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Ecology & Biodiversity

1 Nilgiri Tahr: Climate change threatening 60% of its habitat

CONTEXT: A new study has predicted that most of the existing habitats of the Nilgiri Tahr (species of wild mountain goat) in the Western Ghats will become unsuitable as global warming intensifies.

Nilgiri Tahr:

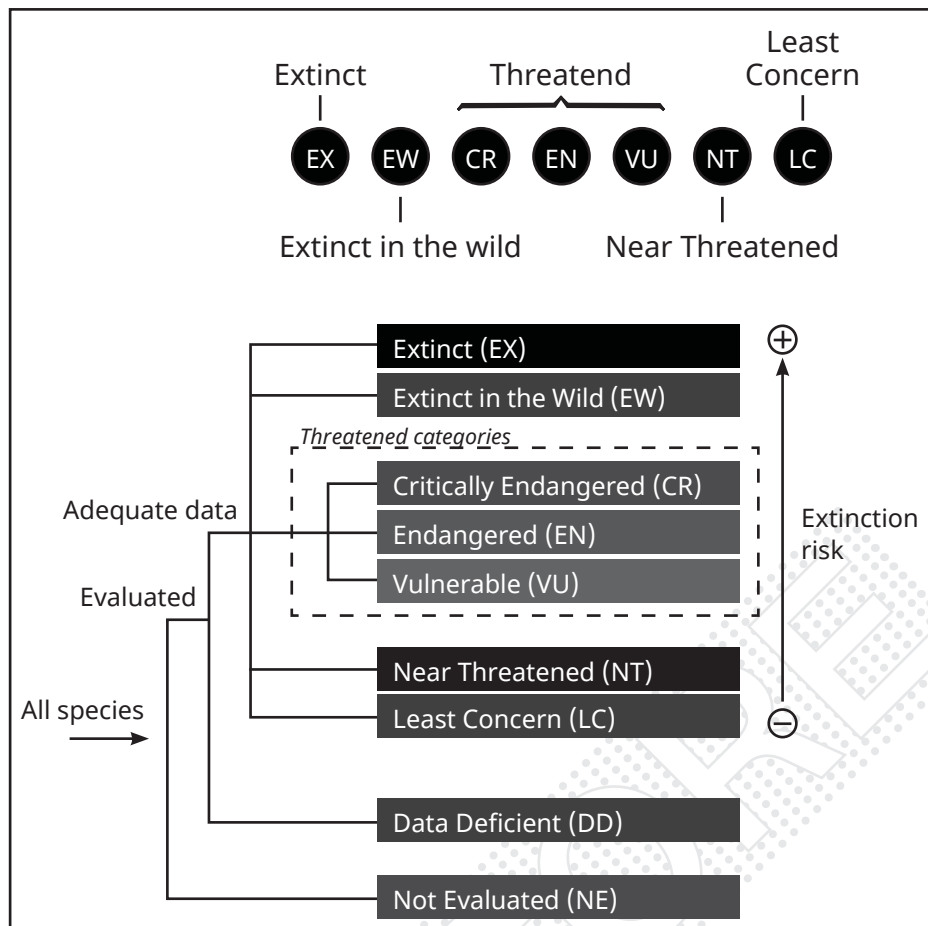
- **IUCN Redlist Status:** Endangered
- **Habitat And Ecology:** Grassland, Shrubland, Rocky areas (eg. inland cliffs, mountain peaks)
- They are known as **Pride of Munnar**.
- Found in the tourism zone of the **Eravikulam National Park (ENP)** near Munnar.

Study Analysis:

- Historically, the Nilgiri Tahr was **found everywhere in the Western Ghats**.
- 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 that **KalakkadMundanthurai Tiger Reserve** in Tamil Nadu and the **Peppara, NeyyarSchenduruny and Srivilliputhur 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**.
- The study recommends **surveys for improving the condition** of existing habitats.

Other Threats:

- Agriculture & aquaculture: Annual & perennial **non-timber crops, Livestock farming & ranching**.
- Biological resource use: **Hunting & trapping terrestrial animals**.
- Invasive and other problematic species, **alien species, genes & diseases**.



International Union for Conservation of Nature (IUCN)

- The International Union for Conservation of Nature is an international organization **working in the field of nature conservation and sustainable use of natural resources**.
- **Created in 1948**, IUCN has evolved into the world's largest and most diverse environmental network. It is involved in data gathering and analysis, research, field projects, advocacy, and education. IUCN is the global authority on the status of the natural world and the measures needed to safeguard it.
- It is a membership Union **uniquely composed of both government and civil society organisations. It provides public, private and non-governmental organisations** with the knowledge and tools that **enable human progress, economic development and nature conservation to take place together**.
- **Headquarter: Gland, Switzerland**

IUCN Red List of Threatened Species:

- Established in 1964, the International Union for Conservation of Nature's Red List of Threatened Species has evolved to become the world's most comprehensive information source on the global conservation status of animal, fungi and plant species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies
- The IUCN Red List is a critical indicator of the health of the world's biodiversity.
- Far more than a list of species and their status, **it is a powerful tool to inform and catalyze action for biodiversity conservation and policy change, critical to protecting** the natural resources we need to survive.
- It provides information about range, population size, habitat and ecology, use or trade, threats, and conservation actions that will help inform necessary conservation decisions.

IUCN Red list Categories: Species are classified by the IUCN Red List into nine groups.

- **Extinct (EX)** – beyond reasonable doubt that the species is no longer extant.
- **Extinct in the wild (EW)** – survives only in captivity, cultivation and/or outside native range, as presumed after exhaustive surveys.
- **Critically endangered (CR)** – in a particularly and extremely critical state.
- **Endangered (EN)** – very high risk of extinction in the wild, meets any of criteria A to E for Endangered.
- **Vulnerable (VU)** – meets one of the 5 red list criteria and thus considered to be at high risk of unnatural (human-caused) extinction without further human intervention.
- **Near threatened (NT)** – close to being at high risk of extinction in the near future.
- **Least concern (LC)** – unlikely to become extinct in the near future.
- **Data deficient (DD)**
- **Not evaluated (NE)**

2 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.

- What most people thought were the **last remaining wild horses** on Earth — known as **Przewalski's horses** — were actually domesticated horses that escaped their owners.
- The study is based on archaeological work at **two sites in northern Kazakhstan, called Botai and KrasnyiYar**, where scientists have found the earliest proof of horse domestication, going back more than 5,000 years.

Przewalski's horses:

- **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

3 Assam to observe 'Rhino Day' on September 22

CONTEXT: 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'.

- **Assam's one-horned rhinos** are all set to get their due recognition.
- One-horned rhinoceros is the **largest of the Asian Rhinos**.

One-horned rhinos:

- 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, Pobitara, Jaldapara (in Assam), Dudhwa (UP) National Park.
- Kaziranga National Park hosts two-thirds of the world's Great One-horned rhinoceros (68% of worldwide population).

4 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

- It is a national park in the **Golaghat and Nagaon districts** of the state of **Assam**, India. The sanctuary, which hosts two-thirds of the world's great **one-horned rhinoceroses**, is a **World Heritage Site**.
- The park is home to large breeding populations of **elephants, wild water buffalo, and swamp deer**.
- Kaziranga is recognized as an **Important Bird Area by Bird Life International** for conservation of avifaunal species.
- The park area is circumscribed by the **Brahmaputra River**, which forms the northern and eastern boundaries, and the **Mora Diphlu**, which forms the southern boundary. Other notable rivers within the park are the **Diphlu and Mora Dhansiri**.
- Kaziranga has flat expanses of fertile, alluvial soil, formed by erosion and silt deposition by the **River Brahmaputra**.
- The park is located in the **Indomalaya ecozone**
- Kaziranga was **declared a Tiger Reserve in 2006** and has the highest density of tigers in the world (one per five km²).
- Kaziranga's rivers are also home to the endangered **Ganges dolphin**.



5 Freedom Baby: India's first Humboldt penguin dies

CONTEXT: India's first captive-born Humboldt Penguin named Freedom Baby died barely a week after it was born at Veermata Jijabai Bhosale Udyan and Zoo (Byculla zoo).

Humboldt penguin:

- It is named after the **cold water current** (Humboldt Current) it swims in. It is native to South America and breeds in coastal Chile and Peru.
- It is categorized as **vulnerable** under IUCN list.

- It died due to new born anomalies like liver dysfunction and yolk sac retention.
- The penguin chick was born on **15th August 2018** to penguin pair of Mr Molt (male) and Flipper (Female).
- It was named **Freedom Baby as it was born on Independence Day**

6**Swelling Salinity Threatens Gangetic Dolphins**

CONTEXT: Five year study in Sundarbans region has found that rising water salinity is threatening the habitat of Gangetic dolphins.

Gangetic dolphins

- IUCN Status: endangered
- **Habitat And Ecology:** Inland Fresh water, Marine Neritic, Wetlands (inland), Artificial/Aquatic & Marine
- One of the 4 freshwater dolphin species found in the India. Other three are found in **Indus in Pakistan, Yangtze River in China and Amazon River in South America.**
- They fall under Schedule 1 of Wildlife Protection Act, 1972 and declared by IUCN.

Threat Analysis:

- Study highlighted that earlier in 1879, these freshwater loving mammals swam along the entire length of Ganga and Brahmaputra and all of their tributaries. From the delta of Bay of Bengal up to the Himalayan foothills.
- Today at the merging of Ganga, Brahmaputra and Meghna which form the Sundarban region, these dolphins struggle to survive.
- **India's "Dolphin Man" Ravindra Sinha** has observed that **water diversion, commissioning of large barrages upstream** has impacted the salinity profile of rivers downstream in central sundarbans.
- Declining flow of Ganga is the biggest threat to Gangetic dolphins along with water intensive agriculture in the basin.
- **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.

Other Threats:

- Biological resource use: Fishing & harvesting aquatic resources,
- Natural system modifications: Dams & water management/use
- **Pollution: Industrial & military effluents, Agricultural & forestry effluents**

7 Indus Dolphins (BHULAN)

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

- 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.

Indus Dolphin

- 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 like Ganges River dolphin is **functionally blind** and relies on **echolocation** to navigate, communicate and hunt prey in muddy river water.
- Their **numbers have declined dramatically** after construction of irrigation system. It listed by the **IUCN as endangered on its Red List** of Threatened Species.
- 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**.

8 Bahuda Rookery: Another Olive Ridley Nesting Site in Odisha

Olive Ridley

- **IUCN Status: Vulnerable**
- Habitat — **warm and tropical waters of primarily in the Pacific**, Indian Ocean and Atlantic Ocean.
- Gets name from its **olive colored carapace**, which is heart-shaped and rounded
- **Arribadas** — synchronized nesting in mass numbers, mating and breeding season — winter
- **Mostly carnivorous**, feeding on such creatures as jellyfish, snails, crabs, and shrimp. They will occasionally eat algae and seaweed
- Threats from Poaching for their meat, shell and leather, and their eggs
- Ingestion of marine debris that causes perforation of the digestive system and exposure to chemicals and hence death.

Nesting sites in India:

- Hope Island of Coringa Wildlife Sanctuary (Andhra Pradesh)
- Gahirmatha beach (Odisha)
- Astaranga coast (Odisha)
- Beach of Rushikulya Rive

- Devi River mouth
- **Gahirmatha marine sanctuary and Rushikulya rookery** coast in Ganjam district are main Olive Ridley Nesting sites in Odisha. Of these sites, **Gahirmatha marine sanctuary** is largest rookery (mass nesting site) of Olive Ridley turtles.
- **Odisha is home to 50% of the total world's population of Olive Ridleys and about 90% of Indian population of sea turtles.**
- Recently, Odisha forest department added another olive ridley mass nesting site Bahuda Rookery at beach on **Bahuda river** mouth in Ganjam district. It is located around 20 km to south of Rushikulya rookery coast.
- Also, **olive ridley turtles** has created an all-time record of mass nesting at the **Rushikulya rookery coast** in the Ganjam district of **Odisha** this year.
- **Operation Olivia** — Olive Ridely Turtle protection program undertaken by **Indian Coast Guard**.

9 Global Tiger Recovery Program

CONTEXT: 3rd stocktaking conference on the global tiger recovery program held in New Delhi, January 2019, highlights the world to fall short of its targets of doubling the tiger population.

Tiger:

- **IUCN Status: Endangered**
- **Habitat And Ecology:** Shrubland, Forest, Grassland
- The **tiger range countries** that are part of the Global Tiger Recovery Program are **Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Nepal, Russia, Thailand, and Vietnam.**

Global Tiger Recovery Program:

- **St. Petersburg declaration on doubling the tiger population** was signed in 2010 under which all **13 tiger range countries** in asia and partner organizations of the global tiger initiative agreed to a global tiger recovery program, the first-ever coordinated, range-wide and international effort to save the world tigers.
- The Declaration in turn established **29 July as the International Tiger Day** (also known as Global Tiger Day) to be observed annually to raise awareness for tiger conservation.
- Nearly a decade has passed since the **St. Petersburg Declaration on Tiger Conservation** issued at the St. Petersburg Tiger Summit. However the progress on the **targets envisaged by the declaration has not been at par.**
- However, China and Indonesia were not present at the conference.

Threats Analysis:

- Over **one-third of tiger conservation sites** in the world are severely at risk of losing their wild tigers — the majority of which are in Southeast Asia.
- Known hot spots for illegal trade in tiger parts include the Indo-Nepalese border, South India, Central India, Mekong-China, Indonesia-China and Russia-China.
- **Residential & commercial development:** Housing & urban areas, Commercial & industrial areas, Tourism & recreation areas
- **Agriculture & aquaculture:** Annual & perennial non-timber crops, Wood & pulp plantations, Livestock farming & ranching, Marine & freshwater aquaculture

- **Energy production & mining:** Mining & quarrying
- **Biological resource use:** Hunting & trapping terrestrial animals
- **Human intrusions & disturbance:** Recreational activities, War, civil unrest & military exercises
- **Natural system modifications:** Fire & fire suppression, Dams & water management/use
- **Invasive and other problematic species, genes & diseases.**

10 Project Tiger

- The Government of India has taken a pioneering initiative for conserving its national animal, the tiger, by launching the '**Project Tiger**' in **1973**.
- From 9 tiger reserves since its formative years, the Project Tiger coverage has increased to 50 at present, spread out in 18 of our tiger range states. This amounts to around 2.21% of the geographical area of our country.
- The tiger **reserves are constituted on a core/buffer strategy. The core areas have the legal status of a national park or a sanctuary**, whereas the buffer or peripheral areas are a mix of forest and non-forest land, managed as a multiple use area.
- The Project Tiger aims to foster an exclusive tiger agenda in the core areas of tiger reserves, with an inclusive people oriented agenda in the buffer.
- Project Tiger is an **ongoing Centrally Sponsored Scheme** of the Ministry of Environment, Forests and Climate Change providing central assistance to the tiger States for tiger conservation in designated tiger reserves.
- The **National Tiger Conservation Authority (NTCA) is a statutory body** of the Ministry, with an overarching supervisory / coordination role, performing functions as provided in the Wildlife (Protection) Act, 1972.

The Wild Life (Protection) Act, 1972

- The Wildlife Protection Act, 1972 enacted for protection of plants and animal species.
- The Act provides for the protection of wild animals, birds and plants; and for matters connected therewith or ancillary or incidental thereto. It extends to the whole of India, except the State of Jammu and Kashmir which has its own wildlife act.
- Before 1972, India only had five designated national parks. Among other reforms, the Act established schedules of protected plant and animal species; hunting or harvesting these species is largely outlawed. It has six schedules which give varying degrees of protection.
 - ▶ **Schedule I and part II of Schedule II** provide absolute protection - offences under these are prescribed the highest penalties.
 - ▶ **Species listed in Schedule III and Schedule IV** are also protected, but the penalties are much lower.
 - ▶ **Schedule V** includes the animals which may be hunted.
 - ▶ The specified endemic plants in **Schedule VI** are prohibited from cultivation and planting.
- The hunting to the Enforcement authorities have the power to compound offences under this Schedule (i.e. they impose fines on the offenders).
- Amended in 1982, 1986, 1991, 1993, 2002, 2006

11 Tiger Census 2018

CONTEXT: India began counting of tigers all across the country in 2018, the most significant survey of the wildlife itself anywhere on the planet.

- The **first tiger census conducted in 1972** Counting of the majestic tigers done in **every four years by the National Tiger Conservation Authorities (NTCA)**.
- NTCA has fully loaded guns of technology for more accurate numbers of tigers and to avoid the minor counting mistakes in tiger census 2018.
- In 2018, NTCA going to use an android app named **MSTripES for the proper location data feeding and filling the record more accurately**.
- Another primary focus of the tiger census 2018 is to cover the northeast India that was not included in the previous census because of the several reasons. This inclusion will surely go to boast in the number of the tigers as compared to the census 2014.
- Individual tigers can be easily identified from the camera images through the software that records the animal's unique stripe pattern.
- The **last census done in 2014 had counted total 2,226 tigers**, 76% of the total, through images from the camera-traps deployed in the forests all across India.

12 Asiatic Lion Conservation Project' launched by Government

CONTEXT: The Ministry of Environment, Forest and Climate Change, Government of India has launched the "Asiatic Lion Conservation Project".

The Asiatic lion

- It is a **Panthera leo leo** population in India.
- On the **IUCN Red List** it is listed as **Endangered** because of its small size and area of occupancy.
- Its range is restricted to the **Gir National Park and environs** in the Indian state of Gujarat.
- **This lion population has steadily increased since 2010.**

- **Aim: To protect and conserve the world's last ranging free population of Asiatic Lion and its associated ecosystem.**
- Key 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.

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.
- The **14th Asiatic Lion Census 2015** was conducted in May 2015. In 2015, the population has been **523** (27% up compared to previous census in 2010).
- The seven major perennial rivers of the Gir region are **Hiran, Shetrunji, Datardi, Shingoda, Machhundri, Godavari and Raval**.
- 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**'.

13 Vaccination of Gir lions against deadly canine distemper virus

CONTEXT: As many as 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.

- The Gujarat forest department started vaccination of lions in the Gir sanctuary to protect them from a deadly virus blamed for the death of some of the big cats in their last abode.
- The lions, an endangered species, are being vaccinated under intensive veterinary care and as per standard protocol.
- After the CDV spread was confirmed in Asiatic lions, the state government had urgently imported 300 shots of the vaccine against the virus from the US.

14 Rajasthan's first lion safari inaugurated at Nahargarh Biological Park

CONTEXT: Rajasthan Forest Minister inaugurated the state's first lion safari at Nahargarh Biological Park.

