



AN INITIATIVE BY
VETRII IAS

ENVIRONMENT

CURRENT AFFAIRS

2018 - 2019

SELF LEARNING PROGRAM

by

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APRIL – MAY - 2019



AN INITIATIVE BY
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CHAPTER – 1 ECOLOGY AND BIO DIVERSITY

1. NILGIRI TAHR

Why in News:

- » A recent study has predicted that the most of the habitat of Nilgiri Tahr in the western ghats will be unsustainable, if the global warming become more intensified.



Description:

- » The Nilgiri tahr (*Nilgiritragus hylocrius*) is a brown-coloured, wild mountain goat with an arresting appearance accentuated by its swept-back horns and bristly mane. Its habitat is the open montane grasslands of the upper reaches of the Western Ghats, the Nilgiris, the Anamallais and the Nelliampathies.
- » IUCN STATUS: Endangered

Analysis of the study:

- » Currently only 3,000 exist and their habitat is restricted to one-tenth of their original range.
- » And they are found only in the southern Western Ghats in an altitude range of 1,100 metres to 2,600 metres. The study suggested wildlife sanctuaries in Kerala and Tamil Nadu will become unsuitable for the Tahr in the future due to climate change.
- » It predicted a maximum habitat loss of 61.2 per cent, 61.4 per cent and 63 per cent for 2030, 2050 and 2080 respectively if emissions did not reduce.
- » The study also forewarns that the existing protected area network might not be effective in conserving the Tahr if climate mitigation measures are not adopted in management plans of protected areas.

Other threats:

- » Hunting for meat, habitat loss, invasion of alien species and diseases.

2. BLACK SOFT-SHELL TURTLE

Why in News:

- » The rare turtle species are being breed in the ponds of Assam's shrines. The black softshells hatching were released into Haduk beel of Pobitora wildlife sanctuary, Assam.



Description:

- » Black softshell turtle (*Nilssonia nigricans*) found in freshwater in INDIA and BANGLADESH.

► **IUCN Red List: Extinct in the Wild**

Threat:

- Consumed for Meat and eggs
- Mining, encroachment of wetlands and change in flooding pattern have had a disastrous impact on the state's turtle population.

Pobitora Wildlife Sanctuary:

- Pobitora or Pabitora Wildlife Sanctuary) is a wildlife reserve in the Morigaon district of the state of Assam in India. It is located about 30 km east of Guwahati.
- It harbors world highest density of Rhinoceros. And become birder's heaven with thousand of water fowl thronging the wetlands during winter.
- Other animals found are leopard, wild boar, wild buffalo etc.

3. GANGETIC DOLPHINS

Why in News:

- Five-year study in Sundarbans region has found that rising watersalinity is threatening the habitat of Gangetic dolphins.



Description:

- The Ganges river dolphin can only live in freshwater and is essentially blind. They hunt by emitting ultrasonic sounds, which bounces off of fish and other prey, enabling them to "see" an image in their mind.
- Ganges river dolphins once lived in the Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu river systems of Nepal, India, and Bangladesh. But the species is extinct from most of its early distribution ranges. The Ganges river dolphin is important because it is a reliable indicator of the health of the entire river ecosystem. The government of India declared it the National Aquatic Animal in 2009. Bihar constitutes 50% of mammals in the country. India's only protected area for Gangetic dolphins is at Vikramshila Gangetic Dolphin Sanctuary in Bihar.
- Asia's First National Dolphin Research Centre is coming up in Patna to give boost to research and conservation of dolphins.
- **IUCN STATUS:** Endangered

Threats:

- Due to the merging of Ganga, Brahmaputra and Meghna which form the Sundarban region, these dolphins struggle to survive. Declining flow of Ganga is the biggest threat to Gangetic dolphins along with water intensive agriculture in the basin. Fishing & harvesting aquatic resources.

- » Dams & water management/use
- » Industrial, military, Agricultural & forestry liquid waste released into the river.
- » Accidental killing through fisheries by-catching and poaching for oil.

4. INDUS DOLPHINS

Why in News:

- » The Punjab government along with WWF-India conducted the first organised census of Indus Dolphins, one of the world's rarest mammals.



Description:

- » Indus Dolphin is subspecies of freshwater river dolphin found in Indus river.
- » It is national mammal of Pakistan. It is a key indicator species of river's health.
- » Its presence is considered as river is healthy. Indus dolphin similar to Ganges River dolphin as it is also functionally blind and relies on echolocation to navigate, communicate and hunt prey in muddy river water.
- » Indus Dolphin was also found in Sutlej decades back, but river pollution has caused its extinction in river. The dolphins are found only in India and Pakistan, confined to the 185 km stretch between Talwara and Harike Barrage in India's Beas River in Punjab.

IUCN STATUS: THREATENED

Threats:

- » Their numbers have declined dramatically after construction of irrigation system.

Conservation:

- » The move was aimed at conservation of the species.
- » The main aim behind the exercise is to establish the accurate population of the dolphins, in order to plan the conservation of the species accordingly

5. GREAT INDIAN BUSTARD

Why in News?

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



About Great Indian bustard (*Ardeotis Nigriceps*)

- » It's among the heaviest bird with a horizontal body and long bare legs giving it an ostrich like appearance.

- » **Habitat:** Arid and semi-arid grasslands, open country with thorn scrub, tall grass interspersed with cultivation. It avoids irrigated areas.
- » It is endemic to Indian Sub-continent, found in central India, western India and eastern Pakistan.
- » Currently, it is found in only six states in the country — Madhya Pradesh, Gujarat, Maharashtra, Andhra Pradesh, Rajasthan and Karnataka.
- » It is also listed in Appendix I of CITES and covered under CMS or Bonn Convention.
- » Bustard Species Found in India: Great Indian Bustard, the Lesser Florican and the Bengal Florican; Houbara also belong to Bustard family but it's a migratory species.
- » **IUCN STATUS: Endangered**

Importance to Ecosystem:

- » GIB is an indicator species for grassland habitats and its gradual disappearance from such environments shows their deterioration.
- » Once the species is lost, there will be no other species to replace it, and that will destabilise the ecosystem of the grassland and affect critical biodiversities, as well as blackbucks and wolves, who share their habitat with the GIB.

Conservation:

- » Great Indian Bustard, popularly known as 'Godawan', is Rajasthan's state bird.
- » It's one of the Species for The Recovery Programme under the Integrated Development of Wildlife Habitats of the Ministry of Environment and Forests.

Bustard Recovery Programme

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

6. ASIATIC LION

Why in News:

- » 23 lions have died in Gujarat's Gir sanctuary in less than a month. Most of them have succumbed to canine distemper virus (CDV) and protozoa infections.

Description:

- » It is a *Panthera leo leo* population in India.

- » The lion is one of five pantherine cats inhabiting India, along with the Bengal tiger, Indian leopard, snow leopard and clouded leopard.
- » Their population is limited to only five protected areas in Gujarat – Gir National Park, Gir Sanctuary, Pania Sanctuary, Mitiyala Sanctuary and Girnar Sanctuary.
- » **IUCN STATUS: Endangered**



Conservation Measures:

- » The Ministry of Environment, Forest and Climate Change, Government of India has launched the “Asiatic Lion Conservation Project”.

Study Analysis:

- » To protect and conserve the world's last ranging free population of Asiatic Lion and its associated ecosystem. Major aspects of the conservation project include undertaking “habitat improvement” measures, making more sources of water available, creating a wildlife crime cell, and a task force for the Greater Gir region. It would also involve having in place a GPS-based tracking system, which would look at surveillance tracking, animal and vehicle tracking.
- » There would also be an automated sensor grid that would have magnetic sensors, movement sensors and infra-red heat sensors. A key outcome of the project is to have a dedicated veterinary institute, lion ambulances and back-up stocks of vaccines that may be required.
- » Veterinary care supplemented with adequate eco development works for the fringe population in order to ensure a stable and viable Lion population in the Country.

7. GIR NATIONAL PARK

- » Gir National Park and Wildlife Sanctuary was established in 1965, with a total area of 1,412 km².
- » It is part of the Kathiawar - Gir dry deciduous forests eco-region.
- » In 2015, the population has been 523 (27% up compared to previous census in 2010). The four reservoirs of the area are at four dams, one each on Hiran, Machhundri, Raval and Shingoda rivers, including the biggest reservoir in the area, the Kamleshwar Dam, dubbed 'the lifeline of Gir'.



8. BLACK PANTHER

Why in News:

- » The wildlife wing of Odisha's Forest and Environment Department has recorded the presence of a black panther in a forest in Sundargarh district.



Description:

- » A Black panther or melanistic leopard is a colour variant of the Indian leopard. It is as shy as a normal leopard and very difficult to detect.
- » **HABITAT:** It is mostly found in densely forested areas of southern India. Black panthers have also been reported from Kerala, Karnataka, Chhattisgarh, Maharashtra, Goa, Tamil Nadu, Assam and Arunachal Pradesh.
- » The photographs make Odisha the ninth State in India where the elusive and rare big cat has been seen.
- » **IUCN STATUS: Vulnerable**

9. HARRIERS BIRDS

Why in News:

- » Concerns have been raised that harrier birds, a migratory raptor species are declining from Indian Subcontinent.

Description:

- » Harriers characteristically hunt by flying low over open ground, feeding on small mammals, reptiles, or birds.
- » The young of the species are sometimes referred to as ring-tail harriers.
- » They are distinctive with long wings, a long narrow tail, the slow and low flight over grasslands and skull peculiarities.
- » The harriers are thought to have diversified with the expansion of grasslands and the emergence of C4 grasses about 6 to 8 million years ago during the Late Miocene and Pliocene.
- » Montagu's, Marsh and Pallid Harriers are widely distributed in India while Pied and Eastern Marsh Harriers are confined to the eastern parts of India.
- » Hen Harriers are commonly seen in Northern India and up to Upper Assam in North Eastern India.



Threats:

- » Habitat destruction: loss of grasslands either due to rapid urbanization or large-scale monocultures and extensive reclamation of wetlands causes change in land use patterns declining their suitable foraging and roosting habitats in many parts in India.
- » Extensive pesticide Use: In farms in and around roosting sites causing bioaccumulation of poisonous substances in food-chain leading to mortality of the birds.

10. RED SANDERS NOT ENDANGERED ANYMORE

Why in News:

- » The International Union for Conservation of Nature (IUCN), now reclassified red sanders (*Pterocarpus santalinus*) as ‘near threatened’ from the earlier ‘endangered’.

Description:

- » It is an endemic tree of South India.
- » They are found in Tropical Dry Deciduous forest of the Palakonda and Seshachalam hill ranges of Andhra Pradesh and also found in Tamil Nadu and Karnataka.
- » It occurs in hot, dry climate with a rainfall of 88-105 cm. It prefers lateritic and gravelly soil and cannot tolerate water logging. It is a rare kind of sandalwood, high in demand internationally due to its red colored wood. The major markets for the wood are – China, Japan, Middle East, Sri Lanka, Bhutan and Nepal.

Uses:

- » It is used for various purposes such as immunity medicine, furniture, radiation absorbent, musical instrument, food dyes and spices, Ayurveda and Sidha medicine, decorative and ornamental purposes etc.

11. RARE SPIDER REDISCOVERED

Why in News:

- » Recently, a rare spider (both a male and a female spider) was rediscovered from Wayanad Wildlife Sanctuary in Western Ghats, Kerala.



Description of Chrysilla Vollupe:

- » The Spider belongs to the family of jumping spider (Salticidae). Female spider has blue iridescent bluish scales present in the top of head region of female and orange bands on both sides of the head.

- » The spider has eight black eyes arranged in the front and sides of head region. The spider makes a retreat between green leaves of small plants.

Study Analysis:

- » A team of researchers from Centre for Animal Taxonomy and Ecology (CATE) discovered the spider named Chrysilla Vollupe after 150 years which was believed to be extinct.
- » The rediscovery is significant for the fact that the female specimen was spotted for the first time and it also points to the need to conduct more explanatory surveys of faunal diversity of India.

12. MONKEY DECLARED VERMIN IN HIMACHAL PRADESH

Why in News:

- » Monkeys have again been declared vermin for the next one year in 11 districts' 91 tehsils and sub-tehsils of Himachal Pradesh.

Background:

- » Wildlife laws divide species into 'schedules' ranked from I to V.
- » Schedule I members are the best protected, with severe punishments meted out to those who hunt them. Wild boars, nilgai and rhesus monkeys are Schedule II and III members — also protected, but can be hunted under specific conditions.
- » Crows and fruit bat fall in Schedule 5, the vermin category.
- » Declaration of Vermin of an animal allows for selective slaughter of that animal Reason behind the move - Because the animals have been adversely affecting crops and causing harm to humans.
- » **Process of declaring an animal as Vermin** In India Section 62 of the Wildlife Protection Act, 1972 empowers the states to send a list of wild animals to the Centre requesting it to declare them vermin.
- » The Central Government through notification may declare any wild animal other than those specified in Schedule I and part 11 of Schedule H of the law to be vermin for any area for a given period of time.

13. PANGOLIN

Why in News:

- » Odisha Special Task Force (STF) has launched drive to bust an international syndicate that peddles 'endangered' pangolin, one of the world's most illegally traded mammals.



Description:

- » Pangolin Pangolins or scaly anteaters are mammals of the order Pholidota.
- » These species range in size from 30 to 100 cm (12 to 39 in).
- » Pangolins have large, protective keratin scales covering their skin; they are the only known mammals with this feature.
- » Pangolins are nocturnal, and their diet consists of mainly ants and termites, which they capture using their long tongues.
- » They tend to be solitary animals, meeting only to mate and produce a litter of one to three offspring, which are raised for about two years.
- » Of the eight species of pangolin, four are listed as **vulnerable**, two are listed as **endangered**, and two are listed as **critically endangered** on the IUCN RED LIST.

Threats:

- » Pangolins are threatened by poaching (for their meat and scales) and heavy deforestation of their natural habitats, and are the most trafficked mammals in the world.

14. GAJ YATRA

Why in News:

- » The Union Ministry of Environment and Forest has launched a nationwide campaign Gaj Yatra to protect elephants.

Study analysis of Yatra:

- » Gaj Yatra is 18-month-long national campaign aimed to protect elephants, India's national heritage animal in 12 elephant range states.
- » It was launched in August 2017 by Environment and Forest Minister on the occasion of World Elephant Day 2017 (observed on August 12).
- » The aim this project is to rehabilitate people affected by man-elephant conflict in corridor areas while ensuring uninterrupted movement of elephants between key habitats. •
- » It's a nationwide campaign to protect elephants, launched on the occasion of World Elephant Day led by the wildlife Trust of India (WTI) and International Fund for Animal Welfare (IFAW), both NGOs, from Tura in Garo Hills, Meghalaya.
- » It was organized in the Garo Hills in recognition of the people's initiative of community forests for human-elephant harmony and conservation of animals such as hoolock gibbon.

15. NEW ELEPHANT RESERVE

Why in News:

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

About: / Singhphan Elephant Reserve

- » It has huge tracts of forest, strategically located in contiguity with the Abhaypur Reserve Forest of Assam.

Measures Taken for Elephant Reserve

- » Elephant is National Heritage Animal and categorised as Endangered under IUCN list. It is under schedule I of the Indian Wildlife (Protection) Act, 1972 and in Appendix I of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES).
- » Karnataka has the highest number of elephants followed by Assam and Kerala respectively.

Project Elephant:

- » It was launched in the year 1992 as a Centrally Sponsored Scheme.
- » Objectives: To protect elephants, their habitat & corridors; to address issues of man-animal conflict and welfare of captive elephants. Elephant reserves are established across states to achieve above objectives.
- » Elephant corridors: These are narrow strips of land that allow elephants to move from one habitat patch to another. There are approx. 100 identified elephant corridors in India.

16. REMOVAL OF ROSEWOOD FROM APPENDIX II CITES

Why in News:

- » India has proposed to remove Rosewood (*Dalbergia sissoo*) from Appendix II of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Study Analysis:

- » India is a signatory to and has also ratified CITES convention in 1976. The Rosewood (*Dalbergia sissoo*) is currently part of Appendix II of CITES that has species not necessarily threatened with extinction. Rosewood is called Sheesham in India.
- » CITES - It is an International agreement to regulate worldwide commercial trade in wild animal and plant species. It also restricts trade in items made from such plants and animals, such as food, clothing, medicine, and souvenirs.
- » CITES is legally binding on state parties to the convention. Appendix I : It lists species that are in danger of extinction.

- » **Appendix II:** These are those species that are not threatened with extinction but that might suffer a serious decline in number if trade is not restricted.
- » **Appendix III species:** They are protected in at least one country that is a CITES member states and that has petitioned others for help in controlling international trade in that species.

Reasons behind this proposal:

- » The harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened.
- » The species grows at a very fast rate COP 17 put the entire Dalbergia genus under Appendix II and the regulation of Dalbergia trade was hurting handicraft makers in our country.

17. ASIAN RHINOS

Why in News?

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



About the Declaration:

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

18. CHEETAH REINTRODUCTION PROJECT: NAURADEHI WILDLIFE SANCTUARY

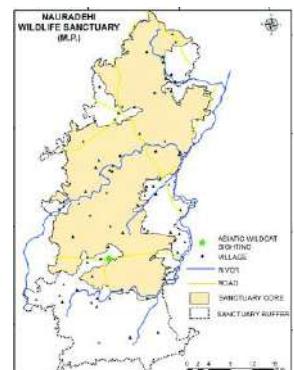
Why in News:

- » The National Tiger Conservation Authority (NTCA) recently told a bench of the Supreme Court that African cheetahs would be translocated in India from Namibia and would be kept at Nauradehi wildlife sanctuary in Madhya Pradesh.

Cheetah IUCN Status: Endangered

Description:

- » The cheetah is also the world's fastest land mammal, an icon of nature.



- » Desert, Grassland, Savanna, Shrubland the cheetah, *Acinonyx jubatus*, is one of the oldest of the big cat species, with ancestors that can be traced back more than five million years to the Miocene era.
- » With great speed and dexterity, the cheetah is known for being an excellent hunter, its kills feeding many other animals in its ecosystem—ensuring that multiple species survive.

Study Analysis:

- » Cheetah Re-introduction Project India's last spotted cheetah had died in 1947.
- » In 1952, the animal was declared extinct in the country.
- » The central government had set up an expert panel for reintroducing the cheetah in India.
- » The panel recommended that the home of the fastest animal could be Kuno Palpur in Madhya Pradesh, Velavadar National Park in Gujarat and Tal Chhapar sanctuary in Rajasthan.

Nauradehi Wildlife Sanctuary:

- » Nauradehi Wildlife Sanctuary, covering about 1,197 km² (462 sq mi), is the largest wildlife sanctuary of Madhya Pradesh state in India.
- » Nauradehi was found to be the most suitable area for the cheetahs as its forests are not very dense to restrict the fast movement of the spotted cat.
- » Besides, the prey base for cheetahs is also in abundance at the sanctuary. During winter season the sanctuary serves as the seasonal home for migratory birds, including the sarus crane.

19. ANDAMAN & NICOBAR ISLANDS HOME TO TENTH OF INDIA'S FAUNA SPECIES: ZSI

Why in News:

- » A recent publication by the ZSI titled Faunal Diversity of Biogeographic Zones: Islands of India has for the first time come up with a database of all faunal species found on the island, putting the number at 11,009.

Andaman & Nicobar Islands:

- » The islands, comprising only 0.25% of India's geographical area, are home to more than 10% of the country's fauna species.
- » The Andaman and Nicobar Islands have a tropical rainforest canopy.
- » The Middle Andamans harbours mostly moist deciduous forests. North Andamans is characterised by the wet evergreen type, with plenty of woody climbers.

- » Saltwater crocodile is also found in abundance. The State Animal of Andaman is the dugong, also known as the sea cow, which can be found in Little Andaman. There are 96 wildlife sanctuaries, nine national parks and one biosphere reserve in these islands.

20. WORLD SMALLEST FERN

Why in News:

- » Indian researchers have discovered the world's smallest land fern hiding in the Ahwa forests of the Western Ghats in Gujarat's Dang district.

Description:

- » The fingernail-sized fern belongs to a group known as the adder's-tongue ferns, named after their resemblance to a snake's tongue.

About study:

- » Initial observations suggest that the ferns are seasonal and grow with the first monsoon rains.
- » They last only for a few months and new plants are born through their spores next year.
- » The ferns are not very common even in the locality they are found in.
- » The researchers uncovered only 12 of these plants in the Ahwa forest division, growing alongside mosses in grasslands near Jakhana village.

21. VETIVER GRASS

Why in News:

- » Vetiver, 'the wonder grass' of Tamil Nadu is being grown by the inland farmers in last few decades due to its high returns despite low yield.

Description:

- » Vetiver Grass Chrysopogon zizanioides, commonly known as vetiver is a perennial bunchgrass of the Poaceae family, native to India.
- » Vetiver grows to 150 centimetres (5 ft) high and form clumps as wide.
- » The stems are tall and the leaves are long, thin, and rather rigid.
- » The flowers are brownish-purple.
- » Though it originates in India, it is widely cultivated in tropical regions.
- » The major vetiver producers include Haiti, India, Indonesia, and Reunion islands.
- » The most commonly used commercial genotypes of vetiver are sterile.

Uses of Vetiver grass:

- » Soil conservation, evaporation, helps in Crop protection, used as pest repellent Perfumery & aromatherapy.
- » Have Medicinal value & Traps pollutants.

22. KHANGCHENDZONGA BIOSPHERE RESERVE

Why in News:

- » Recently, Khangchendzonga Biosphere Reserve was included in the UNESCO's World Network of Biosphere Reserve (WNBR) under the Man and Biosphere Programme (MAB).

About it:

- » UNESCO also announced the registration of 23 other new sites in the World Network of Biosphere Reserves.
- » Now the total number of Biosphere reserves under MAB programme has reached to 686.

Description:

- » It is one of the highest ecosystems in the world and located at trijunction of India (Sikkim), bordering Nepal to the west and Tibet (China) to the north-west.
- » The site is one among the world's 34 biodiversity hotspots.
- » The Khangchendzonga National Park (KNP), which comprises the core area of the KBR, was inscribed as India's first 'Mixed World Heritage Great Site' in 2016.
- » Over 118 species of the large number of medicinal plants found in Dzongu Valley in north Sikkim are of ethno-medical utility. Fauna: Red Panda, Snow Leopard, Himalayan Black Bear and herbivores species of Musk deer, Great Tibetan Sheep, Blue Sheep, Boral and Barking Deer. Over 500 species and sub-species of birds, including; Monal Pheasants, Tragopan Pheasants and Blood Pheasants (the State Bird) — are also found in the reserve.

UNESCO: MAB Program

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

23. KAZIRANGA NATIONAL PARK

Why in News:

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

Description of the Division:

- » The Kaziranga South Division will cover all areas of Kaziranga situated on the south bank of the Brahmaputra with existing four Ranges viz. Kaziranga (Kohora), Eastern Range (Agaratoli), Western Range (Bagori) and Burhapahar Range.
- » The headquarters of the North division will be at Biswanath with three ranges under this division at Biswanath, Panpur and Gohpur (Gomeri). The Panpur Range and the Gohpur Range (Gomeri) will be newly created under the proposed Kaziranga North division.

Reason:

- » Due to expansion of area under the KNP, it became difficult for one division to manage the National Park and because of this these areas did not get the desired attention.

Issued behind it:

- » Poachers remained un-convicted due to large area of the park, which can now be curbed better as it mostly happened in the northern region, and officers from the southern side were unable to prevent it. The funds allocated were not only under-utilised but were largely unused, with bifurcation separate authorities will be more accountable.
- » It will also ease overcoming staff shortage as northern region can now recruit from northern Assam separately and so with the southern region.
- » Tourism was also suffering largely due to above mentioned reasons, bifurcation will lead to better management and increased visitation and hence, the revenue.

24. SC DECLARES NATIONAL PARKS AS ECO SENSITIVE ZONE

Why in News:

- » The Supreme Court has directed the Union Environment Ministry to declare 10 km area around 21 national parks and wildlife sanctuaries across the country as 'eco-sensitive zones'.

Reason for this judgement:

- » The court noted that the State governments have taken no effort to protect the area around these sanctuaries and parks and the issue has been pending for past 12 years.

- » **Protected area** - It is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

In India, Protected Area includes:

- » National Parks -No human activity is permitted inside the national park. Wildlife Sanctuaries - Some restricted human activities are allowed inside the Sanctuary.
- » Conservation Reserves – They act as connectors between established national parks, wildlife sanctuaries and reserved and protected forests of India. Community Reserves - Such areas are designated as conservation areas if they are uninhabited and completely owned by the Government of India. Marine Protected Areas – It is essentially a space in the ocean where human activities are more strictly regulated than the surrounding waters. Eco-Sensitive Zones (ESZs) or Ecologically Fragile Areas (EFAs) These are areas notified by the MoEFCC around Protected Areas, National Parks and Wildlife Sanctuaries. They also act as a transition zone from areas of high protection to areas involving lesser protection.

25. FIRE AT BANDIPUR RESERVE

Why in News:

- » A major fire has broken out in the Bandipur Tiger Reserve and National Park in Chamarajanagar District of Karnataka.



Impact:

- » Hundreds of acres of forest area have been destroyed in the fire and the fire has even spread to the core area.
- » Due to the fire at the core area, huge damage and loss to the wildlife are expected.
- » The strong winds are further causing a hindrance in controlling the fire.

Bandipur National Park:

- » Established in 1974 as a tiger reserve under Project Tiger, is a national park located in the south Karnataka, which is the state with the highest tiger population in India.
- » It is one of the premier Tiger Reserves in the country along with the adjoining Nagarhole national park. Bandipur is known for its wildlife and has many types of biomes, but dry deciduous forest is dominant. The Bandipur Tiger Reserve was established under Project Tiger in 1973 by adding nearly 800 km² to the Venugopala Wildlife Park. Bandipur supports a good population of endangered and vulnerable species like Indian elephants, gaurs, tigers, sloth bears, muggers, Indian rock pythons, four-horned antelopes, jackals and dholes.

26. FLAMINGO SANCTUARY

Why in News:

- » A committee, chaired by Union Environment Minister Harsh Vardhan, has accorded wildlife clearance to the Mumbai-ahembadabad high speed train corridor that encroaches upon a Flamingo sanctuary and the sanjay Gandhi national park, the home to leopards, in Mumbai.

About flamingo sanctuary:



- » It is maharastra's second marine sanctuary after the one at malvan.
- » It is located to western side of Thane creek.
- » It is a home to flamingos as well as other migratory and residential bird species. Convention on the Conservation of Migratory Species of Wild Animals (CMS) or Bonn convention
- » It is the only convention under UNEP which provides a global platform for the conservation and sustainable use of migratory animals and their habitats (and their migration routes). India is a member of the convention.
- » Appendix I of the Convention: It includes Migratory species threatened with extinction.
- » Appendix II of the Convention: It includes Migratory species that need or would significantly benefit from international co-operation

27. SANJAY GANDHI NATIONAL PARK

- » It is spread over three districts-Palghar, thane and Mumbai suburb.
- » It is home to a number of endangered species of flora and fauna. It harbours approximately 800 species of flowering plants, 45 species mammals, 43 species of reptiles among other.

28. WILD HORSES HAVE GONE EXTINCT

Context:

- » All the world's wild horses have gone extinct, according to a study That unexpectedly rewrites the horse family tree based on a new DNA analysis of their ancestry.
- » **Przewalski's horses** — which were the last remaining wild horses on Earth, were actually domesticated horses that escaped their owners.
- » The study is based on archaeological work at two sites in northern Kazakhstan, called Botai and Krasnyi Yar, where scientists have found the earliest proof of horse domestication, going back more than 5,000 years.
- » Przewalski's Horses: General Information
- » **IUCN Status: Endangered**

- » Habitat and Ecology: Desert, Grassland
- » The round-bellied, short legged, reddish brown to beige horses roamed in Central Asia, Europe and China in prehistoric times.

Threats Analysis:

- » Agriculture & aquaculture: Livestock farming & ranching,
- » Energy production & mining: Mining & quarrying
- » Biological resource use: Hunting & trapping terrestrial animals
- » Human intrusions & disturbance: War, civil unrest & military exercises
- » Climate change & severe weather: Droughts, Temperature extremes, Storms & flooding.

29. 22nd SEPTEMBER TO BE OBSERVED AS “RHINO DAY” IN ASSAM

- » **Objective :** To create more awareness about Assam’s famous one-horned rhinoceros and to keep the global spotlight on the animal, the Assam Government has decided to commemorate September 22 as ‘Rhino Day’. One-horned rhinoceros is the largest of the Asian Rhinos.

One-horned rhinos: General Information:

- » **IUCN Status:** Vulnerable
- » **Habitat and Ecology:** Its preferred habitat is alluvial flood plains and areas containing tall Grasslands along the foothills of Himalayas.
- » They are found in Kaziranga, Orang, Pobitora, Jaldapara (in Assam), and Dudhwa (UP) National Park.
- » **Kaziranga National Park** hosts two-thirds of the world’s Great One-horned rhinoceros (68% of worldwide population). One-horned rhinoceros is the largest of the Asian Rhinos.

30. RISE IN RHINO POPULATION IN KAZIRANGA NATIONAL PARK

Context:

- » Rhino population had a gain of 193 rhinos in just 3 years from 2006 to 2009. It increased by 353 between 2009 and 2015 period, despite worrying numbers on poaching.
- » Kaziranga National Park (KNP) has counted 2,413 one-horned rhinos in the latest triennial population estimation.
- » It comes closer to the goal of hitting the 3,000-mark in the Asian one-horned rhino population in Assam by 2020.

Kaziranga National Park: General Information

- » It is a national park in the Golaghat and Nagaon districts of the state of Assam, India.
- » It is a World Heritage Site.
- » The sanctuary hosts two-thirds of the world's great one-horned rhinoceroses. Rhinos are listed as vulnerable on the IUCN Red list of Threatened Species.
- » **Tigers:** Kaziranga is home to the highest density of tigers among protected areas in the world, and was declared a Tiger Reserve in 2006
- » Fauna: The park is home to large breeding populations of elephants, wild water buffalo, and swamp deer
- » Important Bird Area: Kaziranga is recognized as an Important Bird Area by BirdLife International for conservation of avifaunal species
- » When compared with other protected areas in India, Kaziranga has achieved notable success in wildlife conservation
- » Located on the edge of the Eastern Himalaya biodiversity hotspot, the park combines high species diversity and visibility
- » Flora: Kaziranga is a vast expanse of tall elephant grass, marshland, and dense tropical moist broadleaf forests, criss-crossed by four major rivers, including the Brahmaputra, and the park includes numerous small bodies of water
- » The park celebrated its centennial in 2005 after its establishment in 1905 as a reserve

CHAPTER – 2 CLIMATE CHANGE

1. EVIDENCE FROM KANHA AND PENCH NATIONAL PARK INDIA

- » Climate change is as much as local as it is global. However, the perceived impacts are not immediately visible.

