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A Shankar IAS Academy Initiative

TARGET 2018

ENVIRONMENT - I

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Shankar IAS Academy™

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TARGET 2018

ENVIRONMENT I

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TARGET 2018 ENVIRONMENT I

1. POLLUTION

1.1 Understanding Air Quality Index

- AQI is a number used to communicate to the public how polluted the air currently is or how polluted it is forecasted to become.
- As AQI increases, an increasingly large percentage of the population is likely to experience increasingly adverse health effects.
- Different countries have their own air quality indexes, corresponding to different national air quality standards.
- The AQI is most commonly used by Central Pollution Control Board (CPCB) to describe ground-level ozone levels.
- The classifications of air quality are part of a 6 grade, colour coded taking into account 8 pollutant levels.
- These pollutants are:
 1. Ground-level Ozone or O₃
 2. Particulate Matter (soot and dust) - PM 2.5 and PM 10
 3. Carbon Monoxide or CO
 4. Sulphur Dioxide or SO₂ and
 5. Nitrogen Dioxide or NO₂
 6. Ammonia or NH₃

How it is calculated?

- The pollutants in the affected air are given a weight based on a formula.
- That weight depends on the kind of impact it has on human health, each of the pollutants is given a weight.
- The worst of these weights is given as a composite air quality.
- So instead of giving six different numbers, six different colours, it throws up one single colour, one single number.
- The index will throw up one number which will be given to the public.
- People will know the health of their air quality based on this number and one associated colour code.

Colour	Level of Health Concern	AQI Values
Green	Good	0 to 50
Yellow	Moderate	51 to 100
Orange	Unhealthy for sensitive groups	101 to 150
Red	Unhealthy	151 to 200
Purple	Very Unhealthy	201 to 300
Maroon	Hazardous	301 to 500

1.2 Delhi's Pollution Crisis

- The deteriorating air quality and suffocating smog have led to closure of primary schools in Delhi.
- **Smog** - Smog refers to a smoky fog (smoke+fog) and is a kind of air pollution.
- Fog is a hazy condition which is a result of suspension of water droplets close to the ground.
- Smog, on the other hand, is a mixture of pollutants in the atmosphere which consists of fine particles and ground level ozone.
- When pollution is high, nitrogen oxides and dust particles interact with sunlight to form ground-level ozone, leading to hazy smog.

- This condition is a result of a range of factors including:
 - i. geography of the place.
 - ii. sunlight
 - iii. calmness of winds.
 - iv. post-harvest crop burning.
 - v. firing of brick kilns.
 - vi. dust from construction sites and unpaved roads.
 - vii. vehicular pollution.
 - viii. domestic and industrial emissions.
- **Wind** - Smog occurs in a location that is far away from the actual source of pollution after the hazardous pollutants have drifted away in the wind.
- Delhi experiences two kinds of winds in winter which are:
 - i. wind carrying pollutants from stubble burning in Punjab.
 - ii. wind bringing in moisture from Uttar Pradesh.
- These two winds collide in the upper atmosphere above region.
- However, Delhi and its neighbouring areas have nearly still wind conditions near the ground, which is due to prevailing anti-cyclone conditions around the region during winter.
- The two winds, combined with the near still wind conditions, effectively trap the pollutants leading to persistent smog.
- **Crop burning** - The smog that envelops the region is exacerbated by the burning of biomass in nearby Punjab and Haryana.
- The post-monsoon burning of rice and wheat residue releases maximum aerosols.
- And this contributes to the volume of PM_{2.5} in the air.

1.3 Rising Danger of Plastics

- UN Environment Programme's Clean Seas Campaign called for a global ban on “**Microbeads**” in personal care products.
- In India, recently The Bureau of Indian Standards (BIS) has classified microbeads as “unsafe” for use in cosmetic products.
- Microbeads are **smaller forms of plastic**, no greater in size than 5 mm.
- Microbeads are added as an exfoliating agent to cosmetics and personal care products, such as soap, facial scrub and toothpastes.
- Microplastic sources also include breakdown of discarded bags and plastic packaging, particles from vehicle tyres, synthetic fibres from textiles, etc.
- Microbeads escape the filtration and treatment processes for waste water and end up in sites of nature.
- This is resulting in significant global impacts on wildlife from marine environment pollution.
- The durable properties of plastics make them persistent and slow to degrade in the environment entering the food chains.
- It is also getting dangerous as plastics are making way into the food chains of even birds, animals and fishes.



1.4 Role of Aerosols in Indian Monsoon

- Researchers from Indian Institute of Tropical Meteorology, Pune, think that aerosols may be weakening the monsoon.
- Aerosols are minute particles suspended in the atmosphere.
- When these particles are sufficiently large, we notice their presence as they scatter and absorb sunlight.



- Their scattering of sunlight can reduce visibility (haze) and redden sunrises and sunsets.
- Aerosols are short-lived, unlike greenhouse gases that persist and accumulate in the atmosphere for longer period.
- The bulk of aerosols about 90% by mass have natural origins. Ex: Volcanoes.
- The remaining 10% of aerosols are considered anthropogenic, or human-made, and they come from a variety of sources.
- Automobiles, incinerators, smelters, and power plants are prolific producers of sulfates, nitrates, black carbon, and other particles.
- Deforestation, overgrazing, drought, and excessive irrigation can alter the land surface, increasing the rate at which dust aerosols enter the atmosphere.

Direct effects

- Aerosols interact both directly and indirectly with the Earth's radiation budget and climate.
- Different aerosols scatter or absorb sunlight to varying degrees, depending on their physical properties. Although most aerosols reflect sunlight, some also absorb it.
- Aerosol's effect on light depends primarily on the composition and color of the particles.
- Pure sulfates and nitrates reflect nearly all radiation they encounter, cooling the atmosphere.
- Black carbon absorbs radiation readily, warming the atmosphere but also shading the surface.
- Brown carbon or organic matter has a warming influence on the atmosphere depending on the brightness of the underlying ground.
- Salt particles tend to reflect all the sunlight they encounter.
- In addition to scattering or absorbing radiation, aerosols can **alter** the reflectivity, or **albedo**, of the planet.
- A good monsoon is produced by the difference in temperature between land and sea.
- But, the dust clouds shield the earth from the sun's rays, depressing land and sea temperatures and reducing the variation between the two.
- Because of this, the Indian monsoon is getting weakened by aerosol accumulation.

Indirect effects

- As an indirect effect, aerosols in the lower atmosphere can modify the size of cloud particles, changing how the clouds reflect and absorb sunlight, thereby affecting the Earth's energy budget.
- Aerosols also can act as sites for chemical reactions to take place.
- The most significant of these reactions are those that lead to the destruction of stratospheric ozone.
- On a global scale, these aerosol "indirect effects" typically work in opposition to greenhouse gases and cause cooling.
- Broadly speaking, aerosols are thought to suppress precipitation because the particles decrease the size of water droplets in clouds.

1.5 Critically Polluted Cluster Tag

- Visakhapatnam was given the critically polluted cluster tag by the Central Pollution Control Board in the Comprehensive Environment Pollution Index (CEPI) notified in 2009.
- But later it was removed from that list, following improvement in the quality of air, in 2013.
- CEPI is measured by Central Pollution Control Board based on the score on parameters like air and water quality in the industrial clusters.
- It is a rational number to characterize the environmental quality at a given location on a scale of 1 to 100.
- CEPI score of 70 or above is considered as critically polluted cluster tag.
- CEPI score between 60 and 70 is categorised as severely polluted industry.



- Ministry of Environment, Forest and Climate Change imposed a temporary moratorium on development of certain industrial project on the industrial region which is having CEPI score of 70 and above.

1.6 Removal of Oil Spill

- Scientists have developed a simple, cheap and environment-friendly system that can effectively remove crude oil from sea which can pollute and even destroy marine ecosystems.
- The method is based on absorption by cellulose with porous carrier and impregnated with **oleogelator**, a cheap organic compound.
- Oleogelator congeal oils selectively from a biphasic mixture of oil and water and form a 3D fibre network through hydrogen bonding.
- Thus the oil trapped in the gelator form a rigid gel, turns the liquid oil into a solid one, which can be simply scooped out.
- The gelator renders the cellulose matrix hydrophobic. It does not suck in water as naked cellulose does.

1.7 Fatbergs

- It is a term used to denote the giant lumps of floating waste produced due to leftover cooking oils and grease washed down the sink mix with solids in the sewers.
- A UK company, Argent Energy, is now converting these fatbergs into usable fuel (Biodiesel)
- The masses are heated to separate the oils and fats from the solid waste.
- The extracted oil is then treated with a few chemicals to yield an industry-standard biodiesel that can be used for a string of purposes.
- Roughly a quarter to two-fifths of a fatberg is converted into biodiesel.
- Fatberg fuel is far more environmentally friendly than, say, a crop-based biodiesel like the one from palm oil—palm farming has caused destruction of rainforests in South East Asian nations.

1.8 Fly Ash

- Fly ash is a by-product obtained by burning coal and is usually produced at thermal power stations.
- It is a substance containing aluminous and siliceous material that forms cement in the presence of water.
- Thus it can be used for replacing cement to produce concrete for road construction.
- It is utilised in cement and asbestos industry, ready mix concrete plants, road embankment, brick making, mine filling, ash dyke rising and land development.

1.9 Black Carbon

- According to a new study by climate researchers, airplanes may be ejecting significant amounts of black carbon (BC).
- They have evidence of such particles existing up to 18 km into the stratosphere.
- Black carbons derive from emissions from aviation fuel and can linger long enough to provide a fertile ground for other chemical reactions that can deplete the ozone layer.
- BC particles strongly absorb solar and terrestrial radiation and heats up the atmosphere it can upset the monsoon system.
- If deposited on snow, it could accelerate the heating of snow and quicken the melting of glaciers.
- Black Carbon as a pollutant known to aggravate breathing disorders.

1.10 Brown Carbon

- Brown Carbon or organic carbon comes from complex organic reactions in the airborne atmospheric particles. This includes
 - Tar materials form smouldering fires or coal combustion.
 - Breakdown products from biomass burning.



3. A mixture of organic compounds emitted from soil and volatile organic compounds given off by vegetation.
- Black Carbon is inorganic in nature consisting of soot particles that directly come out of combustion processes.
- Both Black carbon and Brown carbon absorbs sunlight and thus in turn warms the atmosphere and when inhaled, causes severe health hazards.
- Black carbon absorbs light in the visible spectrum whereas Brown carbon is light brown in colour and absorbs light in the ultraviolet region.
- Brown Carbon leads to the formation of ground level ozone in the atmosphere.

1.11 Chemicals Banned in Firecrackers

- Central Pollution Control Board recently labelled five chemicals as toxic in the manufacturing of firecrackers. Consequently, SC has banned the use of those chemicals in its recent order.
- The banned chemicals include antimony, lithium, mercury, arsenic and lead.
- The court entrusted the responsibility to ensure compliance to the Petroleum and Explosive Safety Organisation (PESO).
- Antimony – A chemical element with symbol “Sb” is used in the production of heads of safety ammunition, explosives and fireworks.
- Mercury – A Chemical element with symbol “Hg” is commonly known as quick silver and only metallic element that is liquid in standard room temperature and pressure.
- It is mainly used as a trigger for other explosives and sensitive to friction, heat and shock.
- Arsenic – A Chemical element with symbol “As” is generally non-combustible. Arsine is used as an agent in chemical warfare, thus several countries have regulations on its use owing to its highly inflammable nature.
- Lead – Lead is denoted by symbol “Pb”, found in most heavy grade explosives. Due to its explosive nature it is used in most detonators to initiate big explosions.
- Lithium - A highly volatile element, lithium is flammable, and it is potentially explosive when exposed to air and especially to water, though less so than other alkali metals.

1.12 Firecracker Ban in NCR

- Supreme Court recently reinstated the 2016 temporary ban on the sale of fireworks in Delhi-NCR.
- **Chemistry of fireworks** - Explosive fireworks depend on four primary ingredients — oxidiser, fuel, colouring agents & binder.
- The oxidisers release oxygen to allow the explosion to take place. Ex: Nitrates, chlorates.
- The fuel for burning is usually charcoal.
- Colouring agents like aluminium compounds are for brilliant whites, barium nitrate for greens.
- Binders are used to hold the mixture of the firework together in a paste while burning.
- Also, other metals like titanium & strontium are added to regulate the speed of the burning reaction.
- **Existing guidelines** - Currently, guidelines exist for four types of explosive firecrackers — atom bombs, Chinese crackers, garland crackers and maroons.
- The guidelines for these were drawn up by PESO in 2008.
- According to these guidelines, the sulphur, nitrate & aluminium power contents must not exceed 20%, 57%, & 24% respectively.
- Earlier, SC ordered that no firecrackers shall contain antimony, lithium, mercury, arsenic and lead.

PESO

- Petroleum and Explosives Safety Organisation is under the Department of Industrial Policy and Promotion, Ministry of Commerce and Industry.
- It is a statutory authority, which is entrusted with the responsibilities under the Explosives Act, 1884; Petroleum Act, 1934; Inflammable Substances Act, 1952, Environment (Protection) Act, 1986.



- Its mission is to control and administer the usage of explosives, petrol stations in India.
- It frames rules related to safety in manufacture, storage, transport and handling of explosives, petroleum, compressed gases and other hazardous substances.
- The procurement of raw materials for fireworks does not come under the purview of the Explosives Act.
- The PESO has been testing samples of crackers only for adherence to the sound limit of 125 decibels at a distance of four metres.

1.13 BS-VI Fuel Norms

- Bharat stage emission standards (BSES) are emission standards instituted by the Government of India.
- The government introduced Bharat Stage emission standards in 2000, essentially based on European standards.
- It is to regulate the output of air pollutants from internal combustion engines and Spark-ignition engines equipment, including motor vehicles.
- The standards and the timeline for implementation are set by the **Central Pollution Control Board** under the Ministry of Environment & Forests and climate change.
- All new vehicles manufactured after the implementation of BS norms have to be compliant with the regulations.
- Major emissions governed under these norms are carbon monoxide emissions, hydrocarbon emission limits. Nitrogen Oxides and particulate matter are also significant metrics.
- BS-IV standard was brought into place in major 13 cities in India by April 2010. Nation-wide implementation was set for April 2017.
- Implementation of the BS V standard that was earlier scheduled for 2019 has now been skipped.
- In 2016, the Indian government announced that the country would skip the BS-V norms altogether and adopt BS-VI norms by 2020.
- The government has also announced that BS-VI fuel will be available in Delhi by April 2018 and NCR by 2019.
- By moving to BS-VI, the country will be using the highest specifications of fuel standard available in the world right now.
- **Implications** - This measure is expected to help mitigate the problem of air pollution in NCT of Delhi and surrounding areas.
- The move is also in line with India's commitment under **the Paris Climate Change Agreement** to reduce its vehicular emission as part of the effort to cut emission intensity of the gross domestic product.
- The government statement does not mention any plans on seeking automakers to sell only BS-VI vehicles in the city.

BS – IV Vs BS – VI

- The main difference between BS-IV and BS-VI (which is comparable to Euro 6) is in the **amount of sulphur in the fuel**.
- BS-VI fuel is estimated to bring around an 80% reduction in sulphur content — from 50 parts per million (ppm) to 10 ppm.
- Another major difference is NOx. BS-VI is expected to cut NOx emissions from diesel cars by nearly 70% and from cars with petrol engines by 25%.

1.14 Ban on Petcoke

- The SC has requested all States and UT to move forward towards a nationwide ban on the use of pet coke and furnace oil to power up industries but allowed its use in Cement and limestone industries.
- Their use is already prohibited in Delhi, Uttar Pradesh, Haryana and Rajasthan.
- **Petroleum coke** or petcoke is a final carbon-rich solid material that is derived from oil refining or other cracking processes.
- It is a bottom-of-the-barrel residue while refining crude oil, which is high-calorific value petroleum residue, helps to conserve natural resources.
- It is over 90 percent carbon and emits 5 to 10 percent more carbon dioxide (CO₂) than coal on a per-unit-of-energy basis when it is burned.



- Petcoke contains 75,000 ppm of sulphur content when compared to coal which has just 4,000 ppm of sulphur.
- It can contain vanadium, a toxic metal which is toxic in tiny quantities, 0.8 micrograms per cubic meter of air.
- It is a key input material for cement producers and a highly polluting fuel.
- It is sometimes a source of fine dust, which can get through the air passage and lodge in the lungs, causing serious health problems.
- **Furnace oil** - It is a dark viscous residual product used as a fuel in different types of combustion equipment.
- It is obtained by blending residual products from various refining processes with suitable diluents to obtain the required fuel oil grades.
- It is used in special applications such as
 1. In marine engines and slow speed engines for power generation
 2. For drying tea leaves
 3. In gas turbines for power generation
 4. As a feed stock for fertilizer manufacturing
 5. In thermic fluid heaters and hot air generators.

1.15 Rising Light Pollution

- Earth's artificially lit outdoor surface at night grew by about 2%, resulting in increasing light pollution.
- Light pollution, also known as photo pollution, is the presence of anthropogenic light in the night environment.
- It is exacerbated by excessive, misdirected or obtrusive uses of light, but even carefully used light fundamentally alters natural conditions.
- City transitions of its street lighting from sodium lamps to LED, indicates that savings in energy are being offset by either new or brighter lights in other places.
- As a major side-effect of urbanization, it is blamed for compromising health, disrupting ecosystems and spoiling aesthetic environments.
- **Consequences** - It has ecological consequences, with natural light cycles disrupted by artificial light introduced into the night time environment.
- Increased sky glow can affect human sleep.
- In addition to threatening 30 percent of vertebrates that are nocturnal and over 60 percent of invertebrates that are nocturnal, artificial light also affects plants and microorganisms.
- It threatens biodiversity through changed night habits, such as reproduction or migration patterns, of many different species: insects, amphibians, fish, birds, bats and other animals.