Lion safari

- The lion safari project is located at biological park spread across 38 hectare. The park was inaugurated by Rajasthan Chief Minister in June 2016.
- Lions in this park were brought from Junagarh, Gujarat under an exchange programme. Total of 10 lions will be released in the park in a phased manner.
- The park will serve for breeding lions and also centre of attraction for tourists. It will provide new habitat to lions and also add tourism venue to the Pink City.
- Visitors will be able to see lions in their natural habitat in the park in enclosed by a fence. They will be taken on a nearly 4 kilometer safari in closed bus.

Nahargarh Biological Park

- It is located **in the vicinity of Nahargarh Fort**; outside Jaipur located about 12 km from Jaipur on the outskirts of the city near Jaipur- Delhi highway.
- This Biological Park has spread over 7.2 sq km of Nahargarh Sanctuary Park under the **Aravalli range**.
- The **main initiative of the park is to conserve the flora and fauna**.

15 NTCA, Cheetah Reintroduction Project: Nauradehi wildlife sanctuary

CONTEXT: 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**
- **Habitat And Ecology:** 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.
- The cheetah is also the world's fastest land mammal, an icon of nature. 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.

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 Chapar 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.

16 Black Panther

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

- The photographs make **Odisha the ninth State** in India where the **elusive and rare big cat has been seen.**
- 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.** 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.**

17 Monkey Declared Vermin in Himachal Pradesh

CONTEXT: 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.

18 Harrier Birds

- Harrier birds are **migratory raptor species** that regularly visits vast swathes of India.
- India has one of the **largest roosting sites in the world for Pallid Harriers and Montagu's Harriers**.
- Recent reports highlights that the numbers of birds visiting the site are **declining**.
- In **Hessarghatta on the outskirts of Bengaluru**, Western Marsh Harriers declined significantly, leaving the area nearly deserted.
- The gravest **concern is the loss of grasslands**, either to urbanisation or to agriculture.
- **Excessive use of pesticides** in farms in and around the roosting sites could also be a reason for the lowered population counts.

19 Odisha police launch drive to bust Pangolin smuggling racket

Context: 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.

Pangolin

- Pangolins or **scaly anteaters** are mammals of the order **Pholidota**.
- 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 International Union for Conservation of Nature Red List of Threatened Species.
- 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.
- 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**.

- It has requested Union Home Ministry to approach the Myanmar government to block the transit route for smuggled pangolin under **Mutual Legal Assistance Treaty (MLAT)**.
- MLAT is an agreement between nations to exchange information or provide legal assistance for enforcing laws.

20 Uttarakhand HC declares entire animal kingdom as legal entities

CONTEXT: The Uttarakhand HC 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 animals 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.
- 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.

21 'Gaj Yatra'

CONTEXT: Ministry of Environment, Forest and Climate Change (MoEFCC) rolled out 'Gaj Yatra', an awareness campaign to protect elephants from Tura in Garo Hills of Meghalaya.

- It was organised by the **Wildlife Trust of India** in collaboration with the State Forest Department.
- Under this campaign, an **elephant mascot** will be taken across districts frequented by jumbo herds for generating awareness among the people.
- It was launched to acknowledged good gesture of villagers from Garo Hills who had set aside part of their community-owned land to create village reserve forests for human-elephant harmony.

Gaj 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 campaign is being led by **Wildlife Trust of India (WTI)**.
- It aims to involve people from all walks of life in conservation of elephants.
- 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.

Andaman & Nicobar Islands home to tenth of India's fauna species: ZSI

CONTEXT: A recent publication by the Zoological Survey of India (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**.

- The islands, comprising only **0.25% of India's geographical area**, are home to more than **10% of the country's fauna species**.

Andaman and Nicobar

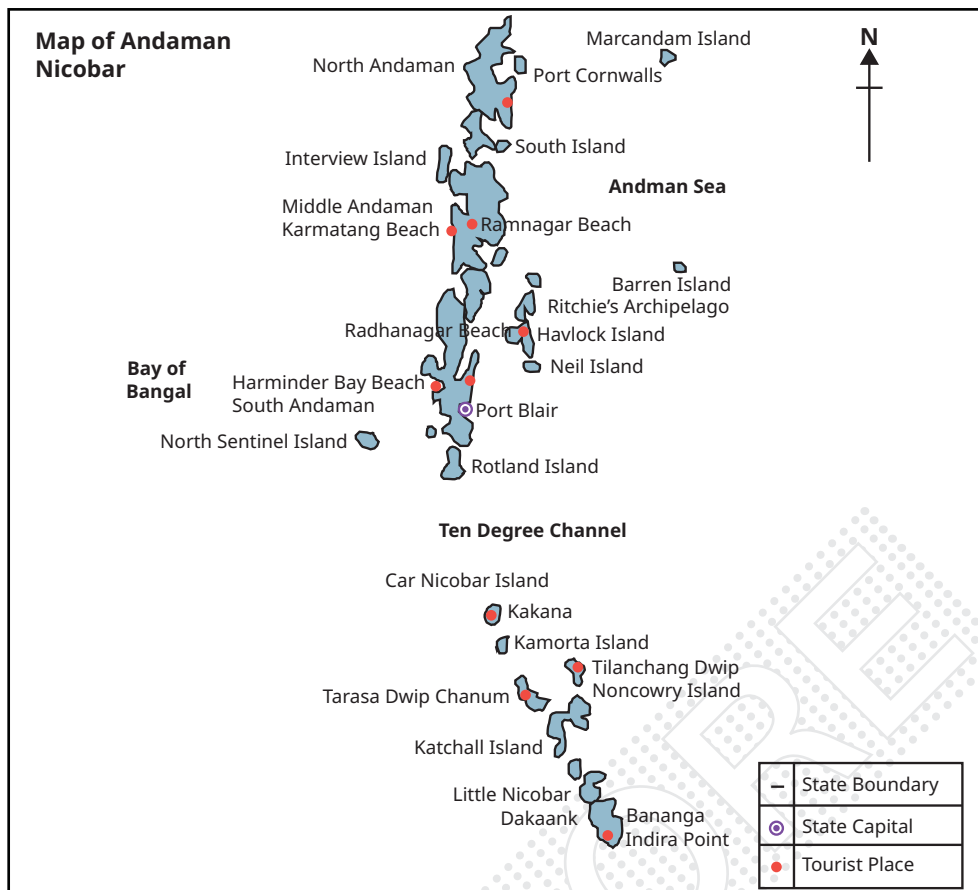
- The islands extend from **6° to 14° North latitudes and from 92° to 94° East longitudes**.
- The Andamans are separated from the Nicobar group by a **channel (the Ten Degree Channel)** some 150 km (93 mi) wide.

Geophysical Features:

- There are **572 islands** in the territory having an area of **8,249 km² (3,185 sq mi)**. Of these, about 38 are permanently inhabited.
- The highest point is located in North Andaman Island (**Saddle Peak at 732 m (2,402 ft)**).
- The only volcano in India, **Barren Island**, is located in Andaman and Nicobar. It is an active volcano and erupted in **2017**.

Vegetation and Biodiversity:

- 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**.
- The North Nicobar Islands (including Car Nicobar and Battimalv) are marked by the complete absence of **evergreen forests**, while such forests form the dominant vegetation in the central and southern islands of the Nicobar group.
- **Grasslands occur only in the Nicobars**, and while **deciduous forests** are common in the Andamans, they are almost absent in the Nicobars.
- Among the larger mammals there are two endemic varieties of **wild boar, Sus scrofa andamanensis** from Andaman and **Sus scrofa nicobaricus** from Nicobar, which are protected by the **Wildlife Protection Act 1972 (Schedule I)**.
- **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.
- **Mount Harriet National Park** is one of the richest areas of butterfly and moth diversity on these islands.
- There are 96 wildlife sanctuaries, **nine national parks and one biosphere reserve** in these islands.



23 World's Smallest Land Fern

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

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

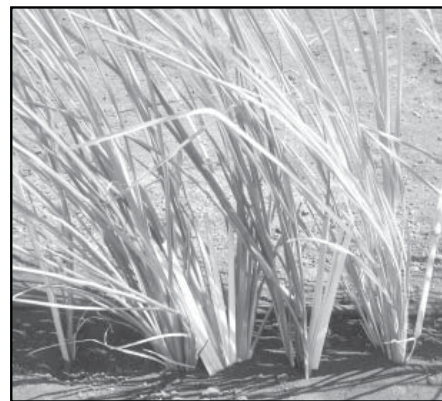
24 Vetiver Grass

Context: 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.

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** - The downward growth of roots makes it an **excellent stabilizing hedge** for stream banks, terraces and rice paddies, and **protects soil from sheet erosion**.
- **Vetiver mulch** increases **water infiltration and reduces evaporation**, thus protects soil moisture under hot and dry conditions. It also protects against splash erosion.
- **Crop protection and pest repellent** -Due to the hairy architecture of vetiver, the larvae cannot move on the leaves, fall to the ground and die.
- **Perfumery and aromatherapy** - Due to its excellent **fixative properties**, it is used widely in perfumes.
- **Medicine** - It is used for **nerve and circulation problems**.
- **Traps pollutants** - This plant is capable of **absorbing heavy metals** from contaminated soil. It absorbs nitrate and phosphate from water bodies where algal growth is common.

25 Red sanders

CONTEXT: The International Union for Conservation of Nature (IUCN), an international organisation for nature conservation, has now reclassified red sanders (*Pterocarpussantalinus*) as 'near threatened' from the earlier 'endangered'.

Red Sanders:

- Red sanders are a rare kind of sandalwood that grows only in the **Palakonda and Seshachalam hills**, with some trees found in isolated areas of Kurnool, Prakasam, Anantapur and Nellore districts in Andhra Pradesh.
- The precious wood has a huge demand abroad, especially in China, Myanmar, Japan and other countries of East Asia, as it is **used in traditional medicines and woodcraft**.

More on news:

- After being classified as endangered in 1997 and added to the Red List, this is the **first time that red sanders has been shifted to a better conserved category**.
- Red sanders wood fetches **huge prices in the international market** for its use in making luxury products, musical instruments and medicine. A tonne of red sanders costs anything between Rs 50 lakh to Rs 1 crore in the international market.
- However, as the species is endemic to India and had been considered endangered, the **Foreign Trade Policy of India doesn't allow its export**.
- This ban, coupled with its high demand, made illegal trade of red sanders rampant in states where it is found like Andhra Pradesh, Karnataka and Tamil Nadu.

26

Removal of rosewood from Appendix II of CITES

CONTEXT: 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).

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.
- 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.

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.

27

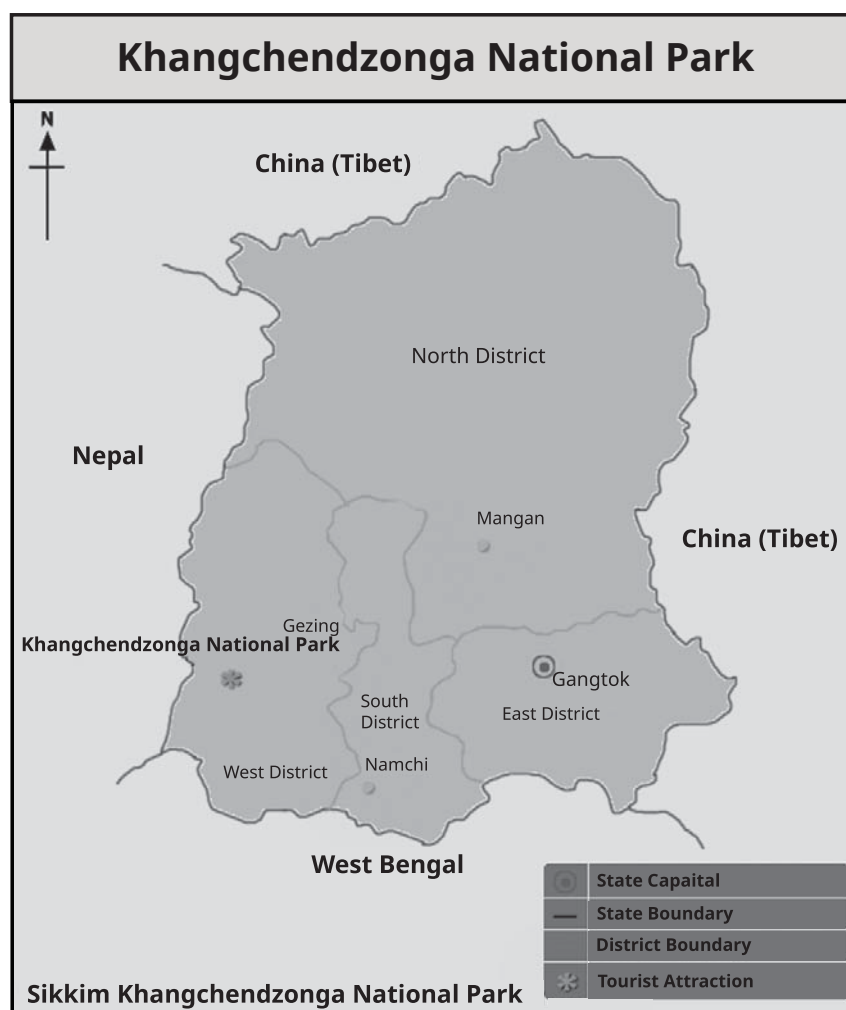
Khangchendzonga Biosphere Reserve was included in the UNESCO's World Network of Biosphere Reserve (WNBR)

Key Facts:

- **Khangchendzonga Biosphere Reserve** was inscribed to the **UNESCO World Heritage Sites** list in July 2016, becoming the first "**Mixed Heritage**" site of India.
- The park gets its name from the **mountain Kangchenjunga** (alternative spelling Khangchendzonga) which is 8,586 metres (28,169 ft) tall, the **third-highest peak in the world**.
- The total area of this park is 849.5 km².
- The Kanchenjunga Park is situated in the North and West Sikkim districts in the Indian state of Sikkim.
- India has **18 Biosphere Reserves**.

CONTEXT:

- Khangchendzonga Biosphere Reserve in Himalayan state of Sikkim was included in UNESCO designated World Network of Biosphere Reserves (WNBR), making it **11th Biosphere Reserve** from India to achieve this recognition.
- The decision was taken at 30th Session of International Coordinating Council (ICC) of **Man and Biosphere (MAB) Programme** of UNESCO held in **Palembang, Indonesia**.



28 Conservation of migratory birds and their habitats

CONTEXT: India to host 13th COP of the Convention on conservation of migratory species (CMS)

- India will host the 13th COP of the CMS on wild animals in Gujarat in February 2020.

Convention on conservation of migratory species (CMS)

- CMS is an environmental treaty under the aegis of **UNEP (United Nations environment programme)**. India has been party to CMS since 1983.
- COP is the decision making body of CMS and centre declared **Great Indian Bustard** as the mascot of COP-13 on migratory species.

- India has declared its **National Action Plan for conservation of migratory species and their habitats** along the **central Asian flyway (CAF)** (2018-2023).
- Around 20 migratory birds have been prioritized under the action plan.

Central Asian Flyway (CAF)

- CAF is among the nine flyways of the world. It encompasses **overlapping migration routes over 30 countries for different waterbirds**. It connects northern most breeding grounds in Russia to southern most wintering non breeding grounds in west and south Asia, Maldives etc.

29

SC directs Centre to declare area around national parks as eco-sensitive.

CONTEXT: 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: 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. (IUCN Definition 2008)

IUCN Protected Area Categorization

- Strict Nature Reserve (Highest Protection)
- Wilderness Area
- National Park
- Natural Monument
- Habitat/Species Management
- Protected Landscape/Seascape
- Protected Area with Sustainable Use of Resources (Lowest Protection)

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.
- The Environment (Protection) Act, 1986 does **not** mention the word "**Eco-Sensitive Zones**".
- An ESZ could go up to **10 kilometres** around a protected area as provided in the **Wildlife Conservation Strategy, 2002**.

30

India Faces Grave Danger to Soil Biodiversity: WWF

CONTEXT: According to Global soil biodiversity atlas prepared by Worldwide Fund for Nature, India's soil biodiversity is in danger.

- **WWF's risk index** for the world **shows threat from loss of above ground biodiversity**, over grazing, intensive agriculture, nutrient over loading, soil erosion, desertification and climate change.

- India's high population makes it vulnerable to ecological crisis even though its per capita ecological footprint is less than 1.75 hectares/ person.
- WWF for nature also stated in its report that **over exploitation of natural resources and agriculture is the two main factors for loss of biodiversity.**
- **Soil biodiversity encompasses presence of micro-organisms (Ex Nematodes and tardigrades) and micro fauna (ants, termites and earthworms).**
- The findings were part of the bi annual **Living Planet Report of 2018.**
- Along with threat to soil biodiversity, threat to pollinators is another major key aspect of the report.

The World Wide Fund for Nature

- It is an **international non-governmental organization** founded in 1961, **working in the field of the wilderness preservation, and the reduction of human impact on the environment.**
- It was formerly named the World Wildlife Fund, which remains its official name in Canada and the United States.

Headquarters: Gland, Switzerland

31 Floods trigger influx of alien fish species in Kerala

CONTEXT: Recent Kerala flood released several alien species of fish into water bodies, raising a threat to the endemic aquatic ecosystem and biodiversity.

Invasive Species

- An invasive species can be **any kind of living organism**—an amphibian (like the cane toad), plant, insect, fish, fungus, bacteria, or even an organism's seeds or eggs—that is **not native to an ecosystem and causes harm.**
- They can harm the environment, the economy, or even human health.
- Species that grow and **reproduce quickly, and spread aggressively**, with potential to cause harm, are given the label "**invasive.**"
- Globally **floodwaters** have proved to be a **major route** for the spread of invasive species

Threat Analysis

- The foreign fish breeds from farms, dams and also aquariums have washed away into rivers after the floods.
- It is assumed that over **20 lakh invasive fishes** were washed away into rivers and other water resources during the flood.
- Presence of **11 alien species** have been documented, including the alligator gar, gold fish, shark catfish also known as Malaysian vaala, red-bellied pacu and four alien invasive species namely the East African catfish, common carp, tilapia and sucker catfish.
- The research team found that the species now abounding in Kerala waters had developed a **preference for snails.**
- Among others, invasive fishes feed also on local fish breeds. As some invasive fishes are capable of living in polluted water too, they can affect survival of local fish breeds in the water resources.

32 Fire at Bandipur Tiger Reserve

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

LOCATION

- BANDIPUR NATIONAL PARK situated in Mysore Karnataka
- National park's total area is -874 sq kms
- Altitude- between 680 meters-145 meters
- Near to Northern edge of Nilagiri Foot Hills



33 Mammals of India (MaOI)

- Mammals of India (MaOI) is a **new model of repository on Indian mammals** by the Scientists and Researchers from the National Centers for Biological Sciences (NCBS), Bangalore.
- It is a **citizen-scientific repository** initiated in **September 2018**. It is a first such repository of Mammals in India.
- It is an **online, freely -accessible portal** whose **aim is to develop individual pages for all Indian mammals covering all related information about their distribution, breeding, variation, identification and conservation**.