Evidences from Kanha and Pench National Parks, India

- » From 1880-2012, the average global temperature on earth increased by 0.8 degrees Celsius, according to US space agency NASA's Goddard Institute for Space Studies. During the same period, India lost about 40% of its forest cover.
- » In Kanha National Park, at least two long-term scientific studies show that grasslands known for hosting diverse populations of herbivorous wildlife are shrinking even as the ranks of the herbivores increase.
- » In Kanha and Pench, due to decreasing moisture conditions and consequent drying up of soil, , weed infestation and the rise of climate-resilient exotic species such as Parthenium hysterophorus, Hyptis suaveolens and Lantana camara have taken place. The exotic species have overpowered the native species.
- » According to a Wildlife Institute of India report, most of the grasslands within the reserves have changed drastically, resulting in the predominance of less palatable and fire-resistant grasses and decrease in cover of perennial fodder species.
- » The plenitude of non-palatable grasses has forced herbivores to move out of grasslands and raid croplands in villages. As these herbivores move towards human habitation, predators like tigers too follow in search of food. This in turn leads to increasing human-wildlife conflict. This poses a huge challenge for the Forest Department to manage and protect wildlife.

What is climate change?

- » Climate change is a long-term shift in the statistics of the weather (including its averages).
- » For example, it could show up as a change in climate normals (expected average values for temperature and precipitation) for a given place and time of year, from one decade to the next.

Why is climate changing? / Natural causes

- » Climate change is a normal part of the Earth's natural variability.
- » It is related to interactions among the atmosphere, ocean, and land.
- » Variation in Solar energy: It is also related to changes in the amount of solar radiation reaching the earth-As the stream of solar energy reaches earth, the character of the Earth's orbit and of its rotation plays a major role in causing long-term climate change.

Volcanic Eruptions:

- » Explosive volcanic eruptions can inject large quantities of dust and the gas, sulphur dioxide, high into the atmosphere. Whereas volcanic debris in the lower atmosphere falls out or is rained out within days, the veil of pollution in the upper atmosphere is above the weather and may remain for several years, gradually spreading to cover much of the globe.
- » The volcanic pollution results in a substantial reduction in the stream of solar energy as it passes through the upper layers of the atmosphere, reflecting a significant amount back out to space.

Anthropogenic Causes

- » Humans are increasingly influencing the climate and the earth's temperature.
- » The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) concludes, "that most of the observed increase in the globally averaged temperature since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."

What are the causes of rising emissions?

- » Combustion of fossil fuels (coal, oil and gas) produces carbon dioxide and nitrous oxide.
- » **Increasing deforestation:** Trees help to regulate the climate by absorbing CO₂ from the atmosphere. As trees are being recklessly cut, the beneficial effect is lost and the carbon stored in the trees is released into the atmosphere, adding to the greenhouse effect.
- » Increasing livestock farming: Livestock such as cows produce large amount of methane when they digest food.
- » **Overuse of fertilizers:** Fertilisers containing nitrogen produce nitrous oxide emissions.
- » Fluorinated gases produce a very strong warming effect, up to 23 000 times greater than CO₂.
- » This leads to the increase in the globally averaged temperature-Global Warming
- » The world's leading climate scientists believe that the human activities are almost certainly the main cause of the warming observed since the middle of the 20th.

Climate is always changing. Why is climate change of concern now?

- » Recent estimates of the increase in global average temperature since the end of the last ice age are 4 to 5 °C. That change has occurred over a period of about 7,000 years, starting 18,000 years ago. The current global average temperature is 0.85°C higher than it was in the late 19th century. CO₂ has risen by 40% in just the past 200 years, contributing to human alteration of the planet's energy budget.
- » The scientists consider that an increase of 2°C compared to the temperature in pre-industrial times is as the threshold beyond which there is a much higher risk that dangerous and possibly catastrophic changes in the global environment will occur.

Impact of Climate Change:

A. Impact on Environment

1. Rising Sea level:
 - » During the 20th century, sea level rose about 15 cm (6 inches) due to melting glacier ice and expansion of warmer seawater. Thermal expansion would continue for many centuries even after GHG concentrations have stabilized causing an eventual sea level rise much larger than projected for the 21st century.

B. Melting of Arctic Sea ice and glaciers:

- » The melting of sea ice may lead to changes in ocean circulation. Melting sea ice is also speeding up warming in the Arctic. Mountain glaciers around the world have decreased considerably in size.

C. Increase in floods and droughts:

- » Warmer temperatures have led to more intense rainfall events in some areas leading to increase in flood events. Drought events have also increased in many areas.

D. Impact on Biodiversity

- » Climate Change has the potential to cause immense biodiversity loss.
- » According to International World Wildlife Fund (WWF) and National Wildlife Federation in the United States species from the tropics to the poles are at risk.
- » Many species may be unable to move to new areas quickly enough to survive changes that rising temperatures will bring to their historic habitats.
- » WWF asserted that one-fifth of the world's most vulnerable natural areas may be facing a "catastrophic" loss of species.
- » The Bramble Cay Melomys (*Melomys rubicola*) is the first mammal to get extinct due to climate changed induced habitat loss.
- » Studies predict that global warming will also lead to extinction of insects in the tropical zone by the end of the century while insects in the temperate zones and the poles could experience a dramatic increase in numbers.
- » Climate change will also affect marine ecosystems adversely. A combined effect of rising sea temperature, changes in ocean circulation and ocean acidification will have catastrophic impact on marine life.

E. Impact on agriculture

- » Climate change can affect crop yield as well as the types of crops that can be grown in certain areas. It will impact agricultural inputs such as water for irrigation, amounts of solar radiation that affect plant growth, as well as the prevalence of pests.

- » Rise in temperatures caused by increasing greenhouse gases is likely to affect crops differently from region to region.
- » Moderate warming (increase of 1 to 3 °C in mean temperature) is expected to benefit crop yields in temperate regions.
- » However, in lower latitudes especially seasonally dry tropics, even moderate temperature increases (1 to 2 °C) are likely to have negative impacts for major cereal crops.
- » Warming of more than 3 °C is expected to have negative effect on production in all regions.
- » Agriculture is of prime importance for food security. It provides the food and also the primary source of livelihood for large number of the world's total workforce.
- » If agricultural production in the low-income developing countries of Asia and Africa is adversely affected by climate change, the livelihoods of large numbers of the rural poor will be put at risk and their vulnerability to food insecurity will increase.

F. Impact on Water Resources

- » A warmer climate will accelerate the hydrologic cycle, altering rainfall, magnitude and timing of run-off.
- » Climate change will reduce water availability, hydropower potential, and would change the seasonal flow of rivers in regions supplied by melt water from major mountain ranges.
- » Rising temperatures will further affect the physical, chemical and biological properties of fresh water lakes and rivers.
- » In coastal areas, sea level rise will worsen water resource constraints due to increased salinization of groundwater.

G. Impact on Health

- » Climate change directly impacts human health. How?
- » Climate change and the resulting higher global temperatures are causing increasing frequency of floods and droughts leading to the risk of disease infections.
- » Endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and South-East Asia due to projected changes in hydrological cycle.
- » Climate change is a major factor in the spread of infectious diseases. Diseases, confined to one specific geographic region spread to other areas.
- » Rising temperatures and changing patterns of rainfall are projected to decrease crop yields in many developing countries which will put a great stress on the food supplies. This will ultimately lead to increased prevalence of malnutrition.
- » Also, it is expected that, number of deaths related to heat waves and other extreme weather events will increase.

International Initiatives to Combat Climate Change

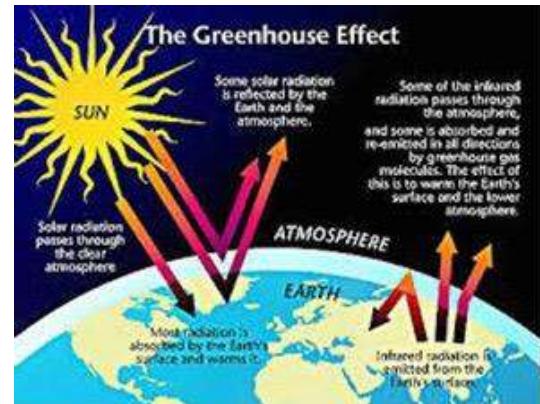
- » 1979 — the first World Climate Conference (WCC) took place.
- » 1988 — The Intergovernmental Panel on Climate Change (IPCC) was set up
- » 1992- Countries joined an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC), as a framework for international cooperation to combat climate change by limiting average global temperature increases and the resulting climate change, and coping with inevitable impacts.
- » 1994 — UNFCCC entered into force.
- » 1995 — the first Conference of the Parties (COP 1) took place in Berlin.
- » 1997 — Kyoto Protocol was formally adopted in December at COP 3.
- » 2001- Bonn Agreement was adopted based on the Buenos Aires Plan of Action of 1998.
- » 2001- Marrakesh Accords was adopted at COP 7, detailing rules for implementation of Kyoto Protocol, setting up new funding and planning instruments for adaptation, and establishing a technology transfer framework.
- » 2005- Kyoto Protocol came into force. The first Meeting of the Parties to the Kyoto Protocol (MOP1) took place in Montreal.
- » 2007- Parties agreed on the Bali Road Map at COP 13.
- » 2009 — Copenhagen Accord was drafted at COP 15 in Copenhagen.
- » 2010 —At COP 16, Cancun Agreements was drafted and largely accepted by the COP.
- » 2011 — The Durban Platform for Enhanced Action drafted and accepted by the COP, at COP17
- » 2012 — The Doha Amendment to the Kyoto Protocol was adopted
- » 2013- At COP 19, key decisions were adopted which included decisions on further advancing the Durban Platform, the Green Climate Fund and Long-Term Finance, the Warsaw Framework for REDD Plus and the Warsaw International Mechanism for Loss and Damage.
- » 2014 — At COP 20 in Lima, Parties adopted the ‘Lima Call for Action’
- » 2015- Paris Agreement was adopted
- » 2016- Paris Agreement came into force
- » 2016- Amendment to Montreal Protocol- the Kigali Agreement

Way Forward:

- » Climate Change is one of the most alarming issues of 21st All the countries should address the issue with a shared perspective, keeping aside self-centred and shallow perspectives.
- » What is needed utmost at this time is an inclusive, cooperative, scientific and environmentally sustainable approach to combat the menace of climate change. Sustainable development is undoubtedly call of the hour. Sustainable and optimal use of scarce resources and to cater to the needs of poor is the headway to save Earth from catastrophic effects of climate change.

What is a Greenhouse Gas?

- » A greenhouse gas is any gaseous compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere. By increasing the heat in the atmosphere, greenhouse gases are responsible for the greenhouse effect, which ultimately leads to global warming.
- » Many of these gases occur naturally, but human activity is increasing the concentrations of some of them in the atmosphere, in particular:
- » Carbon dioxide (CO₂)
- » Methane
- » Nitrous oxide
- » Fluorinated gases



2. DEAD ZONE

Why in News?

- » Scientist have recently predicted that the dead zone in Gulf of Mexico will become larger.
- » Dead Zones are hypoxia (low oxygen) areas in global oceans and lakes, caused by excessive nutrient pollution from human activities coupled with other factors that deplete oxygen required to support most marine life in bottom and near bottom water.

Reasons for their formation: Eutrophication caused by:

- » Untreated wastewater from sewage and industrial activity
- » Agricultural runoff
- » Pollution
- » Destructive fishing practices, deep water chemical disasters like oil spills, are other reasons.
- » Climate change, increased acidification further exaggerates the issue.

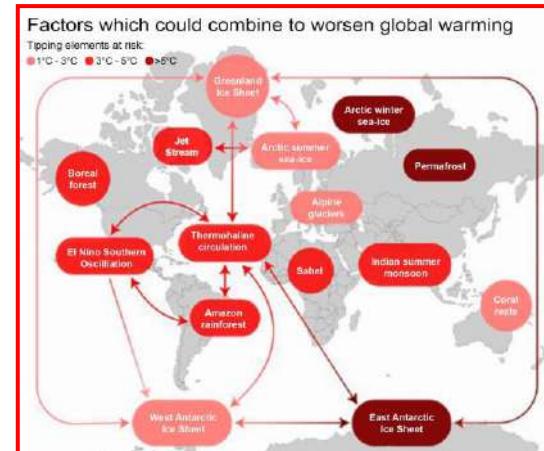
Implication:

- » Loss in overall population and destruction of ecosystem
- » Decline in biodiversity
- » Extinction of same species, threatening of others
- » Economic loss
- » Dead zones can be rectified, concentrations global effort should be made in this regard.

3. EARTH AT THE RISK OF BECOMING THE IRREVERSIBLE HOthouse: STUDY

Why in News?

- » A recent report titled "Trajectories of the Earth System in the Anthropocene", has warned about ill-effects of global temperatures rising more than 2°C above pre-industrial levels.
- » Currently, global average temperatures are just over 1°C above pre-industrial and rising at 0.17°C per decade.
- » According to the report, a domino effect will kick in leading to "hothouse" conditions even if we manage to keep global temperatures to 2°C above pre-Industrial levels and higher sea levels, making some areas on Earth uninhabitable.
- » Hothouse is a condition where the global temperatures will be 4-5 degrees higher than the pre-industrial level and sea levels may surge by up to 60 metres higher than today even if emission reduction targets under the Paris climate deal are met.



Feedback Processes:

- » Human emissions of greenhouse gas are not the sole determinant of temperature on Earth.
- » The scientists looked at 10 natural systems, which they term "feedback processes" which help humanity to avoid the worst impacts of carbon and temperature rises. However, if one of these systems tips over and starts pushing large amounts of CO₂ into the atmosphere, the rest could follow like a row of dominoes. These natural systems are: permafrost, methane hydrates trapped in ocean floors, land and ocean carbon sinks, Arctic summer sea ice, Antarctic sea ice, polar ice sheets, etc.
- » Permafrost refers to the perennially frozen soil found in the Earth's higher latitudes. Technically, it is ground that remains at or below a temperature of 0°C for at least 2 consecutive years. Methane hydrate is a cage-like lattice of ice inside of which are trapped molecules of methane. Hydrate deposits generally occur in two types of settings: under Arctic permafrost, and beneath the ocean floor. Carbon sinks are holding tanks for carbon or carbon compounds, like carbon dioxide (CO₂). Carbon sinks can be natural or man-made. There are three main natural carbon sinks: Plants, Soil, Oceans.
- » Man Made carbon sinks can be created or use existing underground formations, or even the oceans, to store CO₂. The main artificial sinks are landfills and carbon capture and storage processes.

- » The Sahel region of Africa is a 3,860-kilometre arc-like land mass lying to the immediate south of the Sahara Desert and stretching east-west across the breadth of the African continent. A largely semi-arid belt of barren, sandy and rock-strewn land, the Sahel marks the physical and cultural transition between the continent's more fertile tropical regions to the south and its desert in the north.
- » The boreal forest (also known as the taiga, a Russian word meaning swampy moist forest) is found in a nearly continuous belt across North America and Eurasia. The deep-ocean currents are driven by differences in the water's density, which is controlled by temperature (thermo) and salinity (haline). This process is known as thermohaline circulation.
- » El Niño Southern Oscillation (ENSO) is a single climate phenomenon comprising of three states. The two opposite phases, "El Niño" and "La Niña," and "Neutral" is in the middle of them. El Niño is warming of the ocean surface, in the central and eastern tropical Pacific Ocean. La Niña is cooling of the ocean surface, in the central and eastern tropical Pacific Ocean.

Impact:

- » Crossing into a Hothouse Earth period would see a higher global temperature than at any time in the past 1.2 million years.
- » Although the worst impacts may not be felt for a century or two, it would be irreversible once it starts. The report says that the extreme weather events being experienced right now around the world cannot be immediately associated with the risk of passing 2 degrees C. However, it may be evidence of the Earth becoming more sensitive to warming than previously thought.

Solution

- » The hothouse scenario can be avoided by fundamentally re-adjusting mankind's' relationship with the planet. A total re-orientation of human values, equity, behaviour and technologies are required. Not only burning of fossil fuels must be stopped by the middle of this century, but mitigation measures like planting trees, protecting forests, working out how to block the Sun's rays and developing machines to suck carbon out of the air must be taken up at massive scale.
- » Maximizing the chances of avoiding a "Hothouse Earth" requires not only reduction of carbon dioxide and other greenhouse gas emissions but also enhancement and/or creation of new biological carbon stores, for example, through improved forest, agricultural and soil management; biodiversity conservation; and technologies that remove carbon dioxide from the atmosphere and store it underground.
- » However, many scientists argue that we have entered a new geological era, the Anthropocene, in which human activity is directly affecting the planet.

4. URBAN WASTE AND GLOBAL WARMING

Context:

- The collapse of a wall of garbage in east Delhi's Ghazipur area is a stark reminder that solid waste management rules are perfectly being ignored which can lead to deadly consequences.

What is Waste?

- Waste is defined as any material that is not useful and does not represent any economic value to its owner, the owner being the waste generator.

What is Solid Waste?

- Depending on the physical state of waste, wastes are categorized into solid, liquid and gaseous.
- Solid Wastes are categorized into municipal wastes, hazardous wastes, medical wastes and radioactive wastes.

What is Municipal Solid Waste (MSW)?

- It is defined as any waste generated by household, commercial and/or institutional activities and is not hazardous.
- Impact of Waste Dumping

Environmental impact

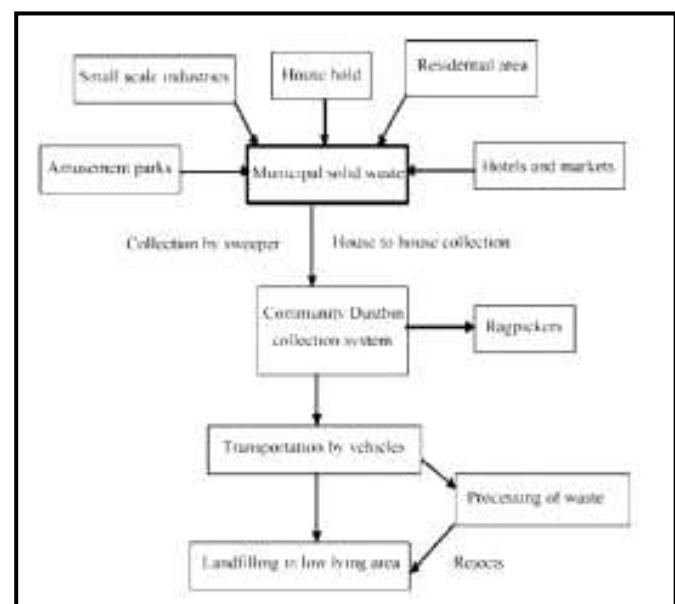
- Release of methane from decomposition of biodegradable waste under anaerobic conditions which can cause fires and explosions. It is also a major contributor to global warming.
- Problem of odour especially during summers
- Migration of leaches to receiving water

Health Impact:

- Uncontrolled burning of waste releases fine particles which are a major cause of respiratory disease and cause smog. Dumping sites provide breeding sites for mosquitoes thus increasing the risk of diseases such as malaria, dengue.

What is Solid waste management?

- Solid Waste Management is a term that is used to refer to the process of collecting and treating solid wastes. It also includes solutions for recycling items that do not belong to garbage or trash. Solid Waste management System in India



Key Waste Management Legislations in India

- » The MoEF issued MSW (Management and Handling) Rules 2000 to ensure proper waste management in India.
- » Municipal authorities are responsible for implementing these rules and developing infrastructure for collection, storage, segregation, transportation, processing and disposal of Municipal solid waste
- » The Solid waste Management Rules were revised in 2016.

What are the key features of Revised Solid Waste Management Rules, 2016?

- » The Rules are applicable beyond Municipal areas and extend to urban agglomerations, census towns, notified industrial townships, areas under the control of Indian Railways, airports, airbase, Port and harbour, defence establishments, special economic zones, State and Central government organizations, places of pilgrims, religious & historical importance.
- » The source segregation of waste has been mandated to channelize the waste to wealth by recovery, reuse and recycle.
- » Responsibilities of Generators have been introduced to segregate waste in to three streams:
- » Wet (Biodegradable),
- » Dry (Plastic, Paper, metal, wood, etc.) and
- » Domestic hazardous wastes (diapers, napkins, empty containers of cleaning agents, mosquito repellents, etc.)
- » Segregated wastes should be handed over to authorized rag-pickers or waste collectors or local bodies.
- » Integration of waste pickers/ rag pickers and waste dealers in the formal system. This is to be done by State Governments, and Self-Help Group, or any other group to be formed.
- » Generator will have to pay ‘User Fee’ to waste collector and for ‘Spot Fine’ for Littering and Non-segregation.

What are the problems associated Solid Waste Management System in India?

- » The increasing solid waste quantities strain the Solid Waste Management System
- » Inappropriate technology
- » Absence of stakeholders at local body level- As a result recoverable resources embedded in discarded materials are lost due to dumping
- » Inadequate human resource
- » Lack of funds
- » Lack of an integrated system which leads to low efficiency
- » Apathy on the part of Management and common people

What are the changes required to improve waste management in India?

- » Behaviour modification among citizens and institutions.
- » Municipal bodies should have an integrated system to transport and process what has been segregated at source.
- » Periodic assessments of the preparedness of urban local bodies to ensure proper management of wastes
- » Political Capital is needed to make required bye-laws and enforce them
- » Improved technology to ensure better solid waste management
- » Large Human Capital is required to follow through on all aspects from planning to implementation.
- » Funds to support planning, research, and implementation

5. THE STATE OF THE GLOBAL CLIMATE IN 2018

Why in News?

- » The World Meteorological Organization (WMO), the UN's weather agency, released its annual report, State of the Global Climate in 2018.

What are the highlights?

- » Climate indicators - The report highlighted the worsening impact of climate change across the world.
- » It showed how the world was degenerating on key climate indicators.
- » These include the following:
 1. Sea levels rose at a record pace last year
 2. Vast ocean stretches continued to become acidic
 3. Very high land and ocean temperatures over the last 4 years
 4. Most monitored glaciers are retreating
- » Emissions - All of the above are linked to the rising anthropogenic carbon dioxide (CO₂) emissions.
- » The CO₂ levels, were at 357 parts per million (PPM) when the WMO statement was first published in 1994.
- » It kept rising to reach 405.5 PPM in 2017, and is expected to increase even further in 2018 and 2019. Extreme weather events - WMO underlined the extreme weather events experienced all over the world in 2018.
- » This included the severe flooding in Kerala in August 2018, which led to economic losses estimated at \$4.3 billion.

- » Rainfall in Kerala in August was 96% above the long-term average.
- » A cold wave also affected parts of India; 135 deaths in just 10 ten days in January in Uttar Pradesh were attributed to cold.

What are the Notable Climate Change impacts?

- » Warming - 2018 was ranked among the top 10 warmest years in Africa, Asia, Europe, Oceania and South America.
- » Sea-surface waters in a number of oceans were unusually warm in 2018, including much of the Pacific.
- » The greatest rates of ocean warming were seen in the Southern Ocean, with warming reaching the deepest layers.
- » In November 2017, a marine heat wave developed in the Tasman Sea (in South Pacific Ocean between Australia and New Zealand) and persisted until February 2018.
- » Sea-surface temperatures in the Tasman Sea exceeded 2 °C above normal, setting a record.
- » Ocean acidification - As ocean acidification rises, marine biodiversity is at a major risk.
- » Since the middle of the last century, there has been an estimated 1%-2% decrease in the global ocean oxygen inventory.
- » Hundreds of sites are known to have experienced oxygen concentrations that impair biological processes or are lethal for many organisms.
- » Sea level - The global mean sea level for 2018 was around 3.7 mm higher than in 2017 and the highest on record. Rapid ice mass loss from ice sheets is the main cause of the global mean sea-level rise.
- » Arctic sea-ice extent was significantly below average throughout 2018.
- » The report referred to monitoring of glacier mass-balance by the World Glacier Monitoring Service for 19 mountain regions.
- » It noted that 2017-18 was the 31st consecutive year of negative mass balance for the glaciers monitored. This refers to glaciers losing more mass than they receive.
- » Rainfall - Although weak La Nina conditions were noticed at the beginning of 2018, the effect on precipitation was the opposite of what had been expected.

HOW CLIMATE CHANGE PLAYED OUT IN 2018

SEA LEVELS RISE

Global Mean Sea Level for 2018 was around 3.7 millimetres higher than in 2017, and the highest on record

OCEAN ACIDIFICATION

In the past decade, the oceans absorbed around 30% of anthropogenic CO₂ emissions. Absorbed CO₂ reacts with seawater and changes the pH of the ocean. This process is known as ocean acidification, which can affect the ability of marine organisms

DEPLETING ARCTIC ICE

Arctic sea-ice extent was well

\$4.3 bn

The WMO report identified the floods in Kerala as one of the main indicators of extreme weather events due to climate change, leading to economic losses of \$4.3 billion

below average throughout 2018 and was at record-low levels for the first two months of the year. The Greenland ice sheet has been losing ice mass nearly every year over the past two decades

- » E.g. several floods occurred in California, an unexpected event during La Nina
- » The Indian monsoon brought less rainfall than normal to the Western Ghats and the eastern parts of the Himalayas, but higher than normal in the Western Himalayas.
- » The all-India rainfall for June to September 2018 was around 9% below the long-term average.
- » In all, the report calls for urgent support to poor people and countries in tackling climate impacts that are forcing millions out of their homes. Rich countries must lead the transition to a greener economy and assist developing countries to follow suit.

THE INITIATIVES TAKEN

6. GREEN GOOD DEEDS CAMPAIGN

Why in News?

- » Green Good Deeds, the societal movement launched by the Union Minister for Environment, Forest & Climate Change
- » It has been launched to protect environment and promote good living in the country.
- » The ongoing BRICS Ministerial on Environment at Durban, South Africa, has agreed to include “Green Good Deeds” in its official agenda in the next Ministerial in Brazil and another meeting in Russia. Harsh Vardhan had formally launched the nation-wide campaign in January 2018. He enlisted the cooperation of thousands of people – students, teachers, voluntary organisations, Residents Welfare Associations and professionals to adopt these deeds. The Ministry of Environment, Forest & Climate Change had drawn up a list of over 500 Green Good Deeds and asked people to alter their behaviour to Green Good Behaviour to fulfil their Green Social Responsibility.
- » These small, positive actions, to be performed by individuals or organisations to strengthen the cause of environmental protection have been put up on a mobile App named “Dr Harsh Vardhan”. It focuses on his social & public activities and involvement of citizens in “Green Good Deeds” movement, which urges people to perform at least one Green Good Deed every day. Some of the 500 Green Good Deeds listed in the Mobile App include – planting trees, saving energy, conserving water, use of public transport and promoting carpool.
- » The objective of transforming Green Good Deeds into a peoples’ movement can be best achieved by starting mass digital campaigns that can reach out to youth and children.
- » A two-way digital communication tool – ‘Connect with Me’ is a unique feature of the Application. This provides six different ways of direct connection – Social Corner, Send Video/Photo, Join My Initiative, Cast Your Vote, Submit An Idea and Chat Room.
- » It also affords citizens an opportunity to directly submit their feedback and suggestions on a variety of issues.

7. LAND DEGRADATION NEUTRALITY

Why in News?

- » Nearly 24 billion tonnes of fertile soil and 27, 000 bio-species are lost every year
- » Nearly 30 per cent of the world's population lives in dry areas
- » 8 out of 21 UNESCO World Heritage Sites are in drylands
- » Land is a complex mixture of soil, water and biodiversity. Working together, these three elements create goods and services that provide a foundation for sustainable livelihoods and peaceful co-existence between peoples. Yet land degradation is putting the health, livelihoods and security of an estimated 1.5 billion people at risk.
- » Land degradation is any reduction or loss in the biological or economic productive capacity of the land resource base. Natural processes play a part, but humans cause most of the damage. Often, the process of degradation is inextricably linked to loss of biodiversity and the impacts of climate change.
- » The international community is working to halt and reverse land degradation, restore degraded ecosystems and sustainably manage our resources through a commitment to land degradation neutrality (LDN). Currently, the global cost of land degradation reaches about US\$490 billion per year, much higher than the cost of action to prevent it.
- » The concept of LDN emerged from the UN Conference on Sustainable Development (Rio+20) in 2012. LDN responds to an immediate challenge: intensifying the production of food, fuel and fiber to meet future demand without further degrading our finite land resource base. In other words, LDN envisions a world where human activity has a neutral, or even positive, impact on the land. In 2015, the 12th session of the Conference of the Parties to the United Nations Convention to Combat Desertification (UNCCD COP 12) adopted 35 decisions related to desertification, land degradation and drought. These included how to pursue LDN within the framework of the Sustainable Development Goals (SDGs) and how to align UNCCD goals and the action of Parties with the SDGs. As a follow-up, the UNCCD Secretariat launched a new initiative: the Land Degradation Neutrality project.
- » Schemes launched for capacity-building of the stakeholders at multiple levels to arrest Land Degradation –

Pradhan Mantri Fasal Bima Yojana (PMFBY):

- » To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests & diseases.
- » To stabilise the income of farmers to ensure their continuance in farming.
- » To encourage farmers to adopt innovative and modern agricultural practices.
- » To ensure flow of credit to the agriculture sector.

National Food Security Mission (NFSM):

- » To bring about significant yield gain to the farmers resulting into increase in their income level; the Mission has target of additional production of 25 million tonnes of foodgrains comprising 10 million tonnes of rice, 8 million tonnes of wheat, 4 million tonnes of pulses and 3 million tonnes of coarse cereals.

Soil Health Card Scheme:

- » Meant to give each farmer soil nutrient status of his/her holding and advice him/her on the dosage of fertilizers and also the needed soil amendments, that s/he should apply to maintain soil health in the long run.

Pradhan Mantri Krishi Sinchayee Yojana (PKSY):

- » To ensure access to some means of protective irrigation to all agricultural farms in the country, to produce 'per drop more crop', thus bringing much desired rural prosperity.
- » **Swacch Bharat mission:** Eliminating open defecation through the construction of household-owned and community-owned toilets and establishing an accountable mechanism of monitoring toilet use.

National Rural Drinking Water Programme:

- » Ensuring provision of safe and adequate drinking water supply through hand-pumps, piped water supply etc. to all rural areas, households and persons.
- » Desertification: Addressed for the first time in 1977 in the United Nations Conference on Desertification. This was followed by the adoption of the United Nations Convention to Combat Desertification in Paris on 17th June 1994. The Convention entered into force in December 1996. It is one of the three Rio Conventions, along with United Nations Framework Convention on Climate Change (UNFCCC) and Convention on Biological Diversity (CBD)
- » India became a signatory to the Convention on October 14, 1994 and ratified it on December 17, 1996. The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal Ministry to co-ordinate all issues pertaining to the Convention

8. RECOVERY OF OZONE LAYER

Context:

- » A UN study 'Scientific Assessment of Ozone Depletion: 2018', has shown that the ozone layer is recovering at a rate of 1-3% per decade.
- » The stratospheric ozone layer protects life on earth from harmful UV radiation.
- » It prevents damage to the earth's ecosystems and provides protection against skin cancer.
- » The study shows that years of dangerous depletion caused by the release of harmful chemicals is being reversed.