1.16 Meisenheimer Complex

- It is a chemical compound which has been found to be highly effective in removing fluoride and metal ions from drinking water.
- The metal ions include lead, mercury, cadmium, copper, and iron.
- It is formed through the single step synthesis through mixing of two chemicals at room temperature.
- It repels water by nature. Thus a polystyrene sponge becomes a water repelling material when coated with this compound.
- It enables the sponge to absorb a wide variety of oils and organic solvents from water.
- It has negative and positive charged parts and this helps it absorb metal ion pollutants and fluoride from water.

1.17 Sulphur Dioxide Emission

- According to a University of Maryland-led study, India is overtaking China as the biggest emitter of sulphur dioxide emission.
- India overtook the US in 2010 to become the world's second-largest SO₂ emitter, and became the world's second-largest consumer of coal last year.



- The estimates for India for 2016 ranged between 9.5 and 12.6 megatons, while the estimates for China ranged between 7.5 and 11.6 megatons.
- India's SO₂ emission has been increased by 50 per cent since 2007, while China's fell by 75 per cent.
- Sulphur dioxide is a gas. It is invisible and has a nasty, sharp smell.
- It reacts easily with other substances to form harmful compounds, such as sulfuric acid, sulfurous acid and sulfate particles
- It causes acid rain, haze and many health-related problems.
- About 99% of the sulfur dioxide in air comes from human sources.
- The main source of sulfur dioxide in the air is industrial activity that processes materials that contain sulphur.
- It is produced predominantly when coal is burned to generate electricity and most of the emission come from coal-fired plants and coal burning factories.
- Coal typically contains up to 3% sulfur by weight, and burning coal creates SO₂.
- Most of the sulphur dioxide emissions come from coal-fired power plants and coal-burning factories.
- Some mineral ores also contain sulfur, and sulfur dioxide is released when they are processed. In addition, industrial activities that burn fossil fuels containing sulfur can be important sources of sulfur dioxide.
- It is also present in motor vehicle emissions, as the result of fuel combustion.

1.18 Bio-Fuel from Algae

- The mechanism behind oil synthesis within microalgae cells has been revealed by a Japanese research team.
- Many species of algae are capable of producing large amounts of oil (lipids), but this is the first time that researchers have captured the metabolic changes occurring on a molecular level when lipids are produced in algae cells.
- The discovery of this metabolic mechanism is not only an important biological finding.
- It could also be used to increase the production of biofuel by improving methods of algae cultivation.
- The amount of biomass on Earth is approximately 10 times the amount of energy we currently consume.
- Roughly half of this biomass grows in aquatic environments, and ocean-based biomass such as microalgae can produce oil without using up arable land and drinking water.
- Microalgae can grow with light, water, carbon dioxide and a small amount of minerals, and their cells divide quickly, meaning that they can be harvested faster than land-based biomasses.
- Algae can also be harvested all year round, potentially offering a more stable energy supply.

Generations of Biofuels

1. First Generation Biofuel

- They are produced directly from food crops.
- wheat and sugar cane are the most widely used feedstock

2. Second Generation Biofuel

- They are produced from marginal croplands unsuitable for food production. For example- Jatropha
- It overcomes over food vs fuel debate in first generation biofuel.

3. Third Generation Biofuel

- Uses specially engineered energy crops such as algae as its energy source.
- The algae are cultured to act as a low-cost, high-energy and entirely renewable feedstock.
- Algae will have the potential to produce more energy per acre than conventional crops.

4. Fourth Generation Biofuels

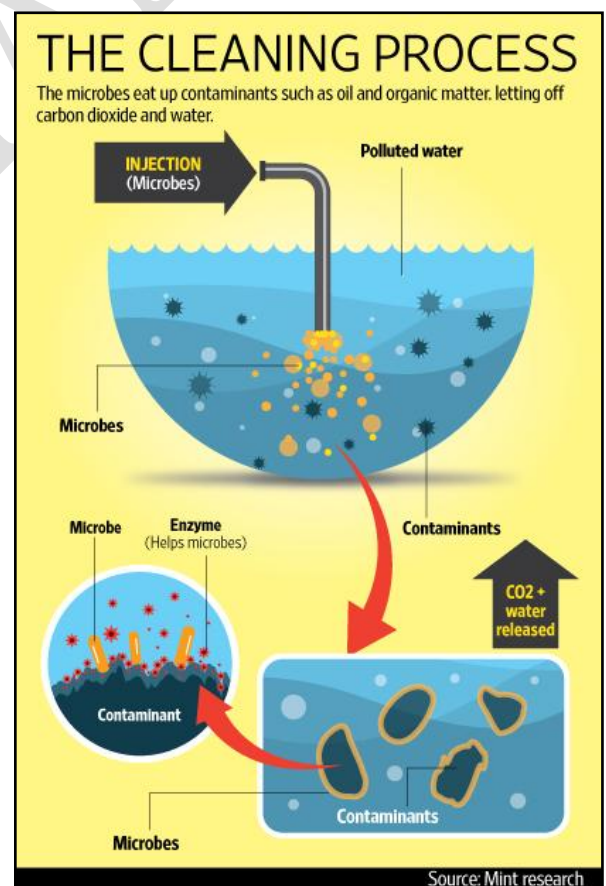
- Aimed at producing sustainable energy and also capturing and storing carbon dioxide.
- Carbon dioxide is captured which can be then geo-sequestered.
- This is carbon neutral technology.

1.19 Production of Bio-Ethanol

- Scientists from CSIR have produced ethanol from discarded cotton-stalks by using a combination of chemical and biological techniques.
- The cotton stalks were first treated with an acid, alkali and enzymes to convert it to glucose.
- Then the fermentation using a novel yeast strain was carried out to convert the glucose into ethanol.
- The final alcohol obtained can be made to fuel grade Bio-ethanol, after distillation and dehydration using molecular sieves.
- Bio-ethanol has a number of advantages over conventional fuels as it comes from a renewable resource.
- It is mandatory to blend 10% ethanol with petrol.
- Presently it is obtained by fermentation of sugar cane molasses which is a by product of sugar production, and has food value.
- Converting the agro-residues (Cotton Stalks) to ethanol reduces the food and fuel competition.

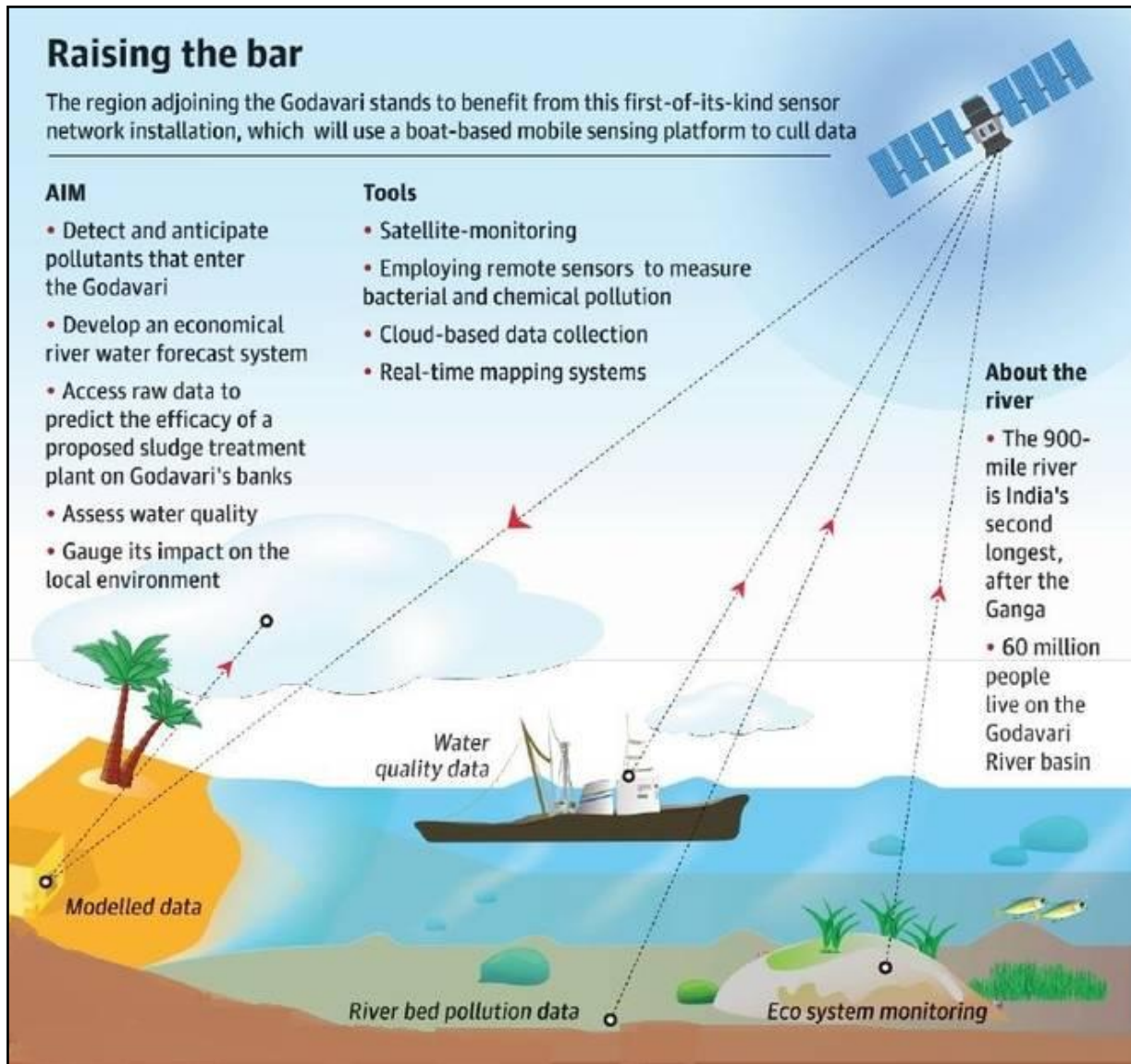
1.20 Bio-Remediation

- National Mission for Clean Ganga is now using bio-remediation technology both to clean drains and to check pollution in some parts of the river Ganga.
- The technology has been successfully demonstrated in pilot projects by the Central Pollution Control Board.
- Bioremediation is a system of sewage treatment where microbes are used to degrade flowing sewage into carbon dioxide and water.
- It includes phytoremediation (plants) and rhizoremediation (plant and microbe interaction).
- Under the process, bacteria are cultured in bulk and applied to the flowing sewage.
- Sometimes, enzymes are also added to activate the microbes.
- Then the microbes simply eat up contaminants such as oil and organic matter and then let off carbon dioxide and water.
- Heavy metals and toxic chemicals are also reduced.
- Harmful pathogenic bacteria such as *E. coli* are also eliminated.
- The microorganisms that are used already exist in nature, hence does not pose any harm to the environment.
- The system does not require construction or any major modification of drains or diversion of flow.
- The process also does not require any additional land or power, making it a simple and easy system.
- It is cheaper than conventional treatment methods and does not require skilled manpower.
- However, bioremediation can be effective only in places where environmental conditions permit microbial growth and activity.



- Where the conditions are not favourable for their growth, manipulation of environmental parameters can be carried out to allow microbial growth.

1.21 Predicting Pollution in Godavari



- A group of U.S. researchers is working on a system to map undulating pollution trends in the Godavari.
- The researchers are trying to develop a cost-effective forecast system using satellite-monitoring, collecting water samples and using special sensors to measure bacterial and chemical pollution.
- The objective is to be able to inform State officials and citizens of a probable spike in levels of dangerous microbes or effluents.
- It would be similar to weather and air pollution forecasts.
- It could also be used to inform the efficacy of a proposed faecal sludge treatment plant other behavioural interventions.
- The exercise is part of a Bill and Melinda Gates Foundation project to support the programme to provide city-wide sanitation improvements in urban Andhra Pradesh.

1.22 Chromium VI

- Researchers from CSIR have developed a new method to remove hexavalent chromium (Cr (VI)) from industrial effluents.
- They have used the heat-dried fungal biomass which converts Cr (VI) to a tri-valent form of chromium.

- Chromium VI is neurotoxic, genotoxic and a carcinogen whereas Chromium trivalent is a non-toxic.
- Cr VI is found in high concentration in tannery waste which is slightly alkaline in nature.
- The positively charged heat dried biomass binds to Cr VI and adsorb the negatively charged Cr VI and other toxic metals such as lead, arsenic which are normally found in tannery waste.

1.23 REMC and GEC

- Green Energy Corridor is grid connected network for the transmission of renewable energy produced from various renewable energy projects.
- It helps in synchronising the electricity produced from solar, wind and other renewable energy resources.
- This dedicated transmission network has been divided into two parts. Intra state network is being implemented by State Transmission Utilities and Inter-state network by Power Grid Corporation of India Ltd.
- Germany has agreed to provide Euro 1 billion soft loan to this project in 2013.
- Renewable Energy Management Centre (REMC) will monitor renewable energy generation on a real-time basis and also make forecasts for hassle-free integration of solar and wind energies with the grid.

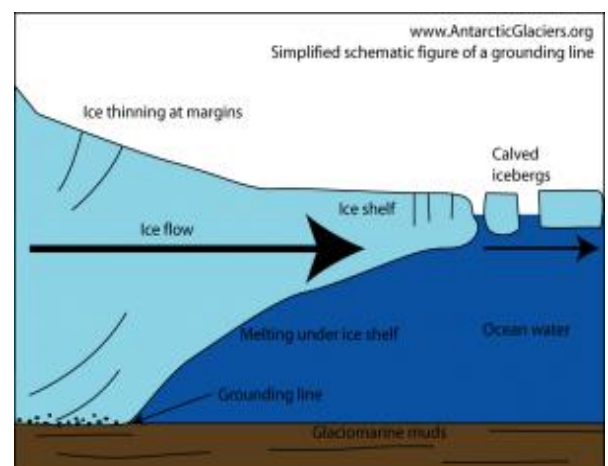
2. CLIMATE CHANGE

2.1 Effect of Climate Change

- A new study claims that fish are expected to shrink in size by 20 to 30% as a result of rising ocean temperatures.
- As fishes grow into adulthood, their demand for oxygen increases because their body mass becomes larger.
- However, the surface area of the gills, where oxygen is obtained, does not grow at the same pace as the rest of the body.
- Fish are as cold-blooded animals and so cannot regulate their own body temperatures.
- When their waters get warmer, their metabolism accelerates and they need more oxygen to sustain their body functions.
- Warmer waters increase fish's need for oxygen but climate change will result in less oxygen in the oceans.
- This means that gills have less oxygen to supply to a body that already grows faster than them.
- This forces fish to stop growing at a smaller size to be able to fulfill their needs with the little oxygen available to them
- Smaller fish will have an impact on fisheries production as well as the interaction between organisms in the ecosystems.

2.2 Receding Ice Shelf

- A trillion-ton iceberg from the **Larsen C Ice Shelf** is being disintegrated into smaller icebergs in **Antarctica**.
- An **ice shelf** is a floating extension of **land ice**. The Antarctic continent is surrounded by ice shelves.
- Ice shelves receive ice in several ways such as flow of ice from the continent, surface accumulation (snow fall) and the freezing of marine ice to their undersides.
- Ice shelves lose ice by melting from below (from relatively warm ocean currents), melting above (from warm air temperatures) and from calving icebergs.
- Warming of ice shelves can lead it to retreat, thinning and making them vulnerable and calve large icebergs and in some cases, catastrophically collapse.
- The difference between sea ice and ice shelves is that sea ice is free-floating.
- **Sea ice** is frozen ocean water surrounding polar region.





- It contains icebergs, thin sea ice and thicker multi-year sea ice. Sea freezes and unfreezes each year adding more ice in each winter.
- It can modify climate change's impact on terrestrial ice because it is highly reflective and because it has a strongly insulating nature.
- Sea ice in the **Antarctic** is currently increasing.
- This is associated with cooling sea surface temperatures in the Southern Ocean, in particular near the Ross Ice Shelf.
- In the **Arctic**, sea ice extent is steadily decreasing, as a result of long-term climate change.

2.3 Project MIDAS

- It is a U.K.-based Antarctic research project that has been looking at the ice shelf for many years
- Scientists from Project MIDAS have said the formation of icebergs is natural.
- And there seems no link to human-induced climate change was available in this case.
- Yet, the impact of such a loss on the stability of the ice shelf itself may not be good.

2.4 Ice Free Islands in Antarctica

- Isolated ice free zones exposed mountain tops, scree slopes, cliffs, valleys and coastal oases,
- It covers less than 1% of the area, but supports almost all of the continent's biodiversity such as small invertebrates, sea birds and seals.
- These ice free islands can expand and coalesce leading to homogenisation of biodiversity since less competitive species could go extinct.
- However, one of the biggest threats from an increase in ice-free area is the spread of invasive species.
- The greatest change in climate is projected for the Antarctic Peninsula by the end of the century, and more than 85% of the new ice-free area is believed to occur in the north Antarctic Peninsula.

2.5 Antarctica Glacier

- An iceberg over 250 square kilometres in size, has broken off from an enormous Pine Island glacier in Antarctica.
- It is second such incident in the last two years.
- The Pine Island Glacier is one of the largest in West Antarctica.
- The glacier loses 45 billion tonnes of ice to the ocean each year equivalent to one millimeter of global sea level rise every eight years.
- This may be due to warmer ocean waters reaching the base of the glacier and weakening it.