- This is an **exclusive portal for mammals** in India which will help in having a good distribution map of mammals all around the country.
- MaOI is an initiative under **Biodiversity Atlas project**. The Biodiversity Atlas is a **species-based bioinformatics platform**.

34 Mangalajodi ecotourism trust

CONTEXT: Mangalajodi Ecotourism Trust in Odisha has won prestigious United Nations World Tourism Organisation (UNWTO) Award for Innovation in Tourism Enterprise at 14th UNWTO Awards ceremony held in Madrid, Spain.

Mangalajodi Ecotourism Trust

- It is community owned and managed venture on banks of **Chilika Lake in Odisha**.
- It has won prestigious United Nations World Tourism Organisation (UNWTO) Award for Innovation in Tourism Enterprise.
- The villagers of Mangalajodi were once associated with poaching of birds near Chilika Lake but now they stand as true defenders of wildlife in the region.
- The **change was mainly due to a coordinated effort in implementing an awareness campaign on importance of preserving natural species and benefits associated with wildlife tourism**.
- The change has soared numbers of birds from 2000 (during peak unsustainable hunting) to over three lakh in the region.
- Moreover other visible impacts this change has resulted in increasing revenue through ecotourism, sharp fall in poaching incidents and increasing support of villagers.
- The award was given in recognition of **Mangalajodi's business model** that is both economically viable and environmentally sustainable based on principles of community ownership and Eco Tourism.

35 Sustainable Catchment Forest Management (SCATFORM) launched in Tripura

CONTEXT: Tripura has launched the Sustainable Catchment Forest Management (SCATFORM) project which is undertaken with the assistance of JICA (Japan International Cooperation Agency).

- The **SCATFORM** project aims to address issues such as **forest cover loss and forest degradation** have been mainly caused by **shifting cultivation**, which increases soil erosion risks on hill slopes especially in upper catchment areas.
- It would be implemented mainly in upper catchments where forest degradation and soil erosion are severe and livelihood improvement needs are high.
- The project aims to improve quality of forest in the catchment area by sustainable forest management, soil and moisture conservation and livelihood development.

The activities undertaken under the project involves promotion of bamboo plantation, agro-forestry based livelihood, eco-tourism development, development of value addition for **bamboo and other Non-Timber Forest Product (NTFP)** in order to create alternate livelihood opportunities for local communities.

36**Floating Treatment Wetland**

CONTEXT: The Floating Treatment Wetland (FTW) was inaugurated on World Wetlands Day, February 2 in Nekkampur Lake in Hyderabad to clean and purify the polluted water body.

- FTW is **joint effort of NGO Dhruvansh, Hyderabad Metropolitan Development Authority (HMDA), district administration and other organisation**
- FTW comprises **four layers viz. floatable bamboo at base, Styrofoam cubicles above it. The third layer consists of gunny bags and gravels on final layer to support cleaning agents plants.**
- Cleaning agents planted on FTW include vetivers, cattalis, canna, bulrush, citronella, hibiscus, fountain grass, flowering herbs, tulsi and ashvagandha.
- FTW's **working is based on soil-less hydroponics technique. Hydroponics permits plants to grow only on sunlight and water only.**
- Micro-organisms growing on FTW and plant root systems 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 body.
- Theme for World Wetland Day, **2017 Wetlands for Disaster Risk Reduction**, themefor **2018 Wetlands for a Sustainable Urban Future**

Pollution

1 Nitrogen Emission

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

- Out of 50 hotspots identified by Greenpeace, three are in India. The three in India are **Delh-NCR**, an area that falls in both **Sonbhadra in UP** and **Singrauli in MP** and another **Talcher-Angul in Odisha**.

Harmful Impact of NO₂

- NO₂ is a **dangerous pollutant** that contributes to the **formation of PM2.5** which is closely linked to **cardiovascular and respiratory illness**, and ozone, two of the most dangerous forms of air pollution.
- Such **exposures overshoot periods** can aggravate **respiratory diseases**, particularly asthma, leading to respiratory symptoms (such as **coughing, wheezing or difficulty breathing**), hospital admissions and visits to emergency rooms.
- Longer exposures** to elevated concentrations of NO₂ may contribute to the development of **asthma** and potentially increase **susceptibility to respiratory infections**.
- Major contributors of N₂O
 - Agricultural soils** - over 70%
 - Waste water** - 12%
 - Residential and commercial activities** - 6%

Findings of Quantitative Assessment Report:

- Burning of crop residue** is a key contributor to winter smog in many parts of North India.
- 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.
- 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.
- Chemical fertilizers** (over 82% of it is urea) account for over **77% of all agricultural N₂O emissions** in India, while manure, compost, etc. 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**.

- Since 2002, **N₂O has replaced methane as the second largest Greenhouse Gas (GHG)** from Indian agriculture.
- 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**.
- **Nutrient recovery/recycling from waste water** for agriculture could cut down N₂O emissions from sewage and waste water by up to 40%.

2 Black Carbon in Haryana

CONTEXT: Stubble burning in Haryana and Punjab leading to toxic air quality in Delhi and neighbouring areas

- Trend of black carbon and GHGs has accelerated since 2010 due to **mechanised harvesting that leaves more residues in the form of stalks, stubble and straws**.
- Emissions from crop stubble burning in Punjab, Haryana and western Uttar Pradesh travel far towards central and southern States. **Eastern fringes of Indo Gangetic plains like Bihar and West Bengal is also affected due to wind patterns**.
- **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 and neighbouring cities.
- The **incomplete combustion of biomass produces black carbon** which are **inhalable particles** of diameter of 2.5micrometers or smaller. They have been **responsible for respiratory diseases, lung cancer, heart strokes etc**.
- **NCAP (National Clean Air Programme)** was launched **to reduce Particulate Matter by 20-30% over next five years**. It is **not legally binding** but touches the issue of cross border plan to tackle pollution.
- NCAP specifically mentions integration of initiatives under UNCCD (United Nations to combat desertification) to address issue of cross border pollution.

3 Erratic Monsoon Rainfall partly due to Air Pollution

CONTEXT: According to a study by IIT- Kanpur, rising suspended particles in atmosphere is partly responsible for erratic behaviour of monsoon rainfall in India.

Findings & Concerns:

- Study shows that **excess aerosols, suspended solid particles like dust and smoke and industrial effluents in the atmosphere lead to changing cloud patterns**. Their shapes, sizes, temperature are affected causing variability in rainfall over Indian subcontinent.
- **Aerosols** are extremely important for **cloud formation**. In absence of aerosols, cloud formation cannot take place as they **act as nuclei around which clouds are formed**. But their **excessive presence in atmosphere interferes with stable cloud formation**.
- **Aerosol Optical Depth (AOD)** has been described as the degree to which **aerosols prevent transmission of light in an area**. It is considered as an **indirect indicator for air quality**. During monsoon, in monsoon areas it was found to be 0.6, but in cleaner areas of world like some parts of USA it was 0.1
- Exact effect of aerosols is not known. In some areas there is excessive rainfall and at other areas there is drought and the monsoon does not progress smoothly.
- Study said that **Aerosol presence is higher over Indo Gangetic plains, heating gradient is higher and cloud microstructures are also changing**.

4 Ban on Petcoke

CONTEXT: Directorate General of Foreign Trade (DGFT) under Ministry of Commerce and Industry has banned import of petcoke for use as fuel. But it has allowed its import of only for use as feedstock in some select industries such as cement, lime kiln, calcium carbide and gasification industries.

Petcoke (Petroleum coke)

- Petroleum coke, abbreviated coke or petcoke, 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.
- In petroleum coker units, **residual oils** from other distillation processes used in petroleum refining are treated at a high temperature and pressure leaving the petcoke after driving off gases and volatiles, and separating off remaining light and heavy oils.
- Petcoke is over **90% carbon and emits 5% to 10% more carbon dioxide (CO₂)** than coal on a per-unit-of-energy basis when it is burned.
- As petcoke has a **higher energy content**, petcoke emits between **30 and 80 percent** more CO₂ than coal per unit of weight.
- 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, petcoke 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 petcoke. It gets over half its annual petcoke imports of around 27 million tonnes from United States.

5 Only Euro VI compliant vehicles to be sold from April 2020: SC

CONTEXT: The Supreme Court on Wednesday clarified that only vehicles compliant with the Bharat Stage VI emission standards would be allowed to be sold from 1 April, 2020.

BS norms

The BS — or **Bharat Stage** — emission standards are norms instituted by the government to **regulate the output of air pollutants from internal combustion engine equipment, including motor vehicles**. India has been following the European (Euro) emission norms, though with a time-lag of five years.

Benefits of BS-IV fuel

- The **major difference** in standards between the existing **BS-IV and new BS-VI auto fuel norms is presence of sulphur**.
- BS-IV fuels contain 50 parts per million (ppm) sulphur, **while BS-V and BS-VI grade fuel will have 10 ppm sulphur**.
- Thus, newly introduced BS VI fuel is estimated to **reduce amount of sulphur released by 80%**.

Key Facts:

- **Delhi became the first city in India to supply ultra-clean Bharat Stage (BS) VI grade fuel (both petrol and diesel)**
- Other cities in NCR like Noida, Gurugram, Ghaziabad and Faridabad as well as other 13 major cities, including Mumbai, Chennai, Bengaluru, Hyderabad and Pune will roll-out cleaner BS-VI grade fuel soon.

6 Air Quality Early Warning System

CONTEXT: Air Quality Early Warning System for Delhi has been launched.

Key Facts:

- **Developed By:** The Scientists at Indian Institute of Tropical Meteorology (IITM), Pune, Meteorological Department and National Centre for Medium Range Weather Forecasting (NCMRWF).
- **The warning system consists of :**
 - ▶ Real time observations of air quality over Delhi region
 - ▶ Predictions of air pollutants from **two different air quality prediction systems** based on state-of-the-art atmospheric chemistry transport models
 - ▶ Warning Messages and Alerts and Bulletins.
- The system will help in proactively forewarning, **3-4 days** in advance.
- All eight important air pollutants like **PM2.5, PM10, NOx, CO, SO2, BC, OC and VOCs** will be monitored.

Analysis

- 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.

7 Dust Mitigation Plan

CONTEXT: The Environment Ministry has made it mandatory for companies seeking environment clearance to ensure that they put in place a dust mitigation plan.

- Road dust contributed 56% of all PM10 pollution, while it was 38% for PM2.5.

Standards Notified by the Government

- The requirements, specified in a gazette say that **roads leading to or at construction sites must be paved and black-topped.**
- There could be **no soil excavation** without adequate dust mitigation measures in place.
- **No loose soil, sand, construction waste could be left uncovered.**
- A **water sprinkling system** is mandatory, and the measures taken should be prominently displayed at the construction site.

The **grinding and cutting** of building materials in **open area** has been **prohibited** and no uncovered vehicles carrying construction material and waste would be permitted.

- **Main functions of the Central Pollution Control Board (CPCB):** The Air (Prevention and Control of Pollution) Act, 1981, describes the main functions of the Central Pollution Control Board (CPCB) as follows:
 - To **advise the Central Government** on any matter concerning the improvement of the quality of air and the prevention, control and abatement of air pollution.
 - To **plan and cause to be executed**, a nation-wide programme for the prevention, control and abatement of air pollution.

- To **provide technical assistance and guidance** to the State Pollution Control Board.
- To carry out and **sponsor investigations and research** related to prevention, control and abatement of air pollution.
- To **collect, compile and publish technical and statistical data** related to air pollution.
- To **lay down and annul standards** for the quality of air.

8 Bio-Jet Fuel Flight

CONTEXT: India's first first-ever environment friendly bio fuel powered flight between Dehradun and Delhi was propelled by blend of oil from jatropha seeds and aviation turbine fuel.

- The plane had carried blend of 25% of bio jet fuel (derived from jatropha seeds) and **75% of aviation turbine fuel (ATF)** in **one of the two engines** of plane, while other carried only ATF.
- This flight was technological demonstration that bio jet fuel can be used in flights. **International standards permit a blend rate of up to 50% biofuel with ATF.** The blend of bio jet fuel and ATF has potential to **reduce fuel costs by 15-20%.**
- The use of bio jet fuel will **help in reducing greenhouse gas (GHG) emissions** by about 15% and sulfur oxides (SOx) emissions by over **99%.**
- It is expected to **provide indigenous jet fuel supply security.** Its usage also offers superior engine performance and reduced maintenance cost for the airline operators.

Jatropha biodiesel in India

- Biofuel development in India centres mainly around the **cultivation and processing of Jatropha plant seeds which are very rich in oil (40%).**
- Jatropha oil has been used in India for several decades as biodiesel for the diesel fuel requirements of remote rural and forest communities; jatropha oil can be used directly after extraction (i.e. without refining) in diesel generators and engines.
- Jatropha has the potential **to provide economic benefits at the local level** since under suitable management it has the potential to grow in dry marginal non-agricultural lands, thereby allowing villagers and farmers to leverage non-farm land for income generation.
- And since **Jatropha oil is carbon-neutral**, large-scale production will improve the country's carbon emissions profile.
- Finally, since **no food producing farmland is required** for producing this biofuel (unlike corn or sugar cane ethanol, or palm oil diesel), it is considered the most politically and morally acceptable choice among India's current biofuel.

9 SATAT Initiative

CONTEXT: The government recently handed over the 100th Letter of Intent (LOI) to the Compressed Bio-Gas(CBG) Entrepreneur (producer) under the SATAT scheme.

Background Information

- **Bio-gas** is produced naturally through a process of **anaerobic decomposition** from waste / bio-mass.
- After **purification**, it is compressed and called **Compressed Natural Gas**, which has **pure methane** content of over **95%.**
- Compressed Bio-Gas can be used as an **alternative, renewable automotive fuel**
- The Government of India had launched the **GOBAR-DHAN** (Galvanising Organic Bio-Agro Resources) scheme to **convert cattle dung and solid waste in farms to CBG and compost.**

About SATAT Initiative:

- **SATAT initiative** is aimed at providing a **Sustainable Alternative Towards Affordable Transportation (SATAT)** as a developmental effort that would benefit both **vehicle-users as well as farmers and entrepreneurs**.
- Compressed Bio-Gas plants are proposed to be set up mainly through **independent entrepreneurs**. CBG produced at these plants will be transported through cascades of cylinders to the fuel station networks of OMCs for marketing as a green transport fuel alternative.
- The entrepreneurs would be able to **separately market the other by-products** from these plants, including bio-manure, carbon-dioxide, etc., to enhance returns on investment.
- It is planned to roll out **5,000 Compressed Bio-Gas plants** across India in a phased manner.
- This initiative is expected to generate **direct employment for 75,000 people** and produce 50 million tonnes of bio-manure for crops.

10 WAYU – Air Pollution Control Device

CONTEXT: Union Minister for Science & inaugurated air pollution control device WAYU for traffic junctions at ITO intersection and Mukarba Chowk in Delhi.

Key Facts:

- WAYU is developed by **Council of Scientific and Industrial Research – National Environmental Engineering Research Institute (CSIR-NEERI)**
- Funded by Department of Science and Technology
- 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.
- CSIR – NEERI is in the process of developing a **bigger version of WAYU** which can purify air in an area of **10,000 meter square** and also the designs of future WAYU devices will have even better aesthetics and can be deployed in bus shelters etc

**11 Uranium Contamination Of Ground Water In India**

CONTEXT: Scientists have found widespread uranium contamination in groundwater, a primary source of drinking water and irrigation, from aquifers across 16 states in India, much above the WHO provisional standard for the country.

Uranium contamination:

- Uranium salts are **toxic**, though less so than those of other heavy metals such as lead or mercury. The organ which is **most affected is the kidney**.
- Soluble uranium salts are readily excreted in the urine, although some **accumulation in the kidneys** does occur in the case of chronic exposure.

- **Tiron may be used to remove uranium from the human body**, in a form of chelation therapy. **Bicarbonate** may also be used as uranium (VI) forms complexes with the carbonate ion.

Findings and Concerns:

- The WHO has set a provisional safe drinking water standard of **30 micrograms of uranium per litre for India**, a level that is consistent with US Environmental Protection Agency standards.
- Despite this, **uranium is not yet included in the list of contaminants monitored under the Bureau of Indian Standards' Drinking Water Specifications.**
- The primary source of uranium is **geogenic, and anthropogenic factors.**
- Contribution of human factors such as **groundwater depletion and nitrate pollution** are aggravating the already present natural uranium contamination to dangerous levels.
- Many of India's aquifers are composed of clay, silt and gravel carried down from Himalayan weathering by streams or uranium-rich granitic rocks. When **over-pumping of these aquifers' groundwater occurs and their water levels decline, it induces oxidation conditions that, in turn, enhance uranium enrichment** in the shallow groundwater that remains.

12 Arsenic contamination in paddy plants

CONTEXT: A recent publication by researchers at the School of Environmental Studies (SOES), Jadavpur University, reveals not only rise in arsenic contamination of paddy plants from ground water in West Bengal, but also that concentration of 'arsenic accumulation' depends on the variety of paddy and its stage in the crop cycle.

Arsenic Poisoning:

- **Arsenic is a natural semi-metallic chemical (metalloid)** that is found all over the world in **groundwater.**
- Arsenic poisoning, or arsenicosis, happens when a person takes in **dangerous levels of arsenic.** Ingestion only poses health problems if a dangerous amount of arsenic enters the body. Then, it can lead to **cancer, liver disease, coma, and death.**
- Treatment involves **bowel irrigation, medication, and chelation therapy.**
- The concentration of arsenic may be higher in certain geographical regions. This could be a **result of human activity, such as metal mining** or the **use of pesticides.** **Natural conditions** can also lead to a higher concentration.
- **Inorganic arsenic compounds are more harmful** than organic ones. They are more likely to react with the cells in the body, displace certain elements from the cell, and change the cell's function.

Findings & Concerns:

- The study shows that arsenic uptake in the paddy plant **reduces from root to grain**, and that its **concentration is related to the variety** of the rice cultivated.
- The study was carried out on two commonly consumed rice varieties — **Minikit and Jaya** — and the latter was found to be more resistant to arsenic.
- The highest concentration was observed in the **initial or vegetative state** in the first 28 days. It reduced during the reproductive stage (29-56 days) and again increased in the **ripening stage.**

13 Heavy Metal Water Pollution

CONTEXT: 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.