World Ozone Day

- » The theme for World Ozone Day (16 September) 2018: 'Keep Cool and Carry on: Montreal Protocol', is a motivational rallying call urging all of us to carry on with the exemplary work of protecting the ozone layer and the climate under the Montreal Protocol.
- » The theme has two connotations – that our work of protecting the ozone layer also protects climate and that the Montreal Protocol is a "cool" treaty, as exemplified by its outstanding success.

Background:

- » The 1985 Vienna Convention for the Protection of the Ozone Layer was an international agreement in which United Nations members recognized the fundamental importance of preventing damage to the stratospheric ozone layer.
- » The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer and its succeeding amendments were subsequently negotiated to control the consumption and production of anthropogenic ozone-depleting substances (ODSs) and some hydrofluorocarbons (HFCs).
- » Ozone depletion is caused by human-related emissions of ODSs and the subsequent release of reactive halogen gases, especially chlorine and bromine, in the stratosphere.
- » The Montreal Protocol's control of ODSs stimulated the development of replacement substances, firstly hydrochlorofluorocarbons (HCFCs) and then HFCs, in a number of industrial sectors. While HFCs have only a minor effect on stratospheric ozone, some HFCs are powerful greenhouse gases (GHGs).
- » ODSs include chlorofluorocarbons (CFCs), bromine containing halons and methyl bromide, HCFCs, carbon tetrachloride (CCl₄), and methyl chloroform.
- » These ODSs are long-lived (e.g., CFC-12 has a lifetime greater than 100 years) and are also powerful GHGs. The adoption of the 2016 Kigali Amendment to the Montreal Protocol will phase down the production and consumption of some HFCs and avoid much of the projected global increase and associated climate change.

Findings of the Study

- » It found long-term decreases in the atmospheric abundance of controlled ozone-depleting substances and the ongoing recovery of stratospheric ozone.
- » It shows that the Antarctic ozone hole is recovering while continuing to occur every year.
- » As a result of the Montreal Protocol much more severe ozone depletion in the polar regions has been avoided.
- » The Kigali Amendment is projected to reduce future global average warming in 2100 due to hydrofluorocarbons (HFCs) from a baseline of 0.3–0.5°C to less than 0.1°C.

- » There has been an unexpected increase in global total emissions of CFC-11.
- » The Antarctic ozone hole is expected to gradually close, returning to 1980 levels in the 2060s.
- » At projected rates, Northern Hemisphere and mid-latitude ozone are scheduled to heal completely by the 2030s followed by the Southern Hemisphere in the 2050s and polar regions by 2060. The UN had already hailed the success of the Protocol which banned or phased out ozone depleting chemicals, including CFCs once used in refrigerators and spray cans, but the report said it was the first time that there were emerging indications that the Antarctic ozone hole had diminished in size and depth since 2000.

Conclusion:

- » For over three decades, the Montreal Protocol has done much more than shrink the ozone hole; it has shown how environmental governance can respond to science, and how countries can come together to address a shared vulnerability.
- » The same spirit of common cause and greater leadership to implement the Paris Agreement on climate change is the need of the hour.

9. GLOBAL DEAL FOR NATURE

Why in News?

- » Saving the diversity and abundance of life on Earth may cost \$100 billion a year, say scientists who have proposed a policy to prevent another mass extinction event on the planet.
- » There have been five mass extinctions in the history of the Earth.

Global Deal for Nature (GDN):

GATEWAYY

- » Scientists have proposed new science policy to reverse the tide, called A Global Deal for Nature (GDN).
- » It is a time-bound, science-based plan to save the diversity and abundance of life on Earth.
- » The GDN campaign is being driven by One Earth, an initiative of the Leonardo DiCaprio Foundation that aims to gather support from international institutions, governments, and citizens of planet Earth to support ambitious conservation goals.
- » The policy's mission is to save the diversity and abundance of life on Earth — for the price tag of \$100 billion a year.

What would GDN do?

- » Societal investment in the GDN plan would, for the first time, integrate and implement climate and nature deals on a global scale to avoid human upheaval and biodiversity loss.
- » The study outlines the principles, milestones and targets needed to avoid the disastrous extinction threats of a two degrees Celsius global warming forecast.

Why GDN?

- » Scientists now estimate that society must urgently come to grips this coming decade to stop the very first human-made biodiversity catastrophe.

Goals:

- » To protect biodiversity by conserving at least 30% of the Earth's surface by 2030;
- » Mitigate climate change by conserving the Earth's natural carbon storehouses; and
- » Reduce major threats.

10. ATMOSPHERE & CLIMATE RESEARCH-MODELLING OBSERVING SYSTEMS & SERVICES (ACROSS)

Context:

- » The Government has approved continuation of the nine sub-schemes of the umbrella scheme "Atmosphere and Climate Research-Modelling Observing Systems & Services (ACROSS)" during 2017-2020.
- » The scheme will provide improved weather, climate and ocean forecast and services. This would include warnings for cyclones, storm surges, heat waves and thunderstorms.
- » It will be implemented by the Ministry of Earth Sciences through its institutes namely India Meteorological Department (IMD), Indian Institute of Tropical Meteorology (IITM), National Centre for Medium Range Weather Forecasting (NCMRWF), and Indian National Centre for Ocean Information Service (INCOIS).
- » It has also approved establishment of National Facility for Airborne Research (NFAR) which will serve the purpose of airborne measurements in respect of Aerosol sampling, measurement of cloud properties, cloud physics, Convective Tropical Convergence Zone (CTCZ), atmospheric chemistry, etc. to address all relevant scientific issues.

11. GLOBAL ENVIRONMENT FACILITY

Why in News?

- » Recently, the Sixth GEF Assembly summit took place in Da Nang, Vietnam in June 2018.
- » Global Environment Facility (GEF) is a multilateral financial mechanism that provides grants to developing countries for projects that benefit global environment and promote sustainable livelihoods in local communities. Since its inception, this multilateral financial mechanism has advanced \$17.9 billion in grants and mobilized an additional \$93.2 billion in financing for more than 4,500 projects in 170 countries.
- » GEF was established during the Rio Earth Summit of 1992.

- » It is based in Washington DC, United States
- » The GEF is jointly managed by the United Nations Development Programme (UNDP), the World Bank and the United Nations Environment Programme (UNEP)
- » 183 nations are united under GEF in partnership with civil society organizations (CSOs). International institutions, private sector etc with the purpose of addressing the environmental issues across the globe.
- » The financial mechanism was established to help tackle our planet's most pressing environmental problems. It provides funds to the developing countries and transition economies for projects related to climate change, Biodiversity, ozone layer.

Global Environment Facility

- » As an independently operating financial organization, GEF addresses six designated focal areas:
 1. Biodiversity
 2. Climate change
 3. International waters
 4. Ozone depletion
 5. Land degradation and
 6. Persistent Organic Pollutants

Structure of GEF:

- » The GEF has a unique governing structure organized around an Assembly, the Council, the Secretariat, 18 Agencies, a Scientific and Technical Advisory Panel (STAP) and the Evaluation Office.

GEF also serves as financial mechanism for following conventions:

- » Convention on Biological Diversity (CBD).
- » United Nations Framework Convention on Climate Change (UNFCCC).
- » UN Convention to Combat Desertification (UNCCD).
- » Stockholm Convention on Persistent Organic Pollutants (POPs).
- » Minamata Convention on Mercury

India and Global Environmental Facility (GEF)

- » India is one of developing country in the world that has been a participant of GEF since its inception in 1991. It has played a major role in shaping GEF. India is both donor and recipient of GEF.

CHAPTER – 3 POLLUTION

- » Air pollution can be defined as an alteration of air quality that can be characterized by measurements of chemical, biological or physical pollutants in the air. Therefore, air pollution means the undesirable presence of impurities or the abnormal rise in the proportion of some constituents of the atmosphere. It can be classified in 2 sections: visible and invisible air pollution.

1. BLACK CARBON

Why in News?

- » Stubble burning in Haryana and Punjab leading to toxic air quality in Delhi and neighboring areas. A recent study has found that black carbon travelling from Mediterranean countries during the western disturbances and wind trajectories may be one of the contributing factors leading to pollution and receding snowline in the Himalayas.

Black Carbon:

- » Black Carbon is formed due to the incomplete combustion of fossil fuels, wood and other fuels. It is a potent climate-warming component of the particulate matter. It is a Short-Lived Climate Pollutant and it on the human health, agriculture, Climate. There is a increase trends in black carbon due to the mechanized harvesting which leaves more residue, like stalks, stubbles. Emissions from crop stubble burning in Punjab, Haryana and western Uttar Pradesh travel far towards central and southern States. Wind direction in winter (North westerly) as opposed to south westerly in summers and monsoon help in bringing biomass overload, in the form of black carbon to Delhi.

Initiatives taken by the Government and International Agencies:

- » **National Clean Air Programme:** was launched to reduce the short-lived particulate matter by 20-30%. It is not legal Binding
- » **Global Air Pollution and Health Conference:** Organized by World Health Organization aims at reducing the number of deaths due to air pollution by 2/3 by 2030. Theme: ‘Improving Air Quality, Combating Climate Change: Saving Lives.’

Impact of Black Carbon:

- » Melting of snow and ice, by absorbing heat in the atmosphere and by reducing albedo (the Earth's ability to reflect sunlight, when deposited on snow and ice)
- » Interference with cloud formation and changes in precipitation patterns.
- » Reduced agricultural production in some parts of the world.
- » Soiling and damage of material/Water Pollution, Global temperature change, Visibility impairment, Respiratory and cardiovascular diseases in human beings.

2. PET COKE

Why in News?

- » The Directorate General of Foreign Trade has banned the import of Pet coke for fuel use. It is allowed only for cement, lime kiln, calcium carbide and gasification industries, when used as the feedstock or in the manufacturing process on actual user condition.

Pet Coke:

- » It is categorized as a “bottom of the barrel” fuel.
- » Petroleum coke, abbreviated coke or pet coke, is a final carbon-rich solid material that derives from oil refining, and is one type of the group of fuels referred to as cokes.
- » It is a dirtier alternative to coal and emits 11% more greenhouse gases than coal and nearly 17 times more sulphur than coal. It is source of fine dust, which can get through filtering process of human airway and lodge in lungs which can cause serious health problems.
- » Apart from sulphur, pet coke also releases cocktail of other toxic gases after burning such as nitrous oxide, mercury, arsenic, chromium, nickel, hydrogen chloride and greenhouse gases (GHG) which contribute to global warming.
- » India is the world’s biggest consumer of pet coke. It gets over half its annual pet coke imports of around 27 million tonnes from United States.

What it is used for?

- » High grade pet coke which is low in sulphur and heavy metals can be used to make electrodes for the steel and aluminium industry.
- » But the majority of pet coke manufactured globally, approximately 75-80%, is of a much lower grade, containing higher levels of sulphur and heavy metals and is used solely as fuel.
- » In recent years, pet coke is also being used in captive power generation plants in India.

3. GREEN HOUSE GAS

Why in News?

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

Combating air pollution from shipping:

IMO regulations to address air pollutants from international shipping, particularly sulphur oxide (SOx) and nitrogen oxide (NOx), have been successful in lowering the amount of those pollutants being emitted from ships. Further strengthening of the requirements is set to continue.

- » There are global caps, with more stringent requirements in Emission Control Areas or ECAS. Currently, there are four ECAS designated by IMO:
- » Baltic Sea area (SOx only)
- » North Sea area (SOx only)
- » North American area (SOx, NOx and PM);
- » In SECAS, the sulphur cap is 0.10% m/m (mass/mass).
- » Outside SECAS, the global sulphur cap will be cut to 0.50% from 1 January 2020 (from 3.5% m/m currently).
- » Limiting SO₂ emissions from ships will improve air quality and protects the environment. MARPOL Annex VI regulations to restrict air pollution from ships were first adopted in 1997. A revised Annex VI was adopted in 2005 and it entered into force in 2010, phasing in a progressive reduction in sulphur oxide (SOx) from ships and further reductions in nitrogen oxide (NOx) emissions from marine engines.

4. NITROGEN GAS

Why in News?

- » Nitrogen emissions going up as per first-ever quantitative assessment of nitrogen pollution in India.

Harmful Effects of NO₂

- » Long-term exposure to high levels of nitrogen dioxide can cause chronic lung disease.
- » It may also affect the senses, for example, by reducing a person's ability to smell an odor.
- » High levels of nitrogen dioxide are also harmful to vegetation—damaging foliage, decreasing growth or reducing crop yields. Nitrogen dioxide can fade and discolor furnishings and fabrics, reduce visibility, and react with surfaces.

Findings of Quantitative Assessment Report:

- » While the burning of crop residue is said to be a key contributor to winter smog in many parts of North India, it contributes over 240 million kg of nitrogen oxides (NOx: a generic term for the nitrogen oxides that are most relevant for air pollution, namely nitric oxide and nitrogen dioxide) and about 7 million kg of nitrous oxide (N₂O) per year.
- » Though agriculture remains the largest contributor to nitrogen emissions, the non-agricultural emissions of nitrogen oxides and nitrous oxide are growing rapidly, with sewage and fossil-fuel burning — for power, transport and industry — leading the trend. Indian NOx emissions grew at 52% from 1991 to 2001 and 69% from 2001 to 2011. Annual NOx emissions from coal, diesel and other fuel combustion sources are growing at 6.5% a year currently, the report says.

- » As fertilizer, nitrogen is one of the main inputs for agriculture, but inefficiencies along the food chain mean about 80% of nitrogen is wasted, contributing to air and water pollution plus greenhouse gas emissions, thereby causing threats for human health, ecosystems and livelihoods. India is globally the biggest source of ammonia emission; nearly double that of NOx emissions. But at the current rate of growth, NOx emissions will exceed ammonia emissions and touch 8.8 tonnes by 2055, the report says.

5. ERRATIC MONSOON RAINFALL PARTLY DUE TO AIR POLLUTION

- » Air pollution particles lead to change in the physical properties of monsoon clouds, which can lead to more intense rainfall, flash floods and unusual gaps in the progression of monsoon rainfall, say scientists from Indian Institute of Technology (IIT), Kanpur, who have used long-term satellite data (2002-2016) and modeling to understand the association between aerosols and cloud properties. The thunderstorm in Rajasthan and Uttar Pradesh that killed more than a 100 people in May and the spate of severe thunderstorms this summer may be attributable to such aerosol-induced changes. Aerosols, particularly black carbon and dust particles, induce “cloud invigoration”, which means cloud cover and thickness increases because of reduction in the size of cloud droplets and other structural modifications during cloud formation.
- » Enhanced cloudiness reflects more sunlight back to space, leading to a cooling effect of the clouds’ surface. The enhanced cloud cover limits reflection of solar energy back to space and traps the energy emitted from the surface at night and decreases the surface diurnal temperature range to make days cooler and nights warmer.
- » The main sources of aerosols are fossil and bio-fuels combustion from residential and industrial sector, biomass burning and forest fires.

THE STEPS TAKEN BY THE GOVERNMENT TO CURB AIR-POLLUTION

1. NATIONAL CLEAN AIR PROGRAMME

What are the features of the programme?

- » **Objective** - The overall objective of the programme includes comprehensive mitigation actions for prevention, control and abatement of air pollution.
- » It also aims to augment the air quality monitoring network across the country and strengthen the awareness and capacity building activities.
- » Also, city-specific action plans are being formulated for 102 non-attainment cities that are considered to have air quality worse than the National Ambient Air Quality Standards.

- » The Smart Cities programme will be used to launch the NCAP in the 43 smart cities falling in the list of the 102 non-attainment cities.
- » **Target** - It proposes a tentative national target of 20%-30% reduction in PM_{2.5} and PM₁₀ concentrations by 2024, with 2017 as the base year for comparison.
- » However, the government has stressed that NCAP is a scheme, not a legally binding document with any specified penal action against erring cities. Implementation - NCAP talks of a collaborative, multi-scale and cross-sectoral coordination between central ministries, state governments and local bodies. The CPCB will execute the nation-wide programme for the prevention, control, and abatement of air pollution within the framework of the NCAP. NCAP will be “institutionalized” by respective ministries and will be organized through inter-sectoral groups that will also include the Ministry of Finance, Ministry of Health, NITI Aayog, and experts from various fields.

Other features of NCAP include

- » Increasing the number of monitoring stations in the country including rural monitoring stations, Technology support
- » Emphasis on awareness and capacity building initiatives
- » Setting up of certification agencies for monitoring equipment
- » Source apportionment studies, Emphasis on enforcement
- » Specific sectoral interventions.

What are the proposed mitigation measures?

- » Enforcement - It calls for stringent enforcement through a web-based, three-tier mechanism that will review, monitor, assess and inspect to avoid any form of non-compliance.
- » The experience indicates lack of regular monitoring and inspection as the major reason for non-compliance. Trained manpower and regular inspection drive will be ensured for stringent implementation purpose. Elaborating existing schemes—While some of the strategies are not new to India, NCAP appears to be targeting effective implementation.
- » For example, it talks of “congestion management” at traffic junctions by the traffic police, solid waste management by municipal corporations, and stringent industrial standards put in place by concerned ministries. For power sector emissions, it refers to emission standards set by the Ministry of Environment and Forests for Thermal Power Plants in December 2015 to be implemented within a two-year period. It notes that this has since been extended to December 2022. For agricultural stubble burning, it highlights the initiatives already in place by way of the central assistance of Rs 1,151 crore for in situ management of crop residue and provides for general action points to be explored. It also advises that state capitals and cities with a million-plus population be taken up on priority.

2. CLEAN AIR – INDIA INITIATIVE

Why in the News?

- » Recently the Clean Air Initiative was launched by the Prime Minister of Netherlands in Delhi.

About the Initiative:

- » Clean Air India Initiative is collaborative project between Get In The Ring, a platform for startups of Netherlands Government, Start-up India and INDUS Forum, an online matchmaking platform of Indian and Dutch businesses. It is multi-corporate challenge that will test and scale innovations through collaboration between startups, corporate and governments by providing pilot opportunities for promising innovations that solve problem of pollution.

3. SYSTEM OF AIR QUALITY AND WEATHER FORECASTING AND RESEARCH

SAFAR stands for System of Air Quality and Weather Forecasting And Research

- » It is a research program to build Air-Pollution mitigation strategies in consonance with nation's economic development.
- » It is launched in greater metropolitan cities of India to provide location specific information on air quality in near real time. It has been combined with the early warning system on weather parameters. The ultimate objective of the project is to increase awareness among general public regarding the air quality in their city well in advance so that appropriate mitigation measures and systematic action can be taken up for betterment of air quality and related health issues. SAFAR was developed indigenously by Indian Institute of Tropical Meteorology (IITM), Pune and operationalised by India Meteorological Department (IMD).
- » Pollutants monitored: PM1, PM2.5, PM10, Ozone, CO, NOx (NO, NO₂), SO₂, BC, Methane (CH₄), Non-methane hydrocarbons (NMHC), VOC's, Benzene, Mercury.
- » Monitored Meteorological Parameters: UV Radiation, Rainfall, Temperature, Humidity, Wind speed, Wind direction, sola.

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk
Moderate	51-100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution
Unhealthy for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151-200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201-300	Health alert: everyone may experience more serious health effects.
Hazardous	> 300	Health warnings of emergency conditions. The entire population is more likely to be affected.

4. NATIONAL AIR QUALITY INDEX

- » This index is launched under Swacch Bharat Abhiyan in 2014
- » Aim is ‘one number- one color-one description’ for The common man to judge the air quality within his vicinity, Air quality is declared in 6 categories, Index considers eight pollutants i.e. PM₁₀, PM_{2.5}, NO₂, SO₂, CO, O₃, NH₃, for which National Ambient Air Quality Standards are prescribed

5. AIR QUALITY EARLY WARNING SYSTEM

Why in News?

- » Ministry of Earth Sciences (MoES) has launched Air Quality Early Warning System for Delhi which is designed
- » To predict extreme air pollution events and
- » To give warnings to take necessary steps as per Graded Response Action Plan (GRAP)

About:

- » The air pollution system has been developed jointly by the scientists at Indian Institute of Tropical Meteorology (IITM), Pune, Indian Meteorological Department (IMD) and National Centre for Medium Range Weather Forecasting (NCMRWF).
- » The Air Quality Early Warning System consists of two components: (i) Warning System (ii) Prediction system

Significance:

- » The early warning system will help in proactively forewarning, 3-4 days in advance, any large scale air pollution events which may occur over the Delhi region.
- » The prediction and warning system will help the authorities to better prepare for mitigating the adverse effects of the pollution.
- » The system will complement other efforts of the government such as in-situ management of crop residue in reducing pollution in the national capital.
- » The system will become a benchmark to be replicated for the pollution bulletin and mitigation mechanism for other cities of Delhi.

6. COMPREHENSIVE ENVIRONMENTAL POLLUTION INDEX:

Why in News?

- » The Central Pollution Control Board (CPCB) is all set to monitor over 100 polluted industrial areas in India using a new formula, a revised version of the existing Comprehensive Environmental Pollution Index (CEPI).

- » In 1989, CPCB for the first time identified 24 critically polluting areas (CPAS). It then rolled out a slew of measures to arrest the pollution levels.
- » In 2009, it came up with another CPA list, using the CEPI formula. By then, the number of industrial areas in the list had gone up to 43.
- » The new list also had 18 of the CPAs identified in 1989, suggesting things had worsened in the 20 years despite the anti-pollution measures.
- » Categorisation of industrial sectors based on CEPI score: Industrial Sectors having Pollution Index
- » score of 60 and above - Red category Industrial Sectors having Pollution Index score of 41 to 59 – Orange category Industrial Sectors having Pollution Index score of 21 to 40– Green category Industrial Sectors having Pollution Index score incl. & up to 20- White category

7. WAYU (WIND AUGMENTATION PURIFYING UNIT)

Why in News?

- » Union Minister for Science & Technology and Earth Sciences and Environment, Forest and Climate change, inaugurated air pollution control device WAYU (Wind Augmentation Purifying Unit) for traffic junctions at ITO intersection and Mukarba Chowk in Delhi.

WAYU:

- » WAYU is developed by Council of Scientific and Industrial Research – National Environmental Engineering Research Institute (CSIR-NEERI) as a part of Technology Development Project being funded by Department of Science and Technology. The prototype device that has been indigenously developed has the capacity to purify air in an area of 500-meter square. Dr. Vardhan further added that the device consumes only half a unit of electricity for 10 hours of running and has a maintenance cost of only Rs. 1500 per month. The device works on two principles mainly Wind generation for dilution of air pollutants and Active Pollutants removal. The device has filters for Particulate Matter removal and activated carbon (charcoal) and UV lamps for poisonous gases removal such as VOCs and Carbon Monoxide. The device has one fan and filter for sucking and removing Particulate Matter.
- » There are two UV lamps and half kg of activated carbon charcoal coated with special chemical Titanium Dioxide

8. DUST MITIGATION PLAN

- » The Environment Ministry has made it mandatory for companies seeking environment clearance to ensure that they put in place a dust mitigation plan. Cities and towns across the country where the hazardous particulate matter (PM10 and PM2.5) exceeds prescribed limits will now under law have to implement measures to reduce dust. the Union environment

- ministry has now notified specific rules under the Environment (Protection) Act, 1986 making its implementation "mandatory" for such cities and towns. Many big cities such as Delhi, Mumbai, Kolkata, Chandigarh, Lucknow, Varanasi and Kanpur, among others, fall in this category.
- These standards are part of the National Ambient Air Quality Standards (NAAQS) developed by the Central Pollution Control Board (CPCB). The notified rules inserted 11-point measures in the existing Act, empowering the ministry to issue notices against local authorities and state agencies for non-implementation of those actions.
- While seven of these points are meant for those construction and demolition activities which need environmental clearance, the remaining four are for "all construction and demolition activities", including private residential constructions.
- While this would give more teeth to monitoring activities in cities such as Delhi, which already have rules in place for managing dust at construction sites, other cities will now have to start implementing these measures.
- Besides, developers of such projects will be required to black-top all roads leading to the construction sites and they will not be permitted to excavate without adequate dust mitigation measures in place. For construction and demolition activities which do not require environmental clearance, the new rules prohibit "grinding and cutting of building materials in open area".

9. BIO - JET FUEL FLIGHT

Why in News?

- For the first time, an An-32 transport aircraft of the Indian Air Force (IAF) flew with blended bio-jet fuel produced from Jatropha oil.

Facts:

- Blended bio-jet fuel produced from Jatropha has the dual benefit of reducing the carbon footprint as well as usage of fossil fuels.
- With this discovery, India had thus joined a league of select nations to have "developed, tested and certified" a single step Hydro processed Renewable Jet (HRJ) process to convert non-edible oil into bio-fuel for use on military aircraft.

About Biofuel Technology:

- Bio-jet fuel technology was developed by the Indian Institute of Petroleum (IIP) under the Council of Scientific and Industrial Research (CSIR) in 2009 and tested between 2011 and 2013.

- » Bio jet fuel can be produced from animal fat, used cooking oil, waste dairy fat, sewage sludge, etc. The oil needs to have a freezing point below -47 degrees so it doesn't freeze at altitudes at which planes fly, should not catch fire on ground when being transferred into a plane, must have the same density as aviation turbine fuel, have a certain calorific value and should not choke the filters.
- » It is also 1.8% more energy dense as compared to Aviation Turbine Fuel and is, therefore, more efficient. A lower Sulphur content causes less wear and tear.

Challenges:

- » Availability and supply chain – IAF would require over 3,000 Kilo Liters' of bio-fuel annually just for operating the AN-32 fleet with a 10% mix.
- » Lack of Policy – Policy intervention to incentive the entire supply chain, from production of the crops to its distribution is absent Jatropha Production – Inedible oil seeds like jatropha have low per acre productivity and there is a need to use biotechnology to enhance yields

10. ENVIRONMENTAL POLLUTION (PREVENTION AND CONTROL AUTHORITY)

- » The Union Government constitutes EPCA as Supreme Court mandated body for the National Capital Region under the section 3 of the Environment (Protection) Act, 1986.
- » The Authority shall have the power suo-moto, or on the basis of complaints made by any individual, representative body or organization functioning in the field of environment.
- » Such complaints may be against any individual, association, company, public undertaking or local body carrying on any industry, operation or process.
- » It shall deal with environmental issues pertaining to the National Capital Region which may be referred to it by the Central Government. It takes all necessary steps to for controlling vehicular pollution, ensuring compliance of fuel quality standards, monitoring and coordinating action for traffic planning and management.

11. SATAT INITIATIVE

- » Government is planning to launch SATAT initiative to promote Compressed Bio-Gas (CBG) as an alternative, green transport fuel.
- » Sustainable Alternative towards Affordable Transportation (SATAT) is an effort that would benefit vehicle-users as well as farmers and entrepreneurs. Compressed Bio-Gas plants are proposed to be set up mainly through independent entrepreneurs.

- » The programme will be funded under Solid and Liquid Waste Management (SLWM) component of Swachh Bharat Mission-Gramin (SBM-G) to benefit households in identified villages through Gram Panchayats.
- » The initiative will help in efficient municipal solid waste management and in tackling the problem of polluted urban air due to farm stubble-burning and carbon emissions.
- » Use of CBG will also help bring down dependency on crude oil imports and in enhancing farmers' income, rural employment and entrepreneurship. Bio-gas is produced naturally through a process of anaerobic decomposition from waste /bio-mass sources like agriculture residue, cattle dung, sugarcane press mud, municipal solid waste, sewage treatment plant waste, etc. After purification, it is compressed and called CBG, which has pure methane content of over 95%. CBG is exactly similar to the commercially available natural gas in its composition and energy potential. It can be used as an alternative, renewable automotive fuel. Given the abundance of biomass in the country, Compressed Bio-Gas has the potential to replace CNG in automotive, industrial and commercial uses in the coming years.
- » Compressed Bio-Gas networks can be integrated with city gas distribution (CGD) networks to boost supplies to domestic and retail users.
- » The National Policy on Biofuels 2018 also emphasizes active promotion of advanced bio-fuels, including CBG.

WATER POLLUTION

- » Toxic substances in Indian Rivers
- » Contamination of Ground Water in India

1. TOXIC SUBSTANCES IN INDIAN RIVERS

Why in News?

- » India's 42 rivers have at least two toxic heavy metals beyond the permissible limit, says a research conducted by Central Water Commission.
- » The study, which tested samples of river water collected from 16 river basins during three seasons—summer, winter and monsoon—found huge amount of lead in 69 rivers. The study also showed that most rivers (137) had iron beyond permissible limits.

Number of rivers polluted with unacceptable levels of heavy metals

Contaminant	Permissible limit:	No of rivers
Lead	10 µg/L	69
Nickel	20 µg/L	25
Iron	300 µg/L	137
Copper	50 µg/L	10
Chromium	50 µg/L	21
Cadmium	3 µg/L	25

- » While Ganga, the national river, was found to be polluted with five heavy metals—chromium, copper, nickel, lead and iron—six rivers—Arkavathi, Orsang, Rapti, Sabarmati, Saryu and Vaitarna—had unacceptably high concentration of four pollutants.

Sources of Pollution

- » Indians still use water directly from rivers for their domestic use. With an increase in population, the pressure on these rivers will only increase.
- » According to the report, mining, milling, plating and surface finishing industries are the main sources of heavy metal pollution and the concentration of such toxic metals has increased rapidly over the past few decades
- » Other sources of metal pollution listed in the study are domestic wastewater effluents, storm water runoff from urbanized areas, industrial waste, sanitary landfill, agricultural runoff and fossil fuel combustion.

Heavy Metal in Water Pollution:

- » In Supebeda of Gariaband district in Chhattisgarh, 1 out of 10 residents are plagued by kidney failures. They have noted the presence of harmful metals in the water and the soil.

Causes of Heavy Metal Pollution

- » Natural sources: Natural causes like seepage from rocks, volcanic activity and forest fires. Minerals like fluoride and arsenic salts are of natural origin, but human activity can also aggravate the situation.
- » Rapid industrialization and resulting industrial solid waste from power plants and integrated iron and steel industries, have imposed an enormous environmental pressure on water resources of Chhattisgarh.
- » Pollutants introduced into the atmosphere by human activities include NO_x, SO₃, dioxins and heavy metals too. These are due to mining activities, thermal power plant, and transportation.

How does Heavy Metals Affects Human Beings?

- » In biological systems, heavy metals have been reported to affect cellular organelles and components such as cell membrane, mitochondrial, lysosome, endoplasmic reticulum, nuclei, and some enzymes involved in metabolism, detoxification, and damage repair.
- » Metal ions have been found to interact with cell components such as DNA and nuclear proteins, causing DNA damage and conformational changes that may lead to cell cycle modulation, carcinogenesis or apoptosis.