2.6 Earth Overshoot Day

- Earth Overshoot Day (EOD) means the day when human consumption exceeds the earth's capacity in that particular year to regenerate natural resources.
- It is the day the world completely consumes all the natural resources produced that year.
- It is calculated by Global Footprint Network.
- August 2, 2017 is the Earth Overshoot Day of the year 2017.
- Since 1987, the EOD has been moving up the calendar, from December 19 in 1987 to August 2, 2017.
- Just seven months into the year, the world has consumed all the natural resources, reveals the shocking rate at which environmental degradation is taking place.
- Global Footprint Network, founded in 2003, is an independent think tank originally based in the United States, Belgium and Switzerland.

2.7 Sixth Mass Extinction

- Scientists have warned that the Earth is undergoing its sixth mass extinction.



- The last extinction happened about 66 million years ago which wiped out non-avian dinosaurs.
- The current extinction is considered as the worst since 3 quarters of life on earth.
- More than 30% of vertebrate animals are declining in range and population.
- Tropical regions have seen the highest number of declining species and while fewer species are disappearing in temperate zones, the percentage is more or less the same as tropical regions.

2.8 Artificial Reefs to Save Islands

- Tamil Nadu has introduced a new idea of deploying artificial reefs in **Gulf of Mannar** to save the sinking islands due to sea level rise and climate change.
- Artificial reefs made of concrete are deployed parallel to the sinking island in the seaward side which reduces the effect of currents and waves, enhances fish habitats for fish production and protection of fish diversity.
- Natural corals get attached to artificial reefs over time and start regeneration.
- It is deployed in Vaan island in Gulf of Mannar. The island is on the verge of submergence.
- The project is one the climate adaptation projects funded by the National Adaptation Fund for Climate Change of the Ministry of Environment, Forests and Climate Change.
- It is the first attempt in India to protect and restore a sinking island.
- The first two phases of the project were funded by the TN Coastal Zone Protection Authority.

2.9 El Nino and Carbon Dioxide Release

- The data collected from NASA's Orbiting Carbon Observatory-2 (OCO-2) satellite reveals that El Nino of 2014-16 caused over 3 billion tonnes of carbon to get released into the atmosphere, pushing carbon dioxide concentration to record levels.
- El Nino is a periodic climate event that causes waters to warm up in east-central Pacific Ocean, which in turn causes huge changes in wind directions bringing less rain to south-east Asia and the Indian subcontinent, while increasing rain in other parts of the world.
- El Nino led to excessive carbon dioxide releases in three ways.
 1. Hot weather and drought caused extensive wildfires in south-east Asia which releases tonnes of CO₂.
 2. Drought in the Amazon rainforest stunted plant growth, reducing the amount of carbon they absorb while growing.
 3. Warmer weather and near normal rainfall in Africa caused forests to exhale more CO₂.
- However, CO₂ concentrations in the atmosphere crossed 400 parts per million (ppm) in 2016 for the whole year and were reported at about 407 parts per million for July 2017.

2.10 Kubuqi Model in Desertification Control

- Kubuqi Desert in Ordos, Inner Mongolia (Autonomous region in **China**) is the first desert in the world to achieve large-scale desertification control.
- The Project of greening of Kubuqi desert was under taken by China and it has become a name card for China's desertification control efforts.
- The project has been praised by UN Environment Programme for being an "eco-pioneer" in greening the world.
- The core pillars of the Kubuqi Model are government policy support, industrial investment, market-oriented participation of farmers and herdsman and sustainable ecological improvement.
- It relies mainly on increasing local people's income in the greening efforts via the combination of ecology and industry, enterprise development and ecological management.
- **United Nations Convention to Combat Desertification (UNCCD)** was adopted in 1994 and entered into force in 1996.
- UNCCD is the only internationally legally binding framework set up to address the problem of desertification.



- The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found.
- 13th meeting of the Parties to the UNCCD was held in Ordos, China in September, 2017.
- In the meeting, 113 countries had agreed to specify concrete targets with clear indicators, to rehabilitate more land and reverse degradation.
- **Ordos Declaration** was signed in the summit which urges countries to step up efforts on all fronts to tackle desertification.
- The new **UNCCD 2018-2030 Strategic Framework** is the most comprehensive global commitment to achieve Land Degradation Neutrality (LDN) in order to restore the productivity of vast swathes of degraded land, improve the livelihoods of more than 1.3 billion people, and to reduce the impacts of drought on vulnerable populations.
- UNGA declared 2010 to 2020 the United Nations Decade for Deserts and the Fight Against Desertification.

2.11 Extreme Rainfall Events in the Central Indian Region

- There is an increase in occurrence of extreme rainfall events in the central Indian region in recent years.
- Importantly, the northern Arabian Sea gets 1-2°C warmer, 2-3 weeks prior to extreme events.
- As a result, there is 20-40% more evaporation and increased moisture levels over the Arabian Sea before an extreme event.
- Notably, Arabian Sea supplies more moisture to the extreme rainfall events than the Bay of Bengal and the central Indian Ocean combined.
- There are two main reasons associated with this event. They are,
- **For Weakening monsoon** - Studies have observed that central Indian Ocean had considerably warmed over the years.
- On the other hand, the Indian peninsular region had not warmed up compared to other regions in the tropics.
- This is leading to a phenomena of reduced land-sea temperature difference.
- This reduced temperature difference and possibly the cooling caused by aerosol are causes behind weakening of the monsoon winds.
- **For increased moisture** - At the same time, the northern Arabian Sea is becoming increasingly warm.
- This is leading to increased moist air over it.
- Also, the warm temperatures result in large fluctuations in the monsoon winds leading to occasional surges.
- Consequently, there is an increased moisture transport during such surges.
- As monsoon winds blow north-eastwards from Arabian Sea into India, this increased moisture causes extreme rainfall events in central India.

2.12 Ozone Hole

- NOAA and NASA collaborate to monitor the growth and recovery of the ozone hole every year.
- Measurements from satellites this year showed the hole in Earth's ozone layer that forms over Antarctica was the smallest observed since 1988.
- The polar stratospheric cloud formation and persistence of these clouds are important first steps leading to the chlorine- and bromine-catalyzed reactions that destroy ozone.
- The smaller ozone hole in 2017 was strongly influenced by an unstable and warmer Antarctic vortex -- the stratospheric low pressure system that rotates clockwise in the atmosphere above Antarctica.
- This helped minimize polar stratospheric cloud formation in the lower stratosphere.

2.13 Lakshadweep Island - Coastal Erosion

- Parali I island, uninhabited and part of Bangaram atoll in Lakshadweep, has vanished due to erosion.



- All the five islets of Bangaram atoll such as Bangaram, Thinnakara, Parali I, II and III, had undergone erosion and Parali I has been inundated.
- Lakshadweep, formerly known as the Laccadive, Minicoy, and Aminidivi Islands is a group of islands in the Laccadive Sea, off the south western coast of India.
- Kavaratti serves as the capital of the Union Territory and the region comes under the jurisdiction of Kerala High Court.
- Nine degree channel separates Laccadive and Minicoy islands.
- The islands form the smallest Union Territory of India.

3. CONVENTIONS & TREATIES

3.1 UN Ocean Conference

- The UN Ocean Conference was held at UN headquarters in New York.
- It is a high-level United Nations Conference to Support the Implementation of Sustainable Development Goal 14.
- SDG 14 emphasises to conserve and sustainably use the oceans.
- Topics that were discussed ranged from plastic pollution in the oceans and seas to ocean acidification and illegal fishing – which tie in with topics of alleviating poverty, ending hunger, promoting health, ensuring access to water and sanitation etc.
- **Outcomes** - It adopted a consensus of a 14-point Call for Action where the participating Heads of State affirmed their strong commitment to conserve and sustainably use our oceans.
- Many voluntary commitments for concrete action to advance implementation were made by governments during the conference.
- To follow-up on the implementation of these voluntary commitments, UN have launched nine thematic multi-stakeholder Communities of Ocean Action.
- International Solid Waste Association also announced a task force on marine litter in concert with the conference
- **Global Ocean Commission** - It is an international initiative that was launched in 2013. It raises awareness and promotes action to address the degradation of the ocean and help restore it to full health and productivity. Its focus is on the high seas, the vast ocean areas that lie beyond the Exclusive Economic Zones (EEZs) of individual states.

3.2 India ratification of 2nd Commitment Period of Kyoto Protocol

- India has ratified the second commitment period of the Kyoto Protocol.
- With this, India became the 80th country to accept the amendment relating to the second commitment period of the Kyoto Protocol.
- The Kyoto Protocol signed in 1997, is an international treaty that commits state parties to reduce greenhouse gas emissions.
- It was adopted in 1997 and entered in to force in 2005.
- Under the Kyoto Protocol, industrialized nations agreed to cut their greenhouse gas emissions below 1990 levels.
- A group of rich and industrialized countries were assigned emission reduction targets with the **first commitment period of 2005-2012**.
- The Doha amendment was made to Kyoto protocol in 2012 to extend the obligations of the developed countries for the **second commitment period of 2013-2020**.
- It requires ratification from a total of 144 of the 192 parties of the Kyoto Protocol to become operational.
- As only 75 countries have so far ratified the Doha amendments it could not be enforced.
- China, Poland, Australia, Mexico, South Africa, Indonesia are some of the countries that ratified Doha amendments.



- US have not ratified the Kyoto Protocol and Canada withdrew from Kyoto protocol in 2012.

3.3 Global Environment Facility (GEF)

- The Global Environment Facility was established in 1991 as a pilot program in the World Bank to assist in the protection of the global environment and to promote environmental sustainable development.
- The UNDP and UNEP and the World Bank were the three initial partners implementing GEF projects.
- 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.
- Today it is an international partnership of 183 countries, international institutions, civil society organizations and the private sector that addresses global environmental issues.
- Since 1994, the World Bank has served as the Trustee of the GEF Trust Fund and provided administrative services.
- GEF funds are available to developing countries and countries with economies in transition to meet the objectives of the international environmental conventions and agreements.
- The GEF is a financial mechanism for 5 major international conventions
 1. The Minamata Convention on Mercury,
 2. The Stockholm Convention on Persistent Organic Pollutants (POPs),
 3. The United Nations Convention on Biological Diversity (UNCBD),
 4. The United Nations Convention to Combat Desertification (UNCCD) and
 5. The United Nations Framework Convention on Climate Change (UNFCCC).
- The GEF, although not linked formally to the Montreal Protocol on Substances that Deplete the Ozone Layer (MP), supports implementation of the Protocol in countries with economies in transition.
- The GEF has 18 agencies as the operational arm of the GEF.
- These agencies work closely with project stakeholders to design, develop and implement GEF-funded projects and programs.

3.4 Water Resources Group

- The 2030 Water Resources Group (2030WRG) will help the Maharashtra Government raise \$270 million from the Green Climate Fund.
- The fund which will be invested in integrated watershed programmes such as Jalyukt Shivar Yojana.
- The 2030 WRG was launched in 2008 at the World Economic Forum and has been hosted by International Finance Corporation since 2012.
- It is public-private-civil society collaboration for water resources reform in developing economies by facilitating open, trust-based dialogue processes.
- Its ultimate aim is to close the gap between water demand and supply by the year 2030.

3.5 Green Climate Fund

- Green Climate Fund is a financial mechanism under the United Nations Framework Convention on Climate Change (UNFCCC).
- It was set up by 194 countries that are part of UNFCCC, at the Conference of the Parties-16 (COP-16) in Cancun in 2010.
- The Fund's investments can be in the form of grants, loans, equity or guarantees.
- The funds come mainly from developed countries, but also from some developing countries, regions, and one city (Paris).
- It aims to deliver equal amounts of funding to developing countries for mitigation and adaptation to climate change.
- It focuses on investing in low-emission and climate-resilient development projects.



- As per the international agreement, advanced economies should provide an annual assistance of \$100 billion, through public and private sources, by 2020 — the deadline is now extended to 2025.

3.6 Meeting of CMS and its Outcomes

- Convention on the Conservation of Migratory Species of Wild Animals (CMS) is popularly known as Bonn convention.
- 12th Session of the Conference of the Parties to the Bonn Convention (CMS COP12) was held in Manila, the Philippines.
- It is the first time that the COP has been held in Asia.
- The slogan for the Conference is “Their Future is Our Future – Sustainable Development for Wildlife & People”, links to the Sustainable Development Goals.
- Four Asian Vultures** such as red-headed vulture, white-rumped vulture, Indian vulture and slender-billed vulture are set to get highest protection by the convention.
- The whale shark**, which inhabits the Indian Ocean, got global protection too.
- The Caspian seal**, the only marine mammal found in the world’s largest inland sea has also been identified for conservation.
- The next edition of the meeting will be held in India in 2020.

BONN CONVENTION

- It is an environmental treaty under the aegis of United Nations Environment Programme.
- It brings together the States through which migratory animals pass (the range states) and lays down conservation measures.
- Migratory species threatened with extinction are listed on Appendix I of the Convention.
- CMS Parties strive towards strictly protecting these animals, conserving and mitigating obstacles to their migration.
- Migratory species that need or would significantly benefit from international co-operation are listed in Appendix II of the Convention.
- India is a party to this convention whereas China, Russia, US, Canada, Japan are not party to it.

3.7 Conference of Parties (COP23) - Bonn

- The 23rd Conference of Parties to the United Nations Framework Convention on Climate Change concluded recently.
- It is the first set of negotiations since the US withdrawal from the Paris deal.
- The session ended with the adoption of “Fiji Momentum for Implementation”
- It is divided into three parts:
 - Part 1 deals with the ‘Completion of the Work Programme under the Paris Agreement’;
 - Part 2 deals with the ‘Talanoa Dialogue’ (which is the Facilitative Dialogue to be conducted in 2018);
 - Part 3 deals with ‘pre-2020 implementation and ambition’.
- Key outcomes:**
 - alliances were formed for phasing out coal
 - decision to putting up green buildings and accelerating eco-mobility
 - recognising gender in dealing with the issue, in a **Gender Action Plan**
 - decision to get indigenous people (adivasis) have a say in climate talks
 - decision to look into the greenhouse gas emissions from agriculture
- Above all, the developing countries stood as a solid bloc demanding a balanced deal.
- The key demands centred on getting agreed upon and including in the official agenda the ‘pre-2020 actions’.
- This is mainly in reference to the obligations of the developed countries under the 1997 Kyoto Protocol that still has three years to run.
- There was also a demand for fixing a deadline for the ratification of 2012 Doha amendments to the Kyoto Protocol to give a legal shape to the ‘pre-2020’ commitments.



- An important outcome of CoP 23 is the '**Talanoa Dialogue**'.
- Talanoa Dialogue is facilitative dialogue among member of Conference of Parties of Paris Agreement to be taken in 2018.
- It is a year-long process to take stock of the collective efforts of Parties in relation to progress towards the long-term goal of economy-wide absolute emission reduction and to inform the preparation of nationally determined contributions.
- Talanoa is a traditional word used in Fiji and the Pacific to reflect a process of inclusive, participatory and transparent dialogue.

3.8 UN Environment Assembly

- The UN Environment Assembly is the world's highest-level decision-making body on the environment.
- The third UN Environment Assembly will gather in Nairobi, Kenya in December 2017 under the overarching theme of "pollution".
- The Assembly has the universal membership of all 193 UN Member States.
- It is prepared throughout the year by a Committee of Permanent Representatives which is based in Nairobi.
- It aims to deliver a number of tangible commitments to end the pollution of air, land, waterways, and oceans, and to safely manage chemicals and waste.

3.9 First CoP of Minamata Convention

- The Minamata Convention is a global treaty established to protect human health and the environment from the adverse effects of mercury.
- The Minamata Convention on Mercury entered into force in August 2017 with ratification by over 50 countries.
- The first meeting of the Conference of the Parties to the Minamata Convention on Mercury (Mercury COP1) was held at Geneva, Switzerland.
- The report, 'Towards a pollution-free planet', was launched during the COP1.
- Global Environment Facility (GEF) is the financial mechanism for Minamata Convention.

4. GOVERNMENT INTERVENTIONS

4.1 Wetlands Conservation Rules

- The Ministry of Environment, Forests and Climate Change has recently notified the Wetlands Rules, 2017.
- **Definition** - Wetlands are defined as an area of marsh, fen, peatland or water.
- It could be natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt.
- It includes areas of marine water the depth of which at low tide does not exceed six metres.
- The rules apply to:
 - i. Wetlands categorised as "wetlands of international importance" under the Ramsar Convention.
 - ii. Wetlands as notified by the central and state governments and UT administration.
- **Management** - The new Rules farm out wetland management to states and union territories.
- The State or UT Wetlands Authority will have to prepare a list of all wetlands and a list of wetlands to be notified, within specified time.
- However, it is up to the states to decide which wetlands are to be notified.
- A comprehensive digital inventory of all wetlands is to be prepared within a year.
- **CWRA** - The new rules have done away with the earlier Central Wetlands Regulatory Authority (CWRA) entirely.
- CWRA has been replaced by the National Wetland Committee, which has a merely advisory role. These include -



- i. advising the central government on proposals received from states/UTs for “omission of the prohibited activities”.
 - ii. prescribing norms and guidelines for integrated management of wetlands based on wise-use principle.
 - iii. recommending trans-boundary wetlands for notification.
 - iv. reviewing the progress of integrated management of Ramsar Convention sites.
- **Restrictions** - As per the new rules, encroachments on wetlands have been banned.
 - It also prohibits solid waste dumping, discharge of untreated waste and effluents from industries and human settlements.
 - It says that conservation and management would be based on the principle of ‘wise use’, which is to be determined by the Wetlands Authority.