Heavy metals:

- Heavy metals are **naturally occurring elements** that have a **high atomic weight and a density at least 5 times greater than that of water**.
- Their **multiple industrial, domestic, agricultural, medical and technological applications** are raising concerns over their potential effects on human health and the environment.
- Their toxicity depends on several factors including the dose, route of exposure, and chemical species, as well as the age, gender, genetics, and nutritional status of exposed individuals.

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 industrialisation 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.

14 Persistent Organic Pollutants

CONTEXT: The Romanian presidency of the European Council reached a provisional agreement with the European Parliament on updating the regulation on persistent organic pollutants, the UN-agreed list of dangerous substances. This regulation will help protect people and the environment against these chemicals.

Persistent Organic Pollutants:

- These are organic compounds that are **resistant to environmental degradation** through chemical, biological, and photolytic processes.
- Because of their persistence, POPs **bio accumulate** with potential adverse impacts on human health and the environment.
- Many POPs are currently or were in the past **used as pesticides, solvents, pharmaceuticals, and industrial chemicals**. Although some POPs arise naturally, for example volcanoes and various biosynthetic pathways, most are man-made.

Stockholm Convention on Persistent Organic Pollutants:

- It was adopted and put into practice by the **United Nations Environment Programme (UNEP) in 2001**.
- Initially the **Convention recognized only twelve POPs** for their adverse effects on human health and the environment, **placing a global ban on these particularly harmful and toxic compounds**.
- Since 2001, this list has been **expanded** to include some **polycyclic aromatic hydrocarbons (PAHs), brominated flame retardants**, and other compounds.

Health effects of POPs:

- **Endocrine disruption:** The majority of POPs are known to **disrupt normal functioning of the endocrine system**.
- **Reproductive system:** POP exposure can lead to negative health effects especially in the male reproductive system, such as **decreased sperm quality and quantity**, altered sex ratio and early puberty onset. For females exposed to POPs, **altered reproductive tissues and pregnancy outcomes** as well as endometriosis have been reported.
- **Gestational weight gain and new-born head circumference:** Prenatal exposure of two types of **organochlorine pesticides (HCH, DDT and DDE)** impaired the growth of the fetus, reduced the birth weight, length, head circumference and chest circumference.

15 Alliance to End Plastic Waste

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

About APEW:

- 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 is to develop solutions to mitigate plastic pollution and promote a circular economy by utilising used plastics.

Efforts needed

- 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.

Important Facts:

- **Just ten rivers transport more than 90% of river-based plastics to the ocean.**
- 80% of ocean plastic comes from land-based sources.
- Replacing plastics in packaging and consumer products with alternative materials could raise environmental costs nearly fourfold.

16 Taj Declaration to Beat Plastic Pollution adopted in Agra

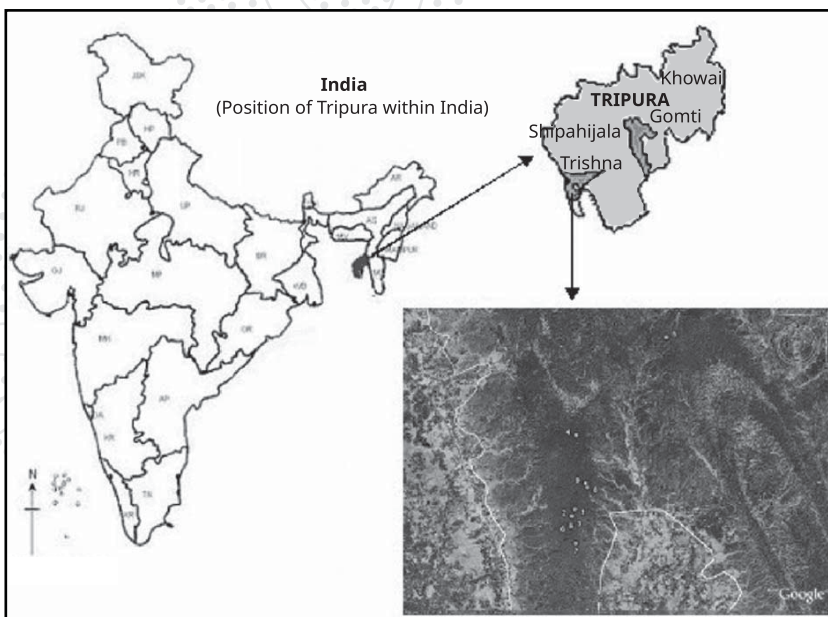
CONTEXT: With an aim to make 500-meter area around Taj Mahal litter free and phase out single use plastic, Union Minister administered a pledge to Agra Residents.

- The pledge called “**Taj Declaration to Beat Plastic Pollution**” was made in the presence of **United Nations Environment Program (UNEP)** Executive Director Erik Solheim and UNEP Goodwill Ambassador Diya Mirza.
- Well before the declaration was undertaken, workshops were conducted to deal with problem. The major focus of the workshop is to curb littering around the 17th century monument. Short term and Long term plans are worked up on.
- 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’.

17 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 Gomti district of Tripura.

- ONGC has discovered 10-12 gas bearing wells in the Trishna Wildlife sanctuary.
- Oil and Natural Gas Corporation (ONGC) Tripura Asset would soon start extracting natural gas from Trishna Wildlife Sanctuary in Belonia subdivision of Gomti district following National Wildlife Board’s clearance of its proposal.
- The gas extracted from Trishna Wildlife Sanctuary would be transported to the



North Eastern Electric Power Corporation Ltd (NEEPCO) owned 100 MW gas-based thermal power project at Monarchak in Sonamura subdivision of Sipahijala district.

Trishna Wildlife Sanctuary

- Trishna Wildlife Sanctuary is a **Wildlife Sanctuary** in Tripura, India.
- It covers an area of about **163.08 square kilometers**.
- This sanctuary is **situated in South Tripura District**.
- This sanctuary has a number of perennial water rivulets, water bodies, and grass land.

- **Indian Gaur (Bison)** is an attraction of this sanctuary.
- Apart from it, there are varieties of Birds, Deers, Hollock Gibbon, Golden Langur, Capped Langur, Pheasant and many other animals and reptiles.

18 Thoothukudi Sterlite Plant

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

- Recently, amid government clampdown, the protests turned violent, and resulted in the death of more than 10 people.
- **Sterlite stakes claim to be India's largest copper producer** and is a major presence in Tamil Nadu's industrial mix.
- But the industry has been under the scanner for environmental violations since its inception in the 1990s.
- Significantly, the Supreme Court in 2013 had imposed an Rs.100-crore fine on Sterlite for pollution.
- As the **nearby residencies started to face health and environmental issues**, they had been protesting sporadically for many years now.
- But the proposal for the plant's expansion plan intensified protests about a couple of months ago and the situation has remained heated since then.
- Tamil Nadu government has claimed that the plant is currently not operational and that **expansion has been stalled**.
- But there was complete official apathy to convey this message unambiguously to the protesting masses, thereby attracting suspensions.

20 Achieving Energy Efficiency Key to Meeting Lower Emissions Commitment

CONTEXT: The World Bank has published a report titled Utility scale DSM opportunities and business models in India.

- It has pegged **India's energy efficiency market at Rs. 1.6 trillion by considering end-use energy efficiency opportunities**, which rose four times in six years from Rs. 44,000 crore in 2010.
- This is **against the backdrop of the success of the government's UJALA scheme** to distribute LED bulbs (Bachat Lamp Yojana).
- Till now, more than 280 million light emitting diode (LED) bulbs have been sold across the country which has resulted in energy savings of 36,545 million units (MUs) and **avoided peak demand of 7,317 MW**.
- In monetary terms, savings of around Rs. 14,618 crore have been achieved.
- The report also mentions that the renewed DSM market potential is envisaged to deliver 178 billion units of electrical energy savings per annum that roughly translates to 18-20% of the current levels of all India annual electricity consumption and 150 million tonnes (mt) of annual CO2 emissions reduction potential.
- Apart from this, demand response, solar photovoltaic (SPV) rooftop systems, along with emerging smart grid technologies, offer tremendous potential for utility DSM in India.

Government efforts towards energy efficiency:

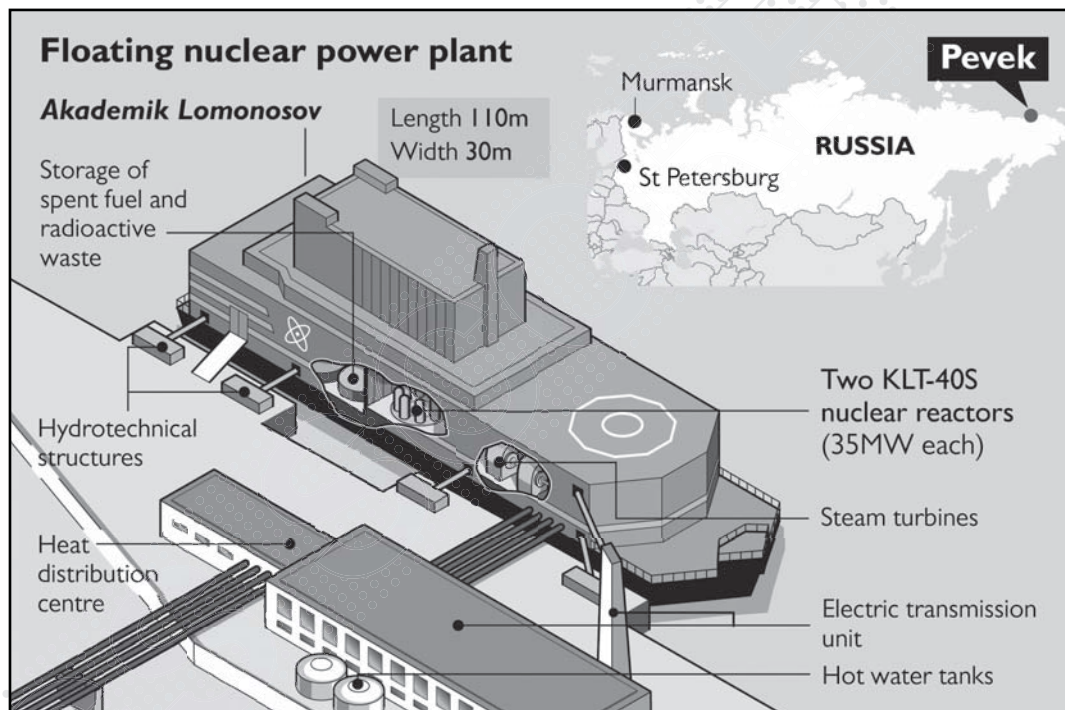
- **Standards and Labelling** by the Bureau of Energy Efficiency (BEE)
- Promotion of **Energy Efficient LED Bulbs** – UJALA scheme
- Promotion of **Electric vehicle** – National Electric Mobility Mission Plan (NEMMP)

- Energy Conservation **Building Codes** (ECBC)
- **National Mission for Enhanced Energy Efficiency** (NMEEE)
- **School Education Program** by Bureau of Energy Efficiency and NCERT
- **Human Resource Development** (HRD)

20

Akademic Lomonosov: World's First Floating Nuclear Power Plant becomes operational

CONTEXT: In December, 2018, Russia's Akademik Lomonosov, the world's first floating nuclear power plant (FNPP) has become operational. The Russian atomic energy corporation Rosatom announced that the plant has been brought to 10% of its capacity.



- **World's first 'floating' nuclear power plant (FNPP)** was designed to make it possible to supply electricity to hard-to-reach areas, regardless of transport infrastructure, landscape, and cost of fuel delivery. The reactor has the potential to work particularly well in regions with extended coastlines, power supply shortages, and limited access to electrical grids.
- **Akademic Lomonosov** -- the first ship of this kind -- was named for 18th-century Russian scientist **Mikhail Lomonosov**.
- The nuclear floating unit is equipped with two **KLT-40C reactor systems** similar to those used on icebreakers.
- The lifecycle of the FNPP is **40 years** with the possibility of being extended to up to 50 years
- **No spent nuclear fuel or radioactive waste will be left behind as it will be taken to the special storage facilities.**

Climate Change

1 Earth at risk of becoming irreversible hothouse: Study

CONTEXT: Our planet is at the risk of entering an irreversible 'hothouse' condition - where the global temperatures will rise by four to five degrees and sea levels may surge by up to 60 metres higher than today - even if targets under the Paris climate deal are met.

Findings & Concerns:

- According to the researchers, **keeping global warming to within 1.5-2 degrees Celsius may be more difficult** than previously assessed.
- Human emissions of greenhouse gas are not the sole determinant of temperature on Earth.
- **Human-induced global warming of two degrees Celsius may trigger other Earth system processes, often called "feedbacks," that can drive further warming - even if we stop emitting greenhouse gases.**
- Avoiding this scenario requires a redirection of human actions **from exploitation to stewardship of the Earth system**
- The study consider ten natural feedback processes, some of which are "tipping elements" that lead to abrupt change if a critical threshold is crossed.
- Maximising the chances of avoiding a "Hothouse Earth" requires **not only reduction of carbon dioxide and other greenhouse gas emissions but also enhancement and creation of new biological carbon stores through improved forest, agricultural and soil management, and technologies** that remove carbon dioxide from the atmosphere and store it underground.

2 Major natural carbon sink may soon become carbon source

CONTEXT: Ecosystems like oceans and forests may stop absorbing carbon from the atmosphere but start emitting it due to the human-induced climate change, according to a research.

Background:

- For the study, the team of scientists looked at **peat lands in the Peruvian Amazon to try to find out if a large amount of peat carbon can be released under a warmer climate.**
- According to an earth systems model spanning from 12,000 years ago to 2100 AD, the relatively small basin could lose up to 500 million tonnes of carbon by the end of this century.
- That is **about five per cent of current global annual fossil fuel carbon emissions**, or 10 per cent of US emissions, being spit back out into the atmosphere.

Concepts:

- **A carbon dioxide (CO₂) sink: It's a carbon reservoir.** The sinks include forests, oceans, soil and plants and other organisms that use photosynthesis to remove carbon from the atmosphere by incorporating it into biomass. Among them, **the peatlands** with a carbon dioxide-rich type of soil called peat are **the most efficient natural carbon sink on the planet.**

Fact File:

- Public awareness of the significance of CO₂ sinks has grown since passage of the **Kyoto Protocol**, which promotes their use as a form of carbon offset.
- The Kyoto Protocol was **adopted in Kyoto, Japan, on 11 December 1997** and entered into force on 16 February 2005. There are currently 192 parties to the Protocol.
- It is estimated that **forests absorb between 10 and 20 tons of carbon dioxide per hectare each year**, through photosynthetic conversion into starch, cellulose, lignin, and wooden biomass.

Peatlands:

- When undisturbed, Peatlands store more carbon dioxide than all other vegetation types on Earth combined.
- But **when the peatlands are drained and deforested, they can release nearly six per cent of global carbon dioxide emissions each year**, according to the researchers.
- Global peatlands cover only about three per cent of the global land area but hold around 30 per cent of the earth's soil organic carbon.

Artificial sink:

- In 2012, scientists from Columbia University came up with a technique **to develop 'artificial trees'**. Klaus Lackner, director of the Lenfest Center for Sustainable Energy at Columbia University, designed an artificial tree that **passively soaks up carbon dioxide from the air using "leaves" that are 1,000 times more efficient than true leaves that use photosynthesis.**
- **Capturing and storing CO₂ by injection into the ocean floor or underground empty rock formations** that used to hold fossil fuels and replicating the natural process of mineral carbonation that uses CO₂ to transform natural minerals into carbonate rocks like limestone, are some of the other ways that are being explored.

- **Carbon sequestration:** It is the term describing **processes that remove carbon from the atmosphere.** There are three types:
 - ▶ **Terrestrial Carbon Sequestration:** Indirect sequestration whereby ecosystems (e.g., forests, agricultural lands, and wetlands) are maintained, enhanced or manipulated to increase their ability to store carbon.
 - ▶ **Geologic Carbon Sequestration:** CO₂ can be stored, **including oil reservoirs, gas reservoirs, unminable coal seams, saline formations and shale formations** with high organic content. These formations have provided natural storage for crude oil, natural gas, brine and CO₂ over millions of years. Geologic sequestration techniques would take advantage of these natural storage capacities.
 - ▶ **Ocean Carbon Sequestration:** Oceans absorb, release and store large amounts of CO₂ from the atmosphere. There are two approaches for oceanic carbon sequestration which take advantage of the oceans' natural processes. One approach is to enhance the productivity of ocean biological systems (e.g., algae) through fertilization. Another approach is to inject CO₂ into the deep ocean.

3 Urban Waste and Global Warming

CONTEXT: The surface temperature of the Earth has risen in the past century and during the past two decades an accelerated warming has been noticed. Evidence suggests that the haphazard urbanization has contributed to it due to poor waste management.

- **Cities are major contributors** to climate change: **although they cover less than 2 per cent of the earth's surface, cities consume 78 per cent of the world's energy and produce more than 60% of all carbon dioxide** and significant amounts of other greenhouse gas emissions, mainly through energy generation, vehicles, industry, and biomass use.
- India needs to get its act together to improve its municipal solid waste management with the **triple objective of resource recovery, improving public health conditions and mitigating the risks associated** with human-induced global warming.
- It will require city administration to develop more robust partnerships with their constituencies.
- The public needs to be an integral part of future responses to climate change and trust needs to be strengthened before specific actions are introduced.

Basic principles of Solid Waste Management:

- **Composting:** The volume of waste sent to the landfill sites can be reduced if biodegradable waste is processed locally through aerobic decomposition with the help of microbes or earthworms (vermicomposting) to produce compost or organic fertiliser.
- **Biomethanation:** Biomethanation generates biogas which is a substitute for fossil fuel and produces slurry which is an excellent organic fertiliser, both helping to mitigate global warming.
- **Segregation at source:** Storing organic or biodegradable and inorganic or non-biodegradable solid waste in different bins.

4 The State of the Global Climate in 2018

CONTEXT: Every year, World Meteorological Organisation issues a Statement on the State of the Global Climate based on data provided by National Meteorological and Hydrological Services (NMHSs) and other national and international organizations.

World Meteorological Organization (WMO)

- It is an intergovernmental Organisation Established in **1950** . It has **191** members
- It originated from **International Meteorological Organization (IMO)**, which was founded in 1873. It is the specialized agency of the UN for meteorology (weather and climate), operational hydrology and related geophysical sciences
- HQ : **Geneva, Switzerland.**
- **India is a member of WMO**
- Its **mandate covers weather, climate and water resources.**
- It is dedicated to international cooperation and coordination on state and behavior of Earth's atmosphere, its interaction with land and oceans, the weather and climate and distribution of water resource.