2. GROUND WATER CONTAMINATION IN INDIA AND ITS EFFECTS

Nitrates

- » Dissolved nitrates commonly contaminate groundwater.
- » Excess nitrate in drinking water reacts with hemoglobin to form non-functional methaemoglobin, and impairs oxygen transport. This condition is called methaemoglobinaemia or blue baby syndrome. Methemoglobin is a form of the oxygen-carrying metalloproteinase haemoglobin. Methemoglobin cannot bind oxygen, unlike oxyhemoglobin.
- » High level of nitrates may form carcinogens and can accelerate eutrophication in surface waters.

Pathogens

- » Poor hygiene of wells may cause pathogenic contamination. Water seepage from solid waste dumps and municipal drains may also cause pathogenic contamination.

Trace metals:

- » Include lead, mercury, cadmium, copper, chromium and nickel. These metals can be toxic and carcinogenic.

Arsenic:

- » Seepage of industrial and mine discharges, fly ash ponds of thermal power plants can lead to metals in groundwater.
- » In India and Bangladesh [Ganges Delta], millions of people are exposed to groundwater contaminated with high levels of arsenic, a highly toxic and dangerous pollutant. Chronic exposure to arsenic causes black foot disease. It also causes diarrhea, peripheral neuritis, hyperkeratosis and also lung and skin cancer.

Organic compounds

- » Seepage of agricultural runoff loaded with organic compounds like pesticides and may cause pesticide pollution of ground water.

Fluoride:

- » Excess fluoride in drinking water causes neuromuscular disorders, gastro-intestinal problems, teeth deformity, hardening of bones and stiff and painful joints (skeletal fluorosis).
- » Fluorosis is a common problem in several states of the country due to intake of high fluoride content water.

- » Florides cause dental fluorosis, stiffness of joints (particularly spinal cord) causing humped back. Pain in bones and joint and outward bending of legs from the knees is called Knock-Knee syndrome. High concentration of fluoride ions is present in drinking water in 13 states of India. The maximum level of fluoride, which the human body can tolerate is 1.5 parts per million (mg/L of water). Long term ingestion of fluoride ions causes fluorosis.

Steps taken by the Government:

A. Composite Water Management Index:

- » In pursuit of cooperative and competitive federalism, NITI Aayog has been laying emphasis on developing indicators on various social sectors. In February 2018, NITI Aayog had released a report on “Healthy States, Progressive India” which covered the ranking of States/ UTs in various health parameters.
- » As a step further in direction and keeping in view the criticality of water for life, NITI Aayog has prepared a report on Composite Water Management Index (CWMI).
- » The CWMI is an important tool to assess and improve the performance of States/ Union Territories in efficient management of water resources. This has been done through a first of its kind water data collection exercise in partnership with Ministry of Water Resources, Ministry of Drinking Water & Sanitation and all the States/ Union Territories.
- » The index would provide useful information for the States and also for the concerned Central Ministries/Departments enabling them to formulate and implement suitable strategies for better management of water resources. Simultaneously a web portal on the subject has also been launched. The report ranks Gujarat as number one in the reference year (2016-17), followed by Madhya Pradesh, Andhra Pradesh, Karnataka and Maharashtra.
- » In North Eastern and Himalayan States, Tripura has been adjudged number 1 in 2016-17 followed by Himachal Pradesh, Sikkim and Assam.
- » In terms of incremental change in index (over 2015-16 level), Rajasthan holds number one position in general States and Tripura ranks at first position amongst North Eastern and Himalayan States.
- » NITI Aayog proposes to publish these ranks on an annual basis in future.

About Composite Water Management Index (CWMI):

- » CWMI has been developed by NITI Aayog comprising 9 broad sectors with 28 different indicators covering various aspects of ground water, restoration of water bodies, irrigation, farm practices, drinking water, policy and governance (Box-1). For the purposes of analysis, the reporting states were divided into two special groups – ‘North Eastern and Himalayan states’ and ‘Other States’, to account for the different hydrological conditions across these groups.

Guidelines for Ground Water Extraction:

Context:

- » In order to comply with various directions of the Hon'ble NGT and to address various shortcomings in the existing guidelines of ground water extraction, the
- » Central Ground Water Authority, Ministry of Water Resources, River Development and Ganga Rejuvenation on 12th December 2018 notified revised guidelines for ground water extraction vide notification S.O. No. 6140 (E), which will be effective from 1st June 2019. The revised guidelines aim to ensure a more robust ground water regulatory mechanism in the country.

Details about the guideline:

- » India is the largest user of ground water in the world, extracting about 25% of the global ground water extraction.
- » Ground water extraction in India is regulated by Central Ground Water Authority (CGWA) constituted under the Environment (Protection) Act of 1986.
- » Ground water is primarily extracted for irrigation in agricultural activities, accounting for 90% of the annual ground water extraction and remaining 10% is for drinking & domestic as well as industrial uses. Central Government has recently notified the revised ground water extraction guidelines which will be effective from June, 2019.
- » The most important feature of the revised guideline is the introduction of the concept of Water Conservation Fee (WCF).
- » The WCF payable varies with the category of the area, type of industry and the quantum of ground water extraction. WCF is designed to progressively increase from safe to over-exploited areas and from low to high water consuming industries as well as with increasing quantum of ground water extraction. The high rates of WCF is to discourage packaged drinking water units in over-exploited areas and a deterrent to large scale ground water extraction.
- » The guideline also encourages use of recycled and treated sewage water by industries. It exempted the requirement of No-Objection Certificate (NOC) for various following fields,
 1. Agricultural users,
 2. Users employing non-energized means to extract water,
 3. Individual households (using less than 1-inch diameter delivery pipe)
 4. Armed Forces Establishments during operational deployment or during mobilization in forward locations.
 5. Strategic and operational infrastructure projects for Armed Forces, Defence and Paramilitary Forces Establishments and
 6. Government water supply agencies.

National Water Informatics Centre:

- » Ministry of Water Resources, River Development and Ganga Rejuvenation has set up central body – National Water Informatics Centre (NWIC) to maintain a comprehensive water resources data. NWIC will be subordinate office under Ministry of Water Resources, River Development and Ganga Rejuvenation. It will be headed by joint secretary level officer.

Functions of NWIC

- » Provide single window source of updated data on water resources and allied themes and also value-added products and services to allied themes and also value-added products and services to all stake holders for its management and sustainable development
- » Empower, inform and enrich every citizen with upto date and reliable water data and information (excluding classified data) through web-based India Water Resources Information System (India-WRIS) on GIS platform. Develop value added products and services for all aspects of integrated water resources management through research, capacity building, linkages, outreach and better governance in water resources sector. Collaborate with leading research institutes nationally as well as internationally to provide technical support to other central and state organizations dealing with water, emergency response for hydrological ext

PLASTIC POLLUTION IN INDIA

Context:

- » Recently states like Tamil Nadu and Maharashtra a state-wide ban on plastic products came into effect.

Plastics:

- » Plastics are non-biodegradable, synthetic polymers.
- » They are made-up of long chain hydrocarbons with additives and can be molded into finished products. These polymers are broken into monomers such as ethylene, propylene, vinyl, styrene and benzene etc. Finally, these monomers are chemically polymerized into different categories of plastics.

Plastic Pollution in India: Fast Facts

- » Size of plastic industry: Rs. 110,000 crores of companies/ units: 30,000 employing about 4 million people / Plastic Consumption: 13 million tonnes/ year
- » Average Per capita plastic consumption: / About 11kg- low as compared to the global average of 28kg. /An estimate by the Ministry of Petroleum and Natural Gas, Government of India suggests that the annual per capita consumption in India would be 20 kg by 2022
- » Waste generated: 16 lakh tonnes/ year
- » Amount of plastic waste recycled: 60%

Impact of Plastic Pollution

1. Land:

- » Hazardous chemicals in plastic degrade land and makes soil infertile. Plastic waste has resulted in destruction and decline in quality of land in terms of use and ability to support life forms.

2. Water:

- » **Surface water:** Hazardous plastic chemicals contaminate water. Further, it has far reaching consequences on aquatic (marine and freshwater) life forms.
- » **Groundwater:** When plastics are dumped in landfills, the hazardous chemicals present in them seep underground when it rains. The chemicals and toxic elements infiltrate into the aquifers and pollute groundwater

3. Air:

- » Burning of plastics generates toxic emissions such as Carbon Monoxide, Chlorine, and Nitriles etc.

4. Wildlife:

- » Entanglement of wildlife in plastics- Major sources of the plastic responsible for entanglement are abandoned or lost fishing nets and pots, plastic packing loops, and plastic rope
- » Ingestion of plastic: It can cause blockage of digestive tract, internal injuries and are fatal for wildlife. Further, when the smaller animals are intoxicated by ingesting plastic, they are passed on to the larger animals along the food chain

5. Human Health:

- » Harmful chemical in plastics lead to reproductive abnormalities, disruption in endocrine system, neurological diseases, respiratory diseases, cancer and birth defects

6. Drainage:

- » Plastic bags choke storm water drains and underground drainage and can lead to flooding during heavy rains

Legislation:

- » **Plastic Waste Management Rules (PWR), 2011:** It was introduced under the Environment Protection Act, 1986. The rules established a framework which assigned responsibilities for plastic waste management to the urban local bodies.

Plastic Waste Management Rules, 2016:

- » The rules offer directives to urban local bodies and Gram Panchayats on segregation, collection, transportation, processing and disposal of plastic waste in their areas of jurisdiction

Important features:

- » Ambit of the rules extended to rural areas; responsibilities entrusted upon Gram Panchayats
- » Calls for ban on plastic bags below 50-micron thickness
- » Phasing out (within 2 years) of manufacture and sale of non-recyclable multi-layered plastic (example: chips packets)
- » Introduction of collect back system of plastic waste by the producers/brand owners, as per Extended Producers Responsibility. Extended Producer's Responsibility (EPR) – Responsibility of collection of used plastics and multi-layered plastics entrusted upon producers, importers and brand owners. Segregation of waste by waste generator; waste generators to pay user free. Every vendor, who sells commodities in a carry bag, to register with their respective urban local body and pay a minimum fee of Rs 48,000/annum- Explicit pricing on carry bags
- » Promote use of plastic waste in road construction

Plastic Waste Management (Amendment) Rules, 2018:

- » Recommends a central registration system for the registration of the producer, importer or brand owner.
- » Recommends a national registry for producers with presence in more than two states, a state-level registration for producers operating within one or two states
- » Rule related to explicit pricing of carry bags has been removed

State Legislations banning the use of Plastic bags:

- » Maharashtra, Haryana, Himachal Pradesh, Jharkhand, Meghalaya, Nagaland, Rajasthan, Sikkim, Tripura, Delhi and Chandigarh have enacted total bans on plastic bags.
- » Gujarat, Kerala, Madhya Pradesh, Odisha, Uttar Pradesh and West Bengal have enacted partial bans

Maharashtra:

- » In March 2018, the state government issued Maharashtra Plastic and Thermocol Products (manufacture, usage, sale, transport, handling, and storage) notification
- » The government had given the manufacturers, distributors, and consumers a period of three months to dispose their existing stock and come up with alternatives to plastic usage.
- » The ban came into effect on 25th June 2018

Tamil Nadu:

- » Tamil Nadu has proposed a ban on manufacturing, storage and use of plastic products (except packing material for milk, curd, oil and medical products) from January 1st 2019.

International Best Practices:

France:

- » In 2016, France legislated ban on all disposable daily-use plastics including cutlery and bags.
- » It prescribed a phase-out for these plastic goods by 2020.
- » Suggested replacements for these products made of biologically sourced materials.



China:

- » In 2008, China made it illegal for vendors to give out plastic bags for free. This has led to a drop in their usage by roughly 50% in two years.
- » China has announced a ban on import of waste from EU nations and the US. Previously, China imported around 50 million tonnes of waste annually, including plastics, paper and textiles. However, burning of wastes to generate energy polluted air.

RECENT STEPS TAKEN TO CURB PLASTIC POLLUTION:

1. ALLIANCE TO END PLASTIC WASTE

Context:

- » An alliance of global companies has launched a new organization- AEPW- to help eliminate plastic waste, especially in the ocean.

About the Alliance to End Plastic Waste (AEPW):

- » The Alliance to End Plastic Waste (AEPW), comprising about 30 companies, pledged over \$1 billion to eliminate plastic waste across the world. They aim to invest \$1.5 billion over the next five years for the same.
- » The alliance is designed as a non-profit organization. It includes companies from across North and South America, Europe, Asia, Southeast Asia, Africa as well as the Middle East are part of the Alliance.

The aim:

- » To develop solutions to mitigate plastic pollution and promote a circular economy by utilizing used plastics. Member companies include those that make, use, sell, process, collect and recycle plastics, as well as chemical and plastic manufacturers, consumer goods companies, retailers, converters, and waste management companies, also called the plastics value chain. From India, Reliance Industries will advance efforts towards a sustainable future.

Significance:

- » Plastic waste management is a complex and serious global challenge that calls for swift action and strong leadership. The issue of plastic waste is seen and felt all over the world. It must be addressed. This new alliance is the most comprehensive effort to date to end plastic waste in the environment. Success will require collaboration and coordinated efforts across many sectors – some that create near-term progress and others that require major investments with longer timelines. Addressing plastic waste in the environment and developing a circular economy of plastics requires the participation of everyone across the entire value chain and the long-term commitment of businesses, governments, and communities.

Taj Declaration to Beat Plastic Pollution adopted in Agra

- » With an aim to make 500-meter area around Taj Mahal litter free and phase out single use plastic, Union Minister Mahesh Sharma administered a pledge to Agra Residents. The pledge called “Taj Declaration to Beat Plastic Pollution” was made in the presence of United Nations Environment Program (UNEP) Executive Director. The UNEP representatives and Goodwill Ambassador expressed their happiness that all the agencies came together for a noble cause of beating plastic pollution. The Environment day to be celebrated on June 5 has a slogan of ‘Beat Plastic Pollution’

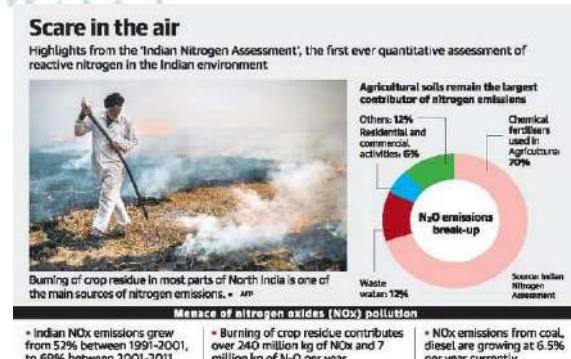
NITROGEN POLLUTION

Why in News?

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

Context:

- » Nitrogen particles make up the largest fraction of PM_{2.5}, the class of pollutants closely linked to cardiovascular and respiratory illness, says the first-ever quantitative assessment of nitrogen pollution in India. The Indian Nitrogen Assessment assesses the sources, impacts, trends and future scenarios of reactive nitrogen in the Indian environment.



Other facts & findings:

- » While the burning of crop residue is said to be a key contributor to winter smog in many parts of North India, it contributes over 240 million kg of nitrogen oxides (NOx: a generic term for the nitrogen oxides that are most relevant for air pollution, namely nitric oxide and nitrogen dioxide) and about 7 million kg of nitrous oxide (N₂O) per year.

- » Though agriculture remains the largest contributor to nitrogen emissions, the non-agricultural emissions of nitrogen oxides and nitrous oxide are growing rapidly, with sewage and fossil-fuel burning – for power, transport and industry – leading the trend.
- » Indian NOx emissions grew at 52% from 1991 to 2001 and 69% from 2001 to 2011.
- » Annual NOx emissions from coal, diesel and other fuel combustion sources are growing at 6.5% a year currently, the report says. As fertilizer, nitrogen is one of the main inputs for agriculture, but inefficiencies along the food chain mean about 80% of nitrogen is wasted, contributing to air and water pollution plus greenhouse gas emissions, thereby causing threats for human health, ecosystems and livelihoods.

Agricultural soils

- » Contributed to over 70% of N₂O emissions from India in 2010, followed by waste water (12%) and residential and commercial activities (6%).
- » Since 2002, N₂O has replaced methane as the second largest Greenhouse Gas (GHG) from Indian agriculture.

Chemical fertilizers:

- » Chemical fertilizers (over 82% of it is urea) account for over 77% of all agricultural N₂O emissions in India, while manure, compost and so on make up the rest. Most of the fertilizers consumed (over 70%) go into the production of cereals, especially rice and wheat, which accounts for the bulk of N₂O emissions from India.

Cattle emissions

- » Cattle account for 80% of the ammonia production, though their annual growth rate is 1%, due to a stable population. India is globally the biggest source of ammonia emission, nearly double that of NOx emissions. But at the current rate of growth, NOx emissions will exceed ammonia emissions and touch 8.8 tonnes by 2055, the report says. The poultry industry, on the other hand, with an annual growth rate of 6%, recorded an excretion of reactive nitrogen compounds of 0.415 tonnes in 2016. That is anticipated to increase to 1.089 tonnes by 2030.
- » The authors suggest that nutrient recovery/recycling from waste water for agriculture could cut down N₂O emissions from sewage and waste water by up to 40%.

1. APPROVAL FOR THE TRISHNA GAS PROJECT OF ONGC WHICH FALLS IN THE TRISHNA WILDLIFE SANCTUARY:

Context:

- » The National Wildlife Board has given its approval for the Trishna Gas project of ONGC which falls in the Trishna Wildlife Sanctuary in the Gomati district of Tripura.
- » ONGC has discovered 10-12 gas bearing wells in the Trishna Wildlife sanctuary.

About National Wildlife Board:

- » National Board for Wild Life is a statutory organization constituted under the Wildlife Protection Act, 1972.
- » It is an apex body to review all wildlife-related matters and approves projects in and around national parks and sanctuaries.
- » Composition: The National Board for Wild Life is chaired by the Prime Minister, Union Minister of Environment, Forest and Climate Change is the vice-chairman of the Board and the members include 15 non-government members, 19 ex-officio members and 10 government officials such as secretaries.

Trishna Wildlife Sanctuary:

- » The Trishna Wildlife Sanctuary was established in 1988. The vegetation covers four broad categories of tropical semi-evergreen forest, the east Himalayan lower Bhanar sal, Moist mixed deciduous forest and the Savanah woodland.

2. THOOTHUKUDI STERLITE PLANT

Why in News?

- » The protest against Sterlite Copper Smelting plant in Thoothukudi (Tamil Nadu) had been intensifying in the past few months.

Facts:

- » Sterlite Copper is a copper smelting unit and is a subsidiary of the London-based Vedanta Group. Sterlite produces non-ferrous metals like copper, aluminum and zinc, along with chemicals such as sulphuric acid and phosphoric acid.
- » The plant in Thoothukudi is one of two copper plants in the country, the other one being in Silvassa, Daman & Diu.
- » In 2011, the Supreme Court ordered the National Environmental Engineering Research Institute (NEERI) to inspect the copper smelting plant and submit a report.
- » The study found high levels of copper, lead, cadmium and fluoride in the groundwater in the area.
- » The plant was shut-down after a massive protest by the people in Thoothukudi in 2018
- » A plea to re-open the factory was refused by the supreme court in 2019

CHAPTER – 4 CONFERENCE AND REPORTS

1. IPCC SPECIAL REPORT ON CLIMATE CHANGE

Context:

- » Recently, a special report, which was commissioned to specifically explore the scientific feasibility of the 1.5°C goal set in the Paris Agreement, on global warming has been released by IPCC.
- » It suggests that it has become extremely improbable to achieve the 1.5°C goal purely by reducing emission. As per the IPCC Report, at current rate of emissions, the world is set to breach the global warming limit of 1.5°C between 2030 and 2052. At present, the world is 1.2°C warmer compared to pre-industrial levels. The latest report was requested by various countries in 2015 to explore the possibilities of keeping the temperature rise within 1.5°C. This was the key demand made by a number of smaller and poorer countries, especially the small island states, which face the maximum risks from the impact of climate change.
- » One of the key messages from this report is that we are already seeing the consequences of 1°C of global warming through more extreme weather, rising sea levels and diminishing Arctic sea ice, among other changes.

Key Findings

- » It projects that a 1.5°C world would witness greater sea level rise, increased precipitation and increased frequency of droughts and floods, more hotter days and heatwaves, more intense tropical cyclones, increased ocean acidification and salinity.
- » While 1.5°C rise in global temperature will be precarious, a 2°C rise would be catastrophic. The report points out that the risk transition from 1.5°C to 2°C is very high and the impact of a 2°C rise will be more devastating than what IPCC's earlier Report had indicated.
- » Coastal nations and agricultural economies of Asia and Africa would be the worst affected. Decline in crop yields, unprecedented climate extremes and increased susceptibility could push poverty by up to several hundred million by 2050.
- » When global warming is limited to 1.5°C instead of 2°C:
- » By 2100, global sea level rise would be 10 cm lower with global warming of 1.5°C compared with 2°C. Climate related-risks in terms of food productivity, crop yields, water stress, health hazards and economic growth will be lower than at 2°C.
- » Limiting global warming to 1.5°C rather than 2°C is projected to prevent the thawing of a permafrost area in the range of 1.5 to 2.5 million sq km.
- » The land area at risk is projected to be approximately 50 percent lower at 1.5°C compared to 2°C.

- ▶ Limiting global warming to 1.5°C reduces risk of rising ocean temperatures and salinity, thereby making marine ecosystems less vulnerable.
- ▶ The likelihood of an Arctic Ocean free of sea ice in summer would be once per century with global warming of 1.5°C, compared with at least once per decade with 2°C.
- ▶ Coral reefs would decline by 70-90 percent with global warming of 1.5°C, whereas virtually all (over 99 percent) would be lost with 2°C.
- ▶ Considering the scale and intensity of devastation that 1.5°C temperature rise can cause, the focus of the upcoming discussions must only be on this target instead of 2°C as only the rich would survive in a world that is warmer by 2°C and the poor would be drowned.
- ▶ Adaptation needs will also be lower for global warming of 1.5°C. It implies that limiting global warming to 1.5°C compared to 2°C is projected to lower the impacts on terrestrial, freshwater, and coastal ecosystems and retain more of their services to humans.
- ▶ To limit global warming to 1.5°C, net-zero emissions would have to be achieved by 2050 and emissions would need to be drastically cut by at least 45 percent by 2030. The corresponding rates of reduction to limit warming to 2°C would require a 20 percent reduction by 2030 and net-zero emissions by 2075.
- ▶ The science shows that current climate efforts would not limit global warming to 1.5°C, even if they are supplemented by an increase in the scale and ambition of emissions reduction after 2030.

Way Forward:

- ▶ Technologies for Carbon Dioxide Removal (CDR) are still undeveloped and untested. Varying amounts between 100 to 1000 gigatons (billion tonnes) of carbon dioxide would need to be removed from the atmosphere. The world currently emits about 47 billion tonnes of carbon dioxide every year.
- ▶ There is a requirement of rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems to curb carbon emissions.
- ▶ Global net anthropogenic CO₂ emissions must decline by about 45 percent from 2010 levels by 2030 and net-zero emission should be achieved by 2050.
- ▶ This is difficult, and would require rapid and unprecedented economy-wide transformation in each country.
- ▶ Countries need to undertake massive de-carbonisation while the developed countries must also address consumption in their countries.
- ▶ It would involve upscaling of low-carbon technologies in all carbon-intensive sectors of the economy, energy efficiency and enhancement of carbon sinks for sequestering carbon globally.

- » There must be renewed emphasis on adaptation, which requires transformation and incremental shifts with more finance directed towards adaptation.
- » The focus must now be on how developed world can lead and support this transformation. Therefore, even though urgent action is a necessity, it should be equitable and the onus of addressing climate change cannot fall on the developing world. Science has delivered its verdict. It has also provided hope for action and results. It is up to the policymakers to carry out necessary action for survival at 1.5°C. For that to happen, IPCC's findings must guide the discussions on the Talanoa Dialogue and COP 24 at Katowice (Poland) in December, 2018.

About IPCC:

- » The Intergovernmental Panel on Climate Change (IPCC) is the international body for assessing the science related to climate change. It was set up in 1988 by the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) to provide policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. IPCC assessments provide a scientific basis for governments at all levels to develop climate related policies, and they underlie negotiations at the UN Climate Conference – the United Nations Framework Convention on Climate Change (UNFCCC). IPCC assessments are written by hundreds of leading scientists who volunteer their time and expertise as Coordinating Lead Authors and Lead Authors of the reports.

2. COP24 IN KOTOWICE

Why in News?

- » COP24 took place from 2-14 December 2018, in Katowice, Poland.
- » Poland held the Presidency of the Climate Convention for the third time.

What is COP24?

- » COP24 is the informal name for the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).
- » The Conference of the Parties (COP) is the supreme body of the UNFCCC, consisting of the representatives of the Parties to the Convention. COP holds its sessions every year and takes decisions which are necessary to ensure the effective implementation of the provisions of the Convention and regularly reviews the implementation of these provisions.

United Nations Framework Convention on Climate Change (UNFCCC)

- » UNFCCC is an international environmental treaty adopted on 9 May 1992 and opened for signature at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992, entered into force on 21 March 1994.

- » The UNFCCC objective is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.
- » Currently, there are 197 Parties (196 States and European Union) to the United Nations Framework Convention on Climate Change.

Important Outcome of Summit:

- » Paris Rulebook: The COP-24 finalized a “rulebook” to operationalise 2015 Paris Agreement.
- » The rulebook set out how countries will provide information about their Nationally Determined Contributions describing their domestic climate actions, mitigation and adaptation measures. The rulebook covers areas such as how countries should report their greenhouse gas emissions, contributions to climate finance, what rules should apply to voluntary market mechanisms, such as carbon trading etc.
- » The rulebook has addressed some concerns about the opaqueness of climate financing, such as, developed nations will have to provide hard data on the sources of future financial flows.
- » Climate finance refers to local, national or transnational financing—drawn from public, private and alternative sources of financing. It seeks to support mitigation and adaptation actions that will address climate change.
- » The UNFCCC, the Kyoto Protocol and the Paris Agreement call for financial assistance from developed countries to developing and less developed countries in accordance with the principle of “common but differentiated responsibility and respective capabilities”.
- » Under Paris Agreement, developed countries have committed to provide \$100 billion annually from 2020 for dealing with climate change. The rulebook describes which loans, concessions and grants can be classified as climate finance, how they should be accounted for, and the kind of information about them needed to be submitted. The modalities and procedures for Monitoring and Progress Report System proposal (MPR) to (INDC) were also discussed.

India's stand at the conference:

- » India reaffirmed its INDCs commitments to meeting the goals under the 2015 Paris Agreement.
- » India argued that delicate balance reached between developed and developing countries must be retained, and the principles such as equity, climate justice and Common but Differentiated Responsibility and Respective Capabilities must be given its due.
- » India expressed strong reservation over the lack of equity in the global stock-take i.e. taking stock of collective progress toward achieving the goals of the Paris Agreement in the rule book of the agreement.
- » It sought a robust transparency regime for countries to disclose their emissions.

3. INDIA STATE FOREST REPORT 2018

Context:

- The Ministry of Environment, Forest and Climate Change (MoEFCC) has released India State of Forest Report (ISFR) 2017. It has revealed that total forest and tree cover in India has increased of over 8,021 sq km (about 80.20 million hectare) which is one percent increase from 2015.

Key Findings of ISFR 2017

- The increase in the forest cover has been observed as 6,778 sq km and that of tree cover as 1, 243 sq km. The total forest and tree cover is 24.39% of geographical area of the country.
- The increase in forest cover has been observed in Very Dense Forest (VDF) which absorbs maximum carbon dioxide from the atmosphere.
- It is followed by increase in forest cover in open forest.

India's Global Position

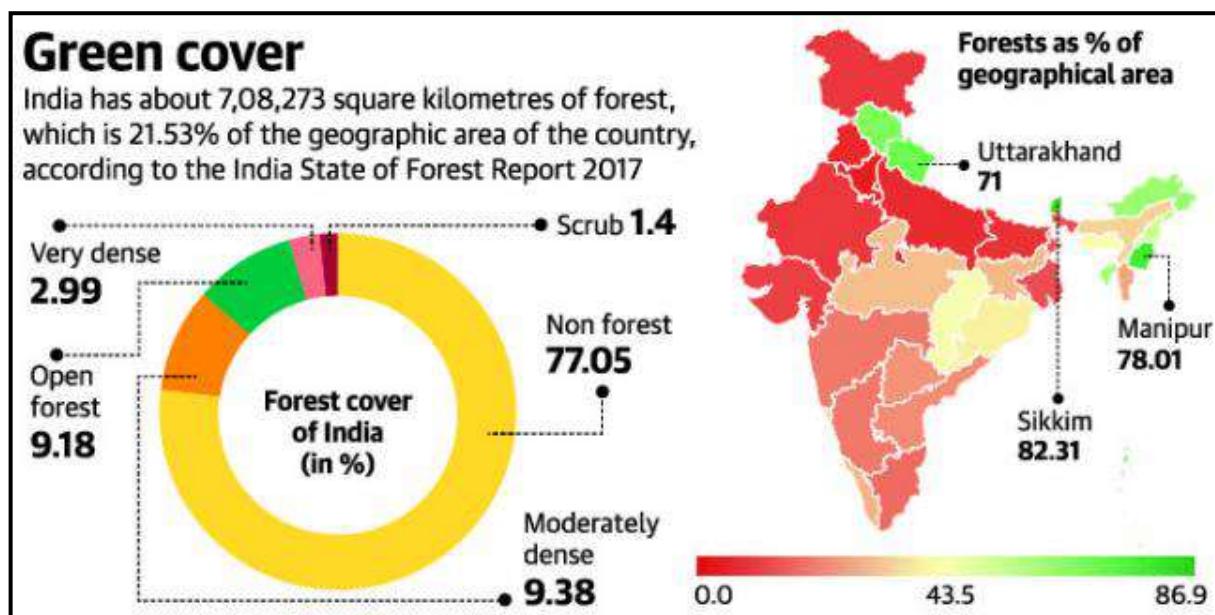
- India is ranked 10th in world, with 24.4% of land area under forest and tree cover, even though it accounts for 2.4 % of the world surface area and sustains needs of 17 % of human and 18 % livestock population.
- India was placed 8th in list of Top Ten nations reporting the greatest annual net gain in forest area.

State-wise break-up

- 15 states/UTs have above 33% of geographical area under forest cover.
- About 40% of country's forest cover is present in 9 large contiguous patches of the size of 10, 000 sq.km, or more.
- 7 States/UTs have more than 75% forest cover: Mizoram, Lakshadweep, Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland, Meghalaya and Manipur.
- 8 States/UTs have forest cover between 33% to 75%: Tripura, Goa, Sikkim, Kerala, Uttarakhand, Dadra & Nagar Haveli, Chhattisgarh and Assam.
- Top 5 States with maximum increase in forest cover: Andhra Pradesh (2141 sq km), followed by Karnataka (1101 sq km) and Kerala (1043 sq km), Odisha (885 sq kms) and Telangana (565 sq kms).
- Top 5 States with maximum Forest cover (in terms of area): Madhya Pradesh (77,414 sq km) Arunachal Pradesh (66,964 sq km) and Chhattisgarh (55,547 sq km).
- Top states with highest Forest cover in terms of percentage geographical area: Lakshadweep with (90.33%), Mizoram (86.27%) and Andaman & Nicobar Islands (81.73%).