Shortfalls in the rules

- **Definition** - The 2010 Rules included in the definition of wetlands all inland waters such as lakes, reservoir, tanks, backwaters, lagoon, creeks, estuaries, etc.
- It also included man-made wetland and the zone of direct influence on wetlands.
- However, the 2017 Rules are not as comprehensive as this.
- It does not include river channels, paddy fields, human-made water bodies/tanks specifically for drinking water purposes, aquaculture, salt production, recreation and irrigation purposes.
- It also do not include wetlands under forest and coastal regulation zones..
- **Management** - There were lethargic response from states and UTs, in the past, on wetlands protection.
- So devolving management to states and UTs could be ineffective
- **Restrictions** - The term ‘wise use’ is subjective and could dilute the earlier restrictions.
- There is also no timeline specified for phasing out solid waste and untreated waste from being dumped into wetlands.
- The restrictions on “any other activity likely to have an adverse impact on the ecosystem of the wetland”, are not specified clearly in the Rules.
- **Appeal** – The older provision of appealing to the National Green Tribunal does not exist in the 2017 Rules.

4.2 Draft National Energy Policy

- Draft National Energy policy prepared by NITI Aayog aims to create independence in the energy sector and to provide 24x7 hours power to all.
- It focus on energy independence through rationalisation of costs, subsidy & boost to renewable sector.
- It aim to produce 75 GW energy from the renewable sector till 2022.
- Emphasis on transition from the coal to clean energy for domestic use.
- Focus on the infrastructure development ie. the projects like TAPI to development the gas pipelines.
- **Issues with the DNEP** - It encapsulates well the problems and the solutions, but lacks the implementation procedures.
- It does not define roles, responsibilities and accountability.
- It does not provide a timeline for delivery and there is no discussion on financing.
- There is no institutional platform for mediating vested interests and stakeholders engaged with different aspects of the energy sector.
- Niti Aayog should extend its mandate unilaterally and map each of its policy recommendations against existing institutions of governance.



4.3 SECURE Himalaya

- The SECURE Himalaya project was launched by the union government in association with the United Nations Development Programme (UNDP) on the occasion of the Global Wildlife Programme (GWP) conference.
- It is a six-year project to ensure conservation of locally and globally significant biodiversity, land and forest resources in the high Himalayan ecosystem spread over four states in India.
- The SECURE - securing livelihoods, conservation, sustainable use and restoration of high range Himalayan ecosystems is meant for specific landscapes.
- It includes Changthang (Jammu and Kashmir), Lahaul - Pangi and Kinnaur (Himachal Pradesh), Gangotri - Govind and Darma - Byans Valley in Pithoragarh (Uttarakhand) and Kanchenjunga - Upper Teesta Valley (Sikkim).
- **National Wildlife Action Plan** for the period 2017-2031 was also launched in the conference.
- The Plan focuses on preservation of genetic diversity and sustainable development through 103 wildlife conservation actions and 250 projects.
- The NWAP has five components, 17 themes, 103 conservation actions and 250 projects.
- The five components are
 - i. Strengthening and improving protected area network;
 - ii. landscape level approach for wildlife conservation;
 - iii. control of poaching and illegal trade in wildlife;
 - iv. mitigation of human-wildlife conflicts
 - v. Management of tourism in wildlife areas

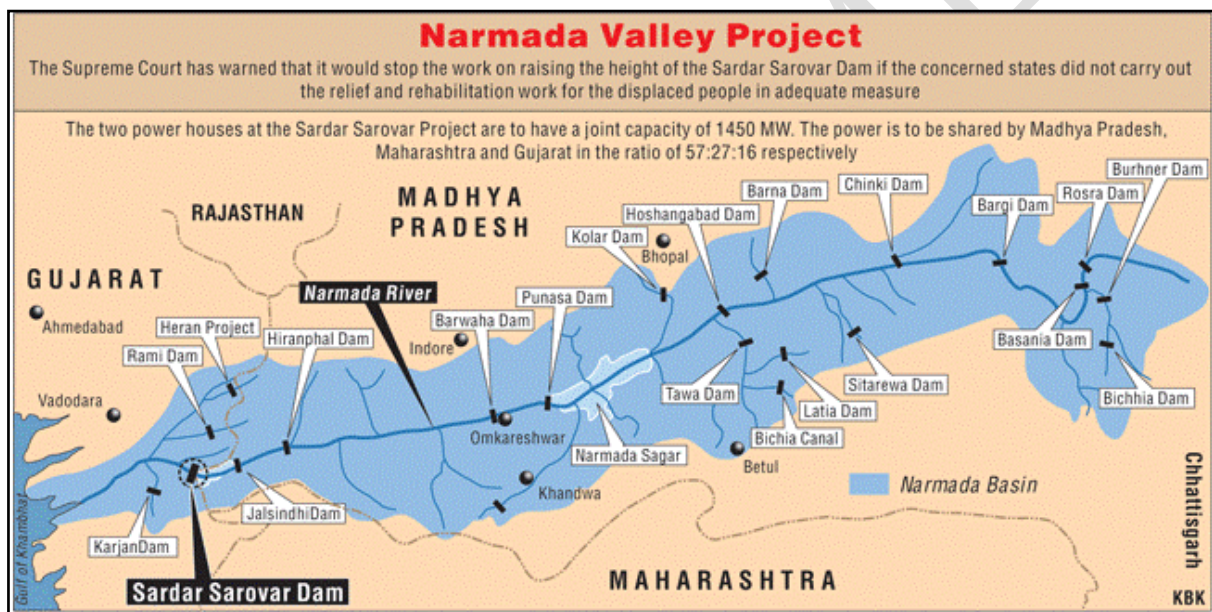
4.4 Guidelines on Groundwater Usage

- The proposed guidelines by Central Ground Water Authority (CGWA) on ground water usage stipulates that all industries, mining and infrastructure dewatering projects (both existing and new) that draw or propose to draw groundwater will now need to **obtain a no-objection certificate (NOC)**.
- The authority to issue NOCs for various uses will now be vested with the district magistrates, deputy commissioners, state groundwater authorities/state nodal agencies and CGWA.
- However, farmers are exempt from obtaining NOCs. The guidelines call for medium and large farmers to follow water conservation measures to ensure sustainability of groundwater resources.
- No NOC for extraction of groundwater for construction activities in project in critical and over-exploited areas.
- It will be based on factors like category of groundwater assessment units and quantum of groundwater.
- It proposes to levy a new water conservation fee based on quantum of groundwater extracted.
- The government infrastructure projects, government water supply agencies and group housing societies/ private housing societies with only basic amenities will also be exempt from the fee.
- However, infrastructure projects including societies/ builder-constructed apartments, townships having recreational facilities like club, gym, commercial places, and swimming pools will not be exempted from payment of such fees.
- It does away with provisions regarding artificial recharge and construction of artificial recharge structures by project proponents.
- Presently, regulations has provision like when groundwater is utilised, it requires a recharge capacity has to be built.

4.5 Sardar Sarovar Dam

- Sardar Sarovar Dam over the Narmada River was recently inaugurated by the Prime Minister.
- The foundation stone for the dam was laid in 1961 by Jawaharlal Nehru.
- The dam is the second biggest in the world after the Grand Coulee Dam in the United States and the highest dam ever built in India.

- The height of the dam was recently raised to 138.68 metres, enabling a usable storage of 4.73 million acre feet (MAF).
- The Dam official is also the biggest dam in terms of volume of concrete used in it.
- It, however, was in the news for the several delays and legal roadblocks that the project faced especially in the last three decades.
- One of the biggest challenges to construction of the dam came from Narmada Bachao Andolan (NBA).
- The construction work was suspended in 1996, after the NBA activists obtained a stay order from the Supreme Court, which highlighted environmental and rehabilitation issues.
- It was only after the Supreme Court gave an order in October 2000 in favour of construction of the dam that work had resumed.
- Also the apex court had set a condition that permission to increase the dam height would be given in parts after the project-affected-people (PAP) are resettled or compensated.
- Government sources, however, claim that irrigation from the project is expected to benefit about 10 lakhs farmers and drinking water to up to 4 crore people.
- It is also likely to provide flood protection to riverine reaches measuring 30,000 hectares.



4.6 Draft Sediment Management Policy

- A draft sediment management policy was formulated recently by the centre and circulated to state governments.
- It has suggested forming of **River Basin Authority (RBA)** to ensure that no inter-state or international river is affected by arbitrary de-silting activities.
- It also pointed out that there is a need to establish RBA for all basins as per recommendation of the **Doabia committee**.
- It also suggested that no de-silting work of more than 1 cubic metre be carried out in any river without the approval of the Central Water Commission (CWC).
- The policy also proposes that in order to safeguard the structural integrity of the barrage or a weir, dredging/de-silting/mining activity upstream of structure will not be allowed within approximately 200 metre.
- Such activities will not also be allowed within a distance of 800 metres downstream of the structures.
- It also recommends against disconnecting lakes from rivers.
- It adds that the de-silting of lakes should be carried out in a way that sediment continuity is maintained.



- It also stresses upon management of solid waste by local governing agencies, saying that littering of solid waste in catchment areas contributes to pollution in rivers.

4.7 Solid Waste Management Rules

- Solid waste management is a major problem in India.
- As per official estimates, at present around 62 million tonnes of solid waste is generated every year.
- Only 43 million tonnes of this is collected and only 12 millions tonnes is treated.
- This means about 31 million is dumped in landfill sites and this number is expected to grow as the total amount of waste increases.
- So the Environment Ministry recently notified the new Solid Waste Management (SWM) rules 2016.
- The SWM rules are being revised after a gap of 16 years and will replace SWM rules 2000.
- It has provisions for spot fines for littering public spaces.
- Some municipal areas in the country already charge people for waste management.
- The new rules give powers to local bodies across India to decide the user fees.
- The user fee is made mandatory for bulk waste generators such as hotels, industry and others, who also would have to focus on waste segregation.
- The new SWM rules 2016 expanded the ambit of the rule beyond municipal areas.
- It includes urban agglomerations, notified industrial townships, areas under Indian Railways, airports, ports and harbours, defence establishments, special economic zones, state and central organisations, places of pilgrimage, religious and historical importance.
- It also states that the developers of SEZs, industrial estate, industrial park to earmark at least 5% of the total area of the plot or minimum 5 plots/ sheds for recovery and recycling facility.
- Construction of landfill on the hill shall be avoided.
- The new rules also define sanitary waste such as diapers and sanitary pads and calls for their proper disposal.
- The environment ministry has also notified waste management rules for plastic waste, e-waste, bio-medical waste, hazardous waste and construction and demolition waste.

4.8 Odour Management

- Odour is basically a perception of smell and it may range from being unpleasant to pleasant.
- At sufficiently high concentrations, odorous compounds may have a direct effect on human health.
- It generally leads to vomiting, headaches, nausea, stress, anxiety, frustration, restriction in outdoor activities, children unable to sleep, and discomfort for elderly people and others.
- Unlike air pollutants, which have specific standards for compliance, “odour regulation” is still in nascent stage in India.
- So the Central Pollution Control Board (CPCB) has come out with detailed guidelines for proper monitoring and management of odour at urban municipal solid waste (MSW) landfills.
- The guidelines suggested a green belt around landfill sites and advocated for selection of “appropriate plant species for vegetation cover” to assist in reducing odours.
- MSW Landfill system be designed for tapping landfill gases efficiently to mitigate fugitive odorous emissions.
- It also noted that as there will be a need for gradual shift for installation of Continuous Odour Measurement Systems (sensor based).
- The guidelines also stated that the selection and number of landfill sites for a city should be based on factors like requirement of land for the disposal site by considering the present population and projected growth over the next 20 years at least.



4.9 Faecal Sludge Management (FSM)

- Sewerage systems and sewage treatment plants (STPs) are not only expensive but are also complicated to maintain for India.
- An alternative to sewerage systems is something known as on-site systems, Septic tanks and pit latrines, which are prevalent in many Indian households, fall into this category.
- If these systems are designed, constructed and managed properly, they can be perfectly safe options.
- Safe containment, collection and treatment is known as faecal sludge management (FSM), and is being increasingly recognised by the Government of India as a viable option.
- FSM has been increasingly recognised by the Government of India as a viable option of sanitation.
- But these on-site systems are not constructed properly.
- The designs of 'septic' tanks have been set out in standards issued in government documents but the house owners and masons are often not aware of these.
- The most severe consequence of these poorly designed pits is the potential contamination of groundwater.
- Faecal waste needs to be transported using de-sludging vehicles (and not manually) but only some States, Tamil Nadu for example, have these vehicles.
- After the National Urban Sanitation Policy (NUSP) in 2008, a national policy on Faecal Sludge and Septage Management (FSSM) was released in 2017.
- Tamil Nadu, Maharashtra and Odisha have released State-wide septage management guidelines and taken concrete steps to execute these policies.
- States which lack de-sludging vehicles have planned to procure vehicles for their urban local bodies or encouraging private players to get into this.

4.10 PAT Scheme

- India's Bureau of Energy Efficiency (BEE) launched its 'Perform, Achieve and Trade' (PAT) Scheme in 2012 to make the industrial sector energy efficient.
- The scheme has set energy efficiency targets for industries.
- PAT is a market based mechanism in which sectors are assigned efficiency targets.
- Industries which over-achieve will get incentives in the form of energy saving certificates.
- These certificates are tradeable and can be bought by other industries which are unable to achieve their targets.
- These certificates will be tradeable at two energy exchanges: Indian Energy Exchange and Power Exchange India.
- The price of these certificates will be determined by the market.
- Under the penalty clause, if an industry fails to achieve its target, it will be penalised.
- The penalty will be calculated on the basis of the what remains to be achieved to meet target.
- PAT has been launched under the National Mission for Enhanced Energy Efficiency, one of the eight missions under the umbrella National Action Plan on Climate Change.
- The government of India had notified targets under the Energy Conservation Act, 2001 for 478 industrial units called 'designated units' -- from eight sectors with high energy consumption.
- The sectors include aluminium, cement, chlor-alkali, fertilizer, iron & steel, pulp and paper, textiles and thermal power plants.
- Just these 478 industrial units from energy-intensive industries have reduced their carbon emissions by 31 million tonne, or 2% of India's total annual emissions, and saved over Rs 9,500 crore through more efficient energy use in the three years between 2012 and 2015.



4.11 Pesticide Poisoning

- Pesticides are generally chemicals, biological agents (virus or bacteria), antimicrobial, or disinfectants designed to repel, control, attract and then terminate, pests.
- Insects, weeds, plants, mammals, birds, fish, fungi, microorganisms are generally considered as pests.
- The pesticide has a broader meaning, and includes many different kinds. The classification of pesticides is often based on the type of organism they target, to control or kill.

1. Insecticides	–	Insects
2. Herbicides	–	Plants
3. Rodenticides	–	Rodents (rats & mice)
4. Bactericides	–	Bacteria
5. Fungicides	–	Fungi
6. Larvicides	–	Larvae
- Pesticide is commonly used interchangeably with insecticide, but it is not always the case. Insecticide is merely a type of pesticide designed to specifically kill insects.
- Recently, the farmers in Vidarbha's yavatmal district have lost their lives due to improper spraying of an **insecticide Profex super**.
- An **insecticide poisoning** occurs when chemicals intended to control an insect affect non-target organisms such as humans, wildlife, or bees.
- Usually Insecticide poisoning occurs in 3 ways,
 - Single and short-term very high level of exposure – Acute poisoning
 - Long-term high-level exposure - Occur in pesticide formulators and manufacturers.
 - Long-term low-level exposure - Individuals are exposed to residues in food as well as in the air, water, soil, sediment, food materials, plants and animals.
- Indiscriminate use of wrong combinations of insecticides and direct and continuous exposure of toxic substances owing to lack of protective gear were the reasons for the death of the farmers.

Profex Super Insecticide

- Profex Super is a combination of Profenofos and Cypermethrin.
- Environmental changes have resulted in huge attacks of bollworm and whitefly on cotton.
- Also, cotton crop is increasingly vulnerable to pests such as bollworm in the current weather.
- When sprayed without covering the mouth and nose, it causes adverse skin reactions, burning sensation, dizziness, and headaches.
- Experts however doubt it to be a cause for death as it is not very toxic generally and the tragic results could be due to faulty application.

Pesticide Management Bill – 2008

- The Bill defines a pesticide as any substance used to destroy or control pests in agricultural commodities or animal feeds.
- So, pesticides used for non-agricultural purposes, such as health care, are outside the ambit.
- The bill seeks to improve the regulations in the manufacture, inspection, testing and distribution of pesticides.
- It proposes a system of licensing and also sets the criteria for classifying pesticides as misbranded, sub-standard, or spurious.
- Constituting a **Central Pesticides Board** to advise the government on pesticide related regulation is also among its provisions.
- Fixation of **tolerance limits by FSSAI** for pesticide residues on crops and commodities is touted to become mandatory.
- State governments are envisioned to implement the set-up.
- Pesticides registered under the Insecticides Act, 1968, are automatically deemed to be registered under the Bill.

- The Bill does not specify penalties for pesticide inspectors or analysts who misuse their powers.
- The Standing Committee has recommended that penalties be imposed on such government officers along the lines of similar provisions in the Drugs and Cosmetics Act, 1940 or the Food Safety and Standards Act, 2006.
- Once it becomes an act, it will replace Insecticides Act, 1968.