Highlights of the State of the Global Climate in 2018:

- **2018, the fourth warmest year on record:** This means that the past four years—2015, 2016, 2017 and 2018—taken together are the four warmest years on record. In contrast to the other top warmest years, 2018 began with La Niña conditions, which are typically associated with lower global temperatures.

Fact Sheet:**WMO Statement on the State of the Global Climate:**

- For more than 20 years, these reports have been published in the **six official languages of the United Nations** to inform governments, international agencies, other WMO partners and the general public about the global climate and significant weather and climate trends and events at the global and regional levels.
 - The Statement on the State of the Global Climate is structured in two strands including physical aspects coordinated by WMO with authors from international scientific institutions and a strand on impact aspects which will be coordinated by other United Nations agencies. The final release of the Publication is usually in March.
 - A provisional Statement on the State of the Global Climate is released at the **Occasion of the UNFCCC Conference of Parties (COP)**, which is usually held in autumn. It provides an assessment of the state of the global climate during the period January-September of the year in question.
 - The Provisional Statement on the State of the Global Climate in 2018 was completed and communicated at a press conference held at the United Nations Palais des Nations on 29 November in Geneva. Key findings were also presented at several high level and side events at the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP24).
- **Greenhouse Gas Concentrations continue to rise:** Levels of carbon dioxide concentrations continued to increase in 2018. Atmospheric concentrations reflect a balance between emissions due to human activities and the net uptake by the biosphere and oceans. Increasing levels of greenhouse gases in the atmosphere are key drivers of climate change.
 - **Sea Level Rise continues:** Mean Global Mean Sea Level for the period from January to July 2018 has been 2 to 3 mm higher than for the equivalent period in 2017.
 - **Ocean Heat Content at record high:** More than 90% of the energy trapped by greenhouse gases goes into the oceans. **Ocean Heat Content provides a direct measure of the energy that accumulates in the upper layers of the ocean.** For each three-month period in 2018, the ocean heat content in the upper 700m and upper 2000m were either the highest or second highest on record.
 - **Ocean Acidification:** In the past decade, the oceans absorbed around 25% of anthropogenic carbon dioxide emissions. **Absorbed carbon dioxide reacts with seawater and changes the pH of the ocean. This process is known as ocean acidification.** Observations in the open-ocean over the last 30 years have shown a clear trend of decreasing pH.
 - ▶ **The IPCC Fifth Assessment report** found that there was a decrease in the surface ocean pH of 0.1 units since the start of the industrial revolution (1750). Changes in pH are linked to shifts in ocean carbonate chemistry that can affect the ability of marine organisms such as molluscs and reef-building corals, to build and maintain shells and skeletal material. This makes it particularly important to fully characterize changes in ocean carbonate chemistry.
 - **Sea Ice Well Below Average:**
 - ▶ Arctic sea-ice extent was well below average throughout 2018.
 - ▶ Antarctic sea-ice extent was also well below average throughout 2018.
 - **Glaciers are retreating:** In the hydrological year 2016/17, observed glaciers experienced an ice loss of 0.850 meter water equivalent (m w.e.). Preliminary estimates for 2017/18 indicate a similarly negative mass balance year with an ice loss of 0.7 m w.e. With this, seven out of the ten most negative mass balance years were recorded after 2010.

5 El Niño and Climate Change: 2019 may be the hottest year yet

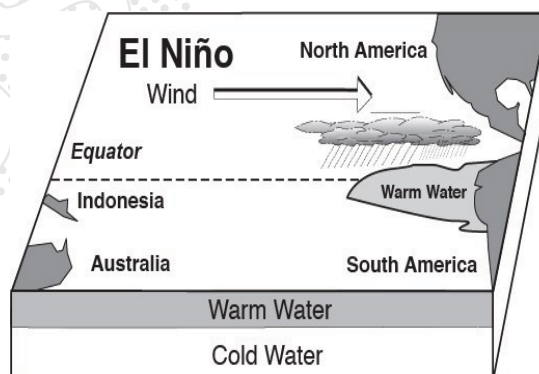
CONTEXT: Spurred by a likely El Niño as well as climate change, the planet is expected to heat up even more, scientists warn.

- There is an 80 percent chance a full-fledged El Niño has already begun and will last until at least the end of February 2019, according to the **Climate Prediction Center at the National Oceanic and Atmospheric Administration**.
- The impacts of El Niño have been more severe in recent years because of global warming, and these impacts will be worse as temperatures continue to rise, according to a recent study in the journal **Geophysical Research Letters**.
- “With an El Niño, it’s entirely possible 2019 will be the hottest year ever,” said co-author Samantha Stevenson, a climate scientist at the University of California, Santa Barbara.

Concepts to know:

- El Niño and La Niña** are opposite phases of what is known as the **El Niño-Southern Oscillation (ENSO) cycle**. The **ENSO cycle** is a scientific term that **describes the fluctuations in temperature between the ocean and atmosphere in the east-central Equatorial Pacific** (approximately between the International Date Line and 120 degrees West).
- La Niña** is sometimes referred to as the **cold phase of ENSO** and **El Niño** as the **warm phase of ENSO**. These deviations from normal surface temperatures can have large-scale impacts not only on ocean processes, but also on global weather and climate.
- El Niño and La Niña episodes typically last nine to 12 months, but some prolonged events may last for years.
- While their frequency can be quite irregular, El Niño and La Niña events occur on average every two to seven years. Typically, El Niño occurs more frequently than La Niña.
- The top four **hottest years have been among the last four, 2015-2018**, driven by increased emissions of heat-trapping carbon dioxide (CO₂)—**World Meteorological Organization (WMO)**.
- The Earth’s climate has been warmer than the 20th Century average over the last 406 consecutive months. That means no one under the age of 32 has ever experienced a cooler-than-average month.

El Niño



- El Niño** is a climatic cycle characterized by **high air pressure and warming of the Western Pacific and low air pressure in the eastern**. In normal conditions, strong trade winds travel from east to west across the tropical Pacific, pushing the warm surface waters towards the western Pacific.
- The **surface temperature could witness an increase o ature is already above that peak**.
- Almost half of South Asia’s population currently lives in areas that are projected to become moderate to severe hotspots by 2050 under the carbon-intensive scenario.

- Importantly, **most of the hotspots are in inland areas**. Analyses of climate change focused on extreme weather events and sea-level rise have focused attention on relatively richer coastal areas.

Recommendations:

- The identification of hotspots from changes in average weather allows **designing strategies to cope with climate impacts with a great level of spatial granularity**.
- The expected **decline in living standards** resulting from expected changes in temperature and rainfall provides an indication of how much it would be worth spending to mitigate the impacts.
- Policies and actions must be tailored to address the specific impacts and needs based on local conditions. **No single set of interventions will work in all hotspots**.

7 Sea Level Rise and its Impact

CONTEXT: The Fourth Assessment Report of IPCC (Intergovernmental Panel on Climate Change) projected the rise of sea level by 18-59 centimetres by the end of this century.

- Recent researches have shown **increased melting of polar ice-caps**. The glaciers have also shown accelerated rates of melting. This will lead to sea level rise with devastating impact on humanity and environment.

Sea level rise:

- A sea-level rise generally means **"increase in the global mean sea level."** It is the result of **increase in volume of water in the oceans**.
- Recently, increase in sea level has been **attributed to global climate change and various anthropogenic causes**.
- There are **two mechanisms** attributed to sea level rise:
 - ▶ **Thermal expansion** – ocean water expanding due to increased temperature.
 - ▶ **Melting of major stores of land ice**. Example – polar ice-caps and glaciers.

The factors behind increase in mean sea-level can be categorized into two parts-

Short Terms Factors:

- **Change in Tides:** Due to different position of Sun and Moon along with gravitational force, sea level rises.
- **Natural Disasters:** Cyclones, storm surges, Tsunamis also tend to increase sea level in particular areas. Example: Some islands of Andaman and Nicobar submerged during the 2004 Tsunami.
- **Monsoon:** Increased rainfall over a short period of time (as it happens during the monsoons) can lead to temporary rise in sea level in coastal areas.

Long Terms Factors:

- **Tectonic Changes:** Changes in tectonic plates and earthquakes can affect the sea level by uplifting the plate.
- **Melting of Ice-Caps:** Melting of ice-bergs, Polar ice-caps and glaciers have contributed to rise of sea-level. This has been due to global warming and associated climate change.
 - ▶ **Thermal Expansion:** Due to climate change and thawing of ice.
 - ▶ **Change in Ocean Basin:** Subsidence or emergence of ocean floor.

- However, among these reasons sea level rise due to climate change reasons has assumed alarming pace in recent times due to increased Global House Gases emissions and thus global warming. This is causing climate change and rise in temperature of the world.

Impact of Sea Level Rise

- **Increased Coastal Erosion and Submergence of Coastal Areas:** It leads to wastage of scarce land resource and also affects coastal population.
- **Vulnerability to Disasters:** Higher storm surge flooding, destruction by cyclones and tsunamis. Increased flood risk and potential loss of life.
- **Changes in Surface Water Quality and Groundwater Characteristics:** Due to mixing of water of different profiles.
- **Loss of Property and Coastal Habitats:** Coastal areas are one of the most populated areas of the country. Loss of property and coastal habitat will impact the national economy and resources.
- **Non-Monetary Loss:** Loss of non-monetary cultural resources, culture and values.
- **Impact on Agriculture and Aquaculture:** Through decline in soil and water quality.
- **Loss of tourism, recreation, and transportation functions:** Eg- Maldives economy is based on tourism. Submergence of islands can cripple the whole nation.
- **Melting Of Himalayas:** The IPCC report of 2007 predicted that melting of the Himalayan ice caps and the resulting rise in sea levels would likely increase the severity of flooding in the short term during the rainy season.

8 "Green Good Deeds" Campaign

CONTEXT: The Union Ministry of Environment, Forests and Climate Change (MoEFCC) has launched Green Good Deeds campaign.

- The purpose of the people-oriented campaign is to sensitise people and students, in particular about climate change and global warming.
- Under this the government has asked teaching community to join a campaign to sensitise all about climate change and global warming, which is a matter of concern for the world.
- The government also underlined **need for 'Green Sainiks' on the lines of 'Polio Sainiks'** to broaden the 'Green Good Deeds' campaign and take it to the grassroots level. The campaign aims to broaden its base with involvement of teachers, students and other voluntary organisations.

9 Adapting Better to Climate Change Mitigation Plan

CONTEXT: While there are on-going efforts to reduce greenhouse gas emissions and restrict global warming to below 2°C or even below 1.5°C, projects on adaptation have been funded or implemented in a number of countries, either by individual governments or with the help of external donor funds.

- It has been concluded that **adaptation projects were not helping the most vulnerable communities, and benefits were simply reaching those who had been assisted earlier.**

Mitigation and Adaptation Strategy Adopted by India

- **Increasing renewable energy capacity from 35 GW (Giga Watt) to 175 GW by 2022.** In addition to the **National Solar Mission** that targets fivefold increase in solar power to 1,000 GW, it also aims **to develop smart power grids** to enhance the efficiency of power transmission and distribution across the country.
- Under the Ministry of Renewable Energy, **UJALA scheme** is launched in which 22.66 crore LED bulbs are distributed that will reduce carbon emission up to 24 metric tons per year.
- Under the Ministry of Petroleum, **free LPG connections are given to women holding BPL cards.** Ujjwala Yojana has already reached 2 crore households and it aims to reach the target of 5 crores households by 2019 with an outlay of Rs. 8,000 crores.
- The **Swachh Bharat Mission** to create energy from the waste in urban areas.
- **Green India Mission** to reforest barren land with the annual target of increasing the forest quality and cover in 5 million hectares that will sequester 100 million tons of carbon annually.

10 India Spearheading Climate solutions

CONTEXT: Ministry of environment, forest and climate change has released a publication titled “India spearheading Climate solutions”. It highlights steps taken by India towards combating and adapting to climate change.

- The book **reflects government commitment towards addressing climate change** while keeping it in balance with sustainable development priorities.
- The Ministry’s overview of its climate actions features government initiatives like: **UJALA** for LED lights distribution; **UJJWALA** for distributing clean cooking stove to women BPL; India’s leadership in setting up ISA (International solar alliance); **FAME for e-mobility**; NAPCC (National Action Plan on climate change); **AMRUT** (Atal Mission for rejuvenation and urban transformation) mission for smart cities etc.
- Other initiatives that are mentioned include **ambitious goal of generating 175GW of renewable energy by 2022.**
- India recently also submitted its **second Biennial Update (BURII) report to UNFCCC.** It said that **emission intensity of India’s GDP came down by 21% between 2005-2014.**
- The BUR-II shows that **country’s share of non fossil (solar, wind and bio fuel) generation has reached 35% in June, 2018.**

11 Stratospheric barrier to curb warming

CONTEXT: Scientists have found that spraying sun-dimming chemicals high above the earth to slow global warming could be remarkably inexpensive costing about \$2.25 billion a year over a 15-year period.

Stratospheric Sulphur Aerosols

- These are **sulfur-rich particles** which exist **naturally** in the **stratosphere** region of the Earth’s atmosphere.
- The layer of the atmosphere in which they exist is known as the **Junge layer.**
- **Volcanoes** are a major source of particles in the stratosphere

- **Solar Geo - Engineering** is a theoretical approach to reducing some of the impacts of climate change by **reflecting a small amount of inbound sunlight back out into space**.

Some SRM techniques:

- **Stratospheric aerosol injection** - Under SAI delivery of precursor sulfide gases such as sulfuric acid, hydrogen sulfide (H₂S) or sulfur dioxide (SO₂) are sprayed by artillery, aircraft and balloons.
- **Marine cloud brightening** - Scientists have proposed that spraying tiny droplets of seawater into the clouds could make them lighter and more reflective. **Whiter, brighter clouds reflect more sunlight back out into space**, and would help cool the planet.
- **Analysis**- This proposed method **could counter most climatic changes, take effect rapidly, have very low direct implementation costs**, and be reversible in its direct climatic effects. But it is in the early stages of research, but it is **already a controversial topic**.

12 Recovery of Ozone Layer

CONTEXT: A recent study by NASA has confirmed the recovery of the ozone layer due to the absence of chlorine from Chlorofluorocarbon(CFC) in the atmosphere.

Highlights of Study:

- The study revealed that **chlorine levels declined by 0.8% each year between 2005 and 2016** and speculates that it could be the effect of the **worldwide ban on the use of CFC**.
- Previous research had hinted at the decrease in the depletion of ozone layer. Scientists believe that the ozone layer would **fully recover by 2080**.

Ozone Layer

- A layer of ozone envelops the Earth and keeps damaging ultraviolet, or **UV, radiation from reaching living things** on the planet's surface.
- The ozone layer exists mainly in the **stratosphere**.

Ozone Hole - The ozone hole is a region of depleted layers of ozone above the Antarctic region, whose creation is linked to increased cases of skin cancer.

Chlorofluorocarbons (CFCs) - These are compounds made up of combinations of the elements chlorine, fluorine and carbon. When these CFCs enter the air, they rise up into the atmosphere to meet up with and destroy ozone molecules.

How CFCs Destroy the Ozone

- Once in the atmosphere, CFCs drift slowly upward to the stratosphere, where they are **broken up by ultraviolet radiation, releasing the chlorine** that catalytically destroys ozone. The process is as follows:
 - ▶ UV radiation breaks off a chlorine atom from a CFC molecule.
 - ▶ The chlorine atom attacks an ozone molecule (O₃), breaking it apart and destroying the ozone.
 - ▶ The result is an ordinary oxygen molecule (O₂) and a chlorine monoxide molecule (ClO).
 - ▶ The chlorine monoxide molecule (ClO) is attacked by a free oxygen atom releasing the chlorine atom and forming an ordinary oxygen molecule (O₂).
 - ▶ The chlorine atom is now free to attack and destroy another ozone molecule (O₃). One chlorine atom can repeat this destructive cycle thousands of times.

Montreal Protocol

- It seeks to cut the **production and consumption of ozone depleting substances (ODS)** in order to protect the earth's fragile ozone layer. It also aims at phase out **CFCs by 2030**.

- It came into force in **1989** and has been **ratified by 197 parties** making it **universally ratified** protocol in UN history.

13

Atmosphere & Climate Research-Modelling Observing Systems & Services (ACROSS)

CONTEXT: The Cabinet Committee has approved continuation of the nine sub-schemes of the umbrella scheme "Atmosphere & Climate Research-Modelling Observing Systems & Services (ACROSS)" during 2017-2020.

About Atmosphere & Climate Research-Modelling Observing Systems & Services (ACROSS)

- ACROSS scheme pertains to the **atmospheric science** programs of the **Ministry of Earth Sciences (MoES)**.
- It 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" and is implemented in an integrated.
- The objective of the ACROSS scheme is to **provide a reliable weather and climate forecast** for betterment of society.

Analysis:

- The **scheme will provide improved weather, climate and ocean forecast and services**, thereby ensuring transfer of commensurate benefits to the various services.
- It will also **provide a sizable number of scientific and technical staff** along with requisite administrative support, thereby generating employment.
- To ensure **last-mile connectivity** of the weather based services to the end -user, a large number of agencies like the **Krishi Vigyana Kendras** of ICAR, Universities and local municipalities are roped in thus generating employment opportunities to many people.

14

World Bank's climate action investment for 2021-25

CONTEXT: World Bank has unveiled US \$200 billion in climate action investment for 2021 to 2025 to fight impact of climate change.

- The move coincides with **Conference of Parties-24 (COP24)** United Nations Climate Summit in **Katowice, Poland**.
- The breakdown of US \$200 billion will comprise approximately 100 billion in direct finance from World Bank.

The Climate Investment Funds (CIF)

- It is a collaborative effort among the **Multilateral Development Banks (MDBs)** and countries to **bridge the financing and learning gap between now and a post-2012 global climate change agreement**.
- Designed through extensive consultations, the CIF are governed by balanced representation of donors and recipient countries, with active observers from the UN, GEF, civil society, indigenous peoples and the private sector.
- The CIF are comprised of two Trust Funds viz., **Clean Technology Fund (CTF)** and **Strategic**

Climate Fund (SCF).

- CTF promotes investments to initiate a shift towards clean technologies, whereas SCF serves as an overarching framework to support targeted programs with dedicated funding to pilot new approaches with potential for scaled-up, transformational action aimed at a specific climate change challenge or sectoral response.
- Government of India has agreed in principle to access Climate Investment Funds. In the process of accessing these Funds, Climate Investment Plan (CIP) of India has been endorsed in the Trust Fund Committee meeting held on **4 November, 2011**.

15**UNEP partners with Google for monitoring impact of human activity on global ecosystem**

CONTEXT: UN Environment Programme (UNEP) has entered into partnership with search engine giant Google to monitor impacts of human activity on global ecosystems by using sophisticated online tools.