Top 5 states where forest cover has decreased:

- » Mizoram (531 sq km), Nagaland (450 sq km), Arunachal Pradesh (190 sq km), Tripura (164 sq km) and Meghalaya (116 sq km).
- » These states are in North Eastern region of the country where total forest cover is very high i.e. more than 70% in each state. The main reasons for decrease are shifting cultivation, rotational felling, other biotic pressures, diversion of forest lands for developmental activities, submergence of forest cover, agriculture expansion and natural disasters.



Mangrove cover

GATEWAYY

- » Mangrove eco-systems are rich in biodiversity and provide number of ecological services.
- » They also play a major role in protecting coastal areas from erosion, tidal storms and tsunamis.
- » According to ISFR 2017, total mangrove cover stands at 4,921 sq km and has increased by 181 sq kms. 7 out of 12 mangrove states have shown an increase in mangrove cover and none of them show any negative change.
- » Maharashtra (82 sq kms), Andhra Pradesh (37 sq kms) and Gujarat (33 sq kms) are top three gainers in terms of mangrove cover.

Water bodies inside forests

- » Forests play vital role in water conservation and improve water regime in area.
- » According to ISFR 2017, water bodies inside forest cover have increased by 2,647 sq kms during the last decade. Maharashtra (432. sq kms), Gujarat (428 sq kms), Madhya Pradesh (389 sq kms) are top three states showing increase in water bodies within forest areas.
- » Overall, almost all the states have shown a positive change in water bodies.

Bamboo Cover

- » The extent of bamboo-bearing area in country is estimated at 15.69 million ha.
- » There has been an increase of 1.73 million ha in bamboo area in comparison to last assessment done in 2011.
- » There is increase of 19 million tonnes in bamboo-growing stock as compared to last assessment done in 2011.
- » The growing stock of bamboo in forest has been estimated to be 189 million tonnes.

4. PANEL REPORT ON WESTERN GHATS

Context:

- » Recently, floods have wreaked havoc in Kerala and Costal Karnataka.
- » In this context, the various reports on western ghat ecosystems have assumed new focus that calls for further brainstorming and discussions.

Why are the various reports on Western Ghats currently significant?

- » The catastrophic monsoon floods in Kerala and parts of Karnataka have opened brought back the various reports published on the Western Ghats.
- » 7 years ago, “Western Ghats Ecology Expert Panel” (WGEEP) was constituted by the “Union Environment Ministry” with “Madhav Gadgil” as chairman.
- » The Gadgil Committee published its report recommending actions to preserving the fragile system, most of which weren’t accepted. While this was due to political reasons, some experts have now opined that Kerala’s deluge was largely due to short-sighted policymaking.
- » Further, they’ve also warned that Goa may also be in the line of nature’s fury eventually akin to how Kerala and Karnataka (coastal region) had suffered.
- » They’ve hence asked the Western Ghats states (Kerala, Karnataka, Tamil Nadu, Goa and Maharashtra), to get together to coordinate strategies.
- » Further, the Gadgil Report and subsequently, the toned down Kasturirangan Committee Report on the same issue, needs to be taken up seriously.

What are the varying estimates?

- » Western Ghats is spread over 1,29,037 sq.km according to the WGEEP estimate but the same was noted as 1,64,280 sq.km by Kasturirangan panel.
- » The crux of the problem is in calculating what constitutes the sensitive core and what activities can be carried out there.

- » The entire system is globally acknowledged as a biodiversity hotspot, but population estimates within the sensitive zones vary greatly.
- » In Kerala, for instance, one expert assessment says 39 lakh households are in the ESZs outlined by the WGEEP. But the figure drops sharply to four lakh households for a smaller area of zones identified by the Kasturirangan panel.

What is the Way ahead?

- » Intent - Kerala's Finance Minister, Thomas Isaac, has acknowledged the need to review decisions affecting the environment, in the wake of the floods.
- » Public consultation on the expert reports that includes people's representatives will find greater resonance now, and help chart a sustainable path ahead.
- » The role of big hydroelectric dams must now be considered afresh and proposals for new ones dropped considering the ecological challenges. A moratorium on quarrying and mining in the identified sensitive zones, in Kerala and also other States, is necessary to assess their environmental impact.
- » Actions - The concerned state governments have the task of initiating corrective measures to adhere to environmental policy decisions. This is not going to be easy, given the need to balance human development pressures with stronger protection of the Western Ghats ecology.
- » The issue of allowing extractive industries such as quarrying and mining to operate is arguably the most contentious. In this context, the regulatory framework like the "Western Ghats Ecology Authority" as proposed by the Gadgil report can be considered.
- » Commissioning state-level units, under the Environment (Protection) Act, and to adopt the zoning systems as proposed are other aspects to consider.
- » These actions can help in keeping incompatible activities out of the Ecologically Sensitive Zones (ESZs).

5. ENVIRONMENT PERFORMANCE INDEX 2018

Context

- » India ranks 177 among 180 countries in the Environmental Performance Index 2018.
- » A drop in the index from previous year calls for a relook at the country's environmental policy.

What is the Environmental Performance Index?

- » EPI is a biennial report by Yale and Columbia Universities along with the World Economic Forum. The report ranks 180 countries on 24 performance indicators.
- » It is spread across 10 categories covering environmental health and ecosystem vitality.

- » Switzerland leads the world in sustainability, followed by France, Denmark, Malta and Sweden in the recent EPI.

What is India's status?

- » India is among the bottom 5 countries on the index, at 177th place.
- » This is a drop of 36 points from 141 in 2016.
- » Emerging peer economies, Brazil and China, ranks 69 and 120, respectively.
- » In the environmental health category, India is at the bottom of the list.
- » And in terms of air quality it is placed third last.
- » The overall drop is attributed to poor performance in the environment health policy and high pollution related deaths.
- » Pollution from solid fuels, coal and crop residue burning, and emissions from motor vehicles are the major causes. Population growth industrial production and automotive transportation continue to increasingly degrade the air quality.

6. WORLD WATER DEVELOPMENT REPORT 2018

Context:

- » The United Nations World Water Development Report (WWDR) was released ahead of World Water Day (March 22). Ensuring the sustainable use of the planet's resources is vital for ensuring long-term peace and prosperity.

What is the Report on?

- » The WWDR is an annual and thematic report that focuses on different strategic water issues each year. It aims to provide decision-makers with the tools to implement sustainable use of our water resources. The development of the WWDR is coordinated by the World Water Assessment Programme (WWAP).
- » The report is a joint effort of the UN agencies and entities which make up UN-Water.
- » The latest report was released at the 8th World Water Forum in Brasilia, hosted by Brazil.

What are the highlights?

- » Water - Global demand for water has increased six-fold over the past 100 years and continues to grow at the rate of 1% each year.
- » Demand for water is projected to rise faster in developing countries.
- » The report highlights that more than 5 billion people could suffer water shortages by 2050.
- » This could be due to the effects of climate change, increased demand and polluted water supplies.
- » Climate change will put an added stress on supplies because it will make wet regions wetter and dry regions drier.

- » Drought - It is arguably the greatest single threat from climate change.
- » Drought and soil degradation, the biggest risks of natural disaster, are likely to worsen.
- » Water quality - Pollution has worsened the water bodies and water is expected to deteriorate further in the coming two decades.
- » This would be mainly due to agriculture runoffs of fertiliser and other agrochemicals.
- » They load freshwater supplies with nutrients that lead to the growth of pathogens and choking algae blooms.
- » Industry and cities are also a significant problem.
- » About 80% of industrial and municipal wastewater is discharged without treatment.
- » Threat - Water scarcity can lead to civil unrest, mass migration and even to conflict within and between countries.
- » The report thus warns of conflict and civilisational threats unless actions are taken.

What is the concern with the present approach?

- » For too long, the world has turned first to human-built, or 'grey', infrastructure to improve water management.
- » In doing so, it has often brushed aside traditional and indigenous knowledge that embraces greener approaches.
- » But accelerated consumption, multi-faceted impacts of climate change and increasing environmental degradation is the reality now.
- » All these call for new ways of managing the competing demands on freshwater resources.

What are the suggestions?

- » Water - Reducing the stress on rivers, lakes, aquifers, wetlands and reservoirs is important.
- » Water shortage cannot be offset by groundwater supplies, a third of which are already in distress.
- » Nor is the construction of more dams and reservoirs likely to be a solution.
- » The report emphasises a shift away from watershed management.
- » It calls for a wider geographic approach that takes in land use in distant areas, particularly forests. Although farmers have long seen trees as a drain on water supplies, the vegetation helps to recycle and distribute water.
- » Evidently, the São Paulo (Brazil) drought of 2014-15 has been linked to Amazon deforestation.
- » The key for change, even for the water problem, will be agriculture.
- » Agriculture - This is the biggest source of both water consumption and pollution.
- » The report thus emphasises the importance of nature-based solutions.
- » Nature-based solutions can be personal – such as dry toilets – or broad landscape-level shifts in agricultural practices.

- » In agricultural practices, it is essentially an approach to rely more on soil and trees than steel and concrete. It calls for shift to “conservation agriculture”.
- » This would make greater use of rainwater rather than irrigation, and regularise crop rotation to maintain soil cover. This is crucial to reverse erosion and degradation, which currently affects a third of the planet’s land. The suggestions imply that the potential savings of such practices exceed the projected increase in global demand for water.
- » This would ease the dangers of conflict and provide better livelihoods for family farmers and poverty reduction.

7. ENVIRONMENTAL IMPACT ASSESSMENT

- » Development projects in the past were undertaken without any consideration to their environmental consequences. As a result, the whole environment got polluted and degraded.
- » In view of the colossal damage to the environment, governments and public are now concerned about the environmental impacts of developmental activities. So, to assess the environmental impacts, the mechanism of EIA was introduced.
- » EIA is a tool to anticipate the likely environmental impacts that may arise out of the proposed developmental activities and suggest mitigation measures and strategies.
- » EIA was introduced in India in 1978, with respect to river valley projects. Later the EIA legislation was enhanced to include other developmental sections since 1941.
- » EIA comes under Notification on Environmental Impact Assessment (EIA) of developmental projects 1994 under the provisions of Environment (Protection) Act, 1986.
- » Besides EIA, the Government of India under Environment (Protection) Act 1986 issued a number of other notifications, which are related to environmental impact assessment.
- » EIA is now mandatory for 30 categories of projects, and these projects get Environmental Clearance (EC) only after the EIA requirements are fulfilled.
- » Environmental clearance or the ‘go ahead’ signal is granted by the Impact Assessment Agency in the Ministry of Environment and Forests, Government of India.

Benefits of EIA:

- » EIA provides a cost-effective method to eliminate or minimize the adverse impact of developmental projects.
- » EIA enables the decision makers to analyses the effect of developmental activities on the environment well before the developmental project is implemented.
- » EIA encourages the adaptation of mitigation strategies in the developmental plan.

- » EIA makes sure that the developmental plan is environmentally sound and within limits of the capacity of assimilation and regeneration of the ecosystem.
- » EIA links environment with development. The goal is to ensure environmentally safe and sustainable development.

8. WATER BIRD SURVEY

Context:

- » A waterbird survey conducted in the Upper Kuttanad region of Kerala has recorded 16,767 birds of 47 continental and local species. The survey, conducted as part of the annual Asian Waterbird Census.
- » The survey, conducted as part of the annual Asian Waterbird Census, has spotted three new species – Greater flamingo, Grey-headed lapwing, and Blue-cheeked bee-eater.

Asian Waterbird Census

- » It is a part of global waterbird monitoring programme of International Waterbird Census (IWC) carried out each January as a voluntary activity and coordinated by Wetlands International. It runs in parallel with other regional programmes of the International Waterbird Census in Africa, Europe, West Asia, the Neotropics and the Caribbean.
- » It was initiated in 1987 in the Indian subcontinent and since has grown rapidly to cover major region of Asia, from Afghanistan eastwards to Japan, Southeast Asia and Australasia.
- » Presently, the census covers the entire East Asian – Australasian Flyway and a large part of the Central Asian Flyway.

Objectives

- » To obtain information on an annual basis of waterbird populations at wetlands in the region during the non-breeding period of most species (January).
- » To monitor on an annual basis the status and condition of wetlands.
- » To encourage greater interest in waterbirds and wetlands amongst citizens.

Significance

- » The information collected is available to a wide range of government agencies and non-government organisations and contributes to conservation activities from the local to global level, including:
- » Raising awareness of waterbirds and waterbird conservation issues;
- » supporting local conservation activities at wetlands;
- » The Ramsar Convention on Wetlands, in identifying and monitoring wetlands of international importance;

- » The Convention on Migratory Species (CMS), by monitoring the status of migratory waterbirds and their habitats;
- » The Convention on Biological Diversity's (CBD) goal in conservation and sustainable use of biodiversity;
- » Implementation of the East Asian-Australasian Flyway Partnership Initiative (EAAFP) and Central Asian Flyway Action Plan through monitoring important and Flyway Network sites;
- » BirdLife International's Important Bird Area (IBA) Programme;
- » IUCN/BirdLife International's Global Species Programme (Red List);
- » Wetlands International's Waterbird Population Estimates programme.

9.13th COP OF BONN CONVENTION

Context

- » India will host 13th Conference of Parties (COP) of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), in Gandhinagar, Gujarat.
- » Representatives from 129 Parties and eminent conservationists and international NGOs working in the field of wildlife conservation are expected to attend the COP.

CMS and its role:

- » The Convention was signed in 1979 in Bonn (hence the name), and entered into force in 1983.
- » It is an environmental treaty exclusively for migratory species under the aegis of United Nations Environment Programme.
- » It provides a global platform for the conservation and sustainable use of migratory animals and their habitats.
- » It brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. CMS complements and co-operates with a number of other international organizations, NGOs and partners in the media as well as in the corporate sector.

Appendices

- » Migratory species threatened with extinction are listed on Appendix I of the Convention.
- » CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them.
- » Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States (through which respective species migrate) of many of these species.

- » Migratory species that need or would significantly benefit from international co-operation are listed in Appendix II of the Convention. For this reason, the Convention encourages the Range States to conclude global or regional agreements.

Is the convention legally binding?

- » CMS acts as a framework Convention. The agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions.

Organisational structure of the convention

- » The Conference of the Parties (COP) is the decision-making body of the Convention. It meets at three-yearly intervals. The Scientific Council meets between COP sessions to offer scientific advice and identify research and conservation priorities. The Secretariat is provided by the United Nations Environment Programme (UNEP) and is based in Bonn, Germany and has an out-posted office in Abu Dhabi, United Arab Emirates. The Secretariat develops and promotes Agreements, services meetings, supports and supervises research and conservation projects and co-operates with governments and partner organizations.

India and CMS:

- » India is a signatory to the convention since 1983.
- » During COP 10, the Ministry of Environment and Forests, WWF-India, Wetlands International and BNHS (Bombay Natural History Society) jointly organized a side event on Black-necked Crane urging the Range States for regional cooperation for conservation of this unique species found in the Himalayan high-altitude wetlands.

10. INDIA TO BRING IT'S OWN NATIONAL ENVIRONMENT SURVEY IN 2019

Context:

- » India's first ever National Environment Survey (NES) will be Kicked off from 55 districts across 24 states and three Union Territories in January, 2019. The first set of complete green data of the survey will be available from 2020, which will provide an important tool in the hands of policy makers to make decisions at district, state and national levels.

National Environment Survey (NES):

- » The first NES will be carried out by Ministry of Environment, Forests and Climate Change (MoEFCC) through Environmental Information System (ENVIS) and its hubs and resource partners across the country.

- » The NES will rank all the districts on their environmental performance and document their best green practices. The survey will be done through a grid-based approach, using grids measuring 9x9 km, to collect comprehensive data on various environmental parameters such as air, water, soil quality; emission inventory; solid, hazardous and e-waste; forest & wildlife; flora & forest & wildlife; flora & fauna; wetlands, lakes, rivers and other water bodies.
- » The earliest the first set of complete green data from the survey will be available is 2020, providing an important tool in the hands of policy-makers for decision making at all levels – district, state and national.
- » It will also assess carbon sequestration potential of all the districts across the country.

Utility of the Survey:

- » At present, the country has secondary data on most of these parameters.
- » The NES for the first time will provide primary data on all the green heads in the same way that the National Sample Survey (NSS) periodically collects various socio-economic data.
- » The first set of complete green data from the survey will be available is 2020 providing an important tool in the hands of policy-makers for decision making at all levels – district, state and national.

Importance:

- » The green data from this survey will provide important tool in hands of policy-makers for decision making at all levels – district, state and national. The survey will fully map and create emission inventory, provide valuation of ecosystem services and collate research in the field of environment. The skilled manpower required for the survey will be provided from persons skilled and trained under MoEFCC's Green Skill Development Programme.

Benefits of survey:

- » This survey will provide accurate data to policy makers so that they can make appropriate environmental decisions. So far, no such survey was conducted in the country so that it felt necessary before implementing schemes for any particular area. At present, secondary data is available on most of the country's standards. However, the National Environmental Survey will provide primary data on all green parts for the first time. It will be of the same type as the National Sample Survey periodically collects various socio-economic data.

Other details:

- » The first set of data will be compiled in one year because it needs to cover seasonal cycles in terms of air pollution and flora & fauna.
- » Presently the survey is planned for 55 districts across the country.
- » All 716 districts in the country are expected to be surveyed in a period of three to four years.

11. INTERNATIONAL DAM SAFETY CONFERENCE, 2018

Context:

- » India is all set to host the International Dam Safety Conference- 2018 on January 23-24 at Thiruvananthapuram, Kerala. The conference is a part of DRIP project, which aims to achieve rehabilitation of old dams in the country that may be experiencing distress and are in need of attention for ensuring their structural safety and operational efficiency.

Significance:

- » The annual conference is organised under the Dam Safety Rehabilitation and Improvement Project (DRIP) project, which is being run by the Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD & GR) in the seven states of Jharkhand, Karnataka, Kerala, Madhya Pradesh, Odisha, Tamil Nadu and Uttarakhand.

About DRIP Project:

- » The project, with financial support from the World Bank, was launched in 2012 with a total financial outlay of Rs 2100 Crores.
- » It aims to achieve rehabilitation of old dams in the country that may be experiencing distress and are in need of attention for ensuring their structural safety and operational efficiency.
- » The project also aims to strengthen the institutional capacity and project management in this area. To enable the same, the project has been engaged in bringing greater awareness on dam safety issues and finding novel solutions to address them by pooling the best technologies, knowledge and experience available around the world.
- » The project consists of three main components:
- » Rehabilitation of selected dams and their appurtenances
- » Institutional Strengthening
- » Project Management

About Dam Safety Conferences

- » The hosting of the Dam Safety Conferences annually in the states associated with the DRIP project is an effort to realise the project's aims and objectives itself.
- » The conference sets the platform for various dam professionals, academicians, scientists, as well as industries to assemble and deliberate on the problems associated with dam safety and share the concepts, techniques, instruments and materials available to address the design and construction of new dams and also for monitoring, surveillance, operation, maintenance, rehabilitation along with disaster mitigation measures for existing dams.

Key Highlights:

- » The upcoming conference is expected to witness participation from around 550 delegates from over 20 nations across the world. Besides this, about 30 national and international organisations would be showcasing their contemporary developments in technology, materials, instrumentation and their application in addressing dam safety issues at an exhibition that will be organised during the conference. The themes for various sessions include Sustainable Dam Safety Initiatives; Uncertainties and Risk Management in Dams; Operation, Maintenance, Rehabilitation, and Upgrading of existing dams; Dam Safety Management Practices; and Integrated Flood Management for existing dams. Seven dam safety guidelines and manuals developed under DRIP will also be released for implementation during the conference. The conference will also witness the launch of a software programme called, ‘Dam Health and Rehabilitation Monitoring Application (DHARMA).

About Dharma:

- » It is a web tool to digitise all dam-related data effectively.
- » It will help to document authentic asset and health information related to the large dams in the country, which will enable appropriate actions to ensure need-based rehabilitation.
- » It is a new stride in asset management aspect by India.

12. ENVIRONMENTAL REFUGE:

Context:

- » World Bank Group report on Environmental/Climate Refugee
- » The worsening impacts of climate change in three densely populated regions of the world could see over 140 million people move within their countries' borders by 2050, creating a looming human crisis and threatening the development process, a new World Bank Group report finds. These are people forced to move from increasingly non-viable areas of their countries due to growing problems like water scarcity, crop failure, sea-level rise and storm surges. These “climate migrants” would be additional to the millions of people already moving within their countries for economic, social, political or other reasons.

The report recommends key actions nationally and globally, including:

- » Cutting global greenhouse gas emissions to reduce climate pressure on people and livelihoods, and to reduce the overall scale of climate migration. Transforming development planning to factor in the entire cycle of climate migration (before, during and after migration) Investing in data and analysis to improve understanding of internal climate migration trends and trajectories at the country level.

13. INDIA PITCHES FOR DECLARING 2023 AS THE INTERNATIONAL YEAR FOR MILLETS

Context:

- » India's proposal to observe an International Year of Millets in 2023 has been approved at the by the Food and Agriculture Organisation
- » India is celebrating 2018 as the national year of millets.
- » Millet is a collective term referring to a number of small-seeded annual grasses that are cultivated as grain crops, primarily on marginal lands in dry areas in temperate, subtropical and tropical regions.
- » Some of the common millets available in India are Ragi (Finger millet), Jowar (Sorghum), Sama (Little millet), Bajra (Pearl millet), and Variga (Proso millet).

Millets as Smart Food:

- » Millets are less expensive and nutritionally superior to wheat & rice owing to their high protein, fibre, vitamins and minerals like iron content.
- » Millets are also rich in calcium and magnesium. For example, Ragi is known to have the highest calcium content among all the food grains.
- » Millets can provide nutritional security and act as a shield against nutritional deficiency, especially among children and women. Its high iron content can fight high prevalence of anaemia in India women of reproductive age and infants.
- » Millets are rich in antioxidants.
- » Millets can help tackle lifestyle problems and health challenges such as obesity and diabetes as they are gluten-free and have a low glycemic index (a relative ranking of carbohydrate in foods according to how they affect blood glucose levels).
- » Millets as Smart Crop
- » Millets are Photo-insensitive (do not require a specific photoperiod for flowering) & resilient to climate change.
- » Millets can grow on poor soils with little or no external inputs.
- » Millets are less water consuming and are capable of growing under drought conditions, under non-irrigated conditions even in very low rainfall regimes
- » Millets have low carbon and water footprint (rice plant needs at least 3 times more water to grow in comparison to millets).
- » Millets can withstand high temperature. In times of climate change Millets are often the last crop standing and, thus, are a good risk management strategy for resource-poor marginal farmers.

Way Forward:

- » Since India, which supports more than 15% of the world's population, but only has 4% of its water resources, promotion of millets could be helpful.
- » To efficiently feed the growing population, increase in the production of and demand for millets is need of the hour.
- » Policy changes need to address infrastructure development in regions growing millets.
- » Cultivation of several varieties of millets should be encouraged and practised.
- » The government should include millets in Public Distribution System (PDS) and nutrition programmes. For example, Odisha has planned to introduce millets in PDS, mid-day meal scheme (MDM) and the Integrated Child Development Services (ICDS).
- » The government should incentivise farmers growing millets and practising mixed cropping, besides providing financial support for their processing, storage and marketing.
- » Specific value addition practices, like grading, sorting, cleaning, processing and packaging should also be supported.

Additional Information:

- » FAO (specialized agency of the United Nations that leads international efforts to defeat hunger) Council approved India's membership to the Executive Board of the United Nations World Food Program (WFP) for 2020 and 2021. World Food Programme is the UN agency focused on hunger alleviation and food security.
- » Globally, it responds to emergencies making sure food reaches where it is needed, especially in times of civil strife and natural disasters. In India, WFP has moved from providing direct food aid to providing technical assistance and capacity building services to the Government of India.

14. LIVING PLANET REPORT 2018

- » World Wildlife Fund (WWF) has recently released Living Planet Report 2018 along with Living Planet Index.
- » The report also explores three other indicators measuring changes in species distribution, extinction risk and changes in community composition. All these show severe declines or changes. The Living Planet Index (LPI) is an indicator of the state of global biodiversity and the health of our planet. It was first published in 1998.
- » LPI tracks the population abundance of thousands of mammals, birds, fish, reptiles, and amphibians around the world.

Key Findings of Report

- » Populations crashing (In the period of 1970-2014)
- » The main reasons for biodiversity decline continue to be the overexploitation of species, agriculture, and land conversion.
- » 60% Loss of vertebrates (animals with a backbone)
- » 80% decline in freshwater fauna population
- » 90% loss of wildlife in Latin America, which is the worst-hit region

Species disappearing

- » The index of extinction risk for five major groups birds, mammals, amphibians, corals and an ancient family of plants called cycads shows an accelerating fall.
- » The current rate at which species are going extinct is 100 to 1,000 times greater than the natural rate of extinction.
- » This means that Earth has entered a mass extinction event, only the sixth in half-a-billion years.
- » Boundaries breached
- » In 2009, scientists weighed the impact of humanity's expanding appetites on nine processes known as Earth systems within nature. Each has a critical threshold, the upper limit of a "safe operating space" for human species.
- » The critical threshold for climate change is global warming of 1.5 degrees Celsius.
- » So far, humans have clearly breached two of these planetary boundaries: species loss, and imbalances in Earth's natural cycles of nitrogen and phosphorous (mainly due to fertilizer use). For two others, climate and land degradation, we have begun breaching critical threshold indicators. Ocean acidification and freshwater supply are not far behind. As for new chemical pollutants such as endocrine disruptors, heavy metals, and plastics are concerned, their full impact is yet to be assessed.
- » Forests shrinking
- » Exploding human consumption is the driving force behind the unprecedented planetary change. Earth is witnessing, through the increased demand for energy, land, and water.
- » Consumption indicators – such as the Ecological Footprint – provide a picture of overall resource use.
- » Nearly 20 percent of the Amazon rainforest, the world's largest, has disappeared in five decades. Tropical deforestation continues unabated, mainly to make way for soybeans, palm oil, and cattle.

- » Globally, between 2000 and 2014, the world lost 920,000 square kilometers of intact or "minimally disturbed" forest, an area roughly the size of Pakistan or France and Germany combined.
- » Oceans depleted
- » Plastic pollution has been detected in all major marine environments worldwide, from shorelines and surface waters down to the deepest parts of the ocean, including the bottom of the Mariana Trench. Freshwater habitats, such as lakes, rivers, and wetlands, are most threatened. These are strongly affected by a range of factors including habitat modification, fragmentation and destruction; invasive species; overfishing; pollution; disease; and climate change. Since 1950, humans have extracted six billion tonnes of fish, crustaceans, clams, squids and other edible sea creatures. Climate change and pollution have killed off half of the world's shallow-water coral reefs, which support more than a quarter of marine life.
- » Coastal mangrove forests, which protect against storm surges made worse by rising seas, have also declined by up to half over the last 50 years.

Way Forward:

- » With two key global policy processes underway – the setting of new post-2020 targets for the Convention on Biological Diversity and the Sustainable Development Goals – there is currently a unique window of opportunity to reverse the trend. Lessons can be learned from progress towards addressing other critical global issues, like climate change, and everyone – governments, business, finance, research, civil society, and individuals – has a part to play.

15. SUSTAINABLE BIO-FUEL INNOVATION CHALLENGE:

Context:

- » The two-day international conference on Sustainable Biofuels was held in New Delhi. It was jointly being organized by Department of Biotechnology and Biofuture platform. The conference will seek to a clear understanding of the development in bio-economy made by participating countries, increase awareness of policy makers about the challenges faced by the industry-investor for commercial scale up of advanced biofuels. The conference will also focus on concerns of the private sectors to speed up large scale production of sustainable biofuels.

International conference on Sustainable Biofuels

- » About 50 international delegates including country representatives from mission innovation member countries, International Energy Agency (IEA), Biofuture Platform member countries, The International Renewable Energy Agency (IRENA) are attending the conference.

- » All co-leads of sustainable biofuel challenge - China, Brazil, Canada and India are represented in the conference.
- » The international conference on Sustainable Biofuels will bring the experts and delegates from 19 countries together in Sustainable Biofuels sector to share information and best practices, take stock of current knowledge and build consensus on the actions most needed to move forward.
- » This event aims to provide a common platform to Government policy makers, industry, investors and research community to exchange experiences and challenges related to development and scaling of advance biofuels.

Biofuels:

- » Use of fossil fuels for transportation contributes significantly to global greenhouse gases (GHG) emission. The sustainable biofuels have ability to reduce the GHG emission load and this consideration led to establishment of Sustainable Biofuel Innovation Challenge (SBIC) under Mission Innovation (MI). Advanced or second-generation biofuels produced from non-food biomass materials and specially grown high yielding plants or algae, if managed sustainably can contribute to significantly reduce emissions.
- » The sustainable biofuel innovation challenge will build on existing knowledge of individual participating countries and international institutes like IEA, IRENA and in collaboration of Bio-future Platform coordinated by Brazil as program Secretariat.
- » A major aim of this cooperation is to avoid duplication of efforts and define clear areas of collaboration for speeding up of innovations in this area.
- » The need for collaboration-cooperation to speed up commercialisation and focus on latest R&D in advanced biofuels will be the expected outcomes of this International event.

16. GLOBAL COOLING INNOVATION SUMMIT HELD IN NEW DELHI

Context:

- » The two-day summit is a first-of-its-kind solutions-focused event, which has been organised to explore concrete means and pathways to address the climate threat that comes from the growing demand from room air conditioners.
- » Two-day summit will be inaugurated by Union Science & Technology Ministry in New Delhi.
- » It has been jointly organised by the Department of Science and Technology along with Rocky Mountain Institute, Alliance for An Energy-Efficient Economy (AEEE), Conservation X Labs and CEPT University.

Global Cooling Prize:

1. The Global Cooling Prize – Mission Innovation challenge aims to spur development of a residential cooling solution that has at least five times (5x) less climate impact than today's standard.
2. It is a competition with global reach and participation to achieve dramatic breakthroughs in cooling technologies.
3. The competition aims to develop a cooling technology that requires radically less energy to operate, utilizes refrigerants with no ozone depletion potential and with low global warming potential, and has the potential to be cost-effective at scale.

17. SUVA EXPERT DIALOGUE ON LOSS AND DAMAGE

- » **Context:** Organised to deliberate on issues in the mechanisms set up so far to address losses and damages caused by climate change impacts.
- » Participants of the Suva expert dialogue were required to be registered to the forty-eighth sessions of the Subsidiary Body for Implementation (SBI 48) and Subsidiary Body for Scientific and Technological Advice (SBSTA 48) as well as the fifth part of the first session of the Ad Hoc Working Group on the Paris Agreement (APA 1-5), which were held between 30 April to 10 May 2018 in Bonn.