4.12 Srilankan Fisheries and Aquatic Resources Act

- Sri Lanka recently passed amendments to Fisheries and Aquatic Resources Act.
- It banned the fishing practice of bottom-trawling in their waters
- Violators liable for a fine of LKR 50,000 (approximately Rs. 20,000) and face two years imprisonment.
- Bottom-trawling is a fishing practice, which involves trawlers dragging weighted nets along the sea floor.
- It is known to cause great depletion of fishery resources.
- Ever since Sri Lanka's civil war ended in 2009, fishermen of Sri Lanka's Tamil-majority north have been trying to start fishing.
- For decades, they had been denied access to the sea by the armed forces and the LTTE.
- But they are confronting the challenge of bottom-trawlers, originating from Tamil Nadu and trespassing into their waters.
- Sri Lankan fishermen want an immediate end to incursions by Indian trawlers, and those from Tamil Nadu insist on a three-year phase-out period.
- The development could directly impact a section of fishermen from Tamil Nadu, who engage in bottom-trawling.
- The Central and State governments plan to provide 500 deep sea fishing boats with long lines and gill nets this year, as part of a plan to replace 2,000 trawlers in three years.



4.13 Deep Sea Fishing

- The water depth should be at least 30 meters to be considered a deep sea fishing territory.
- The deep sea vessels cannot trawl or operate in the Palk Bay.
- The government is now creating a new deep sea fishing harbour at Mookaiyur, south of the Palk Bay in the Gulf of Mannar, where many of these vessels are likely to be berthed.
- However, due to lack of information on location of oceanic stocks of fishery resources, availability of sufficient stocks in the adjacent waters of the Bay of Bengal and Gulf of Mannar is uncertain.
- Thus the economic viability of deep sea fishing is not fully established.
- The operational cost of deep sea fishing is also a concern.
- The skills and interest of Palk Bay fishers are limited to trawlers and one-day fishing.
- Shifting to deep sea fishing also needs skill upgrade.

4.14 Definitions of various terms related to Indian Monsoon

- In India, the "average" rainfall or the long-period average (LPA) is the average of rainfall between 1951 and 2000, which is **89 cm**.
- **Normal Monsoon (Rainfall distribution on All India scale)** - percentage departure of realized rainfall is within $\pm 10\%$ of the Long Period Average.

SOUTHWEST MONSOON	
	RAINFALL RANGE
Deficient	less than 90%
Below normal	90-96%
Normal	96-104%
Above normal	104-110%
Excess	above 110%

- **Below Normal Monsoon** - percentage departure of realized rainfall is $< 10\%$ of the Long Period Average.
- **Above Normal** - Percentage departure of realized rainfall is $> 10\%$ of the Long Period Average.
- **All India Drought Year** - When the rainfall deficiency is $> 10\%$ and when **20 - 40% of the country is under drought conditions**, then the year is termed as All India Drought Year.
- **All India Severe Drought Year** - When the rainfall deficiency is $> 10\%$ and when the spatial **coverage of drought is more than 40%** it is called as All India Severe Drought Year.

Prediction errors of IMD

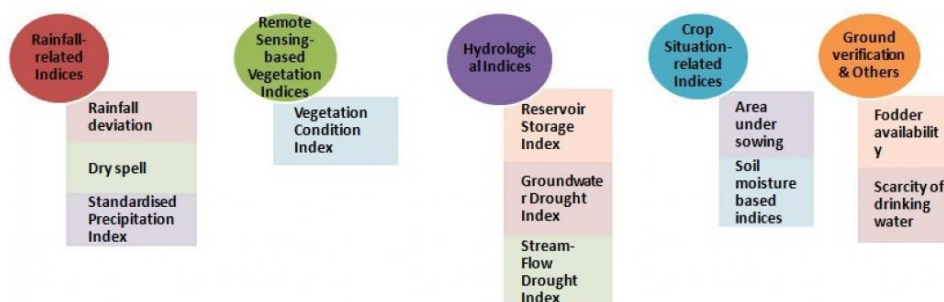
- IMD has recently made an error in predicting the monsoon.
- The India Meteorological Department (IMD), is an agency responsible for meteorological observations, weather forecasting and seismology.
- It works under the Ministry of Earth Sciences.
- It is headquartered in Pune with regional offices at Mumbai, Kolkata, Nagpur and Delhi.

4.15 Definition of Drought

- The Centre had issued a 'Manual for Drought Management' in December 2016.
- The new manual limits Centre's scope to offer financial assistance to states in the eventuality of drought.
- Unlike the 2009 manual for drought management the 'moderate' drought category has been deleted in the new manual.
- It means drought-hit areas will now be categorised as 'normal' and 'severe'.
- Only in case of 'severe' drought, a state would be eligible for central assistance from the National Disaster Relief Fund (NDRF).
- The 2009 norms was a mere guideline and not mandatory for the states to follow.
- But the new norms are mandatory in nature and were formulated based on the direction of the Supreme Court.
- The new manual gives six parameters for declaration of drought.
- These categories of indices are
 1. Rainfall,
 2. Vegetation,
 3. Hydrological indices,
 4. Crops situation indices,
 5. Ground verification and
 6. Others.

IMD & Drought

- The India Meteorological Department (IMD) has officially removed the word "drought" from its vocabulary in 2016.
- The agency had several definitions of drought like meteorological, hydrological and agricultural drought.
- It was quite possible for a State to have a meteorological drought but not suffer an agricultural drought.
- Hence the move is part of a decision to do away with or re-define terms that are not scientifically precise.
- So if India's monsoon rainfall were to dip below 10% of the normal and span between 20 and 40% of the country's area, it would be called a "deficient" year instead of an "All India Drought Year".
- If the deficit exceeds 40% it would be called a "Large Deficient Year" instead of an "All India Severe Drought Year".
- The IMD also has always maintained that declaring droughts was the prerogative of States.



- These six indices are further elaborated into more than 13 sub-points, making it technically extensive.
- Except rainfall and ground verification, all other indices are considered impact indicators.
- To come under 'severe' drought category, a state has to prove severity in three out of these four impact indicators.
- The 2009 manual had four parameters –
 1. Rainfall deficiency,
 2. Extent of area sown,
 3. Normalised difference vegetation index and
 4. Moisture adequacy index.
- These parameters left much scope for manipulation.
- Hence the yardstick to measure severity of drought has also been made stricter.
- This would be a double curse for most of the states as they lack drought early warning systems.

4.16 Indian Forest (Amendment) Ordinance, 2017

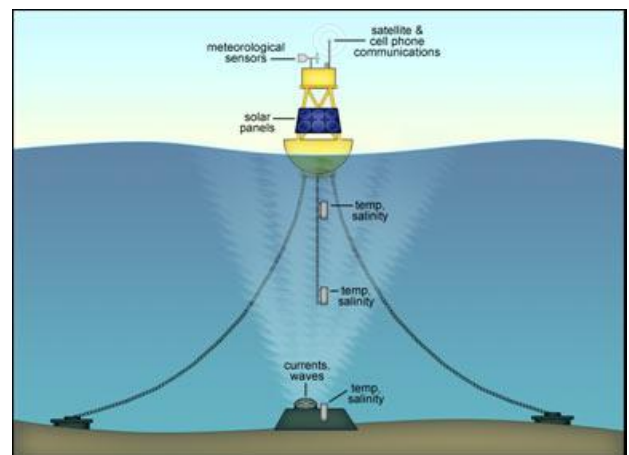
- Bamboo is taxonomically a grass.
- Yet it was legally defined as a tree under the Indian Forest Act, 1927.
- This was a major impediment for bamboo cultivation on non-forest land as the act mandates requirement of felling/transit permit for its economic use.
- Though India has 19% share of world's area under bamboo cultivation, its market share in the sector is only 6%.
- So the Union Government has recently promulgated the Indian Forest (Amendment) Ordinance, 2017.
- It exempts bamboo grown in non-forest areas from the definition of tree.
- So there is no more a requirement of felling/transit permit.
- Hence this will promote cultivation of bamboo in non-forest areas to achieve twin objectives of increasing the farmer incomes and also increasing the green cover.
- It will greatly aid the success of recently constituted National Bamboo Mission.
- Bamboo grown in the forest areas will continue to be governed by the provisions of IFA, 1927.

4.17 M-STRiPES

- M-STRiPES (Monitoring System For Tigers-Intensive Protection and Ecological Status) is an app developed by Wildlife Institute of India.
- The app will be used for the first time in All India Tiger estimation.
- It is already in place in some national parks but it has been made mandatory for the fourth All-India Tiger estimation.
- It is expected that the app would ensure more robust estimate by eliminating human errors in the survey.

4.18 India's first wave-powered Navigational Buoy

- A buoy is an anchored float serving as a navigation mark, to show reefs or other hazards, or for anchorage.
- A wave-powered navigational buoy, developed by the National Institute of Ocean Technology (NIOT).
- This buoy for guiding ships, is powered by wave energy while conventional ones use solar power, it stores energy generated by waves in a battery.
- It will guide ships in and out of ports, navigate through a designated channel.





- The buoy would be able to record data on wind speed and direction various other aspects, which would be relayed to port authorities,
- It was launched by Ministry of Earth Sciences on the eve of executive committee meeting of IEA-OES.

4.19 International Permaculture Convergence

- 13th edition of International Permaculture Convergence was held in Hyderabad with the theme “Towards healthy societies”.
- The first IPC was hosted in Australia in 1984.
- It is held once every two or three years in different venues around the world.
- It has been serving as a platform to discuss strategy, education standard, research, and regional and global permaculture developments.
- It was organised by Hyderabad-based environmental and developmental NGO Aranya Agricultural Alternatives, the International Permaculture Convergence Council (IPCC) and Friends of IPC (FIPC).
- The primary objective of IPC 2017 is to provide Indian farmers an opportunity to get inspired and learn how their current challenges can be solved using permaculture principles.
- The term “Permaculture” was coined by Australian researcher Bill Mollison.
- It refers to ‘permanent agriculture and permanent culture’ and designed to bring a harmonious synergy of people and land to preserve and enhance natural ecosystems.

4.20 Environmental Cess vs GST

- GST subsumed several central & state levies under it.
- Among them were three environment-related cesses - Swachh Bharat Cess, Clean Energy Cess and the historical Water Cess on water consumption by industry and local authorities.
- Unless the nodal ministries are compensated for revenue loss, the Cess-targeted schemes will suffer.
- **Water cess** - Introduced under the Water (Prevention and Control of Pollution) Cess Act 1977, it was to augment the resources of the Central and State pollution control boards to address water pollution.
- Water cess is the second most important source of revenue for State Pollution Control Boards next only to consent fees.
- The loss of this revenue will be a huge setback for boards which already suffer from poor technical capacity and autonomy.
- Even if the loss is made good through budgetary allocation, the channelling of money through State budgets will make the boards even more vulnerable to the discretion of State governments.
- **Swachh Bharat Cess** - The Centre collected Rs.12,500 crore in 2016-17 through this Cess for the Swachh Bharat Abhiyaan (SBA) which aims to make India open-defecation free by 2019 and improve the appalling state of waste management in the country.
- While it is clear the programme will require significant public expenditure to meet the targets, it will be interesting to see whether budgetary allocations are maintained after the abolition of the cess.
- **Clean Energy Cess** - Levied on coal at the rate of Rs.400/tonne in 2016 (progressively increased from Rs. 50/tonnes in 2010), it amounted to a staggering Rs.28,500 crore in 2016-17.
- Touted as a tax on carbon, it met almost 50% of the budget of the ministry of new and renewable energy for 2016-17.
- This is despite the fact that MNRE is only one of the beneficiaries along with the ministries of water resources, environment and drinking water and sanitation from the fund.

4.21 Prakriti Khoj

- It is an environment awareness initiative by the Union Ministry of Environment.
- The objective is to reach out to young minds to trigger their sensitivity towards environment protection and conservation.



- Schools under the National Green Corps (NGC) programme will get an opportunity to participate in the national level environmental quiz competition under this initiative.
- NGC was initiated by Environment Ministry in 2001-02 for creating environmental awareness among children by formulating “Eco-clubs” in schools across the country.

4.22 Forest Plus Programme

- Forest Plus, also known as Land Use Science is a joint programme by the United States Agency for International Development (USAID) and Ministry of Environment, Forest and Climate Change (MoEF&CC).
- It aims to strengthen capacity for REDD (Reducing Emissions from Deforestation and Forest Degradation) implementation in India.
- It brings together experts to develop technologies, tools and methods of forest management to meet the technical challenges of managing forests for the health of ecosystem, carbon stocks, biodiversity and livelihood.

4.23 B4 boat labs

- ‘B4’ – the ‘Brahmaputra Biodiversity and Biology Boat’, was launched to safeguard the Asia’s largest riverine island - Majuli island.
- The research will be carried out on floating ‘B4’ boat labs along the Brahmaputra River to study the changes caused by dams, climate change, human interventions and the eventual effects it has on the river eco-system.
- Majuli is the first island district of the country and also known for being the seat of Assam’s Vaishnava monasteries.

4.24 Early Warning Dissemination System

- Odisha is the first state in India to install Early Warning Dissemination System to provide early warning to coastal people.
- It installed the EWDS in 6 coastal districts to reduce the vulnerability of coastal communities to natural calamities.
- The government will install 122 towers to disseminate early warnings about cyclone, tsunami and flood to people.
- The project will be implemented under the National Cyclone Risk Mitigation Project (NCRMP).
- The project, which is being implemented with **assistance from the World Bank**, will have towers in 22 blocks under six coastal districts at an estimated cost of Rs 82 crore.

4.25 National Centre for Sustainable Coastal Management (NCSCM)

- Ministry of Environment, Forest and Climate Change has formed a new institution, the “National Centre for Sustainable Coastal Management”.
- The centre is located in Chennai and established with the objective of creating a new National Coastal Mission.
- NCSCM’s core strength is the coastal system research for the well-being of coastal communities and promoting sustainable development.
- NCSCM’s researches will be useful for arriving at policy decisions and for capacity building of coastal communities.
- Along with other Ministries and State/UT governments, it will scientifically map the cumulative vulnerability of coastal environment to climate change and consequent threats to ecology, lives and livelihoods.

4.26 Neem Coated Urea

- Urea, the nitrogenous fertilizer when applied to soil, is hydrolysed into ammonia and then to nitrite and nitrate.
- This process is called **Nitrification**.
- Thus most plants take nitrogen in the form of Nitrates. When the process of nitrification is too rapid, nitrogen will escape to the atmosphere and plants will not be able to recover it from Urea efficiently.



- Coating Urea with Neem oil or Neem cake has been proved to be an effective natural inhibitor to the loss of nitrogen to the atmosphere.
- It slows down the process of nitrate formation and hence excess nitrate is not available for de-nitrification.
- Neem coating leads to more gradual release of urea, helping plants gain more nutrients and resulting in higher yields.
- There is also a lower underground water contamination due to leaching of urea and neem serves as a natural insecticide as well.
- Neem-coating will help check heavily subsidized urea's pilferage to chemical industry and other uses such as making of adulterated milk.
- Government has mandated all indigenous producers of Urea to produce 100% of urea as Neem coated urea only.

4.27 New Green Building Code

- The Bureau of Energy Efficiency (BEE) launched a code for new commercial buildings in the country.
- Energy Conservation Building Code (ECBC) 2017 was developed by Ministry of Power and BEE.
- The code sets parameters for builders, designers and architects to integrate renewable energy sources in building design with the inclusion of passive design strategies.
- It promotes low-carbon growth and lead to 30-50% energy savings by commercial buildings by 2030.
- In order for a building to be considered ECBC-compliant, it will need to demonstrate minimum energy savings of 25 per cent.
- Additional improvements will enable new buildings to achieve higher grades like ECBC+ or SuperECBC, leading to further energy savings of 35 per cent and 50 per cent, respectively.

4.28 Green Building Rating System

- Rajasthan government has adopted the green building rating system developed by the Indian Green Building Council (IGBC).
- There are three green building rating agencies in India.
- **Green Rating for Integrated Habitat Assessment (GRIHA)** – It is developed by TERI (The Energy and Resources Institute) and the Ministry of New and Renewable Energy.
- The criteria used for rating are site selection and site planning, Conservation and efficient utilization of resources, Building operation and maintenance, and Innovation.
- **Indian Green Building Council (IGBC)** – It is a part of the Confederation of Indian Industry (CII).
- The rating systems are voluntary, consensus based, market-driven programmes.
- It organises Green Building Congress, its annual flagship event on green buildings which host delegates from 31-member countries of the World Green Building Council (WGBC).
- The rating systems are based on the five elements of the nature (Panchabhutas) and are a perfect blend of ancient architectural practices and modern technological innovations
- All the stakeholders of construction industry comprising of architects, developers, product manufacturers, corporate, Government, academia and nodal agencies participate in the council activities through local chapters.
- **Bureau of Energy Efficiency (BEE)** – It is a statutory body under Ministry of Power.
- It is created under the provisions of Energy Conservation Act, 2001.
- BEE has been started with a mission to create policies and develop strategies with a thrust on self-regulation and market principles to achieve energy efficiency.
- BEE coordinates with government, industries, manufacturers and consumers to facilities measures to be taken for conservation of energy.
- It sets performance standards for appliances and designs labeling scheme for the same.



- The star rating of various appliances like AC, Refrigerators, Fans, Pumps, Water Heaters, etc is part of its mandate.
- They also define the testing and certification procedures for all kinds of appliances.
- They develop energy efficiency code for buildings and Industries and certify Energy Managers and Energy Auditors who can perform energy audits.
- They develop norms for energy consumption and Energy Performance Index (EPI).

4.29 Solar Rooftop Investment Program

- The **Asian Development Bank** (ADB) and the Punjab National Bank (PNB) signed a \$100 million loan—that will finance large solar rooftop systems on industrial and commercial buildings throughout India.
- This is the **first tranche loan of the \$500 million** multi tranche finance facility Solar Rooftop Investment Program (SRIP) approved by ADB in 2016.

4.30 Electric vehicles

- Nagpur became the first Indian city to have an electric cab fleet with about 100 EVs.
- The state-run power giant NTPC set up its first EV charging stations in Delhi and Noida.