- The partnership was launched during High-Level Political Forum on Sustainable Development at United Nations (UN) **headquarters in New York**.
- The aim of the partnership is to develop platform to enable governments, NGO's and public to track specific environment-related development targets with user-friendly Google front-end.
- Its initial focus is on freshwater ecosystems including mountains, forests, wetlands, rivers, aquifers and lakes.
- Freshwater ecosystems areas account for **0.01% of world's water** but provide habitat for almost **10% of world's known species** and evidence suggests a rapid loss of freshwater biodiversity.
- Google will periodically produce geospatial maps and data on water-related ecosystems by employing massive parallel Cloud computing technology.
- It will generate satellite imagery and statistics to assess extent of change occurring to waterbodies and make it freely accessible to ensure nations have opportunity to track changes, prevent and reverse ecosystem loss.

Conferences & Reports

1 IPCC Special Report on Climate Change

CONTEXT: The Special Report on global warming of 1.5 °C (SR15) was published by the Inter-governmental Panel on Climate Change (IPCC) in October 2018.

Intergovernmental Panel on Climate Change (IPCC):

- The IPCC is the **leading world body** for assessing the **science related to climate change, its impacts and potential future risks, and possible response options.**
- The report was prepared under the scientific leadership of all three IPCC working groups:
 - **Working Group I** assesses **the physical science basis of climate change;**
 - **Working Group II** addresses **impacts, adaptation and vulnerability;** and
 - **Working Group III** deals with **the mitigation of climate change.**
- As part of the decision to adopt the Paris Agreement, the IPCC was invited to produce, in 2018, a Special Report on global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways.
- **Global Warming of 1.5°C** is the **first in a series of Special Reports** to be produced in the IPCC's Sixth Assessment Cycle. Next year the IPCC will release the **Special Report on the Ocean and Cryosphere in a Changing Climate, and Climate Change and Land**, which looks at how climate change affects land use.

About the Report

- The report, approved in **Incheon, South Korea**, includes over 6,000 scientific references, and was prepared by 91 authors from 40 countries.
- The report was **delivered at the United Nations' 48th session of the IPCC** to "**deliver the authoritative, scientific guide for governments**" to deal with climate change.
- The report's full name is **Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.**

Key Findings of the Report:

- World is already witnessing the consequences of 1°C of global warming through more extreme weather, rising sea levels and diminishing Arctic sea ice, among other changes.
- Meeting a 1.5 °C (2.7 °F) target is possible but would **require deep emissions reductions and rapid, far-reaching and unprecedented changes** in all aspects of society.

- By 2100, global sea level rise would be 10 cm lower with global warming of 1.5°C compared with 2°C.
- **Coral reefs would decline by 70-90 percent** with global warming of 1.5°C, whereas virtually **all (> 99 percent) would be lost with 2°C**.
- Limiting global warming to 1.5 °C compared with 2 °C would reduce challenging impacts on ecosystems, human health and well-being and that a 2°C temperature increase would **exacerbate extreme weather, rising sea levels and diminishing Arctic sea ice, coral bleaching, and loss of ecosystems, among other impacts**.
- The reduction of emissions by 2030 and its associated changes and challenges, including rapid decarbonisation, was a key focus.
- Limiting global warming to 1.5°C would require “rapid and far-reaching” transitions in land, energy, industry, buildings, transport, and cities. Global net human-caused emissions of carbon dioxide (CO₂) would need to fall by about 45 percent from 2010 levels by 2030, reaching ‘net zero’ around 2050. This means that any remaining emissions would need to be balanced by removing CO₂ from the air.

This report gives policymakers and practitioners the information they need to make decisions that tackle climate change while considering local context and people’s needs.

2 COP24 IN KATOWICE: Major Outcomes

CONTEXT: UN climate talks which took place in Katowice, Poland delivered a milestone ‘rulebook’ for the Paris climate treaty, but failed to dial up national efforts to slash carbon emissions.

The 195-nation pact calls for capping the rise in Earth’s temperature at “well under” two degrees Celsius (3.6 degrees Fahrenheit), and 1.5C if possible.

Major Outcomes:

- **Countries agreed on most of the elements of the “rulebook”** for putting the 2015 Paris agreement into practice that will come into effect in 2020 that is to say the rulebook on how governments will measure, and report on their emissions-cutting efforts.
- **Countries agreed on the way governments will measure, report on and verify their emissions-cutting efforts**, a key element because it ensures all countries are held to proper standards and will find it harder to wriggle out of their commitments.
- Parties to the 195-nation talks **could not agree** to “welcome” the **findings of the Intergovernmental Panel on Climate Change (IPCC) report on 1.5C**, as urged by at-risk nations.
- The governments of four countries (the **gas/oil-producers USA, Russia, Saudi Arabia and Kuwait**) **blocked a proposal to welcome the Intergovernmental Panel on Climate Change’s (IPCC) Special Report on Global Warming** of 1.5°C.
- Due to difficulty to reach agreement between parties, some difficult questions such as ways to scale up existing commitments on cutting emissions, ways to provide financial help for poor countries, wording that does not allow double counting and whether countries are doing enough to cut their emissions (in the light of the IPCC report) were postponed to the next conference.

Major Achievements:

- 50 countries signed the **“Silesia declaration”, which emphasized the need for emission-reducing policies to ensure “a just transition of the workforce”** and create **“decent work and quality jobs”**.

- The Polish presidency declared a **“forests for climate” policy** highlighting the important role of forests in solving climate problems.
- Some countries **committed to increase their climate pledges in 2020**, including **India, Canada, Ukraine, and Jamaica**.
- Several dozen countries forming **“High Ambition Coalition”** – including the EU, UK, Germany, France, Argentina, Mexico, and Canada – **pledged to raise their targets by 2020**.
- New members join the **Powering Past Coal Alliance**; now there are around 80.
- **Germany** made a €70m contribution to the **Adaptation Fund**. Smaller pledges made by France, Sweden, Italy and the EU raised the total to \$129m – an annual record for the fund.
- **Germany** gave €1.5bn for the **Green Climate Fund** – double their 2014 contribution.
- **Norway** pledged \$516m to the **Green Climate Fund**.
- The **World Bank** gave \$200bn for climate programmes in 2021-2025, two times more than in 2015 - 2020. It was also one of nine banks which pledged to “align their activities” with the goals of the Paris Agreement.
- The UK committed to increase by £100m the **funding for renewable energy projects in sub-Saharan Africa**, and by £170m the funding to **support the creation low carbon industry** in the UK by 2040.
- **Maersk, the world’s largest shipping company**, committed to totally eliminate its carbon impact by 2050,
- **Shell** committed to link short-term carbon targets to executive pay from the year 2020.

Note: In the conference which will take place in 2020, countries need to meet the deadline for their current emissions commitments and produce new targets for 2030 and beyond that go further towards meeting scientific advice.

3 India to submit Second Biennial Report to UNFCCC

CONTEXT: India’s green house inventory updates of 2014 and information on mitigation actions would be provided to UNFCCC (United Nations Framework on Climate Change).

- As a party to UNFCCC India is mandated to submit biennial (Once in two year) updates report.
- Second biennial update report (BUR) contains five components: **National circumstances; National Greenhouse inventory gas inventory; Mitigation Actions; Finance , technology and capacity building needs and support received; Domestic monitoring, reporting and verification**
- As per an official statement, in 2014 approximately 2.607 billion tonnes of CC-2 equivalent of GHGs were emitted from all activities excluding land use, land use changes and forestry (LULUCF).
- Net national emissions after including LULUCF were 2.306 billion tonnes of CO2 equivalent.
- Out of total emissions, largest contribution was from energy sector (73%); industrial processes and product use (IPPU) (8%); agriculture (16%) and waste sector (3%)
- The report also said that 12% of emissions were reduced by action carbon sink action of forestlands, cropland and settlements.

The EARTH SUMMIT:

In June 1992- United Nations Conference on Environment & Development (UNCED): held At Rio de Janeiro, Brazil also known as The EARTH SUMMIT or the RIO SUMMIT.

- Agenda 21 and Rio Declaration were outcome of it focusing on future Sustainable Development.
- The three important Conventions are the result of Rio Summit –
 - ▶ **Convention on Biological Diversity (CBD)** – deals with Biodiversity conservation
 - ▶ **UN Framework Convention on Climate Change (UNFCCC)** - Climate Change
 - ▶ **UN Convention to Combat Desertification (UNCCD)** - Desertification

UN Framework Convention on Climate Change (UNFCCC)

- Convention was opened for signature at the Rio Summit 1992.
- It is Legally binding
- Secretariat in Bonn, Germany
- Its Governing body - Conference Of Parties COP meets annually. the meeting is also called UN Climate Change Conference
 - ▶ The ultimate objective of the Convention is **to stabilize greenhouse gas concentrations “at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system.”**
 - ▶ It states that “such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.

4 BASIC Ministerial Meeting on Climate Change

CONTEXT: 27th BASIC Ministerial Meeting on Climate Change was recently held in New Delhi

About BASIC

- BASIC countries are bloc (geopolitical alliance) of four large newly industrialized countries – **Brazil, South Africa, India and China.**
- It was formed by agreement in **November 2009.**
- They were committed to act jointly at **Copenhagen climate summit 2009**, including possible united walk-out if their common minimum position was not met by developed nations during climate talks

Outcomes:

- Member Countries have reaffirmed their commitment to implement UN Framework Convention on Climate Change (UNFCC) its **Kyoto Protocol and Paris Agreement.** It resolved to **promote low carbon transition** to safeguard future of mankind.
- As a group they will continue to push for developed countries on their earlier commitment to providing **\$100 billion annually from 2020.**
- They also urged developed countries to take urgent actions to close **pre-2020 implementation gaps** by 2023 which they said can be useful input for first **Global Stocktake (GST).**
- **Brazil** will host **next BASIC meeting in 2019.**

5

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.

- 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.**
- The summit saw the launch of the **Global Cooling Prize**, which is an Innovation challenge that aims to spur development of a residential cooling solution that has at least five times less climate impact than the standard air conditioners.
- It is expected to witness participation from distinguished speakers from around the world, including innovators, philanthropists, venture capitalists, and other industry leaders.
- **Global Cooling Prize:** It is an innovation competition with wide global reach and participation that aims to achieve dramatic breakthroughs in cooling technologies.

6

Sustainable Biofuel Innovation Challenge (SBIC)

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.

- It aimed to provide common platform to Government policy makers, industry, investors and research community to exchange experiences and challenges related to development and scaling of advance biofuels.
- It also focused on concerns of private sectors to speed up large scale production of sustainable biofuels.
- The conference also aimed to provide **clear understanding of development in bio-economy made by participating countries, increase awareness of policy makers about challenges faced by industry-investor for commercial scale up of advanced biofuels.**
- It also provided common platform to experts and delegates from **19 countries** including representatives from mission innovation member countries in Sustainable Biofuels sector to take stock of current knowledge, share information and best practices, and build consensus on the actions most needed to move forward.

7

Suva Expert Dialogue on Loss and Damage

CONTEXT: Organized to deliberate on issues in the mechanisms set up so far to address losses and damages caused by climate change impacts.

- **Venue:** Inter-sessional climate summit at Bonn.

Background

- The expert dialogue came about **in response to a call by developing nations during last year's COP for a separate agenda item on loss and damage to tackle issues related to finance, technology transfer and capacity building** while dealing with climate change impacts.
- The idea behind the discussions was to capture the gaps in the way loss and damages are being assessed and compensated around the world, and options to bridge these gaps.
- To develop fair and just redressal mechanism for loss and damage.

Outcomes:

- **Current mechanisms and financial instruments set up under the aegis of the UNFCCC were inadequate** to deal with the mounting pressure of climate change on vulnerable populations.
- The aspect of “risk creation” due to human activity was also introduced
- Finance even emerged the single biggest concern among participants in a snap poll conducted.
- Doubt over feasibility of climate-based insurance system
- Forecast-based compensations
- Gaps in current loss and damage mechanisms

Discussions on these issues have been going on for more than a decade now, but there has been little progress on the ground. A document will be prepared based on the discussions and will be introduced as an input during the review slated for 2019, a year before the updated mechanism is due to be operationalised. The expert dialogue was an important step in the review process of the Warsaw International Mechanism.

8 India State of Forest Report 2017

CONTEXT: Forest Survey of India (FSI) prepares report on the state of India’s forest, providing the detailed information about National, State and District wise forest cover assessment.

- The report contains information on forest cover, tree cover, mangrove cover, growing stock inside and outside the forest areas, carbon stock in India’s forests and forest cover in different patch size classes.
- Special thematic information on forest cover such as **hill, tribal districts, and north eastern region has also been given separately** in the report.
- **India among Top Ten Nations in the World in Terms of Forest Area. The countries are:** Russia, Brazil, Canada, US, China, Australia, Congo, Argentina, Indonesia, India.

ISFR

- **ISFR is a biennial publication** of FSI, an organization under MoEFCC, GoI.
- ISFR 2017 is **the 15th in the series since 1987.**
- It provides **state wise and district (633) wise forest cover.**
- It provides the estimates of :
 - ▶ Growing stock within and outside the forest areas
 - ▶ Special thematic information on forest cover in hill, tribal and north eastern states
 - ▶ Carbon Sink
 - ▶ Bamboo
 - ▶ Mangrove cove

Key Findings of the Report

- **24.4% of land area under forest and tree cover.**
- **India is placed 8th in the list of Top Ten nations reporting the greatest annual net gain in forest area.**
- **Forest and Tree Cover of the country has increased** by 8,021 sq km (1%) as compared to assessment of 2015. The very dense forest has increased by 1.36% as compared to last assessment. This is very heartening as VDF absorbs maximum carbon dioxide from the atmosphere.

CANOPY-WISE FOREST COVER

Class	Area (sq km)	Percent of Geographic Area
Very Dense Forest	98,158	2.99
Moderately Dense Forest	3,08,318	9.38
Open Forest	3,01,797	9.18
Total Forest Cover	7,08,273	21.54
Scrub	45,979	1.40
Non-Forest	25,33,217	77.06
Total Geographic Area	32,87,469	100.00
Includes 4,921 sq km under Mangrove Cover Percentage rounded off		

- **Top 5 states where maximum forest cover has increased** are **Andhra Pradesh** (2,141 sqkms), Karnataka (1,101 sqkms), Kerala (1,043 sqkms), Odisha (885 sqkms) and Telangana (565 sqkms).
- **Top 5 states where forest cover has decreased** are **Mizoram** (531 sq km), Nagaland (450 sq km), Arunachal Pradesh (190 sq km), Tripura (164 sq km) and Meghalaya (116 sq km).
- Total carbon stock in forest is estimated to be 7,082 million tonnes. There is an **increase of 38 million tonnes in the carbon stock** of country as compared to the last assessment.
- In comparison to the last assessment done in 2011, there has been an increase of 1.73 million ha in bamboo area.
- Top three states/UTs having the largest forest cover in terms of area are:
 - ▶ Madhya Pradesh (77414 sq.km), Arunachal Pradesh (66964 sq.km), Chhattisgarh (55547 sq.km)
- Top three states/UTs in terms of percentage of forest cover with respect to the total geographical area are:
 - ▶ Lakshadweep with (90.33 per cent), Mizoram (86.27 per cent), Andaman & Nicobar Island (81.73 per cent)
- 15 States/UTs have above 33 per cent of the geographical area under forest cover. Out of these, 7 States/UTs have more than 75% forest cover. They are Mizoram, Lakshadweep, Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland, Meghalaya and Manipur.
- 8 States/UTs have forest cover between 33 per cent to 75 per cent. They are: - Tripura, Goa, Sikkim, Kerala, Uttarakhand, Dadra & Nagar Haveli, Chhattisgarh and Assam

MANGROVE:

- The total **mangrove cover stands at 4921 sq.km** and has shown an increase of 181 sq.km. The **top three gainers** in terms of mangrove cover are: **Maharashtra (82 sq.km), Andhra Pradesh (37 sq.km), Gujarat (33 sq.km)**
- 7 out of the 12 mangrove states have shown an increase in mangrove cover and none of them show any negative change.

BAMBOO:

- The extent of bamboo-bearing area in the country has been **estimated at 15.69 million ha**. There has been an increase of 1.73 million ha in bamboo area compared to 2011 assessment.

- The Government has recently **enacted a Bill in the Parliament for taking out bamboo from the tree category, where it is grown outside forest areas**. This will encourage people to grow bamboo on private lands, which will be helpful in increasing the livelihood opportunities for farmers and also enhance the green cover and carbon stock of the country.

WATER BODIES:

- There is an increase of 2,647 sq.km in the extent of water bodies inside forest cover between 2005 to 2015.
- State Forest Departments besides plantation and protection also undertake steps to improve water conservation through different interventions such as - **Building Check dams, Vegetation barriers, Percolation ponds, Contour trenches**.
- Top three states showing **increase in water bodies within forest areas are: Maharashtra (432 sq.km), Gujarat (428 sq.km), Madhya Pradesh (389 sq.km)**. Overall, almost all the states have shown a positive change in water bodies.

CARBON SINK

- Striving towards achieving NDC goal India is striving towards achieving its NDC goal of **creating additional carbon sink of 2.5 to 3.0 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030**.
- As per present assessment total carbon stock in forest is estimated to be 7,082 million tonnes. There is an increase of 38 million tonnes in the carbon stock of country as compared to the last assessment.
- **The main reasons for the decrease are -**
 - ▶ Shifting cultivation, other biotic pressures, rotational felling, diversion of forest lands for developmental activities, submergence of forest cover, agriculture expansion and natural disasters.
- Initiative for Increasing in Forest Cover:
 - ▶ The increasing trend of forest and tree cover is largely due to the various national **policies aimed at conservation and sustainable management of our forests** like **Green India Mission, National Agro-Forestry Policy (NAP), REDD Plus Policy, Joint Forest Management (JFM), National Afforestation Programme** and funds under Compensatory Afforestation to States.
 - ▶ **Green Highways** (Plantations & Maintenance) Policy to develop 1,40,000 km long tree line with plantation along with both sides of national highways will go a long way in enhancing the forest & tree cover.
 - ▶ **Water bodies inside forests have increased** over a decade.
 - ▶ **Mangrove cover** of the country has shown a **positive change**.
- Limitations of the Forest Cover Assessment Exercise
 - ▶ Remote sensing data has certain inherent limitations:
 - ▶ Since the **resolution** of the LISS-III sensor data is 23.5 m, land cover having a geometric dimension on the ground less than 23.5 m is not discernible.
 - ▶ Considerable ground details may sometimes be obscured due to **clouds and shadows**. Such areas can be classified to a certain extent with the help of collateral data.
 - ▶ **Non-availability of appropriate season data** sometimes leads to misinterpretation of the features owing to poor reflectance of data.