Mandate:

- » COP 23 requested the Secretariat, under the guidance of the Executive Committee of the Warsaw International Mechanism for Loss and Damage (the Executive Committee) and the Chair of the Subsidiary Body for Implementation (SBI), to organize, an expert dialogue to explore a wide range of information, inputs and views on ways for facilitating the mobilization and securing of expertise, and enhancement of support, including finance, technology and capacity-building, for averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, with a view to informing the preparation of the technical paper referred to in paragraph 2(f) of decision 4/CP.22 (see below for the details of the paper).
- » COP 23 requested the secretariat to prepare a report on the Suva expert dialogue for consideration by the Executive Committee at its second meeting in 2018 (September). The report will inform the discussions around scoping the technical paper mentioned above.

The technical paper will elaborate:

- » The sources of financial support, as provided through the Financial Mechanism, for addressing loss and damage as described in relevant decisions, as well as modalities for accessing such support;

- » Finance available for addressing loss and damage as described in relevant decisions, outside the Financial Mechanism, as well as the modalities for accessing it.
- » This technical paper will be prepared by the Secretariat as an input to the review of the Warsaw International Mechanism, to take place at COP 25 (2019). The Executive Committee will assist the secretariat in determining the scope of the technical paper with a view to making the paper available to Parties by SB 50 (June 2019) for consideration in the review of the Warsaw International Mechanism.

Relevant submissions:

- » The Executive Committee opened a call for submissions of information on 'the type and nature of actions to address loss and damage for which finance may be required', in December 2017.
- » COP 23 invited Parties and other stakeholders to submit their views by 15 February 2018.
- » A two-part synthesis paper was developed based on the 18 submissions received by 9 March, and considered at the 7th meeting of the Executive Committee (13–16 March):

Outcome:

- » One of the outcomes will be a table capturing the potential sources of support to avert, minimize, and address loss and damage. This table would help meet one of the central mandates of the Suva expert dialogue of informing the preparation of the technical paper mentioned above, including by gaining a better understanding of sources of financial support and the modalities for accessing such support.
- » Additional expected outcomes, include:
- » Involvement of a wider range of stakeholders in order to contribute to facilitating the mobilization and securing of expertise, and enhancement of support, including finance, technology and capacity-building;
- » Transfer of information generated by the Executive Committee to a wider audience;
- » Better understanding of needs and challenges faced by developing countries;
- » Sharing of information on financial support available and new opportunities, including the modalities for access.

18. BASIC MINISTERIAL MEETING ON CLIMATE CHANGE

- » Context: 27th BASIC Ministerial Meeting on Climate Change was recently held in New Delhi
- » The top climate change negotiators from Brazil, South Africa, China and India (BASIC) convened in Delhi recently to push for developed countries on their earlier commitment to providing \$100 billion annually from 2020.
- » The meet was held ahead of the United Nations Conference of Parties (COP24) to be held in December, in Katowice, Poland.

About Katowice Conference:

- The representatives from at least 190 countries, think-tanks, and activists will converge in Katowice, Poland to try to agree on a Rule Book that will specify how countries will agree to take forward commitments taken at the 21st COP in Paris in 2015. In CoP21 in Paris, the countries had agreed to take steps to limit global warming to 2C below pre-industrial levels and “as far as possible” limit it to 1.5C before the end of the century.

About BASIC meeting:

- This 27th BASIC meet chaired by Minister of Environment, Forest and Climate Change of India expressed their “deepest concern” over some developed nations’ attempting at unilaterally applying new eligibility criteria for developing countries’ access to funding under the Global Environmental Facility and the Green Climate Fund.
- Such criteria, according to the ministers, “are not compatible with guidance from the Conference of the Parties and are a departure from the letter and spirit of the Convention and its Paris Agreement. The BASIC ministers urged developed countries to honor their commitments and increase climate finance towards at least \$100 billion per annum goal by 2020, to be scaled up significantly thereafter. The BASIC group also encouraged developed countries to progressively and substantially scale up their financial support and finalise a new collective finance goal to inform parties for future action through NDCs (nationally determined contributions). The NDCs are the commitments made by countries to adapt to climate change and reduce emissions. In the post-2020 period, the ministers called upon developed countries to provide financial resources to assist developing countries with respect to both mitigation and adaptation in continuation of their existing obligations under the convention.
- The ministers also called upon to clarify about what constitutes climate finance.g., whether investments made by private companies in developed countries in new green technology or improving efficiency in a thermal plant count as climate finance.

19. INDIA TO SUBMIT SECOND BIENNIAL REPORT TO UNFCCC

Context

- The Cabinet has approved submission of India’s second Biennial Update Report (BUR) to the UNFCCC towards fulfillment of the reporting obligation under the convention.

Biennial Update Report (BUR)

- India had submitted its first BUR in 2016.
- As per the first report, the country had emitted 2,136.84 million tonnes of CO₂ equivalent greenhouse gases in 2010. It said energy sector was the prime contributor to emissions and with 71 per cent of total emissions.

About the Report:

1. The submission of India's second BUR would fulfil the obligation of India to furnish information regarding implementation of the convention, being a party.
2. The BUR contains five major components:
 - » National Circumstances
 - » National Greenhouse Gas Inventory
 - » Mitigation Actions, Finance, Technology and Capacity Building Needs and Support Received and
 - » Domestic Monitoring, Reporting and Verification (MRV)
3. The BUR has been prepared based on a range of studies conducted at the national level.

2nd Biennial Update Report (BUR)

- » This year, India emitted around 2.607 billion tonnes of CO₂ equivalent of GHGs in 2014, with the energy sector contributing over 70 per cent of the total.
- » In 2014, a total of 26,07,488 Gigagram (Gg) CC-2 equivalent (around 2.607 billion tonnes of CC-2 equivalent) of GHGs were emitted from all activities (excluding LULUCF) in India.
- » The net national GHG emissions after including LULUCF were 23,06,295 Gg CO₂ equivalent at around 2.306 billion tonnes of CO₂ equivalent.

Sectorwise Emissions

1. Out of the total emissions, the energy sector accounted for 73 per cent, Industrial Processes and Product Use (IPPU) 8 per cent, agriculture 16 per cent and waste sector 3 per cent.
2. About 12 per cent of emissions were offset by the carbon sink action of forest land, cropland and settlements.

India's obligations to UNFCCC

1. India is a Party to the United Nations Framework Convention on Climate Change (UNFCCC).
2. The Convention, in accordance with its Article 4.1 and 12.1, enjoins upon all Parties, both developed country Parties and developing country Parties to furnish information, in the form of a National Communication regarding implementation of the Convention.
3. The UNFCCC in COP-16 Cancun decided vide paragraph 60 (c) of decision 1 that developing countries, consistent with their capabilities and the level of support provided for reporting, should also submit biennial update reports.
4. Decision 2 of COP17, in paragraph 41 (f) states that Biennial Update Reports shall be submitted every two years.

20. STAPCOR – 2018

Context:

- » The International Conference on Status and Protection of Coral Reefs (STAPCOR – 2018) with the theme “Reef for Life” was inaugurated by the Union Environment Ministry at Bangaram coral Island of Territory of Lakshadweep.



STAPCOR:

- » The effect of climate change and global warming along with El-Nino on the corals has lead to heavy bleaching internationally during the year 1998.
- » This led to the foundation of STAPCOR with a decision to have a international conference in every 10 years to review the status and progress of coral reefs all over the world.

3rd International Year of the Reef 2018

1. The first IYOR was designated in 1997 in response to the increasing threats on coral reefs and associated ecosystems.
2. The hope was to increase awareness of the value of and threats to coral reefs, and to promote conservation, research and management efforts on a global scale.
3. Over 225 organizations in 50 countries and territories participated, publishing over 700 articles in papers and magazines and undertaking hundreds of scientific surveys.
4. This effort was repeated 11 years later, when 2007 was designated as the second IYOR.
5. The goals of the 3rd IYOR – 2018 are to:
 - » Strengthen awareness about ecological, economic, social and cultural value of coral reefs and associated ecosystems. Improve understanding of the critical threats to reefs and generate both practical and innovative solutions to reduce these threats
 - » Generate urgent action to develop and implement effective management strategies for conservation and sustainable use of these ecosystems

Benefits of Coral Reefs:

- » Rainforests of the sea: Coral reefs are often called the rainforests of the sea, both due to the vast amount of species they harbor, and to the high productivity they yield.
- » Reefs provide spawning, nursery, refuge and feeding areas for a large variety of organisms, including sponges, cnidarians, worms, crustaceans
- » Reef structures play an important role as natural breakwaters, which minimize wave impacts from storms such as cyclones, hurricanes or typhoons.

- » **Habitat:** Home to over 1 million diverse aquatic species, including thousands of fish species.
- » **Income:** Coral reefs and related ecosystems have a global estimated value of '\$2.7 trillion per year, or 2.2% of all global ecosystem service values', this includes tourism and food.
- » **Coastal protection:** coral reefs reduce shoreline erosion by absorbing energy from the waves: they can protect coastal housing, agricultural land and beaches. The global net benefit of coastal protection by reefs is an estimated \$9 billion per year.
- » **Medicine:** Reefs are home to species that contain pharmaceutical compounds that have potential for treatments for some of the world's most prevalent and dangerous illnesses and diseases.



CHAPTER – 5 PROGRAMMES AND INSTITUTION

1. ICFRE INKS TWO MOUS TO LAUNCH PRAKRITI PROGRAMME

- » The Indian Council of Forestry Research and Education (ICFRE), Dehradun on October 15, 2018 signed two Memorandums of Understanding (MoUs) with Navodaya Vidyalaya Samiti (NVS) and Kendriya Vidyalaya Sangathan (KVS).
- » The main objective behind the agreements is to provide a platform for the school children to learn practical skills towards sustainable use of the resources.
- » The two agreements have been signed for a period of 10 years. They aim to make the Indian youth more sensitive towards national and global issues of environment and thus, help them become responsible citizens.
- » The main objective of Prakriti programme is to provide platform for school children to learn practical skills towards sustainable use of resources.
- » It also aims to promote awareness about forests and environment and stimulate interest among students of KVS and NVS in maintaining balanced environment.
- » It also seeks to provide students with skills that reflect care and protection towards forests, environment and society.
- » Objective: To empower, inform and enrich every citizen with up-to date and reliable water data (other than classified data) and information through web-based India Water Resources Information System (India-WRIS) on a GIS platform in Public Domain.
- » To develop value added products and services for all aspects of integrated water resources management serving the nation through research, capacity building, linkages, outreach and better governance in water resources sector.
- » Collaboration with leading research institutes nationally as well as internationally to provide technical support to other central and state organizations dealing with water, emergency response for hydrological extremes. Water Resources Information System (WRIS) Central Water Commission in collaboration with Indian Space Research Organization had undertaken the work of development of Water Resources Information System (WRIS) during the XI plan WRIS, a tool for planning and management of Water resources, has following major objectives. To collate available data from various sources, generate new database of country's water "resources in standardized Geographical Information system (GIS) and provide a thin client scalable web enabled information system.
- » To provide easier and faster access and sharing nationally consistent and authentic water "resources data to various Water Resources departments, professionals and other stakeholders for Integrated Water Resources management.

- » To provide tools to create value added maps by way of multi-layer stacking of GIS databases so “as to provide integrated view of water resources issues. To provide foundation for advance modelling purpose and future Spatial decision support system “Including automated data collection system.
- » Significance: The management of water resources is a highly complex and tedious task that involves expertise of multidisciplinary domains and depend on historical and real time reliable data and information.
- » For this, the first requirement is to develop, maintain and update regularly a comprehensive “Water Resources Information System” (WRIS) in public domain for awareness and involvement of all concerned for effective integrated water resources management.
- » This is also prerequisite for scientific assessment, monitoring, modelling and Decision Support System (DSS) and Integrated water resource Management.

2. ONE PLANET ONE CITY CHALLENGE OF WWF

Why in News:

- » Three Indian cities - Panaji, Pune and Rajkot have been selected as national finalists in the 2017-2018 edition of WWF's One Planet City Challenge (OPCC).

About:

- » These are amongst the 40 finalists out of the 118 cities across 23 countries that participated in the global challenge this year. The One Planet City Challenge, previously known as the Earth Hour City Challenge, invites cities in participating countries to report ambitious and innovative climate actions and plans in different sectors including energy, transport, housing and waste, on the international carbon Climate Registry platform.
- » After evaluation by international jury, one city from each country is selected as the National Winner, which is then in the run-up to receive the Global Winner title.
- » One Planet One City Challenge One Planet City Challenge (OPCC) aims to mobilise action and support from cities in the global transition towards a climate friendly future, and to stimulate ambitious plans for low carbon development, as well as enhancing the use of sustainable, renewable and energy efficient solutions. OPCC, earlier called the Earth Hour City Challenge (EHCC), is now a global biennial challenge that is designed to highlight and reward cities that are willing and prepared to make substantial long-term efforts toward sustainability and resilience. The platform also aims at inspiring and supporting cities to become climate-smart and sustainable solution hotspots. OPCC first began in 2011 in Sweden and then expanded globally in 2012.

3. MONITORING OF ILLEGAL KILLING OF ELEPHANTS (MIKE)PROGRAMME

- » It was established in 2003, through Conference of the Parties (COP) resolution to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- » It is an international collaboration that tracks trends in information related to the illegal killing of elephants across Africa and Asia, to monitor effectiveness of field conservation efforts.
- » It is an umbrella of five NGOs-Elephant Family, International Fund for Animal Welfare (IFAW), IUCN Netherlands, World Land Trust (WLT) and Wildlife Trust of India (WTI).
- » It aims to secure a safe future for the wild elephants of India, which make up approximately half of the world's wild Asian.



CHAPTER – 6 POLICIES, SCHEMES AND INITIATIVES:

1. PARIVESH

Why in News:

- » An ambitious web-based single-window system Parivesh (Pro-Active and Responsive facilitation by Interactive, Virtuous and Environmental Single-window Hub) for environmental clearances was rolled-out at state levels since January 15.

About:

- » Parivesh provides for an automated system for submission, clearance and monitoring.
- » Parivesh is expected to bring an end to the clearance nightmare for entrepreneurs.
- » Parivesh has already been implemented at the Central level.

Description:

- » It is a **web-based** workflow application which has been developed for online submission and monitoring of the proposals submitted by the proponents for seeking Environment, Forest, Wildlife and CRZ Clearances from Central, State and district level authorities.
- » It automates the entire **tracking of proposals** which includes online submission of a new proposal, editing/updating the details of proposals and displays status of the proposals at each stage of the workflow. It removes manual intervention and puts the proposals on the **first-come-first-serve** basis for agenda. This enhances the transparency of the system.
- » It provides for an amalgamation of various objectives of government like Digital India initiated by the Prime Minister and capturing the essence of Minimum Government and Maximum Governance.

2. DRAFTING NATIONAL FOREST POLICY:

Why in News:

- » The Ministry of Environment, Forest and Climate Change (MoEFCC) has come up with a new draft National Forest Policy (NFP), 2018, which takes into account a reality that has become the defining feature of the world today—climate change.

Study Analysis:

- » The previous NFPs were focused on production and revenue generation of forests (NFP, 1894 and NFP, 1952) and environmental stability and maintenance of ecological balance (NFP, 1988). The Ministry of Environment, Forest and Climate Change (MoEFCC) had earlier brought out a draft policy in 2016, which attracted heavy criticism from forest rights groups for proposing a parallel community forest management arrangement along the lines of joint forest management.

- » The inclusion of Forest Rights Act in the draft policy 2018 has stemmed from that criticism. But the manner in which this inclusion will happen is not clear now.

Description:

- » Focus on: climate change mitigation through sustainable forest management.
- » Objective and Goal of the present Policy: "To safeguard the ecological and livelihood security of people, of the present and future generations, based on sustainable management of the forests for the flow of ecosystem services."
- » It aims to bring a minimum one-third of India's total geographical area under forest cover through scientific interventions and enforcing strict rules to protect the dense cover.
- » The draft policy document proposes public-private participation models for undertaking afforestation and reforestation activities in degraded forest areas available with Forest Development Corporations and outside forests.
- » The document proposes creation of a community forest management mission for the community resource management under Forests Rights Act.

3. POLICY ON SHIFTING CULTIVATION

Why in News:

- » NITI Aayog in its recent report has suggested that Ministry of Agriculture should take up on "Mission on Shifting Culture" to ensure inter-ministerial convergence.

Study Analysis:

- » Report titled "Mission on shifting cultivation: towards a transformational approach" calls for policy coherence and said that land for shifting culture should be recognised as "agricultural land".
- » It is so because farmers use this land for production of food rather than as forestland.
- » The Forest Policy (1988) considers jhum land as forest land and forest departments aim to rehabilitate it through social forestry measures. However, agricultural departments aim to promote agriculture on it. Cash crops, horticulture etc.
- » These are considered arable lands. Therefore, centre and states department of forest and environment, agriculture and allied departments have divergent approach towards shifting cultivation.
- » Today there is a shift towards regular agriculture especially horticulture as jhum cultivation did not give communities sufficient cash.

4. DRAFT RULES FOR COMPENSATORY AFFORESTATION ACT, 2016

- » **Why in News:** Compensatory Afforestation Fund Act, 2016 which provides for setting up Compensatory Afforestation Fund Management and Planning Authority (CAMPA) at both central and state level to ensure expeditious and transparent utilization of amounts realised in lieu of forest land diverted for non-forest purpose has come into force.
- » The utilization of funds is expected to mitigate the impact of diversion of such forest land.

Importance of the bill:

- » Establishes the National Compensatory Afforestation Fund under the Public Account of India, and a State Compensatory Afforestation Fund under the Public Account of each state.
- » These Funds will receive payments for: Compensatory afforestation, Net present value of forest (NPV), and Other project specific payments. The National Fund will receive 10% of these funds, and the State Funds will receive the remaining 90%.
- » These Funds will be primarily spent on afforestation to compensate for loss of forest cover, regeneration of forest ecosystem, wildlife protection and infrastructure development.
- » The Bill also establishes the National and State Compensatory Afforestation Fund Management and Planning Authorities to manage the National and State Funds.
- » The determination of NPV will be delegated to an expert committee constituted by the central government. These funds would be brought under the focus of Parliament and State Legislatures by transferring them to nonlapsable interest bearing funds.
- » A High-Level Committee on Environment Laws observed that quality of forest cover has declined between 1951 and 2014, with poor quality of compensatory afforestation plantations being one of the reasons behind the decline.
- » The Bill delegates the determination of NPV (value of loss of forest ecosystem) to an expert committee constituted by the central government.
- » As NPV constitutes about half of the total funds collected, its computation methodology would be important.
- » The provisions of the act are against the principles of democratic devolution as laid down in the 73rd and 74th constitutional amendments.
- » The act ignores the recommendations of the Kanchan Chopra Committee and the Indian Institute of Forest Management Committee on NPV and also the recommendations to share the compensation with the forest dwelling communities. Kanchan Chopra committee calls for the revision of NPV every five years.

5. CAMPA

Why in News:

- » The Compensatory Afforestation Fund Management and Planning Authority (CAMPA) was envisaged as an independent body that would manage a corpus — collected from industries that have used forest land for projects.

About:

- » These funds are meant to be used by states to implement agro-forestry in non-forest land to compensate for felled forest.

CAMPA fund Disbursement:

- » Funds collected under CAMPA directly go into the Public Account and from there on to the states. But according to the finance ministry power to disburse the funds should be with the CAMPA, however it should be routed through the Consolidated Fund of India (CFI).
- » The CFI is the repository of government revenues and taxes and all funds channelled through it require Parliamentary approval.
- » **Compensatory Afforestation Fund Act:** The CAF Act, 2016 has the provision for creating a national fund with contributions from user agencies—any person, organisation, company or department of the Central Government or state government making a request for diversion or de-notification of forest land for non-forest purpose.
- » According to the Act, the fund will be used for compensatory afforestation, additional compensatory afforestation, penal compensatory afforestation, net present value, catchment area treatment plan or any money for compliance of conditions stipulated by the Central Government while according approval under the provisions of the Forest (Conservation) Act, 1980.

6. GANGA VRIKSHAROPAN ABHIYAN

- » **Why in News:** National Mission for Clean Ganga (NMCG) is running “Ganga Vriksharopan Abhiyan” in five main stem Ganga basin states – Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal.

About:

- » State Forest Departments of these states have been made the nodal agencies for the smooth and effective execution of the campaign.
- » The involvement of District Ganga Committees, of which District Magistrates are the Chairpersons, has given strength to the programme.

- » Divisional Forest Officers (DFOs) have been designated as the district level Nodal Officers and Chief Conservator of Forest (CCF) at the State level for organizing the events.

Description of campaign:

- » The campaign, which has been initiated as part of the Forest Interventions in Ganga (FIG) component of Namami Gange programme.
- » **Aim:** To bring greater awareness among people and other stakeholders regarding the importance of afforestation for the task of Ganga Rejuvenation.
- » A number of schools, colleges and departments have been requested to “Adopt a Plant” for turning this campaign into a people’s movement.

7.I-HARIYALI

Why in News:

- » I-HARIYALI app is used to increase the green cover.

Description:

- » Punjab government has launched ‘i-Hariyali’ mobile application under ‘Mission Tandarust Punjab’ aimed at increasing the state’s green cover.
- » It will enable app users to order free plant saplings and help to save the environment from pollution. The app aims to inspire more and more people to plant maximum saplings during current monsoon season so as to save environment from pollution hazards.
- » Using it, users can book sapling of their choice, a maximum of 25 per person, from nearby government nursery. It will ensure clean, green, healthy and robust Punjab with active participation of people.

8.NEELAKURINJI

Why in News:

- » Scheme has been announced to protect Neela kurinji.

Study analysis:

- » Tamil Nadu government has announced a novel scheme for the protection of the exotic Neela kurinji (Strobilanthes kunthianus) plants.

Description of Neelakurinji:

- » Kurinji or Neelakurinji (Strobilanthes kunthianus) is a shrub that is found in the shola forests of the Western Ghats in South India. Nilgiri Hills, which literally means the blue mountains, got their name from the purplish blue flowers of Neelakurinji that blossoms only once in 12 years. Some Kurinji flowers bloom once every seven years, and then die.

- » Their seeds subsequently sprout and continue the cycle of life and death. The Paliyan tribal people living in Tamil Nadu used it as a reference to calculate their age.

9. SCHEME TO PROMOTE IN-SITU (IN THE FARM ITSELF) MANAGEMENT OF CROP RESIDUE

- » **Why in News:** The Cabinet Committee on Economic Affairs (CCEA) has approved Central Sector Scheme for in-situ management of crop residue in Punjab, Haryana, Uttar Pradesh and NCT of Delhi.

About It:

- » It will promote agricultural mechanization for next two years (2018-20) to provide cost-effective and eco-friendly solution to farmers to deal with problem of stubble burning that result in raising air pollution levels in Delhi and neighbouring states every winter.
- » The proceeds from central fund will be used to establish Farm Machinery Banks (FMBs) for Custom Hiring of in-situ crop residue management machinery.
- » Government will provide 80% financial assistance of project cost to cooperative societies of farmers, FPOs, SHGs, registered farmers societies or farmers groups, private entrepreneurs and group of women farmers. It will provide 50% financial assistance to farmers for procurement of agriculture machinery and equipment for in-situ crop residue management. Beneficiaries will be identified and selected for establishment of Farm Machinery Bank for Custom Hiring and procurement of machines on individual ownership basis by state nodal department/DLEC. They may tie up with Banks for credit requirements of beneficiaries.
- » The central fund will also be used to create awareness among farmers about in-situ management of crop residue. The activities will involve mass awareness campaigns through documents, short and long films, radio and TV programmes, demonstration camps at various levels and capacity building programme etc.
- » It will also include advertisement in print media, star campaigning, award for village or gram Panchayat for achieving Zero Straw Burning etc.

10 TASK FORCE ON BIOMASS MANAGEMENT

- » **Why in News:** Initiative to improve air quality in Delhi and National Capital Region (NCR).

'Cleaner Air Better Life' Initiative:

- » CII-NITI Aayog 'Cleaner Air Better Life' initiative aims to bring together all relevant stakeholders for designing a set of solutions to the identified sources of air pollution.

- » The farm burning, specific to the paddy-wheat cultivation cycle in the rural regions of Northern and North-Western states of India, has been identified as a major source of air pollution.
- » **Task Force:** Constitution of a dedicated task force on biomass management with Additional Secretary, Ministry of Environment Forests and Climate Change as convener and eminent experts as members.
- » **Task Force Report:** Identified solutions to address farm waste burning and in the long-run, recommended action would induce behavioural change in the farmers' community through adoption of insitu and ex-situ options to utilize the crop residue.
- » **Major Highlights of Niti Aayog's reports** on biomass management, clean fuel and clean transport Stressed on managing the air-quality of the Indo-Gangetic plain as a whole, rather than dealing with the National Capital Territory of Delhi as a separate geographical entity.
- » The rationale behind this is that the entire plain witnesses high air pollution levels every winter.

Major Recommendations / Biomass Management:

- » Provision of financial support to farmers and rewards to Panchayats to ensure zero-burning on fields. In-situ use of crop-residue for mulching.
- » Utilisation of crop residue in bio-ethanol, biochar, briquettes, pellets, etc. The reports evaluate the cost-effectiveness of each solution proposed.
- » Provision of storage facilities in the form of warehouses and better farm equipment which could be shared among farmers.
- » Need for strengthening of state level remote sensing to keep a track on crop burning cases.
- » **Clean Fuel:** Facilitation of city gas distribution projects in adjoining National Capital Region (NCR) areas. Prioritisation of gas-based power generation Ten per cent blending of ethanol in transport fuel: Bio-ethanol obtained from paddy straw could possibly be used Vapour Recovery Systems in depots and petrol pumps
- » Kerosene should be banned in rest of NCR areas Subsidies to poor families to transition to LPG Commercial established should set up units to convert their waste into energy
- » **Clean Transport:** Scaling up and augmentation of public transport, by involving private players. Route optimisation and real time tracking and notification of bus movement.
- » Mapping pedestrian facilities in NCR and sensitising traffic policemen and drivers to pedestrian rights. Liberalisation of taxi permits to allow smooth conversion of private cars to taxis-centre and state permits. End of life policy for high mileage vehicles segments.

11. ASH TRACT APP

Why in News:

- » Ministry of Power has launched Web based monitoring System and Fly Ash mobile application named ASH TRACK.

About:

- » It was launched by Minister of State (IC) for Power and New & Renewable Energy in New Delhi. These platforms will enable better management of fly ash produced by thermal power plants by providing interface between ash producers (thermal power plants) and potential ash users such as –cement plants, road contractors etc.

About Ash Track:

- » The app shows coal-based power plants situated within radius of 100 km and 300 km from a given location. It will allow user to select power station from where he wants to take fly ash. It will also show ash availability, distance from user's location.
- » It will help power plants to see location of prospective fly ash users surrounding it like – cement plants, NHAI, contractors of Pradhan Mantri Gram Sadak Yojana (PMGSY) projects, brick producers, etc. The app will give plant wise, utility wise and state wise fly ash utilization status in the country and also details of ash generation and utilization in real time., It will allow effective monitoring and reviewing for increasing fly ash utilization.
- » It will help in protecting environment in terms of reduction in fugitive emissions, saving of precious top soil and conservation of land for sustainable development.
- » Fly ash Fly ash is end product of combustion during process of power generation in the coal based thermal power plants. Fly ash is proven resource material for many applications of construction industries and is used in manufacturing of Portland Cement, road embankment construction, bricks/blocks/ tiles manufacturing and low-lying area development, etc.

12. SOUTH ASEAN NITROGEN HUB

- » **Why in News:** A major international research programme is being carried out to tackle the challenge that nitrogen pollution poses for environment, food security, human health and the economy in South Asia.

About:

- » The South Asian Nitrogen Hub, a partnership led by the UK's Centre for Ecology & Hydrology and comprising around 50 organisations from across the UK and South Asia, will be established with funding from UK Research and Innovation (UKRI) under its Global Challenges Research Fund (GCRF).

- » The Hub is one of 12 GCRF hubs announced by the UKRI to address intractable challenges in sustainable development. The interdisciplinary hubs will work across 85 countries with governments, international agencies, partners and NGOs.
- » India is a major partner with 18 Indian institutions in this project. India is the only country in South Asia that has completed its nitrogen assessment over a year ago and is already coleading the South Asian nitrogen assessment with CEH, UK, for the UN Environment.

Significance:

- » Nitrogen, which is a vital macronutrient for most plants, is the most abundant element in the atmosphere. A little over 78% of dry air on Earth is nitrogen.
- » But atmospheric nitrogen, or dinitrogen, is unreactive and cannot be utilised by plants directly. Nitrogen fixation – a natural process for the conversion of atmospheric nitrogen into reactive nitrogen in the soil – was inadequate to feed to the growing population.

13. NATIONAL POLICY ON BIOFUELS

- » **Why in News:** The Union Cabinet approved a national policy on biofuels that seeks to not only help farmers dispose of their surplus stock in an economic manner but also reduce India's oil-import dependence.

Description:

- » The Policy categorizes biofuels as:
- » First Generation " : Basic Biofuels such as bioethanol & biodiesel
- » Second Generation " : Advanced Biofuels, ethanol, Municipal Solid Waste (MSW) to drop-in fuels
- » Third Generation Biofuels: " Bio-CNG etc.

About:

- » The Policy expands the scope of raw material for ethanol production by allowing use of: Sugarcane Juice " Sugar containing materials like Sugar Beet, Sweet Sorghum " Starch containing materials like Corn, Cassava " Damaged food grains like wheat, broken rice, Rotten Potatoes (unfit for human consumption "for ethanol production).
- » The Policy allows use of surplus food grains for production of ethanol for blending with petrol with the approval of National Biofuel Coordination Committee.
- » The Policy encourages setting up of supply chain mechanisms for biodiesel production from non-edible oilseeds, Used Cooking Oil, short gestation crops.
- » Roles and responsibilities of all the concerned Ministries/Departments with respect to biofuels has been captured in the Policy document to synergise efforts.

14. WASTE TO WEATH

Why in News:

- » Bio-gas is fast becoming a popular source of fuel in rural areas. Biogas fuels such as ‘Gobar Gas’ has gained popularity displacing LPG as a source of clean fuel.

About:

- » Government of India has launched GOBAR Dhan scheme which would make the farmers more self-reliant apart from converting ‘waste to energy.’ Prime Minister has been talking about moving from “waste to wealth” in his recent ‘Mann Ki Baat’ programme.
- » The estimated 62 million tons of MSW generated annually by 377 million people in urban areas, more than 80% is disposed of indiscriminately at dump yards in an unhygienic manner by the municipal authorities leading to problems of health and environmental degradation.
- » To meet the challenge government has initiated Galvanizing Organic Bio-Agro Resources Dhan (GOBAR-DHAN) scheme recently with an objective of achieving ‘waste-to-wealth’.

15. GANGA GRAM PROJECT

Why in News:

- » Ganga Gram Swachchhata Sammelan was recently organized at Chyavan Rishi Ashram in Chousa Village of Buxar district in Bihar.