4.31 Elephant Census

- The first-ever synchronised **All-India Elephant population estimation** was carried out by the Union Ministry of Environment.
- Previously, various states used different methodologies and effort was not synchronised across the country.
- According to the census, Karnataka has the highest number of elephants, followed by Assam and Kerala respectively. The population has decreased by about 3,000, compared to last census in 2012.
- India started Project Elephant in 1992 to protect the Asian elephant, its habitat and corridors and address the man-elephant conflict and to address welfare of captive elephants.
- IUCN status of Asian Elephants is listed as “Endangered” and African elephants are listed as “vulnerable”.

4.32 Gaj Yatra

- It is a nationwide campaign to protect elephants on the occasion of World Elephant Day (12th Aug).
- International Fund for Animal Welfare (IFAW) is partnering the campaign.
- The campaign is planned to cover 12 elephant range states.
- Elephant Range States – Tamil Nadu, Kerala, Karnataka, A.P, Assam, Arunachal Pradesh, Meghalaya, Nagaland, West Bengal, Jharkhand, Odisha and Uttarakhand.

4.33 Mike Programme

- Monitoring of Illegal Killing of Elephants (MIKE) programme was started by CITES (The Convention on International Trade in Endangered Species of Wild Fauna and Flora).
- It was started in South Asia (Bangladesh, Bhutan, India, Nepal and Sri Lanka) in the year 2003.
- It is an international collaboration that tracks trends in information related to the illegal killing of elephants to monitor effectiveness of field conservation efforts.
- CITES is the only treaty to ensure that international trade in plants and animals does not threaten the survival in the wild.

4.34 Eco-Sensitive Zones

- The Karnataka State Government has decided to limit the eco-sensitive zone (ESZ) around Kali Tiger Reserve.
- Eco-Sensitive Zones (ESZs) are areas notified by the Ministry of Environment, Forests and Climate Change (MoEFCC), around Protected Areas, National Parks and Wildlife Sanctuaries.
- The purpose of declaring ESZs is to create some kind of shock absorbers to the protected areas by regulating and managing the activities around such areas.
- They also act as a transition zone from areas of high protection to areas involving lesser protection.



- An ESZ could go up to 10 kilometres around a protected area as provided in the Wildlife Conservation Strategy, 2002. And it may go beyond 10 kilometres in ecologically important patches.
- Though the word “Eco-Sensitive Zones” is not mentioned in the Environment protection act, a clause in the act states that central government can prohibit or restrict the location of industries and carrying on certain operations on the basis of considerations like the biological diversity of an area.

4.35 National Green Tribunal

- NGT has given the Karnataka government 10 days to provide a concrete action to save the **Bellandur Lake in Bengaluru** from frothing.
- The frothing was due to the presence of Phosphorus in detergent waste flowing from residential complexes.
- NGT was established in 2010 with its principal bench in Delhi.
- Its objective is to provide an effective and speedy disposal of cases pertaining to environment protection, conservation of forests and for seeking compensation for damages caused to people or property due to violation of environmental laws.
- The NGT has the power to hear all civil cases relating to environmental issues that are linked to **The Water (Prevention and Control of Pollution) Act, 1974; 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.**
- There is a bar on civil court to take cases under these listed laws in Schedule 1 of NGT act.
- The NGT has not been vested with powers to hear any matter relating to the Wildlife (Protection) Act, 1972, the Indian Forest Act, 1927 and various laws enacted by States relating to forests, tree preservation etc.
- The NGT is not bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice.

4.36 Exploration in Deep Sea Bed

- India's exclusive rights to explore polymetallic nodules from seabed in Central Indian Ocean Basin have been extended by five years.
- The rights in the international water, is allocated by **International Seabed Authority (ISA)** for developmental activities.
- India is implementing a long-term programme on exploration and utilization of Polymetallic nodules through **Ministry of Earth Sciences** and it includes survey and exploration, environmental studies, technology development in mining and extractive metallurgy.
- ISA is an intergovernmental body based in Kingston, Jamaica, established by the Law of the Sea Convention.
- It was established to organize, regulate and control all mineral-related activities in the international seabed area beyond the limits of national jurisdiction.
- UNCLOS defines the international seabed area—the part under ISA jurisdiction—as “the seabed and ocean floor and the subsoil thereof, beyond the limits of national jurisdiction”.
- India's rights have been approved unanimously in the 23rd session of ISA concluded at Kingston, Jamaica.

4.37 Renewable Energy Pact

- **India and Germany** signed an agreement on technical cooperation under the Indo-German Energy Programme – Green Energy Corridors (IGEN-GEC).
- The main objective of this programme is to improve the conditions for grid integration of renewable energy.
- This programme component supports the implementation of the Renewable Energy Management Centre (REMCs), Green Energy Corridors (GEC) scheme which is a prerequisite for large scale grid integration of renewable energy.
- Green Energy Corridor is grid connected network for the transmission of renewable energy produced from various renewable energy projects.
- It helps in synchronising the electricity produced from solar, wind and other renewable energy resources.



- Renewable Energy Management Centre (REMC) will monitor renewable energy generation on a real-time basis and also make forecasts for hassle-free integration of solar and wind energies with the grid.
- Thus the programme contributes to achieve the 175 GW target for renewable energy generation capacity by 2022.

4.38 Varshadhare Project

- It is a cloud seeding project flagged off by the Karnataka government to enhance the amount of precipitation from the clouds to generate more rain.
- Special aircraft will disperse silver iodide as they fly through rain-bearing clouds to trigger and enhance the precipitation.
- Karnataka is facing a cumulative rainfall deficiency of around 25% till date, while the deficit across the country as a whole is 4%.

4.39 Ecosystems Service Improvement Project

- India signs Global Environment Facility (GEF) Grant Agreement with the World Bank for Ecosystems Service Improvement Project.
- The objective of the Project is to enhance forest ecosystem services and improve the livelihoods of forest dependent communities in Central Indian Highlands.
- The Project will be implemented in the states of Chhattisgarh and Madhya Pradesh under the National Mission for Green India.
- The project will be entirely financed by the World Bank out of its GEF Trust Fund.
- The duration of the project is 5 years.

4.40 Renewable Energy Guidelines

- In order to promote use of energy from renewable sources, central government has enacted a provision in Electricity Act, National Electricity Policy and National Tariff Policy.
- The provision accords renewable energy sector a “**Must Run**” status, meaning that the renewable energy sources will always supply electricity to the grid in all conditions.
- This status is in contrast to “**Merit Order Dispatch**” principle which is followed for conventional generation sources.
- Merit Order Dispatch ranks available sources of electrical generation based on the ascending order of prices charged by power plant.
- Preference to supply power is given to least price power plant, then second least and so on. This process continues till demand required is matched with supply from generators.
- States like Tamil Nadu, Rajasthan and Madhya Pradesh has opposed to the “Must Run” status accorded to Renewable energy by Central Government and subject it to “Merit Order Dispatch” Principle.
- This may lead to uncertainty in solar and wind power production and decline in investments.

4.41 Amendments to Environment Protection Act

- The Union government is planning to make changes to the Environment (Protection) Act of 1986.
- **Present provisions** - The maximum fine that can be imposed on a polluting industry or other entities is Rs.1 lakh along with a jail sentence of up to five years.
- Even this requires the government agencies to first file a complaint with a magistrate at the district level and secure a favourable order against the polluter.
- At present, there are powers to shut down a polluting industry or an operation of a part of the industry temporarily.
- Currently, a violation of the Environment Protection Act is treated as a criminal offence.
- There is a felt need to have graded response to the pollution problem without everything ending up in court.



- **Proposed changes-** The level of fines for a polluting industry from Rs.1 lakh to Rs.1 Crore to be increased.
- The fine is to be imposed without going through a judicial process prescribed in the current law.
- A designated officer would be the final authority to decide the money that needs to be recovered from the polluting entity.
- There is also a plan to make pollution a civil offence for which the government can demand costs from the polluters without going to the courts.
- **Shortfalls -** The proposed changes lack understanding of why repeated attempts over the past failed to bring a change in pollution levels in the river. This includes the recent NamamiGange project's output.
- The river is a community asset and polluting it has disastrous health effects. This cannot be overlooked because a polluting industrial unit is happy to pay Rs.1 Crore.
- Undermining judicial review could give scope for official-polluter nexus, instead of reducing pollution.
- Change can start with more efficient execution of the existing rules than amending them or bringing new ones.

4.42 SUNREF

- SUNREF (Sustainable Use of Natural Resources and Energy Finance) Housing India programme is to be launched by the National Housing Bank (NHB) along with French Development Agency (FDA) and the European Union.
- It is aimed at scaling up green housing projects in India by providing €112 million to NHB.
- Green residential buildings demonstrate more efficiency in energy, water and building material use.

5. PROTECTED AREAS

5.1 Orang Tiger Reserve

- Recently, the census carried out in the Orang Tiger Reserve has shown that the reserve has the highest density of tigers in the country.
- Orang tiger reserve in Assam with the smallest core (78.28 sq. km) among 50 nationally protected areas, has presented wildlife scientists doing a census with a surprise: a high density of 28 big cats
- Orang Tiger Reserve is the 49th in the country. **Kamlang Tiger Reserve in Arunachal is the 50th and latest to be notified.**
- **Orang has the highest tiger density nationally**
- Orang has the density of 28 big cats followed by Kaziranga National Park (12.72) in Assam, Jim Corbett National Park (11) in Uttarakhand and Bandipur National Park (10.28) in Karnataka.
- States having higher tiger population in terms of numbers - Karnataka, Uttarakhand, Madhya Pradesh, Tamil Nadu, Assam, Kerala.

5.2 First Biodiversity Heritage Site

- **Ameenpur Lake** is an ancient man-made lake in western part of Telangana that dates back to the time of Ibrahim Qutb Shah, who ruled the kingdom of Golconda between 1550 and 1580.
- It becomes the first Biodiversity Heritage Site in the country.
- The lake is now divided into two parts called Pedda Ameenpur and Chinna Cheruvu.
- With the biodiversity heritage tag given under the Biological Diversity Act 2002, the lake, which will now be

Key Biodiversity Areas (KBA)

- They are identified nationally using globally standardised criteria and thresholds.
- KBA sites represent the important site for biodiversity conservation worldwide and contribute significantly to the global persistence of biodiversity.
- The identification of KBAs is to address biodiversity conservation at the site scale i.e. at the level of individual protected areas, concessions and land management units.
- KBAs are seen as an 'umbrella' designation, which includes globally important sites for different taxa and realms, such as:
 - i. Important Bird and Biodiversity Areas (IBAs);
 - ii. Important Plant Areas (IPAs);
 - iii. Important Sites for Freshwater Biodiversity;
 - iv. Alliance for Zero Extinction (AZE) sites.



managed by a locally constituted Biodiversity Management Committee, also becomes eligible for funding for upkeep of the lake as well as its protection.

Biodiversity Heritage Site (BHS)

- These are areas of biodiversity importance, which harbour rich biodiversity, wild relatives of crops, or areas, which lie outside the protected area network. The purpose is not to cover the already designated protected areas such as national parks and wildlife sanctuaries.
- Section 37 of the Biological Diversity Act for notification of BHS by State governments in consultation with local bodies.

5.3 Important Bird and Biodiversity Areas

- **Bird Life International** has recognised three new sites in Goa and nine sites in Kerala as hotspots for protection.
- The sites have been added to the list of Important Bird and Biodiversity Areas (IBA).
- Now, seven areas in Goa have been termed important biodiversity areas by Bird Life.
- Goa harbours a good population of the **lesser adjutant and the Nilgiri wood pigeon** in certain pockets of the State apart from the identified sites.
- Kerala's IBA sites are home to three critically endangered species such as White-rumped Vulture, Indian Vulture and Red-headed Vulture.

Bird Life International

- It is a global partnership of conservation organisations (NGOs).
- Each Bird Life Partner (Conservation organisation) is an independent environmental not-for-profit organisation.
- Its global office is located in Cambridge, UK.
- It identifies Important Bird and Biodiversity Areas.
- An IBA is an area identified using an internationally agreed set of criteria as being globally important for the conservation of bird populations.
- Currently there are over 12,000 IBAs worldwide.
- It publishes a quarterly magazine, World Bird watch.

Bombay Natural History Society (BNHS)

- It is a pan-India wildlife conservation research organization, has been promoting the cause of nature conservation since 1883.
- It is the partner of Bird Life International in India.
- It has been designated as a 'Scientific and Industrial Research Organisation' by the Department of Science and Technology.
- It created Internet of Birds which is an online tool for birdwatchers that identifies birds based on their photos.

5.4 Land diversion to DRDO

- The Ministry of Environment, Forest and Climate Change has issued forest clearance to DRDO, approving diversion of 150 hectares of forest land which includes **Krishna wildlife sanctuary** in A.P.
- The notification says that DRDO should transfer the funds for the net present value of the forest to be diverted to CAMPA and design a comprehensive wildlife management plan.
- The area diverted for DRDO, an equivalent mangrove and mudflat area contiguous to the sanctuary, should be notified and the work should be halted during the nesting season of Olive Ridley turtles.

5.5 Krishna Wildlife Sanctuary

- The sanctuary is part of the mangrove wetland which spreads across Krishna and Guntur districts of A.P.
- The sanctuary is also an estuary, located in the coastal plain of Krishna Delta.
- The region potentially holds one of the most significant populations of fishing cats in the world and it has the potential to become world's first reserve for IUCN identified endange red species including the fishing cat.
- Recently, Smooth-coated otter was sighted for the first time in the mangrove forest adjacent to the Krishna Wildlife Sanctuary.



5.6 Tadoba-Andhari Tiger Reserve

- Tadoba-Andhari Tiger Reserve is a tiger reserve in Chandrapur district of Maharashtra.
- It is the Maharashtra's oldest and largest national park.
- It is one of the India's 50 "Project Tiger" tiger reserves.
- Andhari, a minor river in Waiganga basin, flows through the tiger reserve.

5.7 Human Animal Conflict - Pilibhit Tiger Reserve

- Pilibhit Tiger reserve in Uttar Pradesh is becoming one of the worst man-animal conflict zones. The tigers have killed 6 people over the last 3 months.
- The tiger reserve lies along the India-Nepal border in the foothills of the Himalayas and the plains of the 'terai' in Uttar Pradesh.
- It is one of India's 41 Project Tiger Tiger reserves.
- It is bounded by River Sharda (also known as Mahakali river in Nepal) in the north east and River Ghagara and Sharda in south west.
- The reserve has terai forest and savannah grassland ecosystem.
- It is home to threatened species like Bengal Tiger, Indian Leopard, swamp deer, hispid hare and Bengal floricans.
- Tadoba (Maharashtra) and Pilibhit are the two reserves that saw the bulk of the recent deadly man-animal conflicts.
- Sunderbans (West Bengal) and Corbett(Uttarkhand) are other notable conflict zones.

5.8 Eco-bridges

- Telangana is the first state to have **eco-friendly bridges for the movement of tigers** over a canal, cutting across the tiger corridor.
- The bridge links Tadoba-Andhari Tiger Reserve (TATR) in Maharashtra with the forests in Telangana.
- It requires laying of fertile soil to raise grass and plants over the structure, so that fragmentation of the reserve forest is camouflaged.

5.9 Largest Volcanic Region on Earth

- Researchers have recently discovered the largest volcanic region on Earth with nearly 100 volcanoes, two km below the surface of the vast ice sheet in west Antarctica.
- This huge region is likely to dwarf east Africa's volcanic ridge currently rated as the densest concentration of volcanoes in the world.

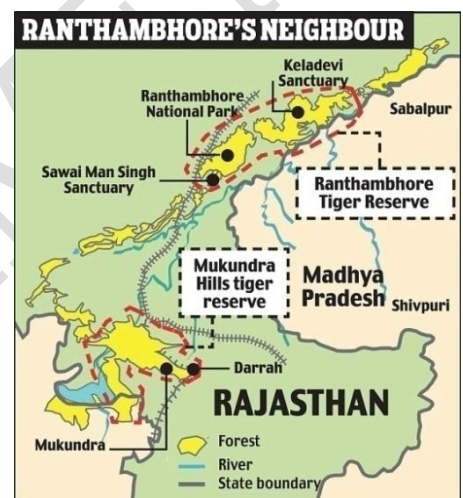
5.10 Augmentation Program in Buxa Tiger Reserve

- Buxa Tiger reserve located in Alipurduar district of West Bengal, parts of which **border Bhutan**.
- It has been notified as a tiger reserve in 1983.
- It consists of moist, deciduous and evergreen forests.
- National Tiger Conservation Authority (NTCA) recently chose Buxa tiger reserve in West Bengal for the tiger augmentation programme.
- Experts have consciously decided not to augment tigers in the Buxa reserve from the Sunderbans, a completely different mangrove ecosystem.
- Instead, tigers from the forest reserves of Assam, which have a similar flora and fauna, will be introduced in Buxa.
- Experts believe that tigers are migrating from nearer Manas wildlife sanctuary through Buxa-Bhutan corridor.



5.11 Mukundra Hills Tiger Reserve

- NTCA has given nod for shifting tigers from Ranthambhore National Park to Mukundara Hills tiger reserve.
- The Mukundara Hills, located in the south-eastern Rajasthan, is the third notified tiger habitat in the State, after Ranthambhore and Sariska.
- It was established in 2013 to cater to the spill over tiger population from Ranthambhore.
- The reserve covers the existing Darrah, Chambal and Jawahar Sagar wildlife sanctuary.