CONTEXT: A recent study has found that unplanned developmental activities and land use are reducing the evergreen forest cover and perennial streams in central region of Western Ghats in India.

- The study was published in **Yale Journal of Biology and Medicine**.
- The study focused on **Kali River** that originates in **Uttara Kannada district in Karnataka** and joins the Arabian Sea.
- The river is as old as Western Ghats, has six major dams, 325 species of flora, and 190 species of fauna.
- **Eco-hydrological footprint** is a measure of how ecology of a region responds to changes in water cycle and water usage. It can be measured by assessing the ratio of available water and water lost due to usage and evaporation.

Findings of the Report:

- Between the years **1973 and 2016**, the **forest cover has reduced from 85% to 55%**.
- **Land use pattern in the region has changed** during 1980–2000 period due to developmental projects such as dams built on the river Kali, **Kaiga nuclear plant** and **Dandeli paper mill**.
- **Dandeli paper mill** has led to large-scale conversion of forests to crops.
- **Evergreen forests** have **shrunk from 62% to 38.5%** during this period, and large water reservoirs have been constructed at the expense of forest cover.
- Kali River has sufficient water supply and perennial streams in the Ghats and coastal area, regions that lie in plain lands with higher degree of agriculture and cultivation have intermittent and seasonal flow that has led to water scarcity for 4 to 9 months in a year.
- Perennial streams were found in regions that have greater than 70% of forest cover, showing the link between ecology and hydrology with land use. Forests with native species of vegetation play a pivotal role in enhancing the water retention capability of the catchment.
- Villagers in the vicinity of native forests earn Rs 1.54 lakh per acre per year compared to Rs 32,000 in villages with stream catchments experiencing deforestation which confirms vital role of native forests in sustaining water and people's livelihood.
- The **management practices adopted by engineers** were **contributing to erosion of water retention capability** in the river catchment with severe water scarcity.
- The government agencies should establish better management and conservation strategies to maintain forest cover for food and water security.

10

13th CoP of Bonn Convention

CONTEXT: The 13th Conference of Parties (COP) of the Convention on the conservation of migratory species of wild animals (CMS) is going to be hosted by India.

- 15th to 22nd February, 2020
- **Location - Gandhinagar in Gujarat.**
- **Reason-** To showcase India's conservation initiatives for wildlife species. India is temporary home to several migratory animals and birds like Amur Falcons, Bar headed Gheese, Black necked cranes etc.

Important Information

- **Migratory species** are those animals that move from one habitat to another during different times of the year, due to various factors such as food, sunlight, temperature, climate, etc
- In order to protect the **migratory species** throughout their range countries, a Convention on Conservation of Migratory Species (CMS), has been in force, under the aegis of **United Nations Environment Programme**. Also referred to as the **Bonn Convention**
- India has been a Party to the CMS since **1983**.
- The Conference of Parties (COP) is the **decision-making organ** of this convention.
- India has also launched the **National Action Plan** for conservation of migratory species under the **Central Asian Flyway**.

11 2018 State Of The World's Birds Report

CONTEXT: Provides a comprehensive look at the health of bird populations globally.

BirdLife International's flagship science publication

Bird Life International

- BirdLife International (formerly the International Council for Bird Preservation) is a **global partnership of conservation organizations** that strives to **conserve birds, their habitats, and global biodiversity**, working with people towards sustainability in the use of natural resources.
- **Headquarters: Cambridge (UK)**
- Priorities of BirdLife International: **Preventing extinction of bird species, identifying and safeguarding important sites for birds**, maintaining and restoring key bird habitats, and empowering conservationists worldwide.
- **Official listing authority** for birds for the World Conservation Union's **Red List of threatened species**.
- World's largest partnership of conservation organisations, with over 120 partner organisations
- Major partners include **Royal Society for the Protection of Birds**, the **Wild Bird Society of Japan**, and the **U.S. National Audubon Society**.

Major Concerns Highlighted in the Report:

- Extinction crisis has spread so far that even some well-known species are now in danger and risk of extinction.
- Instantly recognisable bird species including **Snowy Owl *Bubo scandiacus*, Atlantic Puffin *Fratercula arctica*, and European Turtle-dove *Streptopelia turtur*** are all now globally **threatened with extinction**.
- **40 percent of the world's 11,000 bird species are in decline**, and one in eight bird species is threatened with global extinction.
- The expansion of agriculture, as well as its intensification, impacts 1,091 (74 percent) of globally threatened birds.
- The neurotoxin insecticides known as neonicotinoids or 'neonics' impaired the migrating White-crowned Sparrows *Zonotrichia leucophrys* ability to navigate while migrating.

Some Encouraging Findings of the Report:

- At least 25 bird species would have gone extinct in recent decades were it not for conservation interventions.
- Birds that were once **Critically Endangered** but have now been downlisted to **Endangered** include:
 - ▶ Red-billed Curassow *Crax blumenbachii* (Brazil)
 - ▶ Pink Pigeon *Nesoenas mayeri* (Mauritius)
 - ▶ Black-faced Spoonbill *Platalea minor*

Some Recommendations of the Report:

- Restoration of habitats key to birds.
- Eradicating and controlling invasive species.
- Targeting the most vulnerable bird species in order to protect them.

Significance

- These statistics aren't just bad news for birds, they are also warnings for the planet as a whole. The health of bird species is a good measure of the state of ecosystems in general.
- Birds are so widespread, being found in nearly every type of ecosystem, and one of the most studied groups of animals, they are excellent indicators of the state of the environment.

12**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.

Background

- The survey was jointly organized by the Social Forestry wing of the Forest Department, **Kottayam Nature Society, and Alappuzha Natural History Society.**

Asian Waterbird Census - The Asian Waterbird Census is part of the global **International Waterbird Census (IWC)** carried out **each January** as a **voluntary activity**.

- The information gathered during the survey would be used to promote the designation and management of protected areas, Ramsar Sites, Important Bird and Biodiversity Areas (IBAs)
- **International Water bird Census (IWC)** - The IWC is a **monitoring programme** operating in 143 countries to collect information on the numbers of water birds at wetland sites.
 - ▶ The International Water bird Census requires a **single count at each site** which should be repeated every year.
 - ▶ All types of **natural and man-made wetlands**, including: rivers, lakes, reservoirs, ponds, freshwater swamps, mangroves, mudflats, coral reefs, rice fields and sewage farms that are **covered by the Ramsar Convention**.

Findings:

- This year, the survey was conducted in 15 places.
- The 2019 Water bird Survey has spotted **three new species** — **Greater flamingo, Grey-headed lapwing, and Blue-cheeked bee-eater.**
- Compared to the previous years, the number of winged visitors to the region has declined drastically.

13 STAPCOR – 2018

CONTEXT: The International Conference on Status and Protection of Coral Reefs (STAPCOR – 2018) is being held at Bangaram coral Island of Territory of Lakshadweep.

About STAPCOR

- The International Conference on Status and Protection of Coral Reefs (STAPCOR – 2018) is an international conference **held every 10 years to review the status and progress of coral reefs all over the world.**
- Union Territory of **Lakshadweep organized STAPCOR - 2018** in collaboration with the **Zoological Survey of India.**
- The International Coral Reef Initiative (**ICRI**) has declared the year **2018 as the International Year of the Reef (IYOR 2018).**

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.

Corals

- Corals are **colonial organisms** that are composed of thousands individual animals, called **polyps.**
- Corals are **sessile**, which means that they **permanently attach themselves to the ocean floor,**
- Most corals **contain algae called zooxanthellae**, which are plant-like organisms. It **gives color to the Corals.**
- The corals benefit, as **the algae produce oxygen, remove wastes, and supply the organic products of photosynthesis** that corals need to grow, thrive, and build up the reef.
- Corals secrete an **external calcium carbonate skeleton.** This hard skeleton forms the **framework of coral reefs.**

Coral Reefs

- Coral reefs are large **underwater structures** composed of **the skeletons of corals.**
- The coral species that build reefs are known as "**hard,**" corals.
- Other species of corals that are not involved in reef building are known as "**soft**" corals.
- The largest of these coral reef systems, the **Great Barrier Reef** is in **Australia.**

Coral Bleaching

- When corals are stressed **by changes in conditions such as temperature, light, or nutrients,** they **expel the symbiotic algae** living in their tissues, causing them to **turn completely white.**
- **When a coral bleaches, it is not dead.**
- Corals can survive a bleaching event, but they are **under more stress** and are subject to mortality.

14

India to Bring its First Own National Environment Survey (NES) in 2019

CONTEXT: NES will kick start from 24 states and 3 UTs in January, 2019.

- Survey will be done in **grid based approach, grids measuring 9 by 9 Km to collect comprehensive data on environment parameters** like air, water soil quality; emission inventory; solid, hazardous and e- waste; flora, fauna; water bodies, wetlands etc.
- Country currently has secondary data on these parameters; NES will for the first time give primary data about these factors. Similar to socio economic data by NSSO (National Sample Survey Office)
- 55 Districts across 24 states and 3 UTs would be initially covered in the survey, and then all 716 districts would be covered in span of three to four years.
- NES is proposed under **ENVIS (Environmental Information System)** scheme of the environment ministry. ENVIS would also conduct the survey through its resource partners across the country.
- The survey will also assess **carbon sequestration** potential of districts. It will also rank them according to their environmental performances and document their best green practices.

15

Environment Performance Index (EPI) 2018

CONTEXT: India is among the bottom five countries on the Environmental Performance Index 2018, plummeting 36 points from 141 in 2016.

- Its **overall low ranking — 177 among 180 countries —** was linked to **poor performance in the environment health policy and deaths due to air pollution categories.**

EPI

- It is a **research project** aiming at establishing an international composite environment index. It is jointly implemented by **two US-Universities - Yale and Columbia** and has been commissioned by the **World Economic Forum**.
- The EPI identifies **targets for several core environmental policy categories and measures how close countries come to meet them.** In addition to publishing the composite index and individual country scores, a country ranking is released.

Recent Government Steps for Controlling Air Pollution:

- The Government has notified a **Graded Response Action Plan** for Delhi and NCR, which comprises measures such as prohibition on entry of trucks into Delhi; ban on construction activities, introduction of odd and even scheme for private vehicles.
- The Centre has recently notified **dust mitigation norms** to contain dust pollution.
- Notification of **National Ambient Air Quality Standards.**
- Formulation of **environmental regulations / statutes.**
- Setting up of **monitoring network for assessment of ambient air quality.**
- Introduction of **cleaner fuels** like gaseous fuel (CNG, LPG etc.), ethanol blend etc.
- Promotion of **cleaner production processes.**
- Decision taken to leapfrog directly **from BS-IV to BS-VI fuel** standards by 1st April, 2020.
- **Taxing polluting vehicles** and incentivizing hybrid and electric vehicles.
- **Ban on burning** of leaves, biomass, municipal solid waste.

16**Environmental Impact Assessment (EIA)**

- EIA is an important **management tool** for ensuring **optimal use of natural resources** for sustainable development.
- A beginning in this direction was made in India with the impact assessment of **river valley projects in 1978-79** and the scope has subsequently been enhanced to cover other developmental sectors such as industries, thermal power projects, mining schemes etc.
- EIA has now been made **mandatory under the Environmental (Protection) Act, 1986** for 29 categories of developmental activities involving investments of Rs. 50 crores and above.

The Concept of EIA

- Environmental Impact Assessment (EIA) is a **process of evaluating the likely environmental impacts of a proposed project or development**, taking into account inter-related **socio-economic, cultural and human-health impacts**.

Social Impact Assessment (SIA) and how is it different from EIA:

- Social Impact Assessment analyse, monitors and manage the intended and unintended social consequences of any policies, programs, plans or projects. **The EIA can include SIA.**
- The SIA is increasingly being accepted as an important part of the EIA. In India, SIAs are mandatory for any major project since the land acquisition law of 2013.

Historical Facts about EIA

- **United States** is considered to be originator of EIA. Where due to huge public pressure, the government enacted National Environmental Policy Act (NEPA) in 1970s.
- In India till 1980s, almost all projects were implemented with little or no environmental concerns in India. The **Department of Environment came into existence in 1980s**.
- EIA process was **recognized at the Earth Summit in Rio Conference in 1992** in which the Rio declaration stated that EIA shall be taken as national instrument for proposed projects which might adversely impact the environment.

17**Asia Environment Enforcement Awards, 2018**

CONTEXT: United Nation Environment has awarded Wildlife Crime Control Bureau (WCCB) with Asia Environment Enforcement Awards, 2018.

About Asia Environmental Enforcement Awards:

- These awards publicly recognize and celebrate excellence in enforcement by government officials and institutions/teams **combating trans-boundary environmental crime in Asia**.
- The thematic scope of the Awards covers any trans-boundary environmental crimes, **including illegal trade in wildlife, and illegal trade in chemicals or waste**.
- 2018 Awards theme: fighting transboundary environmental crime

Key Facts:

- WCCB has been conferred this award in **Innovation category**.
- WCCB has developed an **online Wildlife Crime Database Management System** to get real time data in order to help analyze trends in crime and devise effective measures to prevent and detect wildlife crimes across India.

- WCCB has also carried out operations such as **Operation SAVE KURMA, THUNDERBIRD, WILDNET, LESKNOW, BIRBIL, THUNDERSTORM, LESKNOW-II** along with other enforcement agencies
- WCCB has also developed a scheme to enroll willing persons as **WCCB Volunteers**.

18 Environmental Refugee

CONTEXT: World Bank Group report on Environmental/Climate Refugee

Major Findings:

- The worsening impacts of climate change could see **over 140 million people move within their countries' borders by 2050**, creating a looming human crisis and threatening the development process.
- 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.

Recommends key actions nationally and globally by the Report:

- **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.

19 World Water Development Report 2018

CONTEXT: The United Nations World Water Development Report titled Nature-based Solutions for Water was launched on 19 March 2018 during the 8th World Water Forum, and in conjunction to the World Water Day (March 22).

Highlights of the World Water Development Report 2018:

- The report **aims at addressing the contemporary water management challenges across various sectors**, in particular, **sustainable cities, disaster risk reduction, and agriculture and water quality**.
- Nature-based solutions refer to the sustainable management and use of nature for tackling societal and environmental challenges. Water security, food security, water pollution, climate change, disaster risk and human health are some of the challenges.
- **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 is arguably the greatest single threat** from climate change. Drought and soil degradation, the biggest risks of natural disaster, are likely to worsen.
- **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 fertilizer 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.**
- Water scarcity can lead to civil unrest, mass migration and even to conflict within and between countries.
- The report thus warns of conflict and civilizational threats unless actions are taken.

Nature-Based Solutions :

- Nature-based solutions (NBS) offer a vital means of moving beyond business-as-usual to address many of the world's water challenges while simultaneously delivering additional benefits vital to all aspects of sustainable development.
- NBS use or mimic natural processes to **enhance water availability (e.g., soil moisture retention, groundwater recharge), improve water quality (e.g., natural and constructed wetlands, riparian buffer strips), and reduce risks associated with water-related disasters and climate change** (e.g., floodplain restoration, green roofs).
- Currently, water management remains heavily dominated by traditional, human-built (i.e. 'grey') infrastructure and the enormous potential for NBS remains under-utilized.
- NBS include green infrastructure that can substitute, augment or work in parallel with grey infrastructure in a cost-effective manner. The goal is to find the most appropriate blend of green and grey investments to maximize benefits and system efficiency while minimizing costs and trade-offs.

Suggestions:

- 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 emphasizes 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.
- The report thus **emphasizes 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 regularize 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.

Status of Trace and Toxic metals in Indian rivers 2018 Report

CONTEXT: Status of Trace and Toxic metals in Indian rivers 2018 Report. The present report attempts to provide the water quality scenario of Indian rivers in respect of trace & toxic metals.

- Publisher of the Report: Central Water Commission

Findings of the Report:

- 42 rivers in India are polluted with at least two toxic heavy metals.
- River Ganga is polluted with five heavy metals—chromium, copper, nickel, lead and iron.
- Water quality monitoring issues in Indian rivers have emerged as a critical challenge in the country.
- Industrial effluents as well as domestic waste are adversely affecting their health of the rivers.
- Lack of monitoring and enforcement also makes it difficult for countries and regions to understand and deal with this challenge.
- Metal contamination in the environment is one of the persistent global environmental problems and is caused by continuous growth in mining, fertilizer, tannery, paper, batteries and electroplating industries which subsequently has shown noxious effects on human health around the globe.
- Unlike organic contaminants, heavy metals are non-biodegradable and also carcinogenic.
- Heavy metals such as Zinc, Copper, Nickel, Mercury, Cadmium, Lead, Chromium and Arsenic tend to accumulate in organisms, which may lead to a reduction in species diversity.

Central Water Commission

- Technical organization of the Ministry of Water Resources, GoI.
- It has been playing a Major role: Monitoring water quality of river water since year 1963 and at present, is observing water quality at 429 key locations covering all major river basins of India.
- Work Domain:
 - ▶ Initiating, coordinating and furthering in consultation for the State Governments concerned.
 - ▶ Entrusted with the coordination of schemes for control, conservation and utilization of water resources throughout the country, for purpose of flood control, irrigation, navigation, drinking water supply and water power development.
 - ▶ Undertakes the investigations, construction and execution of any such schemes as required.

International Dam Safety Conference 2019

CONTEXT: The International Dam Safety Conference - 2019 is part of the series of Dam Safety Conferences being organized under the aegis of the Dam Rehabilitation and Improvement Project (DRIP).

Dam Rehabilitation and Improvement Project (DRIP)

- Central Water Commission (CWC), with financial assistance from the World Bank, is implementing the Dam Rehabilitation and Improvement Project (DRIP) to rehabilitate 223 large dams in seven States.
- DRIP addresses the safety issues related to dam structural and non-structural aspects such as flood mapping, development of Emergency Action Plans, installation of warning systems, and development and updating of dam operation manuals.
- Organized by** - Central Water Commission (Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India) in collaboration with Odisha Water Resources Department, and The World Bank.
- Reason** - More than 80% of over 5200 large dams in India are older than 25 years and their health and safety are of paramount importance for sustainable utilization of these valuable assets.
- 13-14 February 2019
- Location:** Bhubnesawar, capital city of Odisha.

22 Hindu Kush Himalayan Assessment Report

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

Hindu Kush Himalayan Region

- 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).

International Centre for Integrated Mountain Development (ICIMOD):

- It is a regional intergovernmental learning and knowledge sharing centre serving the eight regional member countries of the Hindu Kush Himalaya – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan –
- Based in Kathmandu, Nepal
- Mission** - To enable sustainable and resilient mountain development for improved and equitable livelihoods through knowledge and regional cooperation.