About:

- » The Ganga River Basin is one of the largest living river systems in the world, the main stem of the river flows through 5 states of India however the entire catchment provides water to 11 states. The mouth of River Ganga forms the world’s largest delta, known as Sunderbans, and was declared a World Heritage Site by UNESCO in 1997. The Ganga Basin supports numerous diverse ecosystems, from the alpine forests near Gaumukh to the plains of northern India to the mangrove forests and saline mud flats of West Bengal.
- » **Implementation:** The program would be implemented by the National Mission for Clean Ganga (NMCG), and its state counterpart organizations i.e., State Program Management Groups (SPMGs). In order to improve implementation, a three-tier mechanism has been proposed for project monitoring comprising of a) High level task force chaired by Cabinet Secretary assisted by NMCG. The program emphasizes on improved coordination mechanisms between various Ministries/ Agencies of Central and State governments.

16. INITIATIVE TO REDUCE CARBON EMISSION

Why in News:

- » The Government had approved the eight Mission under the National Action Plan for Climatic Change (NAPCC).

About:

- » These focuses on Soil, water and crop management practices that reduce carbon emission.
Aim: To make agriculture more adaptive and resilient to climate variability and in the process to reduce carbon emission.

Important initiatives

- » Crop diversification programme under Rashtriya Krishi Vikas Yojana (RKVY), National Food Security Mission (NFSM) & Bringing Green Revolution to Eastern India (BGREI).
- » "Other supporting programmes: Soil Health Card (SHC) " Paramparagat Krishi Vikas Yojana (PKVY) " Mission Organic for Value Chain Development for North East (MOVCD) " Rainfed Area Development (RAD) "Sub-Mission on Agroforestry (SMAF) "National Bamboo Mission (NBM) "

17. CLEAN SEAS CAMPAIGN

Why in News:

- » With the threat of plastic pollution mounting and its deadly impacts on marine ecosystems, India joined the global 'Clean Seas Campaign'.

About:

- » In 2018, India was the global host of the World Environment Day in collaboration with United Nations Environment Programme (UNEP) with 'Beat Plastic Pollution' as its theme.
- » UNEP launched the 'Clean Seas' programme in February 2017 to fight marine plastic litter with the help of governments, civil society and citizens. Plastic pollution is now entering our food chain. In fact, micro-plastics have now even entered basic food like salt, bottled water and tap water.

18. TIGER CENSUS

Why in News:

- » For the first time, India, Nepal and Bangladesh will be conducting the 2018 tiger census in close coordination in their respective territories at the same time.
- » While India has engaged with Nepal and Bangladesh in previous tiger counts, this is the first time all countries are uniting in arriving at tiger numbers, particularly in regions with shared borders.

- » The National Tiger Conservation Authority (NTCA), which is responsible for conducting the exercise in India, has proposed major changes including uniformity in counting of big cats in all tiger reserves, national parks and wildlife sanctuaries in the country at the same time.

Tiger Census Methodology Pugmark technique:

- » It has been one of the most popular ways of counting tigers.
- » Each tiger is known to leave a distinct pugmark on the ground and these are different from the others in the big cat family.
- » Photographs or plaster casts of these pugmarks are then analysed to assess the tiger numbers.
- » **Installation of cameras:** Cameras could be left in dense forests for several days to capture images of individual tigers.
- » **Double-sampling method:** The first stage involves forest department staff collecting evidences of tiger presence such as “pugmarks, scat, scratches on trees or other such unmistakable signs of tiger presence.
- » The **next stage** involves camera trapping. These cameras are heat and motion sensitive. "M-STRIPES M-STRIPES, short for Monitoring System for Tigers - Intensive Protection and Ecological Status "is a software-based monitoring system launched by National Tiger Conservation Authority (NTCA) in 2010. **Objective:** To strengthen patrolling and surveillance of the endangered Bengal tiger."

19.3-D PRINTED CORAL REEF

Why in News:

- » The world's largest 3-D printed reef has been submerged at Summer Island Maldives, in what is hoped could be a new technology-driven method to help coral reefs survive a warming climate.

About:

- » The artificial reef, assembled with hundreds of ceramic and concrete modules, was submerged at Summer Island's 'Blue Lagoon' — a sandy part of the lagoon, where the resort hopes to create a new coral reef ecosystem.
- » The experiment was aimed at increasing their resilience and longevity against the ongoing environmental rampage. The ceramic structures built closely resemble the original structures found in the Maldives. Ceramic itself is made of calcium carbonate, the same inert substance that occurs in abundance in corals. Bleaching poses the most potent danger to corals, which used to abound in the Pacific Ocean and colour its waters in different hues.
- » **THREATS** like increasing temperatures of water bodies and disposal of chemical wastes in oceans, 3D printing technology is hoped to offer a safety net for corals, for posterity.

- » The technology allows mimicking the complexity of natural reef structures, so as to design artificial reefs that closely resemble those found in nature.
- » This will be a more effective way of growing and restoring corals.
- » 3D printing technology offers a new way of saving the corals to fight with global warming, bleaching and environmental pollution.

20. BLUE FLAG CERTIFICATION

Why in News:

- » The Chandrabhaga beach on the Konark coast of Odisha is first in Asia to get the Blue Flag certification. It was awarded the honour on World Environment Day on June 5.

About:

- » The Environment Ministry embarked on the Blue Flag project in December 2017.
- » Twelve more beaches in the country are being developed by the Society for Integrated Coastal Management (SICOM) in accordance with the Blue Flag standards.
- » SICOM is an Environment Ministry's body working for the management of coastal areas.
- » Blue flag standards to achieve the Blue Flag standards, a beach must be plastic-free and equipped with a waste management system. Clean water should be available for tourists, apart from international amenities.
- » The beach should have facilities for studying the environmental impact around the area.
- » The standards were established by the Copenhagen-based Foundation for Environmental Education (FEE) in 1985.

CHAPTER – 7 DISASTER MANAGEMENT

1. NATIONAL DISASTER RESPONSE FORCE

Why in News:

- » Union Cabinet has given approval for raising of four additional battalions of National Disaster Response Force (NDRF) to strengthen the India's disaster response set up.

Study Analysis:

- » The objective of raising four additional battalions is to reduce response time keeping in view vast geographic area of the country.
- » These battalions will be placed in Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Delhi National Capital Region based on their disaster vulnerability profile.

About:

- » Disaster Management Act was enacted in 2005 which led to the constitution of National
- » Disaster Management Authority (NDMA) to lay down the policies, plans and guidelines for disaster management.
- » The Disaster Management Act has statutory provisions for constitution of National Disaster
- » Response Force (NDRF) for the purpose of specialized response to natural and man-made disasters. In 2006 NDRF was constituted with 8 Battalions.
- » At present, NDRF has strength of 12 Battalions with each Battalion consisting of 1149 personnel. Today NDRF is a distinguished, unique Force across the country functioning under the Ministry of Home Affairs, Government of India, within the overall command, control and leadership of the Director General, NDRF.

2. NATIONAL DISASTER RISK INDEX

Why in News:

- » Maharashtra has been ranked at the top of the list of Indian states, vulnerable to natural disasters, followed by West Bengal, Uttar Pradesh, and Madhya Pradesh, according to the National Disaster Risk Index.

About:

- » This is the first Disaster Risk Index released by our country. Among the Union Territories, Delhi is the most vulnerable to such disasters.
- » The index takes many factors into consideration before ranking the states/ union territories like the exposure of population, agriculture and livestock, along with the environmental risk.
- » Some states like Gujarat, Tamil Nadu, Assam, Tripura, and Himachal Pradesh have taken significant steps in Disaster Risk Reduction.

- » These states have invested in building disaster resilient infrastructure and early warning systems. Also, capacity building by some states has led to a lower risk to their population economy. This index is currently in a draft form made by the Union Home Ministry with support from the

3. UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

- » The United Nations Development Programme (UNDP) believes that in many countries, the process of development itself has a huge impact — both positive and negative — on disaster risk.
- » It shows how countries that face similar patterns of natural hazards — from floods to droughts — often experience widely differing impacts when disasters occur.
- » The impact depends in large part on the kind of development choices they have made previously.

4. REGIONAL INTEGRATED MULTI-HAZARD EARLY WARNING SYSTEM(RIMES)

Why in News:

- » In a bid to offer actionable early warning information for improved disaster management, Odisha State Disaster Management Authority (OSDMA) in collaboration with Regional Integrated Multi-Hazard Early Warning System has developed a system, SATARK.

About:

- » It is an international and intergovernmental institution, owned and managed by its Member States, for the generation and application of early warning information.
- » 12 Member States: Bangladesh, Cambodia, Comoros, India, Lao PDR, Maldives, Mongolia, Papua
- » New Guinea, Philippines, Seychelles, Sri Lanka and Timor-Leste.
- » RIMES evolved from the efforts of countries in Africa and Asia, in the aftermath of the 2004 Indian Ocean tsunami.
- » **Objective:** To establish a regional early warning system within a multi-hazard framework for the generation and communication of early warning information, and capacity building for preparedness and response to trans-boundary hazards.
- » RIMES was established on 30 April 2009, and was registered with the United Nations on 1 July 2009.
- » RIMES address both high-impact, low-frequency hazards, such as tsunamis, as well as low-impact, but high-frequency hazards, such as extreme weather events, for the optimum

► use of its technological facilities.

- » The cost incurred is much lower than that required for establishing individual early warning systems for high-impact, low-frequency hazards.
- » RIMES provide an interface between global centers of excellence and national and local level institutions to bring the best of science and practices for enhanced performance of early warning systems
- » RIMES act as a test-bed for identifying promising new and emerging technologies and research products, and pilot testing and making these operational through demonstration
- » of tangible benefits.

5 FIRE DISASTER MANAGEMENT

- » **Why in News:** Recently the fire at the Kamala Mills (Mumbai) Compound has taken 14 lives.

About:

- » These are the kind of accidents that could happen almost anywhere in the country at the same time this is also a type of preventable disaster.

Reasons for the Fire Disaster:

- » Flammable chemicals found in laboratories. Shops, art studios. Maintenance activities - painting, cleaning, auto repair. Engines, boilers and other heating appliances.
- » Processes involving open flame: Welding, brazing and similar operations, cooking, smoking, and some lab operations. Drying (both in the laundries and laboratories), cooking, heat producing devices such as hot plates and space heaters.
- » Use and disposal of chemicals: Experiments in labs. Hazardous waste handling. Oily rags in art studios, and shops.
- » **Electrical equipment:** Short circuits and malfunctioning equipment.

Poor Infrastructure:

- » Lack of emergency lights, foot light and exit lights, blocked gangways, blocked exits with most of the doors locked, and obstruction at available exits due to unauthorised shops were some of the reasons for the fire to become a severe accident.
- » Absence of fire extinguishers and lack of periodic maintenance also contributed towards more casualties. Weak Compliance of Policies.

6 LANDSLIDE WARNING SYSTEM

Why in News:

- » Sikkim to have an advanced landslide warning system.
- » The new landslide system would help in safe evacuation of people before disaster strikes.
- » This new system would be based on IoT (Internet of things) and was installed by Amrita

- » VishwaVidyaPeetham and co- funded by MoES (Ministry of Earth science)
- » It is a real time landslide warning system set up in Sikkim Darjeeling belt of North east
- » Himalayas which is world's most prominent "landslide hotspots".
- » Warning system consists of over 200 sensors that can measure geophysical and hydrological parameters like rainfall, pore pressure and seismic activities. It has been set up on slopes spread over 150 acre at Chandmari village in Gangtok.
- » Landslides are triggered by natural causes like vibrations from earthquakes and the build-up of water pressure between soil layers due to prolonged rainfall or seepage. In recent decades, manmade causes have become significant in triggering landslides, including removal of vegetation from the slopes, interference with natural drainage, leaking water or sewer pipes, modification of slopes by construction of roads, railways, buildings etc.

7. INDIAN TSUNAMI EARLY WARNING SYSTEM

- » **Why in News:** Indian Tsunami Early Warning System has been recognised as the best in the world.

About:

- » National Centre for Ocean Information Services (INCOIS), Hyderabad has developed a real time Tsunami prediction system.
- » This system will be able to predict risk to coastal areas, height of waves that can hit them and even pinpoint vulnerable buildings, all in 'real-time'. INCOIS, is an institute under the Indian government's Ministry of Earth Sciences (MoES).
- » Government has identified a list of regions on the country's eastern coast that are highly vulnerable to a tsunami.
- » INCOIS has been regularly organising mock drills and tests to check the preparedness of the entire chain of administration and find lacunae. Such a mock drill was conducted in five coastal states on the eastern coast where mass evacuations were conducted in several areas.

8. REPEATED EARTHQUAKES IN PALGHAR

Why in News?

- » The Palghar district in northern Maharashtra has been witnessing an unusual frequency of earthquakes since November, 2018.
- » National Centre for Seismology (NCS) has categorized the unusual tremors as an 'earthquake swarm'.

- » Earthquake swarms can occur through the process of Reservoir Induced Seismicity (RIS) when large amount of seismic energy gets concentrated in a small area due to the weight of the large structure and the water that it holds.
- » Hydro-seismicity is being hypothesized as the reason for swarms in peninsular India.
- » Water from heavy rainfall enters the small fractures in the rocks creating pressure between them. With every 10-meter rise in groundwater, pore pressure increases by 1 bar.
- » This pressure is released in the form of earthquake swarms.

9. DROUGHT DECLARATION IN INDIA

Why in News?

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

About:

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

Declaration of Drought

- » The Manual for Drought Management, released in 2016 by the Union Ministry of Agriculture and Farmers Welfare, prescribes "new scientific indices and parameters" for a "more accurate assessment of drought" in the country. The manual lists five categories of indices, which include rainfall, agriculture, soil moisture, hydrology, and remote sensing (health of crops).
- » According to the National Commission on Agriculture the 3 types of droughts are:
- » Meteorological drought: This happens when the actual rainfall in an area is significantly less than the climatological mean of that area. Hydrological drought: A marked depletion of surface water causing very low stream flow and drying of lakes, rivers and reservoirs. Agricultural drought: Inadequate soil moisture resulting in acute crop stress and fall in agricultural productivity.

10. RAT-HOLE MINING

Why in News?

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

About:

It involves digging of very small tunnels, usually only 3-4 feet high, without any pillars to prevent collapse, in which workers (often children) enter and extract coal.

- » The National Green Tribunal (NGT) banned it in 2014 on grounds of it being unscientific and unsafe for workers. Even after ban, it remains the prevalent procedure for coal mining in Meghalaya as no other method would be economically viable in Meghalaya, where the coal seam is extremely thin. Further, mining activities are a state subject, but safety of mine workers is a central subject which creates problems in implementation of safety policies.

11. KERALA FLOOD

Why in News?

- » Recently, Kerala witnessed their worst flood since 1924.

About:

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

Related Information and Improvement Plan (DRIP)

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

Objective of DRIP:

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

12. GLACIAL LAKES OUTBURST FLOODS

Why in News?

- » Disaster managers and scientists in Sikkim are siphoning out excess water from South Lhonak lake to prevent it from Glacial Lakes Outburst Floods. Glacial Lakes Outburst Floods (GLOFs) Floods caused due to outburst of glacial lakes is known as GLOF.

- » The moraine wall act as a natural dam, trapping the melt water from the glacier and leading to the formation of a glacial lake.

Factors

- » Retreat of glaciers and change in radiative balance in the region in the wake of global warming.
- » Increasingly erratic and unpredictable monsoon rainfall patterns and increased climate variability. Anthropogenic activities such as mass tourism; developmental interventions such as roads and hydropower projects; and the practice of slash and burn type of farming in certain pockets of the Indian Himalayan region.
- » Black carbon also plays important factor which melts the ice on the mountain due to albedo effect.

13. ACROSS SCHEME

Why in News?

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

Across:

- » It pertains to the atmospheric science programs of the Ministry of Earth Sciences (MoES) and addresses different aspects of weather and climate services, which includes warnings for cyclone, storm surges, heat waves, thunderstorms etc. Each of these aspects is incorporated as nine sub-schemes under the umbrella scheme "ACROSS"
- » Atmospheric, Climate Science and Services.
- » Numerical Modeling of Weather & Climate.
- » Physics and Dynamics of Tropical Clouds.
- » Agro Meteorology, Aviation Services, Center for Atmospheric Technology.
- » High Impact Severe Weather Warning System.
- » Metropolitan Air Quality and Weather Service.
- » Monsoon Mission of India.
- » **Implemented** in an integrated manner through the four institutes – India Meteorological Department (IMD), Indian Institute of Tropical Meteorology (IITM), National Centre for Medium Range Weather Forecasting (NCMRWF) and Indian National Centre for Ocean Information Service (NCOIS). LARGE FOREST FIRE

14. MONITORING PROGRAMME

Why in News

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

About Large Forest Fire Monitoring Programme

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

15. INDIAN OCEAN WAVE EXERCISE 2018 (IOWAVE18)

Why in News

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

About:

- » It is being organised by the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO).
- » The Indian Tsunami Early Warning Centre (ITEWC), based out of the Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, participated in it.
- » INCOIS is an autonomous institution under the Union Ministry of Earth Sciences.
- » ITEWS acts as a Regional Tsunami Advisory Service Provider along with Australia and Indonesia for the Indian Ocean region.
- » It is the only competent organization for marine science within the UN system.
- » Purpose: To promote international cooperation and to coordinate programmes in research, services and capacity-building, in order to learn more about the nature and resources of the ocean and coastal areas.
- » It coordinated in setting up of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS).

16. TITLI CYCLONE 'RAREST OF RARE'

- » Titli Cyclone is a severe cyclonic storm that devastated Odisha in October.
- » Titli cyclone is the rarest of rare in terms of its characteristics such as recurvature after landfall and retaining its destructive potential after landfall and recurvature away from the coastal areas for more than two days.
- » Naming of cyclone in Indian Ocean.
- » Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES)
- » It is an international organisation on disaster warning, formed in the aftermath of 2004 Indian Ocean Tsunami by the efforts of African and Asian countries.
- » It operates from the early warning centres located at the campus of the Asian Institute of Technology in Pathum Thani, Thailand.
- » It is registered with United Nations and is also supported by UNESCAP and Danish International Development Agency (DANIDA).

CHAPTER – 8 SUSTAINABLE DEVELOPMENT

1.OFF-SHORE WIND POWER

Why in News?

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

About Off-Shore Power

- » Offshore wind power is the use of wind farms constructed in bodies of water, usually in the ocean on the continental shelf, to harvest wind energy to generate electricity.
- » In India, there is yet no commercial production of energy from off-shore wind farm. Two regions where preliminary studies are conducted are off coast of Gujarat and Tamil Nadu which have shown significant potential.
- » MNRE has declared medium and long-term target for off-shore wind power capacity additions, which are 5 GW by 2022 and 30 GW by 2030.
- » **Advantages of offshore** wind power over the onshore wind power
- » Greater area for setting up large projects and higher wind speed resulting in higher electricity generation per amount of capacity installed.
- » Consistent wind speed: The effective use of wind turbine generating capacity will be higher at sea than on land.
- » Less visual impact: As these sites are located far from land they have less visual impact which helps with public acceptance issues.

- » Close to load centers: The off-shore wind farms are usually located near to the cities and load centers thus transmission losses are minimised.
- » Environmental impact: low global warming potential per unit of electricity generated, comparable to that of onshore wind farms.

2.“NATIONAL OFFSHORE WIND ENERGY POLICY -2015”

- » National Institute of Wind Energy (NIWE) has been authorized as the Nodal Agency for development of offshore wind energy.
- » **Objectives:** To explore and promote deployment of offshore wind farms in the Exclusive Economic Zone (EEZ) of the country, including those under Public Private Partnership.
- » To promote Investment in Energy Infrastructure.
- » To promote R&D and encourage indigenization of the offshore wind energy technology.
- » To create skilled manpower and employment in the offshore wind energy sector.

3.GLOBAL SOLAR COUNCIL

Why in News?

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

About:

- » Global Solar Council is international non-profit association of the national, regional and international associations in solar energy and the world's leading corporations.
- » It was founded at the 2015 Paris Climate Conference.
- » National Solar Energy Federation is a founding member of the Global Solar Council (GSC).
- » It works in a complimentary manner with the Central and State Governments for achieving India's national solar target of 100 GW by 2022.

4.ELECTRIC VEHICLES

Why in News?

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

Need for electric vehicles

- » Fulfilling INDC 2030 goals and combatting increasing air pollution load in Indian Cities as
- » Fossil fuel-based transportation is second largest source of carbon dioxide emission.
- » Cut oil imports and generation of jobs in India both upstream and downstream supply chain.

Government Measures:

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

5. GREEN BONDS

Why in News?

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

About Green Bond

- » Green bonds are debt instruments like normal bonds, but the proceeds are used for renewable energy projects, or for services that are ecologically sustainable.
- » The bond is voluntary and may be issued by a financial institution, the government or even a company to raise funds for a defined period. The first Green bond was issued by the European Investment Bank (EIB) in 2007. In 2015, YES Bank issued the first green bond in India for financing the renewable and clean energy projects particularly, for wind and solar.
- » Gradually, the market has expanded to several public sector undertakings, state-owned commercial banks, state-owned financial institutions, corporates, and the banking sector.
- » SEBI published its official green bonds requirements for Indian issuers making India the second country (after China) to provide national level guidelines.

6. SOVEREIGN BLUE BOND

Why in News?

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

About SBB

- » The Bond and the programs of marine activities have been developed by the support of World Bank and Global Environment Facility.
- » It is part of the project under the World Bank's South West Indian Ocean Fisheries governance and Shared Growth Program (SWIOFish).
- » They are debt instruments issued by the governments, development banks etc. to raise capital from impact investors to finance marine and ocean-based projects that have positive environmental, economic and climate benefits.

CHAPTER -9 RESOURCE CONSERVATION AND MANAGEMENT

MEASURING THE NATURAL CAPITAL

Why in News?

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

Context:

- » Need to re-imagine the country's natural ecosystems as its 'natural capital'
- » Natural capital, if managed suitably can maximize the benefits of economic growth and development for any Nation.

What is Natural Capital?

- » Natural capital is world's stocks of natural assets which include geology, soil, air, water and all living things. Natural capital provides for a wide range of services, often called ecosystem services, which make human life possible.
- » The most obvious ecosystem services include the food we eat, the water we drink and the plant materials we use for fuel.

Is natural capital really valuable in financial terms?

- » There have been many studies that have calculated natural capital's value in financial terms.
- » The financial value of India's forests is estimated to be \$1.7 trillion.
- » Mexico's mangrove forests provide an annual \$70 billion to the economy through storm protection, fisheries support, and ecotourism

- » Street trees in California provide \$1 billion per year through atmospheric regulation and flood prevention

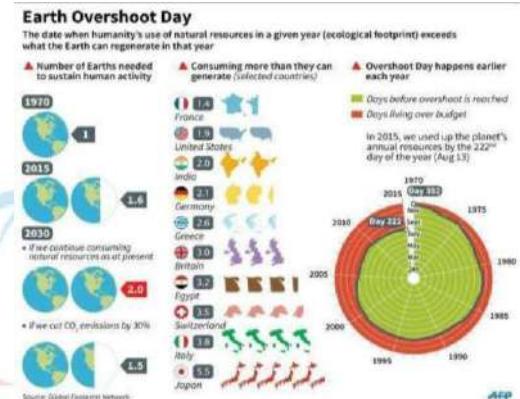
Vast Economic Contributions:

- » India is one of the 17 most ecologically diverse countries, boasting 11% of the world's flora and fauna with increasing economic activity, natural capital assets are on the decline affecting
- » The quality of life Potentially giving rise to future inefficiencies in the economy
- » Limits of natural capital stocks
- » Nine earth systems have been identified which mark the safe zones, beyond which there is a risk of 'irreversible and abrupt environmental change'.

1. THE EARTH OVER SHOOT DAY

Why in News?

- » 2018 Earth Overshoot Day was on August 1, the earliest date since ecological overshoot began in early 1970s.
- » Earth Over shoot Day (EOD), previously known as Ecological Debt Day (EDD), is the calculated illustrative calendar date on which: Humanity's resource consumption for the year exceeds Earth's capacity to regenerate those resources that year.
- » Earth's Overshoot Day is calculated by dividing the world biocapacity (the amount of natural resources generated by Earth that year), by the world ecological footprint (humanity's consumption of Earth's natural resources that year), and multiplying it with 365.
- » When viewed through an economic perspective, EOD represents a day in which humanity enters an ecology deficit spending.



2. LEGAL STATUS FOR ALL THE ANIMALS

Why in News?

- » The Uttarakhand High Court has declared entire animal kingdom i.e. all animals, including avian and aquatic species as legal entities with rights, duties and liabilities of living person.

Court Ruling:

- » The court ruled that entire animal kingdom, including avian and aquatic ones are legal entities and have distinct persona with corresponding rights, duties and liabilities of living person.

- » All the citizens throughout state are hereby declared persons in loco parentis as human face for welfare and protection of animals. It directed State Government that no animal, including horses moving between India and Nepal, carries excess weight. It also banned use of any sharp equipment throughout state to avoid bruises, swelling, abrasions or severe pain to animals. It also directed all veterinary doctors across Uttarakhand to mandatorily treat animals brought to them by citizens of the state. If animal cannot be brought to doctor, then vet must personally visit and attend the stray cattle, or animal without delay.

What is a Legal entity?

- » In common law jurisprudence, there are two types of persons, natural persons or human beings and artificial person, which are also known as juristic persons, juridical entity or legal person other than natural person.
- » Legal or juristic persons are created by law and recognised as legal entity, having distinct identity, legal personality and besides duties and rights.
- » They include private business firm or entity, non-governmental or government organisations, trusts and societies, besides others.

3. NATIONAL BIOGAS AND MANURE MANAGEMENT PROGRAMME

- » National Biogas and Manure Management Programme is a central sector scheme that makes provisions for setting up of Family type biogas plant for providing biogas as clean cooking fuel and a source of lighting in rural and semi-urban areas of the country.
- » The biogas plants can generate biogas from organic substances like cattle dung, night soil wastes, and biomass from the kitchen, garden, farms and other such bio-degradable materials.
- » The biogas is generated through a process called as anaerobic digestion (AD). The programme is being implemented in all the states and Union Territories by the Ministry of New and Renewable energy by the State Nodal Departments/ State Nodal Agencies and Khadi and Village Industries Commission (KVIC), Biogas Development and Training Centres (BDTCs).
- » A target has recently been set up by the Ministry of New and Renewable Energy (MNRE) for setting up of 65,180 biogas plants in the present year under the National Biogas and Manure Management Programme (NBMMMP). The Ministry provides the subsidy for family type biogas plants. Among the states, the best performer in NBMMMP in 2015-16 has been Uttarakhand
- » Other states which have done well are Assam (which has met its target) Andhra Pradesh (67%), Telangana (62.2%), Goa (75%) and Sikkim (65%).

4. ECO-TOURISM POLICY

- Eco tourism is a new approach in tourism sector. Several terms relating to ecotourism such as, sustainable tourism, green tourism, rural tourism, community-based tourism, responsible tourism etc have been emerged over the last 20 years or so. Eco tourism means preserving travel to natural areas to appreciate the cultural and natural history of the environment, taking care, not to disturb the integrity of the ecosystem, while creating economic opportunities that make conservation and protection of natural resources advantageous for local people.
- The potential of ecotourism as a strategy for sustainable development was recognized during the Earth Summit in 1992, when sustainable tourism was considered as an environment friendly economic activity.
- It can provide vitally needed income to poor communities, giving them an economic stake in protecting the environment. It led to change in the tourist perceptions, increased environmental awareness and desire to explore natural environments. Eco tourism may foster cultural exchanges between people- leading to greater understanding.
- India, the land of varied geography offers several tourist destinations that not just de-stress but also rejuvenate you. The few places like the Himalayan Region, Kerala, the northeast India, Andaman & Nicobar Islands and the Lakshdweep islands are some of the places where you can enjoy the treasured wealth of the Mother Nature. Then mala in Kerala is the first planned ecotourism destination in India created to cater to the Eco-tourists and nature lovers.
- Community eco-tourism initiative: Eco-tourism at the initiative of communities has been started in different states of India like J&K, Nagaland, Kerala, Sikkim and West Bengal.
- In Ladakh, several villages have initiated home stay programmes for trekkers and other tourists, with funds going back to conservation and village development.
- Khonoma village near Kohima is the site for ‘Green Village Project’ set up by the Maharana Kumbha Common Interest Group, with nine villages from BPL families. The youths were trained in visitors’ management. The camp offers camel and horse riding, hiking, folk dances etc.



5. BRAZZAVILLE DECLARATION

- The Brazzaville declaration was signed to promote better management and conservation world’s largest tropical peatlands-Cuvette Centrale region in Congo Basin from unregulated land use and prevent its drainage and degradation.

- » It was signed jointly by Democratic Republic of Congo (DRC), Republic of Congo (DRC), Republic of Congo and Indonesia on the side-lines of Third Partners Meeting of Global Peat lands Initiative held in Brazzaville, Republic of Congo.
- » Peat lands are wetlands that contain mixture of decomposed organic material, partially submerged in layer of water, lacking oxygen.
- » The complex biodiversity of peat lands means they are home to variety of species. Their high carbon content makes them uniquely vulnerable to incineration if they are drained. They are globally important carbon store. The unregulated exploitation of peat lands can potentially be detrimental to environment and to climate, as it could release carbon emissions that have been locked in for millennia.
- » The Cuvette Centrale region in Congo Basin is world's largest natural tropical peat lands, which are about size of England. It stores three years equivalent of global greenhouse gas emissions.

Brazzaville declaration

- » It aims to implement coordination and cooperation between different government sectors to protect the benefits provided by peat land ecosystems. It also recognizes the importance of the scientific breakthrough of mapping the world's largest tropical peat land area.

Global Peat lands Initiative

- » GPI is multi-partner United Nations Environment Programme (UNEP) initiative launched at the Global Landscapes Forum in Marrakesh in 2016. It is effort by leading experts and institutions to save peat lands as the world's largest terrestrial organic carbon stock and to prevent it being emitted into the atmosphere.

6. INDIA BIO-DIVERSITY AWARDS

Why in News?

- » Recently, India Biodiversity Award 2018 was conferred by the National Biodiversity Authority (NBA).
- » Arunachal Pradesh-based NGO Singchung Bugun Community Reserve (SBVCR) won the India Biodiversity Award 2018 in the “Conservation of wildlife species” category. It was awarded for its efforts to conserve rare critically endangered bird Bugun Liocichla.
- » India Biodiversity Award the award is joint initiative of Union Ministry of Environment, Forest and Climate Change (MoEFCC), National Biodiversity Authority (NBA) and United Nations Development programme (UNDP).

- » It recognizes contribution of a range of stakeholders towards the conservation of biodiversity. It is given in four categories viz. Conservation of Threatened Species, Sustainable use of biological resources, Successful models for access and benefit sharing and Biodiversity Management Committees.