5.12 Report on fragile island ecosystem

- Recently Zoological Survey of India (ZSI) has published the first consolidated and updated information of the faunal diversity of **Sundarbans**, a mangrove ecosystem.
- The Indian segment of the Sundarbans is part of a UNESCO World Heritage site, forms part of the Ganga-Brahmaputra delta.
- It is the first consolidated and updated information of the faunal diversity of the Sundarbans.
- The researchers documented the famous tigers of the island which have adapted to aquatic conditions.
- The report highlighted that rhinos, swamp deer, barking deer and hog deer, Asiatic wild water buffalo are not found in Sundarbans anymore.
- But it has turtles and the River Terrapin (most threatened freshwater species) and Cartilaginous fish which have cartilage rather than bone.

River Terrapin

- A terrapin is one of several small species of turtle living in fresh or brackish water.
- The northern river terrapin (*Batagur baska*) is a species of riverine turtle native to Southeast Asia.
- It is classified “Critically Endangered” by the IUCN.
- The species is currently found in Bangladesh (in the Sundarbans), India (parts- West Bengal & Odisha), Indonesia, Cambodia and Malaysia.
- A captive conservation breeding programme has been implemented in Sunderbans Tiger Reserve to protect the species against natural risks and also facilitate genetic management.

5.13 Sunderbans Biosphere Reserve

- Sundarban, the largest delta in the world, consists of 10,200 sq km of Mangrove Forest, spread over India (4200 sq km of Reserved Forest) and Bangladesh (6000 sq km approx of Reserved Forest).



- Another 5400 sq km of non-forest, inhabited region in India, along the north and north-western fringe of mangrove forest, is also known as Sundarban region in India.
- Hence, the total area of Sundarban region in India is 9600 sq km which constitutes the Sundarban Biosphere Reserve.
- Indian Sundarban is bound on the west by river Muriganga and on the east by rivers Harinbaha and Raimangal.
- River Matla divides Sundarban Reserved Forest into Sundarban Tiger Reserve (on the east) and Reserved Forest of South 24 Parganas Forest Division.
- Sundarban Biosphere Reserve was constituted by GOI in 1989 and it received the recognition of UNESCO under its Man and Biosphere (MAB) Programme in 2001.
- Sundarban National Park, forming the core area of Sundarban Tiger Reserve, received recognition as World Heritage Site by UNESCO in 1987 and it has the highest tiger population in the world.
- Sundarban is the only mangrove forest in the world which is the home of Tiger and is the largest Mangrove Forest in the world.

5.14 Turtle Sanctuary

- Ministry of Water resources has approved setting up of a **Turtle sanctuary in Allahabad** under Namami Gange Programme.
- The Project envisioned the development of River Biodiversity Park along with Turtle rearing centre.
- The Biodiversity Park will be located at confluence of Ganga, Yamuna and Mythical Saraswati, popularly known as Sangam.
- Rivers Ganga and Yamuna at Allahabad are home to some of the most endangered fauna like turtles, Gangetic dolphin, Gharial and other migratory birds.

5.15 Butterfly Region in West Bengal

- According to the recent study by Zoological Survey of India, Singur in West Bengal's Hoogly district is home to at least 69 species of Butterflies.
- Five of the species found in Singur are rare and to be protected under the Wildlife (Protection) Act, 1972.
- They include species like the Tree Flitter, Striped Albatross, Pea Blue, Common Indian Crow and Danaid Eggfly.
- Singur is not only rich in butterfly diversity but also in the diversity of frogs and birds.
- It has no forested land and the area is known for rice, potato and vegetable cultivation.

5.16 Amrabad Tiger Reserve

- Telangana Forest department has created a new ecotourism spot "Octopus View Point" at Amrabad Tiger Reserve.
- Amrabad Tiger Reserve in the districts of Mahabubnagar and Nalgonda, is the largest tiger reserve in the country.
- Earlier, it was part of 'Nagarjunasagar-Srisailem Tiger reserve'.
- But post-bifurcation, the northern part of the reserve is vested with Telangana state and renamed as 'Amrabad Tiger Reserve'.
- The multipurpose reservoirs Srisailem and Nagarjunasagar are located in the reserve.

5.17 Sathyamangalam Tiger Reserve

- The Forest Department has identified hundreds of leopards in Sathyamangalam Tiger Reserve.
- It is a protected area and tiger reserve along the Western Ghats in the state of Tamil Nadu.
- It was first declared as a wildlife sanctuary in 2008 and it is the largest wildlife sanctuary in Tamil Nadu.
- It later became the fourth tiger reserve as a part of project Tiger.

- It is a significant wildlife corridor in the Nilgiri Biosphere reserve between western ghats and the rest of the eastern ghats.

5.18 Neelakurinji Reserve

- The reserve is located in Munnar in Idukki district of Kerala.
- The government has decided to redraw the boundaries of the Neelakurinji reserve.
- The government had issued a preliminary notification in 2006 reserving a 3,200-hectare area for Neelakurinji bloom.
- Neelakurinji blooms once in 12 years and it is expected to bloom in July, 2018.
- The notification had triggered an outcry from the local community citing the presence of habitations, institutions, and places of worship within the notified area.

5.19 Nelapattu bird sanctuary

- Nelapattu Bird Sanctuary is a bird sanctuary in Nellore district, Andhra Pradesh,
- It is an important breeding site for spot-billed pelicans.
- Spot-billed pelicans are a bird of large inland and coastal waters, especially large lakes.
- It breeds only in peninsular India, Sri Lanka and in Cambodia.
- They are not migratory but are known to make local movements.
- They are colonial breeder, often breeding in the company of other waterbirds.
- It is categorized as “Near Threatened” in IUCN red list.
- Copious rain from the south west and north east monsoon led to the return of pelicans in Nelapattu sanctuary.



5.20 Nilgiris

- The rare, pale-skinned ‘white’ tiger was recently spotted for the first time in the Nilgiris.
- Nilgiris Biosphere Reserve was constituted by UNESCO in September 1986 under Man and Biosphere Programme.
- It is an International Biosphere Reserve in the Western Ghats and Nilgiri Hills ranges of South India.
- The Nilgiri Sub-Cluster is a part of the Western Ghats, which was declared a World Heritage Site by UNESCO in 2012.
- It includes the Mudumalai, Mukurthi, Nagarhole, and Bandipur national parks, as well as the Wayanad and Sathyamangalam wildlife sanctuaries.

5.21 Black Buck Reserve

- A wildlife conservation reserve dedicated exclusively to the blackbuck is coming up in the Trans-Yamuna region of Allahabad near the MP and UP border.
- The reserve in Allahabad is the first ever conservation reserve of its kind in UP.
- Blackbuck or Antilope cervicapra, also known as Indian Antelope is found in India, Nepal and Pakistan.
- It is the sole living member of the genus Antelope and is classified under the family Bovidae.
- It is known for its majestic spiral horns (in males) and coat colour contrasts.
- They are found in the open Savannas of north and central India, but are now restricted to just a few patches and habitats.



- It is inhabited in Velavadar Wildlife Sanctuary in Gujarat, Ranibennur Blackbuck Sanctuary in Karnataka, Great Indian Bustard Sanctuary in Maharashtra, Kaimur Wildlife Sanctuary in Bihar
- It is protected under Schedule 1 of the Wildlife Protection Act and Appendix III of CITES (Convention on International Trade in Endangered Species).

6. BIO-DIVERSITY

6.1 Rhododendron

- Rhododendron is a large genus of flowering plants and is found mainly in Eastern Himalayas, Western Himalayas and Nilgiris.
- Some plants of Rhododendron are evergreen and some are deciduous in nature.
- The species is found in varied habitats from subtropical forest to alpine shrubs, rhododendrons range from dwarf shrubs to large trees.
- The cold, moist slopes and deep valleys of the eastern Himalayas form a conducive habitat for the luxuriant growth of Rhododendron species and rich diversity in North Eastern States.
- The species has been designated as the **State tree of Uttarakhand** and its blooming in the Garhwal Himalayas is celebrated as 'Phool Sankranti', a festival of flowers.
- The studies on the flowering cycle have revealed that they are prominent indicators of climate change.
- In high altitude areas of Arunachal Pradesh rhododendrons are routinely cut for firewood by local people, forest fires in the dry seasons in Manipur and Nagaland were threatening the survival of many species.

6.2 Salt Water Crocodiles

- The Estuarine or salt water crocodiles are found in the eastern coast and Andaman & Nicobar Islands in India.
- Bhitarkanika National park on the odisha coast houses 70% of India's salt water crocodiles.
- Project Crocodile was launched by Government of India and UNDP to save the salt water crocodiles in Bhitarkanika.
- Unlike other crocodiles, estuarine crocodiles lay eggs by creating a mound made of leaves of a particular mangrove species, which are plentifully available in Bhitarkanika.
- Crocodiles start laying eggs by mid-may, with an incubation period of 75 days.
- Other Crocodile species in India: Mugger crocodile and Gharial Crocodile.

6.3 New species of flying squirrel discovered

- Scientists have discovered a new species of flying squirrel known as **Humboldt's flying squirrel**, in North America.
- The new flying squirrel species inhabits the **Pacific Coast region of North America**.
- This new discovery is the **45th known species of flying squirrel in the world**.

6.4 Animal Discoveries & Plant Discoveries 2016

- Animal Discoveries 2016, New Species and Records, brought out by the Zoological Survey of India and Plant Discoveries 2016 by the Botanical Survey of India.
- Animal Discoveries 2016 says that for the first time, the number of animal species in the country, including protozoa, has crossed one lakh.
- The geographical distribution of the new plant species reveals that most discoveries were made in the Western Ghats (17%), followed by the Eastern Himalayas (15%), the Western Himalayas (13%), the Eastern Ghats (12%) and the west coast (8%).
- Most of the new animal species were from the four biological hotspots of the country — the Himalayas, the northeast, the Western Ghats and the Andaman and Nicobar Islands.
- For the first time, the number of animal species in the country, including protozoa, has crossed one lakh.
- **Biological hotspots** – They are designated by an American NGO Conservation International.



- **Criteria** - Atleast 1,500 species of vascular plants (> 0.5% of the world's total) as endemics and it has to have lost at least 70% of its original habitat.
- Total 36 biodiversity hotspots on Earth (4 in India)
- **Critical Ecosystem Partnership Fund (CEPF)** provides fund for management of hotspot.
- CEPF was founded in 2000 to enable civil society to protect the world's biodiversity hotspots
- The fund is a joint program of Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank.

BIODIVERSITY HOTSPOTS IN INDIA

- **Himalaya:** Includes the entire Indian Himalayan region (and that falling in Pakistan, Tibet, Nepal, Bhutan, China and Myanmar)
- **Indo-Burma:** Includes entire North-eastern India, except Assam and Andaman group of Islands (and Myanmar, Thailand, Vietnam, Laos, Cambodia and southern China)
- **Sundalands:** Includes Nicobar group of Islands (and Indonesia, Malaysia, Singapore, Brunei, Philippines)
- **Western Ghats and Sri Lanka:** Includes entire Western Ghats (and Sri Lanka).

Biodiversity hotspots in Asia-Pacific

- East Melanesian Islands
- Himalaya
- Indo-Burma
- Japan
- Mountains of Southwest China
- New Caledonia
- New Zealand
- Philippines
- Polynesia-Micronesia
- Southwest Australia
- Forests of Eastern Australia (new)
- Sundaland
- Wallacea
- Western Ghats and Sri Lanka

6.5 Karkata

- Karkata, which stands for crab in Sanskrit, has been given a separate genus, indicating a higher order of distinctive features.
- It is endemic to the Western Ghats.
- Recently, the scientists have discovered a new genus and six new species of **freshwater crabs** in the Western Ghats biodiversity hotspot.

6.6 Nilgiri Tahr

- The first ever State-wide population estimation of Nilgiri tahrs by the Kerala Forests and Wildlife Department, has put the total population of the endangered species at 1,420.
- The survey covered the landscapes of Periyar, Thiruvananthapuram, Munnar, Parambikkulam, and Silent Valley. Highest population found in Eravikulam National Park in Munnar.
- It is the state animal of Tamil Nadu.
- It is endemic to Western Ghats from the Nilgiris to Kanyakumari. Found in Eravikulam National Park, Adimali forest (Idukki), Silent Valley National Park, Mundanthurai Tiger Reserve.
- It is categorised as Endangered in IUCN Red list.
- It is protected under **Schedule I of Wildlife (Protection) Act of 1972**.
- They are confined to a narrow belt of higher elevation areas in a restricted geographical region.
- A major part of the historical range of the tahr has been lost to plantations, including tea.
- Threat - Grasslands have been planted with eucalyptus, wattle and pine cultivation and plantations, including tea, which are not a natural habitat of Nilgiri tahr

6.7 Vermin

- Tamil Nadu government has planned to allow forest department personnel to **cull the wild boar** for a limited period of time.
- There are laws in the Wildlife Act that empower every State's Chief Wildlife Warden to authorise hunters to cull animals in a region where they are a proven nuisance.
- However, Environmentalists warn that any attempt to declare wild boar as "vermin" would result in irreparable damage to the biodiversity of forest.



- Wildlife laws divide species into 'schedules' ranked from I to V.
- Species listed in Schedule I and part II of Schedule II of WPA are provided absolute protection and offences under these are prescribed the highest penalties. e.g Gangetic Dolphin, Clouded Leopard, Sloth bear etc
- Species listed in Schedule III and Schedule IV are also protected, but the penalties are much lower. e.g Chital, Indian porcupine etc
- Schedule V includes vermins i.e the animals which may be hunted. e.g Common Crows, Fruit Bats, Nilgais etc
- The plants in Schedule VI are prohibited from cultivation and planting. e.g Pitcher plant, Red Vanda etc.

Declaration of a species as vermin

- As per Section 62 of the **Wildlife Protection Act, 1972**, States can send a list of wild animals to the Centre requesting it to declare them vermin for selective slaughter.
- The Central Government may by notification, declare any wild animal other than those specified in Schedule I and part 11 of Schedule II of the law to be vermin for any area for a given period of time.
- As long as the notification is in force such wild animal shall be included in Schedule V of the law, depriving them of any protection under that law.
- Any animal which poses a threat to human and their livelihood especially farming can be declared Vermin under Schedule V of Wildlife Protection act 1972.
- Vermin species can be hunted by anyone within the specified territories of the states in which they have been declared as vermin.
- Those who kill vermin animals will not be subject to the jail terms and fines that hunting these animals typically invite.
- Some of the species under Schedule V are Common crow, Common fox, Fruit bats, Jackal, Mice, Rats and voles.

6.8 Greenland Sharks

- Greenland Shark is the longest living vertebrate on Earth, which live for up to 400 years.
- It is found in the deep waters of the Atlantic Ocean from Canada to Norway, including the deep oceans around the north of Britain.
- Scientists have sequenced the full mitochondrial DNA information of Greenland sharks in an attempt to find the secret of its longevity.
- The sharks are believed to have unique genes that could help explain their long lifespan and also for other vertebrates including humans.

6.9 White Tiger

- A rare white tiger has been spotted for the first time in the Nilgiris in Western Ghats.
- The White Tiger (also known as the White Bengal Tiger) is a subspecies of Tiger, found throughout the Indian subcontinent.
- Although the range of the White Tiger is historically very large, these animals are incredibly rare as their colouration is dependent on a defective, recessive gene that is passed on from their parents.
- Scientific literature describes the cause for white coloration of Bengal tiger as a genetic mutation among tigers that changes an amino acid responsible for the normal colour.
- White tigers lack Pheomelanin, which is responsible for the red-yellow hue in the skin coat.
- Along with the Bengal Tiger, the White Tiger is considered to be the second largest species of Tiger in the world, after the Siberian Tiger.
- White Tigers have been reported predominantly from Rewa, Madhya Pradesh.
- World's first "white tiger safari" was opened for public in Mukundpur Zoo, Madhya Pradesh last year.
- The White Tiger is listed by the IUCN in the "Endangered" Category.

6.10 Sperm Whale

- The sperm whale (Physeter macrocephalus), or cachalot, is the largest of the toothed whales and the largest toothed predator.
- The spermaceti oil extracted from it is used in oil lamps, lubricants, and candles.



- Ambergris is a solid waxy waste product from its digestive system, used as a fixative in perfumes and for other purposes.
- The species is now protected by a whaling moratorium.
- It is currently listed as vulnerable by the International Union for the Conservation of Nature and Natural Resources (IUCN).

6.11 Northern River Terrapin

- A terrapin is one of the several small species of turtle living in fresh or brackish water.
- The northern river terrapin (Batagurbaska) is a species of riverine turtle native to Southeast Asia.
- It is classified as “Critically Endangered” by the IUCN.
- The species is currently found in Bangladesh (in the Sundarbans), India (parts of West Bengal & Odisha), Indonesia, Cambodia, and Malaysia.
- The northern river terrapin is omnivorous, and it prefers freshwater habitats.
- It moves to brackish river mouths or estuaries in the breeding season (December–March) and returns after laying eggs.
- A captive conservation breeding programme has been implemented in Sunderbans Tiger Reserve to protect the species against natural risks and also facilitate genetic management.

6.12 Mosses as Bio-indicators

- A Bio-indicator is a living organism that gives us an idea of the 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 it could even die.
- Bryophyte is a collective term for mosses, hornworts and liverworts which can be used as Bio-indicators. It thrives well in humid cities.
- Mosses found on rocks and trees in cities can be used to measure the impact of atmospheric change and could prove a low-cost way to monitor urban pollution.
- Mosses generally absorb water and nutrients from their immediate environments.
- Thus it responds to pollution or drought-stress by changing shape, density or disappearing, allowing scientists to calculate atmospheric alterations.

