protection Act, 1986, based on Shailesh Nayak Committee recommendation (2016).

Salient Features:

- **Easing Floor Space Index (FSI) or Floor Area Ratio (FAR) norms:**
- This notification de-freezes restrictions imposed FSI under CRZ, 2011.
- **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 High Tide Line (**HTL**).
- **CRZ-III B** areas shall continue to have an **NDZ of 200 meters from HTL**.
- **Temporary Tourism infrastructure** to be promoted at a minimum distance of 10 metres from HTL.

CRZ Clearances streamlined:

- **CRZ clearances are needed** only for projects located in **CRZ-I and CRZ IV**.
- **States to have the powers for clearances CRZ-II and III** with necessary guidance.
- **NDZ of 20 meters** has been stipulated for all Islands.
- All Ecologically Sensitive Areas have been accorded special importance.
- Defence and strategic projects have been accorded necessary dispensation.

Classification of CRZ:

- **CRZ-I:** They are environmentally most critical and are classified as:
- **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 (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.
 - **CRZ-III B:** areas with population density of less than 2161 per sq km.
 - **CRZ-IV:** It constitutes the water area and further classified as:

Earmarking Eco Sensitive Area (ESA)

- **News Context:** Centre has released a notification for earmarking ESA in Western Ghats.
- It proposes **37% of Western Ghats as 'no go zone'**.
 - It was recommended by **Kasturirangan Committee**.

- The Madhav Gadgil panel had recommended 64% of western ghats as ESA.

Eco Sensitive Zones (ESZ) or Eco-Sensitive Area (ESA):

- These are **ecologically important areas** notified under **Environment Protection Act, 1986**.
- It is to be **protected from industrial pollution** and **unregulated development**.
- **The government can prohibit industrial operations such as:**
 - Mining, Sand quarrying.
 - Building thermal power plants etc. in sensitive areas.
- **To categorise an area as ESA, Government looks at:**
 - Topography, climate and rainfall, land use and land cover.
 - Roads and settlements, human population.
 - Biodiversity corridors, Data of plants and animal species of that area.
- **No project are allowed** within 10 km boundary of National Parks, Sanctuaries without approval of National Board of Wildlife (NBWL).

Green Bonds

- They are **debt instruments like normal bonds**.
 - But, used for renewable energy projects, or for services that are ecologically sustainable.
- The bond is voluntary and may be issued by:
 - A financial institution, Government.
 - A company to raise funds for a defined period.
- **Note:** European Investment Bank (EIB) issues 1st Green Bond in 2007.
- **The Indian Green Bond Market:**
 - YES Bank issued 1st Green Bond in India in 2015.
 - It was to finance renewable and clean energy projects.

Green Building Rating System

- **News Context:** Rajasthan has adopted this.
 - It is to promote construction of environment-friendly buildings.
 - It is developed by Indian Green Building Council (IGBC).

Indian Green Building Council (IGBC)

- Its vision is:

- To enable a sustainable built environment for all.
 - To facilitate India to be one of the global leaders in the sustainable built environment by 2025.
 - It organizes **Green Building Congress** annually.
 - All **stakeholders of construction industry** participate in the council activities through local chapters.
 - **It includes:**
 - Architects, Developers, Product manufacturers.
 - Corporate, Government, Academia, nodal agencies
- Other initiatives for Green Building Rating in India:**
- **Green Rating for Integrated Habitat Assessment (GRIHA)**
 - It is developed by TERI (The Energy and Resources Institute) and Renewable Energy Ministry.
 - **The Rating criteria are:**
 - Site selection and site planning,
 - Conservation and efficient utilization of resources,
 - Building operation and maintenance, and
 - Innovation.
 - **Energy Conservation Building Code-2017**
 - **It was developed by:**
 - Bureau of Energy Efficiency (Statutory body under Power Ministry).
 - US Agency for International Development (USAID).
 - It was executed under **US-India bilateral Partnership to Advance Clean Energy Deployment Technical Assistance (PACE-DTA) Program.**

Government Initiatives for Electric Vehicles (EV)

- **India's Electric Vehicle (EV) Mission 2030:**
 - Government plans to have an **all-electric fleet of vehicles by 2030.**
- **National Electric Mobility Mission:**
 - It aims to achieve **national fuel security** by promoting hybrid EVs.
 - It targets **6-7 million sales of hybrid EVs per year from 2020 onwards.**
- **FAME-India (Faster Adoption and Manufacturing of (hybrid &) Electric vehicles in India) scheme:**

- It is to support EVs market development, manufacturing and subsidizing it.
 - To be implemented till 2020.
- **The scheme has 4 focus areas:**
 - Technology development, demand creation.
 - Pilot projects and Charging Infrastructure.
- **Green Urban Transport Scheme**
 - It is to reduce emission of harmful **carbon gas** from transportation.
 - Under this scheme, Government to launch **Eco-friendly transportation facilities** in urban areas.

Environment Impact Assessment

- It is a tool used to identify the environmental, social and economic impacts of a project prior to decision-making.
- It is notified under the **Environment (Protection) Act 1986.**
- **EIA for Category A project** requires clearance by Environment Ministry.
- **For category B project**, State Environment Impact Assessment Authority (SEIAA) clearance is required.
- **News Context:**
 - Government has issued a **draft notification to amend EIA notification, 2006.**
- It increases state government authorities to grant environmental clearances related to:
 - Mining Projects involving non-coal minerals.
 - Minor minerals, River valley, Irrigation projects.

Zero Budget Natural Farming (ZBNF)

- It is a **natural farming technique** which is done without use of chemicals and spending any money on purchased inputs.
- **ZBNF reduces production cost**, down to zero by utilizing of natural resources available around the crops.
- Farmers use **earthworms, cow dung, urine, plants, human excreta etc.** for **crop protection.**
- Under this, **inter-cropping** is practiced.
 - **Combination of various crops** is grown simultaneously to produce greater yield on given piece of land.
- **ZBNF also includes replenishing water bodies.**

- Such as **farm ponds** to ensure water availability during dry spells.
- **News Context:**
 - **Andhra Pradesh is supporting ZBNF through SHGs** to improve livelihood of farmers and fight climate change.



Combustible Ice (Methane Hydrate)

- It is a **frozen mixture of water and concentrated natural gas**.
- It can be **lit on fire in its frozen state** and is seen as one of the world's most abundant **fossil fuels**.
- It has been **found beneath seafloors and buried inside Arctic permafrost and beneath Antarctic ice**.
- **News Context:** Japan and China successfully extracted the combustible ice from Sea Floor off their coastlines.