Singchung Bugun Community Reserve:

- » Singchung Bugun Community Reserve is 17 square km biodiversity hotspot in Arunachal Pradesh.
- » It was instituted under Wildlife (Protection) Act, 1972. It is home to critically endangered bird species Bugun Liocichla, which is not reported anywhere else in world. . It lies right next to Eagles nest Wildlife sanctuary, a biodiversity hotspot, which is also home to the bird species.

Bugun Liocichla:

- » The bird was identified as a new species in 2006 and is reportedly only new bird species to have been discovered in India since 1947.
- » It has been named after Bugun tribe because of their conservation efforts. International Union for Conservation of Nature (IUCN) has classified Liocichla as Critically Endangered (CR). There are only about 20-24 pairs which live in the area.

7. THE FLOATING WETLAND WAS INAUGURATED ON WORLD WETLANDS DAY

Why in News?

- » The Floating Treatment Wetland was inaugurated on World Wetlands Day in Neknampur Lake in Hyderabad to clean and purify the polluted water body. Plants planted on FTW can clean the lake by absorbing nitrates and other pollutants in the water.

Facts:

- » FTW is a joint effort of Ngo Dhuvansh, Hyderabad Metropolitan Development Authority, District Administration and other Organisations.
- » It measures around 3,000 sq.ft and comprises four layers i.e floatable bamboo at base, Styrofoam cubicles above it. The third layer consists of gunny bags and gravels on the final layer to support the cleaning agents (plants). FTW's working is based on soil-less hydroponics technique. Micro-organisms growing on FTW and plant root system of cleaning agents break down and consume organic matter in water through microbial decomposition.
- » The root systems filter out sediments and pollutants, reduce content of these chemicals from water bodies.

8. COMMUNITY FOREST RESOURCE

Why in News?

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

Context:

- » The farmers' and forest dwellers' forest dwellers and landless people who have been deprived and alienated from their resources, especially forest resources march from Nashik to Mumbai, and the Maharashtra government's decision to approve most of their demands within the next six months.

Community participation in Forest Conservation:

- » Until people were involved in planning and implementation of forest conservation, development and extracting forest resources like minor forest produce in a sustainable way, the situation was deteriorating. Joint Forest Management Programmes which started involving people in restoring degraded forest. The degraded forest have been regenerated, the land lost to cultivation has been restored to the forest land. Also, the resources that were dwindling in forest areas with deforestation have been improved. The forest cover has been considerably increased post Joint Forest Management Programme implementation. The importance of Forest Rights Act is that it is recognizing the legitimate rights of forest dwellers including the tribal. The tribal do not own any land like other communities who are living in villages and have no other livelihood.
- » The government had recognized that the only way to protect forest is through the communities who live in and around the forest. The forest guards and the forest administrators would not be able to protect the forest. Community participation is required for the forests to survive.
- » In the forest conservation development programmes people have demonstrated that they are in favour of protection and conservation of forests. They have contributed immensely to restore the degenerated forest. They are conserving the forest resource in a sustainable manner.

9. BHUNGROO WATER HARVESTING SYSTEM

Why in News?

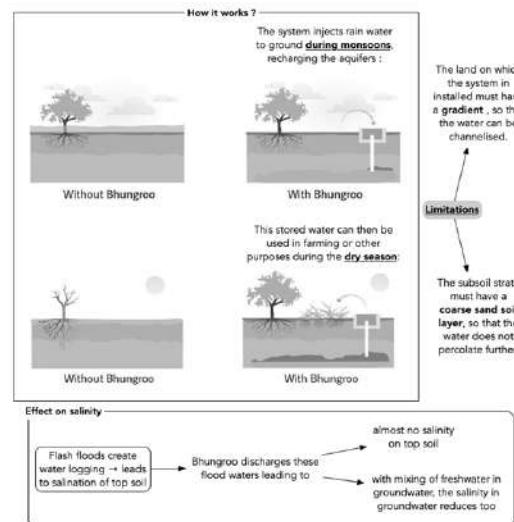
- » This System helped farmers of Coimbatore, in Tamil Nadu who were suffering from drought.

Context:

- » A Geneva based firm Firmenich has installed a unique water harvesting system, named as Bhungroo, near Coimbatore to help farmers overcome water deficiency during dry months.

About:

- » It is a water harvesting technique that uses an injection module to store excess rain water underground. Farmers can then use the same water for irrigation during summer and winter.
- » Bhungroo means “straw” in Gujarati and has been in use in Gujarat since 2002. It is currently being used in Tamil Nadu for horticulture crops.
- » It is also used to prevent soil salinity in marshy areas by checking water logging by injecting excess water into the ground.



Technology involved:

- » Lowest point of the catchment area is identified after hydrological survey of the area.
- » A pipe with a diameter of 5 inches is drilled into the ground up to aquifer or water table.
- » Rain water usually flow towards lowest point and goes into the ground.

11. WORLD MIGRATORY BIRD DAY 2018

Context:

- » World Migratory Bird Day 2018 was celebrated on May 12th this year.
- » “Unifying Our Voices for Bird Conservation”. was the theme of the day.

About World Migratory Bird Day:

- » World Migratory Bird Day is celebrated each year to highlight the need for the conservation of migratory birds and their habitats.
- » More than 300 events in more than 60 countries to mark World Migratory Bird Day 2018 will include bird festivals, education programmes, media events, bird watching trips, presentations, film screenings and a benefit concert to raise funds for international nature conservation.

Conservation of migratory species:

- » Efforts to conserve migratory birds both globally and regionally are internationally coordinated by the Convention on the Conservation of Migratory Species of Wild Animals (CMS, also known as the Bonn Convention) and the Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA).
- » The two UN Environment-administered treaties have been spearheading World Migratory Bird Day since 2006.

About the Convention on Migratory Species (CMS):

- » The Convention on the Conservation of Migratory Species of Wild Animals aims to conserve terrestrial, aquatic and avian migratory species throughout their range.
- » CMS and its related Agreements on migratory birds bring together governments and other stakeholders to coordinate and further develop conservation policies, to ensure that all flyways in the world benefit from coordination mechanisms that promote cooperation at ground level among the countries involved. It is under aegis of United Nations Environment Programme (UNEP).

About the African-Eurasian Migratory Water bird Agreement (AEWA):

- » The Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory water birds that migrate along the African-Eurasian Flyway.
- » The Agreement covers 254 species of birds ecologically dependent on wetlands for at least part of their annual cycle.

12. WATER SCARCE CITIES AND COMPOSITE WATER MANAGEMENT INDEX

Why in News?

- » The NITI Aayog released the results of a study warning that India is facing its ‘worst’ water crisis in history and that demand for potable water will outstrip supply by 2030 if steps are not taken.

Demand for potable water will outstrip supply by 2030, says NITI

1. The NITI Aayog released the results of a study warning that India is facing its ‘worst’ water crisis in history and that demand for potable water will outstrip supply by 2030 if steps are not taken.
2. Nearly 600 million Indians faced high to extreme water stress and about 2, 00,000 people died every year due to inadequate access to safe water.
3. Twenty-one cities, including Delhi, Bengaluru, Chennai and Hyderabad will run out of groundwater by 2020, affecting 100 million people, the study noted.
4. If matters are to continue, there will be a 6% loss in the country’s Gross Domestic Product (GDP) by 2050, the report says.

Ranking the States

- » The NITI Aayog’s observations are part of a study that ranked 24 States on how well they managed their water.

- » Gujarat, Andhra Pradesh and Madhya Pradesh took the top three spots, in that order, and Jharkhand, Bihar and Haryana came in last in the ‘Non-Himalayan States’ category.
- » Himachal Pradesh — which is facing one of its worst water crises this year — led a separate 8-member list of States clubbed together as ‘North-Eastern and Himalayan’.
- » These two categories were made to account for different hydrological conditions across the two groups.

Low performers

1. About 60% of the States were marked as “low performers” and this was cause for “alarm,” according to the report.
2. Many of the States that performed badly on the index — Uttar Pradesh, Odisha, Chhattisgarh — which accounted for 20-30% of India’s agricultural output.

Conservation counts, not Scarcity

1. The index noted, several of the high and medium performers — Gujarat, Madhya Pradesh, Andhra Pradesh, Karnataka, Maharashtra and Telangana — irrespective of droughts in recent years.
2. Therefore, a lack of water was not necessary grounds for States not initiating action on conservation. Most of the gains registered by the States were due to their restoration of surface water bodies, watershed development activities and rural water supply provision.

The Way Forward:

1. Given the combination of rapidly declining groundwater levels and limited policy action this is likely to be a significant food security risk for the country.
2. Envisioned as an annual exercise, the Composite Water Management Index (CWMI), to evaluate States, has been developed by the NITI Aayog to raise awareness for the concern.
3. Experts however say unless India woke up to its water crisis, disaster loomed.
4. There is great awareness now about air pollution however; India’s water crisis does not get that kind of attention.

13. PROTECTION OF PLANT VARIETIES AND FARMERS RIGHTS ACT, 2001

Why in News?

- » **Activists Seek Centre's Intervention in Pepsico's Case Against Farmers.** Nine farmers from Sabarkantha and Aravalli districts have been dragged to court by PepsiCo for allegedly growing a variety of potatoes for which it has claimed Plant Variety Protection (PVP) rights.

- » Plant Variety protection provides legal protection of a plant variety to a breeder in the form of Plant breeder's rights. Plant Breeder's Rights are intellectual property rights that provide exclusive rights to the breeder of the registered variety.

What are the rights enjoyed by the owner of variety/ Breeder's rights?

- » The owner of the protected variety has the following rights
 - ✓ To produce
 - ✓ To sell
 - ✓ To Market
 - ✓ To distribute
 - ✓ To import and export the variety

14. NATIONAL WILDLIFE GENETIC RESOURCE BANK

Context:

- » Union Science and Technology Ministry dedicated to the nation, the National Wildlife Genetic Resource Bank
- » Genetic resources from 23 species of Indian wild animals have been collected and preserved.

Genetic Resource Bank:

- » This facility would increase the collection of genetic resources from wildlife through collaboration with zoos in India. This would facilitate the exchange of genetic material between Indian zoos for maintaining genetic diversity and conservation management made accessible to scientists and wildlife managers for implementing conservation programmes.

LaCONES:

- » The Laboratory for the Conservation of Endangered Species (LaCONES) is a dedicated laboratory of the CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad
- » CCMB-LaCONES is the only laboratory in India that has developed methods for collection and cryopreservation of semen and oocytes from wildlife and successfully reproducing endangered blackbuck, spotted deer and Nicobar pigeons. Wildlife Genetic Resource Banking (GRB) is the systematic collection and preservation of tissues, sperm, eggs and embryos, genetic material (DNA/RNA). It helps prevent the loss of valuable individuals to the gene pool.

Reintroducing Indian Mouse Deer

- » The Telangana Forest Department, Central Zoo Authority, Nehru Zoological Park and CCMB have joined hands to conduct the first-ever planned reintroduction of the Indian spotted chevrotain (*Moschiola indica*), also known as Indian mouse deer

- » This follows more than seven years of conservation breeding of the elusive species at a dedicated facility in the premises of Nehru Zoological Park
- » This helped increase the captive mouse deer population to around 230 individuals till March this year.

15. NATIONAL REDD AND STRATEGY

Why in News?

- » Union Ministry of Environment, Forest and Climate Change (MoEFCC) has released National Reducing Emissions from Deforestation and Forest Degradation (REDD+) strategy for India.
- » It aims at achieve climate change mitigation by incentivizing forest conservation This strategy will soon be communicated to United Nations Framework Convention on Climate Change (UNFCCC).

National REDD+ Strategy.

- » It has been prepared by Indian Council of Forestry Research & Education (ICFRE), Dehradun. It is one of tools to further supplement India's commitment to 2015 Paris agreement. It will support empowerment of youth cadres as community foresters to lead charge at local level. Under it, Green Skill Development programme will be launched for imparting forestry-related specialized skills among the youth.
- » Significance: National REDD+ strategy will help India to fulfill its nationally determined contribution (NDC) commitments and will also contribute to livelihood of forest dependent population. It will help to enhance efforts for forest conservation and enhance productivity of forest eco-systems. It takes into consideration important role played by tribals, other forest dwelling people and society as whole in reiterating India's commitment to Paris Agreement.

Background:

- » Paris Agreement on Climate Change recognizes role of forests in climate change mitigation and calls upon participating nations to take action to implement and support REDD+. India its NDC to this agreement has committed to capture 2.5 to 3 billion tonnes of carbon dioxide (CO₂) through additional efforts in forestry sector. India's first biennial update report to UNFCCC has revealed that forests in India capture about 12% of India's total GHG emissions. Thus, forestry sector in India is making positive cost effective contribution for climate change mitigation.

Reducing Emissions from Deforestation and Forest Degradation (REDD)

- » REDD is set of steps designed to use market and financial incentives in order to reduce emissions of greenhouse gases from deforestation and forest degradation.

- » It is collaborative programme of Food and Agriculture Organization (FAO), United Nations Development Programme (UNDP) and United Nations Environment Programme (UNEP).
- » Its original objective is to reduce greenhouse gases but it is claimed that it can deliver co-benefits such as biodiversity conservation and poverty alleviation. REDD+ initiative goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.
- » It aims at reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks in developing countries. It gives emphasis to activities that will help in sustainable livelihood of local communities and also in conservation of biodiversity.

16. KAZIRANGA NATIONAL PARK

Why in News?

- » The recent census carried out in Kaziranga National Park, Assam has revealed that there was a marginal increase in the population of the one-horned rhinoceros. As per census report, currently there are 2,413 rhinos in Kaziranga National Park registering a marginal increase of 12 rhinos compared to last census.

About the Kaziranga National Park:

- » It is a national park in the Golaghat and Nagaon districts of the state of Assam, India.
- » It is a World Heritage Site. The sanctuary hosts two-thirds of the world's great one-horned rhinoceroses. Rhinos are listed as vulnerable on the IUCN Red list of Threatened Species.
- » **Tigers:** Kaziranga is home to the highest density of tigers among protected areas in the world, and was declared a Tiger Reserve in 2006
- » **Fauna:** The park is home to large breeding populations of elephants, wild water buffalo, and swamp deer
- » **Important Bird Area:** Kaziranga is recognized as an Important Bird Area by BirdLife International for conservation of avifaunal species
- » When compared with other protected areas in India, Kaziranga has achieved notable success in wildlife conservation. Located on the edge of the Eastern Himalaya biodiversity hotspot, the park combines high species diversity and visibility
- » **Flora:** Kaziranga is a vast expanse of tall elephant grass, marshland, and dense tropical moist broadleaf forests, criss-crossed by four major rivers, including the Brahmaputra, and the park includes numerous small bodies of water
- » The park celebrated its centennial in 2005 after its establishment in 1905 as a reserve forest.

17. RECOVERY PROGRAMME FOR WILDLIFE SPECIES:

Why in News?

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

Species recovery programme:

- » The species recovery programme of the Union Environment Ministry is implemented under Integrated Development of Wildlife Habitats — a centrally sponsored umbrella scheme for management and conservation of parks, wildlife habitats and conservation.
- » Started in 2008-09, IDWH is meant for providing support to protected areas (national parks, wildlife sanctuaries, conservation reserves and community reserves except tiger reserves), protection of wildlife outside protected areas and recovery programmes for saving critically endangered species and habitats.

Facts:

- » Species already included in the recovery programme: Snow Leopard, Bustard (including Floricans), Dolphin, Hangul, Nilgiri Tahr, Marine Turtles, Dugongs, Edible Nest Swiftlet, Asian Wild Buffalo, Nicobar Megapode, Manipur Brow-antlered Deer, Vultures, Malabar Civet, Indian Rhinoceros, Asiatic Lion, Swamp Deer and Jerdon's Courser.
- » India is a party to the International Whaling commission that is committed to the protection of whales and its habitats in Indian waters.

National Board for Wildlife (NBWL)

- » It is a statutory Board constituted in September 2003 under Section 5 of the Wild Life (Protection) Act, 1972. The NBWL is chaired by the Hon'ble Prime Minister.

GEOGRAPHY

1. INDIA'S FIRST MOISTURE SOIL MAP

Why in News?

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

Moisture Mapping

1. With the Rabi season around the corner, a countrywide forecast is prepared at the end of the monsoon season.
2. This forecast, following a joint exercise by IIT Gandhinagar and the India Meteorological Department (IMD), for the first time, provides a country-wide soil moisture forecast at seven and 30-day lead times.
3. Soil moisture is crucial for agriculture since it directly affects crop growth and how much irrigation is required for the area.
4. It suggests deficit soil moisture conditions are likely in Gujarat, Bihar, Jharkhand, Tamil Nadu and southern Andhra Pradesh.

Why need Moisture Map?

- Crucial information needed for agriculture is not revealed only through rainfall data.
- Even if there's a normal rainfall, if the temperature is abnormally high, it can rapidly deplete the soil moisture.
- So essentially soil moisture gives us more information on what is needed for crop growth in different parts of the country.
- Forecasting of soil moisture holds significance for the rabi season.
- As per official data, the total area sown under rabi crops is around 625 lakh hectares of which wheat takes up 300 lakh hectares.
- Timely soil moisture forecasts will help target interventions, in terms of seed varieties for better planning in agriculture.

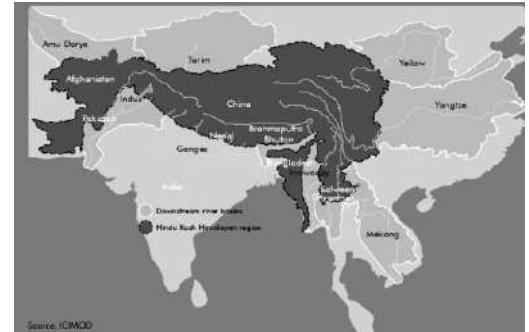
2. HINDU KUSH HIMALAYA ASSESSMENT REPORT

Why in News?

- » The International Centre for Integrated Mountain Development (ICIMOD) recently released the Hindu Kush Himalaya Assessment report.

What is the Background?

- » The Hindu Kush Himalayan (HKH) region extends 3,500 km over all or part of eight countries from Afghanistan in the west to Myanmar in the east.
- » It is the source of ten large Asian river systems – the Amu Darya, Indus, Ganges, Brahmaputra, Irrawaddy, Salween (Nu), Mekong, Yangtse, Yellow River, and Tarim (Dayan).
- » It provides water, ecosystem services, and the basis for livelihoods to a population of around 210.53 million people in the region.
- » The basins of these rivers provide water to 1.3 billion people, a fifth of the world's population.
- » The Himalayan range alone has the total snow and ice cover of 35,110 sq.km containing 3,735 cu.km of eternal snow and ice.



What does the Report reveal?

- » It reveals that more than 35 % of the glaciers in the region could retreat by 2100, even if the global temperature rise is capped at 1.5° C.
- » This could destabilise the hydrology of large parts of South Asia, China and Myanmar.
- » Regions in higher altitudes tend to warm faster than low-lying lands.
- » So, a global temperature increase of 1.5°C could mean at least a 1.8°C temperature rise in the Hindu Kush Himalayas. This will have a major bearing on the ice-fields, which are the largest repository of permafrost outside the polar regions.
- » Since the region's snow is the source of 10 major river systems, large-scale warming could drastically alter the river flows in these countries.
- » The receding glaciers could cause a deluge in the rivers during the monsoon while the flows are likely to reduce during the dry seasons, with serious implications for irrigation, hydropower and ecosystem services. Also, the receding glaciers might be the reason for the changing monsoon. Hindu Kush Himalayan region is a heat sink in summer and a heat source in winter, and this influences the Indian summer monsoon.
- » The number of intense precipitation days and intensity of extreme precipitation have increased overall in the last five decades.

- » If these trends persist, the frequency and magnitude of water-induced hazards in the Hindu Kush Himalaya region will increase.
- » This is a significant conclusion given that developments in the Himalayas are known to have a spin-off on the monsoon in the Subcontinent.
- » However, more studies are required to firm up the links between extreme weather events in the higher reaches of the Subcontinent and the erratic weather in the plains.
- » For this, more data sharing between the countries that share the Hindu Kush Himalaya is needed. Political differences between these countries should not come in the way of joint efforts to build resilience of vulnerable communities and shore up the region's water security.
- » Such cooperation must go alongside meeting the Paris Climate Change Pact's goals.

What should be done?

- » The need is now for informed science-driven advocacy for urgent climate action and immediate conservation efforts.
- » Else, the disastrous impact of glacier-melting will leave the world at large reeling.
- » Success in meeting the Paris Climate Pact's target might not be enough to prevent a serious meltdown in the Hindu Kush Himalayas.
- » Hence, more realistic targets specific to the region are needed, with the consensus of all the nations surrounding this part of the Himalayan region.

3. CLIMATE CHANGE THREATENING UNDER WATER FORESTS

Why in News?

- » Climate change could lead to decline of underwater kelp forests by impacting their micro biome, according to a study.

Kelp Forests:

- » Kelp Forests are underwater ecosystems formed in shallow water by the dense growth of several different species known as kelps.
- » Though they look very much like plants, kelps are actually extremely large brown algae.

How it is getting affected?

- » Predicted ocean warming and acidification can change microbes on the kelp surface, leading to disease and potentially putting fisheries at risk.
- » Climate change is affecting biodiversity at a global scale. In the marine realm, ocean warming and acidification are pushing dominant habitat-forming species, such as corals and large seaweeds, into decline, affecting biodiversity.

- » The study, published in the journal Proceedings of The Royal Society B, shows these two processes can cause changes in the micro biome on the surface of large brown seaweed leading to disease-like symptoms.
- » Blistering, bleaching and eventually degradation of the kelp's surface is impacting the species' ability to photosynthesise and potentially survive.

This could impact kelp forests around the world:

- » It could contribute to further declines of the 8,000-kilometre-long kelp forests that dominate the bottom half of Australia -- known as the Great Southern Reef -- potentially affecting all the associated ecosystems, including many species of fish, shellfish, lobster and abalone.
- » Losing the kelp forests, means we also lose our two biggest fisheries. "Kelp forests support ecosystem services such as biodiversity and fisheries resources worth up to almost \$1 million per kilometre of coastline per year."
- » Climate-driven marine heat waves, strong storms, expanding tropical herbivores, gradual warming temperatures, invasive species and nutrient pollution are some of drivers shifting kelp forests into degraded turf reefs." • The problem is, kelps thrive in cool water and ocean warming is stressing them, lowering their capacity to resist the many pressures they are facing.
- » The socio-economic as well as ecological consequences of this global deforestation could be devastating.

4. DEEP OCEAN MISSION

Why in News?

- » In a recently unveiled Deep Ocean Mission (DOM) blueprint, Centre has drawn up a five year, Rs. 8000 Crore plans on lines of ISRO in designing and launching satellite.
- » **Ministry:** Ministry of Earth Sciences

Mission:

- » The focus of DOM is on deep-sea mining, ocean climate change advisory services, underwater vehicles and underwater robotics related technologies.
- » Two key projects planned under it include desalination plant powered by tidal energy and submersible vehicle that can explore depths of at least 6,000 metres.

Why it is important?

- » India's Exclusive Economic Zone (EEZ) spreads over 2.2 million sq. km and in the deep sea, lies unexplored and un utilised. Besides, India has been allotted site of 1,50,000 sq. km in Central Indian Ocean Basin (CIOB) by United Nations International Sea Bed Authority (UN-ISBA) for exploitation of poly metallic nodules (PMN). These are rocks scattered on seabed containing iron, nickel, manganese and cobalt.

- » It is envisaged that 10% of recovery of that large reserve can meet energy requirement of India for next 100 years. It has been estimated that 380 million metric tonnes of poly metallic nodules are available at the bottom of the seas in CIOB.

5. THE MEGHALAYAN AGE

Why in News?

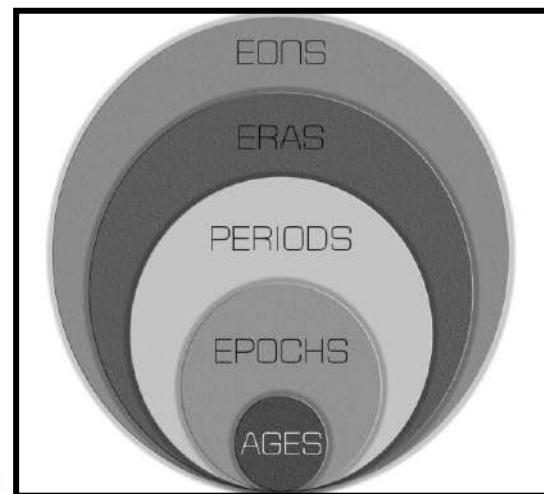
- » Geologists have decided to classify the past 4,200 years as the Meghalayan Age.
- » It is the most recent unit of the Geologic Time Scale in the 4.6 billion-year history of the Earth.

What is Meghalayan Age?

- » The “Meghalayan Age” began 4,200 years ago and experienced an abrupt mega-drought and cooling around the globe. The drought and the cooling lasted two centuries and severely impacted agricultural-based societies that developed in several regions after the end of the last Ice Age. It resulted in the collapse of civilisations in Egypt, Greece, Syria, Palestine, Mesopotamia, the Indus Valley, and the Yangtze River Valley.
- » Evidence of the 4,200-year climatic event has been found on all seven continents. This age is considered unique as this was the only age which began with a global cultural event produced by a global climatic event.
- » Geologists have also introduced two other age classifications:
- » Greenlandian Age (11,700 - 8,326 years ago) - began when the last ice age ended and the world began to warm up.
- » Northgrippian Age (8,326 – 4,200 years ago) – began after an abrupt global cooling started following the Greenlandian Age. Together, these three stages stretch across the Holocene Epoch, which is the current geological time unit - having started 11,700 years ago.

Methods of Classification:

- » Each subdivision of the Holocene Epoch is marked out by sediments accumulated on sea floors, lake bottoms, glacial ice and in stalactites and stalagmites across the world.
- » Clues to the Greenlandian and Northgrippian stages were available at specific levels in Greenland’s ice cores (snow turns into ice, and preserves a record of the climate each year).
- » But this method did not work as well for the younger (newer) part of the Holocene as it did for the older (early) part.



- » Therefore, the younger (newer) part of the Holocene, i.e. Meghalayan Age division was marked out by a deviation in the types, or isotopes, of oxygen atoms present in the layers of stalagmite rocks of Maulm Cave in Meghalaya. Both the ice cores and the stalagmite are now defined as “International Geo standards.” The stalagmite has also been tagged a Global Boundary Stratotype
- » Section and Points (GSSP), the first formally ratified marker of a geological time period change in India. Scientists used the geological age dating method to study the rock’s age.

Classification

- » Geologists divide the 4.6-billion-year existence of Earth into slices of time such as Eon, Era, System/Period, Series/Epoch, and Stage/Age.
- » Eons are divided into Eras, Eras into Periods, Periods into Epochs, and Epochs into Ages.
- » Each slice corresponds to significant happenings - such as the break-up of continents, dramatic shifts in climate, and even the emergence of particular types of animals and plant life.

International Commission on Stratigraphy (ICS)

- » The International Commission on Stratigraphy (ICS) is the largest and oldest scientific body in the International Union of Geological Sciences (IUGS).
- » It is the official keeper of geologic time, i.e. it precisely defines units (periods, epochs, and age) of the Geologic Time Scale.

6. ENSEMBLE PREDICTION SYSTEM

Why in News?

- » IMD has launched systems for probabilistic weather forecasting known as Ensemble Prediction Systems (EPS).

About the System:

- » The India Met Department (IMD) has launched two “very high resolution” Ensemble Prediction Systems.
- » These are to generate ten-day probabilistic weather forecasts.
- » The new systems in place can provide rainfall forecasts with probabilities allowing better lead time to prepare for extreme weather events.
- » These systems also use a higher resolution 12 km grid scale, instead of the 23 km resolution that has been in use. These systems will improve upon the existing deterministic forecasts that are prone to high margins of errors.
- » The new system will tell us the probability of rainfall according to its intensity and volume.
- » This will be colour coded for ease of interpretation.

- » These systems will also help disaster management authorities in making better emergency response decisions.
- » But these particular systems are specifically for rainfall, though it can be tweaked to provide similar forecasts for thunderstorms, cold waves and weather events.
- » Also, this model will not specifically be helpful in providing the exact nature and intensity of thunderstorms.

7. POLAR VORTEX

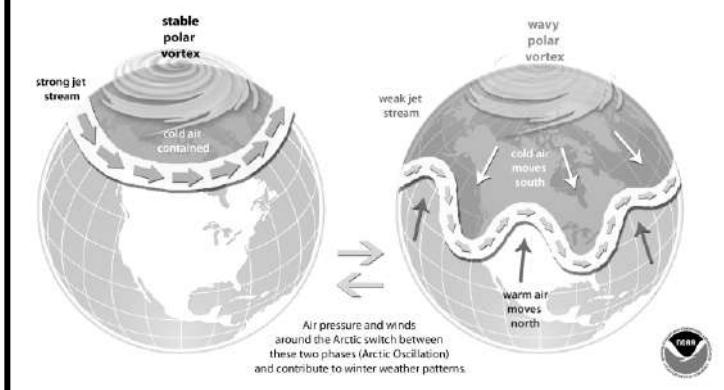
Why in News?

- » Recently, the **United States** is grappling with **extreme cold with temperature** reaching to -30°C in cities like Chicago and Dakota.
- » This is caused by a blast of Arctic air, which is a result of a “polar vortex” event.
- » The polar vortex is a large area of low pressure and cold air surrounding both of the Earth’s poles. It was also known as the Polar Pig.
- » The term "vortex" refers to the counter clockwise flow of air that helps keep the colder air near the Poles. It always exists near the poles, but weakens in summer and strengthens in winter.
- » However, many times during winter in the northern hemisphere, the polar vortex will expand, sending cold air southward. This occurs fairly regularly during wintertime and is often associated with large outbreaks of Arctic air in the United States and portions of Europe and Asia.
- » It is also not a feature that exists at the Earth’s surface, rather it exists tens of thousands of feet up in the atmosphere.
- » By itself, the only danger to humans is the magnitude of how cold temperatures will get when the polar vortex expands, sending Arctic air southward into areas that are not typically that cold.

The Science Behind the Polar Vortex

The polar vortex is a large area of low pressure and cold air surrounding the Earth's North and South poles. The term vortex refers to the counter-clockwise flow of air that helps keep the colder air close to the poles (left globe). Often during winter in the Northern Hemisphere, the polar vortex will become less stable and expand, sending cold Arctic air southward over the United States with the jet stream (right globe).

The polar vortex is nothing new — in fact, it's thought that the term first appeared in an 1853 issue of *E. Littell's Living Age*.



How is it Linked to Global Warming?

- » The global temperature has risen by 0.8°C since 1880.
- » The Arctic has warmed over twice the average.
- » The temperature difference between North Pole and regions like North America has reduced
- » The energy generated by the jet stream travels upward and disrupts the polar vortex, causing it to split.
- » One of these two "child" vortices have visited North America this week, causing the record temperatures.



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