6.13 Nasikabatrachus bhupathi

- It is a new soil dwelling species of frog that has a snout-shaped nose like a pig, discovered by scientists in Hyderabad.
- It inhabits the eastern slopes of the Western Ghats, near the Srivilliputhur Grizzled Giant Squirrel Wildlife Sanctuary in Tamil Nadu.
- It evoked comparisons with the Purple frog that was first discovered in 2003.
- The Purple frog is an inhabitant of Seychelles.
- The discovery of bhupati frog is significant as it constitutes additional evidence in favour of the theory of continental drift.
- It suggests that the Indian subcontinent was part of the ancient landmass of Gondwana before splitting from Seychelles 65 million years ago.

6.14 Mongoose

- Mongoose is a protected species under Part II of Schedule II of the Wildlife Protection Act, 1972.
- Indian grey mongoose is the state animal of Chandigarh.
- Wildlife Crime Control Bureau (WCCB) has recently seized mongoose-hair painting brushes in Kolkata.
- Species listed in Schedule I and part II of Schedule II are provided absolute protection and offences under these are prescribed the highest penalties. e.g Gangetic Dolphin, Clouded Leopard, Sloth bear etc
- Species listed in Schedule III and Schedule IV are also protected, but the penalties are much lower. e.g Chital, Indian porcupine etc
- Schedule V includes vermins i.e the animals which may be hunted. e.g Common Crows, Fruit Bats, Nilgais etc
- The plants in Schedule VI are prohibited from cultivation and planting. e.g Pitcher plant, Red Vanda etc.



6.15 Snow Leopard Conservation

- The conservation status of snow leopard has been changed from “**endangered**” to “**vulnerable**” by the International Union for Conservation of Nature (IUCN).
- The snow leopard is a large cat native to the mountain ranges of Central Asia (Russia’s Altai mountain) and South Asia (The Himalayas).
- It is usually found at elevations of 3,000-4,500m.
- Their habitat covers more than 1.8 million sq km, **across 12 countries**.
- 12 range countries - Afghanistan, Bhutan, China, India, Nepal Kazakhstan, Kyrgyz Republic, Mongolia, Pakistan, Russia, Tajikistan, and Uzbekistan.
- These 12 countries formed the Global Snow Leopard Forum (GSLF) and signed the **Bishkek Declaration** to acknowledge its importance as the indicator of the health and sustainability of mountain ecosystems.
- In India, it is found in Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh.
- It is the State animal of Himachal Pradesh.
- Their coats change with the seasons from a thick, white fur to keep them warm and camouflaged in winter, to a fine yellow-grey coat in summer.
- They are threatened by poaching for their fur, infrastructure developments and climate change.

6.16 Global Snow Leopard and Ecosystem Protection Program (GSLEP)

- It is the world’s first initiative that aims to conserve high mountain ecosystems by protecting snow leopard in the region.
- It unites all 12 range country governments, nongovernmental and inter-governmental organisations, local communities, private sector.
- Arunachal Pradesh is one of the 22 priority landscapes of the GSLEP.
- Recently, Scientists have obtained the first evidence of presence of Snow leopard in Community Conserved Area (CCA) in Arunachal Pradesh.
- In 2004, WWF-India introduced the concept of CCAs in the State to empower local communities to become active decision-makers and implement conservation initiatives.

6.17 Monitor Lizard

- India is home to four varieties of monitor lizard - Agra, Yellow, Water, and Large Bengal.
- Monitor Lizards are protected under **Schedule 1 of the Wildlife Protection Act, 1972**.
- They share their Schedule 1 status with tigers, rhinos, elephants and leopards, and hunting or harming them can attract jail terms of at least 3-7 years;
- Their trade is restricted under Appendix 1 of the Convention on International Trade in Endangered Species (CITES).
- The male reproductive organs of monitor lizards are traded in the name of “Hatha Jodi”, which is claimed to possess magical powers that ensure prosperity for its owner.

6.18 New species in Western Ghats

- Scientists have described a new species of non-venomous **endemic snake “Aquatic Rhabdops”** from the Western Ghats.
- It is 3 foot long nocturnal snake hunts for prey underwater.
- The new species is named after its aquatic nature since the adults are mostly associated with freshwater forest streams.
- All Rhabdops snakes are endemic to India.
- The Aquatic Rhabdops is found only in the laterite plateaus of the Northern Western Ghats in Goa, Southern Maharashtra and Northern Karnataka.

6.19 Gharial Exchange Programme

- Bangladesh Forest Department and IUCN have piloted the first ever gharial exchange programme to initiate the captive breeding of the species in Bangladesh.
- The gharial is a crocodilian of the family Gavialidae, native to the northern part of the Indian Subcontinent.



- It is listed as “Critically Endangered” in the IUCN red list.
- The gharial is one of three crocodilians native to India, the other two being the mugger crocodile and the saltwater crocodile.

6.20 Mouse Deer

- The Telangana State Forest Department re-introduced the ‘mouse deer’ into the forests of Nallamalla in **Amrabad Tiger Reserve**.
- Mouse deer, also called as ‘spotted Chevrotain’ are nocturnal species.
- It is one of the endangered species usually found in deciduous and evergreen forests of the country.
- Because of their small size they are called ‘smallest ungulates’.

6.21 Neelakurinji

- Neelakurinji (*Strobilanthes kunthiana*) is a shrub that is found in the shola forests of the Western Ghats in South India.
- It belongs to the genus *Strobilanthes* which has around 250 species.
- Blooming periods of different species of Kurinji differ from each other.
- Neelakurinji blooms once in 12 years and its gregarious blooming are expected in July next year.
- It grows at an altitude of 1300 to 2400 metres.
- Besides the Western Ghats, Neelakurinji is also seen in the Shevroys in the Eastern Ghats.

6.22 Red Sanders

- *Pterocarpus santalinus* (Red sanders) is a species of *Pterocarpus* with a common name red sandalwood, and saunderswood.
- It is endemic to the southern Eastern Ghats mountain range of South India.
- It is listed in the category of “**Endangered**” by the IUCN because of overexploitation for its timber in South India.
- It is also listed in the appendix II of the CITES.
- This tree is valued for the rich red color of its wood and it is highly in demand in China.
- The wood is not aromatic and it is not to be confused with the aromatic *Santalum* sandalwood trees that grow natively in South India.

6.23 Fish – Lizard

- Indian scientists have recently discovered a fully preserved fossil sea-dwelling reptile known as the ‘fish lizard’ from Gujarat’s Kutch district.
- The fossil is believed to be from Jurassic period, which lasted from about 250 million to 200 million years.
- The discovery adds to the knowledge of ichthyosaur (fish – lizard) from the southern continents.
- It is the first Jurassic ichthyosaur found in India. It has been found in Americas, Australia and Europe.
- It’s the second significant fossil discovery in India this year.
- The oldest plant fossil in India, red algae from the Chitrakoot region in Madhya Pradesh, believed to be 1.6 billion years old was discovered earlier.

6.24 Chondrichthyans

- Chondrichthyes is a class that contains the cartilaginous fishes.
- Sharks, rays and chimaeras are collectively called as chondrichthyans.
- Cartilaginous fishes are jawed vertebrates with paired fins and skeletons made of cartilage rather than bone.
- The first ever assessment of the conservation status of Sharks, rays and Chimaeras in the Arabian Sea Region (ASR) was recently carried out.
- The assessment revealed that 3 marine species viz Pondicherry shark, the red sea torpedo and the tentacle butterfly ray might be possibly extinct in the ASR.
- The guitar fish found in coastal waters of Kerala and Tamil Nadu and the Ganges shark were classified as “Critically Endangered”.



- The ASR covers the waters of the Red Sea, Gulf of Aden, Arabian Sea, Sea of Oman, and the Gulf.

6.25 Tawny Lark

- Tawny Lark belongs to a family of larks well-known for their mimicking abilities.
- It is one of India's 22 lark species.
- It is found only in the arid grasslands and scrub lands of central and west-central India including Gujarat, Uttar Pradesh and Maharashtra.
- Recently, a team of scientists found that male Tawny larks imitate the calls of 34 other bird species, including babblers and lapwings, squirrels and even whistles of local shepherds.
- Rapid urbanization and conversion of grassland and scrub habitats into farms endanger its habitat.

6.26 Discovery of new lizard

- A new species of large Gecko or house lizard was recently discovered in the Eastern Ghats region.
- It is named after Kanger Ghati National park in Chhattisgarh as gecko "Hemidactylus kangerensis".
- It is also found in Sukma in Chhattisgarh and in the adjoining State of Telangana, which are part of the Eastern Ghats.
- **Kanger Ghati National park** is located near Jagdalpur in the Bastar region of Chhattisgarh.
- It is known for Hill Myna, the state bird of Chhattisgarh.
- The park is located in the catchment area of Godavari River.

6.27 Autumn Leaf

- The Autumn Leaf is a rare butterfly species normally found in Karnataka and Kerala.
- It resembles a leaf found in the autumn with an orangish tinge.
- It is spotted for the first time after few years, in the Grizzled Squirrel Wildlife Sanctuary (GSWS), Tamil Nadu.
- GSWS, also known as Srivilliputhur Wildlife Sanctuary, home to the endangered grizzled squirrel, is bordered by Periyar Tiger Reserve and Palaghat gap.
- It is considered as one of the Butterfly hotspots.

6.28 New Species in Andaman

- Edible wild banana species has been discovered in Andaman Island, the second such species on the island in two years.
- In 2014, Musa indandamanensis, wild banana species was discovered in a remote tropical rain forest on the Little Andaman Island.
- The latest discovery, Musa paramjitiana found in North Andaman Island.
- The plant grows to a height of nine metres and bears an edible, sweet-and-sour tasting fruit with numerous bulb-shaped seeds.
- Its conservation status has been declared as 'Critically Endangered'.

6.29 New Species in Western Ghats

- A new species of ant was found in the Periyar Tiger Reserve in the Western Ghats region.
- It belongs to Tyrannomyrmex, a rare tropical genus of ants that is distributed in the Indomalayan bio-region.
- Its Bio region extends from southern India and Sri Lanka to Southeast Asia.
- It is named as Tyrannomyrmexalii as a tribute to country's "Ant Man" eminent myrmecologist Musthak Ali.

6.30 Bonnet Macaques

- The bonnet macaque, an old world monkey, diurnal animal is endemic to southern India.
- They are found only in peninsular India with close proximity to humans.
- It exists as commensals to human, meaning it maintains commensalism with human beings.
- In Commensalism, one organism benefits from the other without affecting it.
- A study suggested that rhesus macaques were invading the bonnet's habitats in south India.
- Rhesus macaques are usually found in northern part of India.



- Decrease in tree cover, loss of contiguous canopies, rapid urbanization causes bonnet's disappearance from temples and tourist spots.

6.31 Clouded Leopard

- A Bornean Clouded Leopard (*Neofelis diardi*), found only on Borneo and Indonesia's Sumatra were recently captured during daytime as a rare sighting.
- It is a wild cat belongs to genus *Neofelis*. The other genus belongs to same family is Sunda Clouded Leopard (*Neofelis diardi*).
- It is listed as Vulnerable on the IUCN Red List and listed in CITES Appendix I.
- The range of the clouded leopard extends from Nepal on the Indian subcontinent to southern China and throughout South-East Asia.
- Clouded Leopard National Park is located in the Sipahijola Wildlife Sanctuary in Tripura.
- It is the state animal of the Indian state of Meghalaya.

6.32 *Gleadovia Konyakianorum*

- Scientists have discovered a new species of **parasitic flowering plant** belongs to the species "***Gleadovia konyakianorum***" in the Nagaland State.
- The species is named in honour of the Konyak tribe of Nagas.
- It is a holoparasite [complete parasite] that derives its entire nutritional requirement from the host plant, which is a *Strobilanthes* species.
- The plant was found in the semi-evergreen forest at an altitude of 1,500-1,600 metres,
- This is only the fourth species from the genus *Gleadovia* to be found in the world.
- The other three are *Gleadovia banerjiana* (discovered in Manipur), *Gleadovia mupinense* (found in China) and *Gleadovia ruborum* (discovered in Uttarakhand and also reported from China).

Parasitic plants

- Parasitic plant obtains all or part of its nutrition from another plant (the host) without contributing to the benefit of the host and, in some cases, causing extreme damage to the host.
- The structural feature of a parasitic plant is the haustorium, a specialized organ that penetrates the host and forms a vascular union between the plants.
- They lack chlorophyll and photosynthetic capacity.
- It differ from plants such as climbing vines, lianas, epiphytes, and aerophytes, which use other plants simply as a structure to grow rather than as a source of water or nutrients.
- All parasitic plant species are angiosperms (flowering plants).

6.33 Indian Emerald Dragonfly

- It is a rare variety of dragonfly known to exist only in the Travancore hills of Kerala.
- It made a dramatic reappearance 83 years, as it was sighted in the Periyar Tiger Reserve (PTR) during an odonata survey.
- Odonata is an order of carnivorous insects that includes dragonflies and damselflies.
- It lives around forest streams and micro habitat near high altitude areas.
- It is easy to spot because it flies irregularly over the water body for nearly an hour
- Thus it acts as an indicator of the health of water bodies inside sanctuaries and reserves.
- If a particular habitat is disturbed by pollution, the species won't be able to survive.

6.34 Mahendragiri Gecko

- A new species of gecko (lizards) belonging to the genus *Hemidactylus* was recently discovered from Mahendragiri hills in Andhra-Odisha border.
- It is the second gecko to be found endemic to the Eastern Ghats area.
- The first one "House Lizard" was discovered from Kanger Ghati National Park in Chhattisgarh.
- Scientists discovered that Mahendragiri geckos were not a population of geckos found in Western Ghats in Maharashtra and it is the latest addition to the species list of the Eastern Ghats.
- The lizard is the 32nd species of *Hemidactylus* gecko found in India.

- The discovery highlights the biodiversity importance of the region.
- For the last 70 years, it did not get its rightful place in the classification scheme.

6.35 Most Threatened Ape - Tapanuli orangutan

- Scientists have so far recognized six living species of great ape aside from humans.
- They are Sumatran and Bornean orangutans, eastern and western gorillas, chimpanzees, and bonobos.
- But researchers have now made the list into seven, based on a collection of evidence showing that an isolated population of orangutans living in Sumatra is actually its own unique species.
- They've named the new species the Tapanuli orangutan.
- But there are only about 800 Tapanuli orangutans left.
- This makes this newly discovered species among the most threatened great ape species in the world.



7. REPORTS AND INDICES

7.1 India - World's Most Disaster-Prone Country

- According to the data published by UN Office for Disaster Risk Reduction and Norwegian refugee council, India tops the list of Disaster-Prone Countries With Highest Displacement Of People.
- India is followed by China, Bangladesh, Vietnam, Philippines, Myanmar, Pakistan, Indonesia, Russia, and the USA.
- In India, on an average annual displacement of 2.3 million is taken place due to calamities such as floods, cyclone or earthquakes.
- UNISDR was established in 1999 as a dedicated secretariat to facilitate the implementation of the International Strategy for Disaster Reduction (ISDR).
- It is mandated by the UNGA to serve as the focal point in the United Nations system for the coordination of disaster reduction and to ensure synergies among UN system and regional organizations.
- UNISDR has five regional offices – in Asia (Bangkok), Africa (Nairobi), Europe (Brussels), Arab States (Cairo) and Americas and the Caribbean (Panama) and the UNISDR Headquarters in Geneva.
- It is an organisational unit of the UN Secretariat and is led by the UN Special Representative of the Secretary-General for Disaster Risk Reduction (SRSR).
- The **Sendai Framework for Disaster Risk Reduction 2015-2030** is the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters.
- The Sendai Framework is a 15-year, **voluntary, non-binding agreement** which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders.

7.2 Greenhouse Gas Bulletin

- The Greenhouse Gas Bulletin is the World Meteorological Organisation's (UN weather agency) annual flagship report.
- It tracks the continent of dangerous gasses in atmosphere in the post-industrial era (since 1750).
- It tracks concentrations of gasses in the atmosphere, rather than emissions with data compiled from a monitoring station in Mauna Loa, Hawaii.
- In its recent report, it highlighted that globally averaged concentrations of CO₂ reached 403.3 parts per million in 2016, up from 400.00 ppm in 2015 because of a combination of human activities and a strong El Nino event.
- The report also said that the last time Earth experienced similar CO₂ concentration rates was three to five million years ago, when the sea level was up to 20 metres (66 feet) higher than now.



7.3 Climate Change Performance Index

- The Climate Change Performance Index (CCPI) is an annual publication by German watch and Climate Action Network Europe.
- It evaluates and compares the climate protection performance of 56 countries and the EU, which are together responsible for more than 90 percent of global greenhouse gas (GHG) emissions.
- 80 % of the evaluation is based on objective indicators of emissions trend and emissions level. 20 % of the index results are built upon national and international climate policy assessments by more than 200 experts from the respective countries.
- The CCPI ranking is qualified in relative terms (better–worse) rather than absolute terms.
- CCPI 2018 report was published on the sidelines of the UN Climate Change negotiations (COP23) in Bonn.
- The top three rankings are still unoccupied as the report says no country is on a Paris-compatible path yet that aims to keep the average global temperature rise well below 2 degrees Celsius and as close as possible to 1.5 degrees Celsius.
- Sweden ranks fourth in this year's CCPI, following the empty top three
- India is ranked 14th in this year's Climate Change Performance Index (CCPI) 2018.
- China, with its high emissions and growing energy use over the past five years, still ranks 41st.
- After withdrawing from the 2015 Paris Agreement and dismantling major climate legislation of the previous government, the US finds itself in the bottom five of the ranking at 56.
- The bottom three of the index is formed by Korea (58), Iran (59) and Saudi Arabia (rank 60).