Findings of Report:

- Hindu Kush Himalayan (HKH) region provides water, ecosystem services, and the basis for livelihoods to a population of around 210.53 million people in the region.
- 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 which could destabilize the hydrology of the region.
- Large-scale warming could drastically alter the river flows in these countries.
- Receding glaciers might be the reason for the changing monsoon.
- If these trends persist, the frequency and magnitude of water-induced hazards in the Hindu Kush Himalaya region will increase.

23 India's E-waste Generation

CONTEXT: International E-Waste Day celebrated on 13 October. 82% of India's e-waste is personal devices.

- It is estimated that **50 million tonne of e-waste will be generated globally in 2018. Half of this is personal devices** such as computers, screens, smartphones, tablets and TVs, with the remainder being larger household appliances and heating and cooling equipment.
- **Only 20 per cent of global e-waste is recycled** each year, which means that 40 million tonnes of e-waste is placed in landfill, burned or illegally traded and treated in a sub-standard way.
- Aim: **To encourage consumers to correctly dispose their e-waste**, with increased reuse and recycling rates and adopt sustainable consumer habits to move towards a circular economy.
- The **Global E-Waste Monitor, 2017 published by the United Nations University** estimated that India generates about **2 million metric tonnes** of e-waste (2016) annually.
- Composition of Indian e- waste:
 - ▶ **Computer equipment account for almost 70 per cent.**
 - ▶ Telecommunication equipment-phones 12 per cent.
 - ▶ Electrical equipment 8 per cent.
 - ▶ Medical equipment 7 per cent.
 - ▶ Remaining from household e-waste.
- **India is ranked 5th in the world** among top e-waste producing countries-**USA, China, Japan and Germany.**
- This increase in quantity of e-waste is because of **increased consumption** but also **obsolescence**. Users discard old computers, mobiles and other equipment much faster than before.
- The newly launched E-waste (Management) Rules 2016 replaced the existing E-waste (Management and Handling) Rules, 2011. The concept of Extended Producer Responsibility (EPR) mandated producers of electrical and electronic equipment to register and specified targets to **collect back e-waste generated** and to ensure that it is channelized to authorized recyclers.

24 Eighth Regional 3R Forum

CONTEXT: Eighth Regional 3R Forum concludes with adoption of Chair Summary which reaffirms the commitment of the Asia-Pacific Nations to promote and imbibe the Principles of 3R - Reduce, Reuse & Recycle.

Regional 3R Forum:

- **Launched in 2009 in Tokyo, Japan with objective of integrating 3Rs- reduce, reuse and recycle in policy, planning and development.**
 - **Strategic platform for sharing best practices in 3R areas**, including new and emerging issues of concern in waste management.
 - **Members:** Governments aid agencies, international agencies, private sector entities, research bodies, NGOs and other relevant parties.
- **Venue: Indore, Madhya Pradesh** (9th April 2018)
 - **Theme:** "Achieving Clean Water, Clean Land and Clean Air through 3R and Resource Efficiency- A 21st Century Vision for Asia-Pacific Communities".
 - **Co-organizers:**
 - ▶ Ministry of Housing and Affairs

- ▶ Japan's Environment Ministry
- ▶ United Nations Centre for Regional Development (UNCRD)
- **Host of the next 3R forum:** Thailand
- **The main issues in Eighth Regional 3R Forum:**
 - ▶ 3R policy implementation in the context of achieving clean land, clean water and clean.
 - ▶ 3R and circular economic development strategies for improving water quality and water security.
 - ▶ Potential opportunities of implementing 3R and circular economic development strategies to prevent physical and chemical degradation of land.
 - ▶ Potential opportunities of implementing 3R and circular economic development strategies to achieve reduction of air pollution and GHG emissions.
 - ▶ **Inter-municipal partnerships and cooperation** in expanding 3R and waste management services for local communities.
 - ▶ **Technological options to deal with new emerging waste streams.**
 - ▶ Role of 3R and circular economy in greening SMEs and enhancing national productivity.
 - ▶ **Domestic and international financing options and investment opportunities** for 3R implementation, including infrastructure development.
 - ▶ Review and evaluate countries' progress, initiatives, achievements and best practices in implementing the **Ha Noi 3R Declaration – Sustainable 3R Goals for Asia and the Pacific for 2013-2023.**

25**Global Energy Transformation: A Roadmap to 2050**

CONTEXT: The International Renewable Energy Agency (IRENA) has released a road map for the global energy transformation.

Highlights:

- The roadmap shows that the adoption of renewable energy must increase dramatically to achieve the **target of limiting global temperature increase to well below 2°C.**
 - ▶ According to the study, these combined efforts could achieve up to **90% of the energy-related emissions reductions required by 2050.**
 - ▶ The roadmap requires the share of total final energy consumption to rise from 18% today to approximately two thirds by 2050. The share of renewable in the power sector would have to increase from 25% today to 85% in 2050.
 - ▶ In addition, the direct use of renewable energy must increase in the transport and heating sectors to displace fossil fuels. Overall, the current rate of renewable energy adoption must increase six-fold.
 - ▶ IRENA identifies six policy areas to achieve these shifts:
 - tapping into synergies between energy efficiency and renewable energy;
 - increasing the share of renewable in the power sector;
 - electrifying the transport and heating sectors;
 - supporting system-wide innovation;
 - aligning socio-economic structures and investment with the transition; and
 - ensuring the transition costs and benefits are fairly distributed.

The Paris Agreement

- It builds upon the Convention and **for the first time brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries** to do so.
- The central aim is to strengthen the global response to the threat of climate change by keeping a **global temperature rise this century well below 2 degrees Celsius above pre-industrial levels** and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.
- The agreement aims to strengthen the ability of countries to deal with the impacts of climate change.
- The Paris Agreement requires all Parties to put forward their best efforts through **nationally determined contributions (NDCs)** and to strengthen these efforts in the years ahead. This includes requirements that all Parties report regularly on their emissions and on their implementation efforts.
- The **Paris Agreement entered into force on 4 November 2016**, thirty days after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55 % of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depository.

Global Commission on the Geopolitics of Energy Transformation:

- The Commission was launched during the Assembly of the International Renewable Energy Agency (IRENA) and its work is supported by Germany, Norway and the United Arab Emirates.
- The **ex-President of Iceland**, Olafur Grimsson has been designated the chair of the Commission.
- Other members of the Commission include prominent government and business leaders from the United States, Saudi Arabia, China, Germany, Brazil and Russia.
- It will work to achieve a better understanding of the geopolitical implications of a large-scale shift to renewable energy.
- It will analyse how higher shares of renewable energy and increased energy efficiency will impact relations between states and thus reshape global energy diplomacy.
- It will suggest how countries can thrive in the new energy economy in line with the Paris Climate Agreement objectives and the SDGs.

International Renewable Energy Agency (IRENA)

- It is an intergovernmental organization that supports countries in their transition to a sustainable energy future.
- It serves as the principal platform for international cooperation, and a repository of policy, technology, resource and financial knowledge on renewable energy.

26

India pitches for declaring 2019 as International Year of Millets

CONTEXT: Agriculture minister proposed to the United Nations Food and Agriculture Organization to declare the year 2019 as international year of millets.

- This will promote cultivation by amending cropping patterns of areas which are especially susceptible to climate change.
- The minister has requested the inclusion of this proposal in the agenda of the 26th session of the Committee on Agriculture (COAG) meeting, scheduled during October 1-5, 2018 in Rome.
- **India celebrated 2018 as the national year of millets.**

Millet:

- Millet is a common term to categorize **small-seeded grasses** that are often termed nutri-cereals or dryland-cereals, and includes **sorghum, pearl millet, ragi, small millet, foxtail millet, proso millet, barnyard millet, kodo millet and other millets.**
- An important staple cereal crop for millions of small holder dryland farmers across sub-saharan Africa and Asia, **millets offer nutrition, resilience, income and livelihood for farmers even in difficult times. They have multiple untapped uses such as food, feed, fodder, biofuels and brewing.**
- Photo-insensitive & resilient to climate change, millets are hardy, resilient crops that have a low carbon and water footprint, can withstand high temperatures and grow on poor soils with little or no external inputs.
- In times of climate change they are often the last crop standing and, thus, are a good risk management strategy for resource-poor marginal farmers.

GS SCORE

Policies, Schemes & Initiatives

1 States set to roll out Parivesh

CONTEXT: 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.

Parivesh

- **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.
- 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 empowers the proponent to track real-time pendency of their proposals or applications. The system will show a bar chart about the delay at each level of clearance.
- It **removes manual intervention and puts the proposals on the first-come-first-serve basis** for agenda. Also barring a few special and specific mentions of a project, the minutes of a meeting will be auto-generated by the system and made available on the same day. 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 Draft National Forest Policy, 2018

CONTEXT: 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.

Background

- 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 previous draft was also **criticised for ignoring the fact that a new community forest governance regime under the Forest Rights Act** has been emerging across the country.
- 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.

- NFP, 2018 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.

Major Highlights:

- NFP, 2018 contributes to the forestry-related **Nationally Determined Contribution Targets** and by integrating, **“climate change mitigation and adaptation measures in forest management through the mechanism of REDD+ (Reducing Emissions from Deforestation and Forest Degradation plus)** so that the impacts of the climate change is minimised.
- 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.
- While the role of forests as climate change mitigation factor has been recognized, **the draft NFP is vague on the issue of forests rights for forest dwelling communities**.

3 NITI Aayog Calls for Clear Policy on Shifting Cultivation

CONTEXT: 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.

- 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. This creates confusion among grass roots level workers and jhum farmers.
- Publication notes that land under jhum cultivation has dropped by 70% between 2000 and 2010.
- Today there is a shift towards regular agriculture especially horticulture as jhum cultivation did not give communities sufficient cash. Thus food and nutritional security of communities practicing Jhum cultivation has to be taken care of through broadening PDS (Public Distribution Network)
- It also said that shifting cultivation fallows must be legally categorised as **“regenerating fallows”** to give these lands sufficient time to regenerate into forests .Also, credit facilities must be extended to jhum cultivators.

Draft Rules for Compensatory Afforestation Act, 2016

CONTEXT: **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.

Highlights 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.
- NPV quantifies the services provided by the forest. It includes **goods and services (tourism and timber); regulating services (climate change); and non-material benefits (recreation)**.
- It seeks to provide **safety, security and transparency in utilization of CAMPA funds** which are currently kept in Nationalized Banks and managed by an ad-hoc body. These funds would **be brought under the focus of Parliament and State Legislatures** by transferring them to **non-lapsable interest bearing funds**.

Key Issues and Analysis

- The Bill establishes the Funds for compensatory afforestation and forest conservation. However, there are several factors (other than administration of funds) which affect compensatory afforestation and forest conservation.
- **CAG report** noted that **state forest departments lack the planning and implementation capacity** to carry out compensatory afforestation and forest conservation. With the share of funds transferred to states increasing from 10% to 90%, effective utilisation of these funds will depend on the capacity of state forest departments.
- **Procuring land for compensatory afforestation is difficult as land is a limited resource**, and is required for multiple purposes, such as agriculture, industry, etc. This is compounded by unclear land titles, and difficulties in complying with procedures for land use.
- 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

CONTEXT: 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 — that accumulates around Rs.6,000 crore annually and is already worth around Rs.42,000 crore.

- 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

- Currently, states are able to access CAMPA funds through an “ad hoc” mechanism whereby the Centre disburses it on a needs-basis. 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

CONTEXT: 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.

- **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.
- The campaign, which has been initiated as part of the Forest Interventions in Ganga (FIG) component of NamamiGange 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’ app’ to increase state’s green cover

CONTEXT: 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 Scheme for protection of exotic Neela Kurinji plants

CONTEXT: Tamil Nadu government has announced a novel scheme for the protection of the exotic Neela kurinji (*Strobilanthus kunthianus*) plants .

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

CONTEXT: 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.**

- 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

CONTEXT: 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 in-situ and ex-situ options to utilize the crop residue.
- Highlights an inclusive approach to the initiative and puts forth a recommended action plan covering the different aspects of biomass management.

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.
- In addition to sector-specific recommendations, the reports lay down a specific implementation timeline for prescribed recommendations and also identify authorities that would be responsible for timely execution of each activity.

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 evaluates 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.

Major Recommendations (Clean Fuel):

- Facilitation of city gas distribution projects in adjoining National Capital Region (NCR) areas
- Notification of list of approved fuel for NCR
- Introduction of schemes to incentivise renewable sources of energy
- 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

Major Recommendations (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 National Clean Air Programme

CONTEXT: Ministry of Environment, forest and climate change launched National clean air programme. It is a pollution control initiative to cut concentration of coarse and fine particles.

- **Aim: Reduction of 20-30% in PM2.5 and PM10 concentration by 2024 with 2017 as the base year**
- NCAP will be a midterm, **five year action plan**. Starting with **2019 as first year**. Later it will be further extended after midterm review of outcomes.
- **Other policies and programmes, including the NAPCC (National action plan on climate change) will be joined together with NCAP.**
- For effective implementation of National level project monitoring unit, project implementation unit, state level project monitoring unit, city level review committee under Municipal Commissioner and DM level committee in districts would be set up.
- Cities will prepare action plan in consultation with CPCB (central pollution control board).
- **NCAP focuses on 102 non attainment cities, whose air quality was found to be of in violation of the national standards during monitoring between 2011-2015.**
- Smart cities program will be used to launch the NCAP in 43 smart cities falling in the list of 102 non attainment cities.

12 Clean Air' India Ring Initiative

CONTEXT: 'Clean Air' India Ring, a critical component of the Indo-Dutch #Start UpLink.

‘Clean Air’ India Ring, a critical component of the Indo-Dutch #StartupLink:

- The initiative is a multi-corporate challenge that will test and scale innovations through collaboration between startups, corporates and governments by providing pilot opportunities for promising innovations that solve the problem of pollution.
- As a partner for the Indo Dutch #StartupLink, **Shell aims to accelerate India’s transition to a sustainable energy future.**

About Shell:

- **Shell E4 Start Hub enable and empower energy entrepreneurs in progressing their impactful solutions.**
- Shell E4 is uniquely positioned in offering startups access to infrastructure (labs + co-working space), industry knowledge, subject matter expertise, funding, global connections and brand recognition, combined with a world-class accelerator program.
- Shell will meet the needs of companies entering India by helping them with market assessment, business model development, regulatory and legal support, product/service development and testing, brand strategy and visual identity development.

The Indo-Dutch #StartupLink initiative:

- In an Endeavour to further the spirit of innovation and entrepreneurship, **Invest India (host to the Govt. of India’s initiative, ‘Startup India’ under the Ministry of Commerce and Industry)** and the **Dutch Government** are jointly launching the **Indo-Dutch #StartupLink** initiative.
- Twin objective of the Initiative: **Facilitating market expansion for startups** in the two countries alongside fostering a **joint sense of innovation and entrepreneurship.**
- The Indo-Dutch #StartupLink is developed for Indian and Dutch startups that are exploring each other’s markets and offers access to key information, relevant networks, pilot opportunities, and navigators for the respective startup ecosystems.
- Startup India Hub under Invest India and Netherlands Enterprise Agency under the Ministry of Economic Affairs and Climate Change would act as single points of contact and navigators for their respective countries.

13 Ash track mobile application

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

ASH TRACK App

- 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.

14**South Asian Nitrogen Hub**

Context: 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.

South Asian Nitrogen Hub:

- 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 co-leading the South Asian nitrogen assessment with CEH, UK, for the UN Environment.

Significance of Nitrogen and Important Information:

- 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.
- Scientists **Fritz Haber and Carl Bosch** solved this problem by producing ammonia by combining atmospheric nitrogen with hydrogen gas at high temperature and pressure—known as the **Haber-Bosch process**.

15**Scheme for Biomass Based Cogeneration Projects**

CONTEXT: Promotion of Biomass Power and Bagasse Cogeneration in India under Ministry of New and Renewable Energy

Objective:

- **To utilize country's available biomass resources like bagasse, rice husk, straw, cotton stalk, coconut shells etc. for power generation.**
- **Waste to Energy projects** are also being set up for generation of Energy from Urban, Industrial and Agricultural Waste / Residues such as municipal solid wastes, vegetable and other market wastes, slaughter house waste, agricultural residues and industrial wastes & effluents.

- **A total capacity of 9.54 GW of-grid connected bio-power has been installed** in the country as on October 2018 **against a target of 10 GW bio-power by 2022**. This includes 8.73 GW from bagasse cogeneration, 0.68 GW from non-bagasse cogeneration and 0.13 GW from waste to energy.

Bagasse:

- Sugar production process releases a valuable byproduct known as Bagasse.
- Basically it is a **fibrous material that remains behind after the crushing of sugar cane**.

Congeneration:

- The **concept of simultaneous generation of electricity and thermal energy is congeration**.
- It produces two forms of energy from a single fuel source. One of the forms of energy must always be heat and the other may be electrical or mechanical energy.
- Almost all sugar mills in India are traditionally using cogeneration by using bagasse as a fuel.
- Bagasse is burnt in boilers to produce steam for its use in the process and turbine generator for power generation.
- After self consumption, the surplus electricity will be available for sale to the grid.
- In addition, captive electricity consumption by the sugar mills from cogeneration based technology is now eligible to earn Renewable Energy Certificates (RECs).

16

National Policy on Biofuels-2018

CONTEXT: 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.

Salient Features:

- 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.
- 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).
- Considering that farmers are at a risk of not getting appropriate price for their produce during the surplus production phase. **The Policy allows use of surplus food grains for production of ethanol for blending with petrol with the approval of National Biofuel Coordination Committee.**
- With a thrust on Advanced Biofuels, **the Policy indicates a viability gap funding scheme for 2G ethanol Bio refineries** of Rs.5000 crore in 6 years in addition to additional tax incentives, higher purchase price as compared to 1G biofuels.
- **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.

Expected Benefits:

- **Reduce dependency on imports:** The ethanol supply year 2017-18 is likely to see a supply of around 150 crorelitres of ethanol which will result in savings of over Rs.4000 crore of forex.
- **Cleaner environment:** The decline in crop burning and conversion of agricultural wastes to biofuels will further lead to reduction in greenhouse gas emissions.
- **Health benefits:** Prolonged reuse of cooking oil for preparing food such as deep-frying is a potential health hazard and can lead to many diseases. However, the use of old cooking oil for making biodiesel will prevent the practice of used cooking oil in the food industry.
- **Management of municipal solid waste:** As per the estimates, **62 MMT of municipal solid waste gets generated in India annually.** One ton of such waste has the potential to provide around 20 percent drop in fuels. There are technologies which can convert MSW to drop in fuels.
- **Boost infrastructural investment in rural areas:** At present Oil Marketing Companies are in the process of setting up 12 2G bio refineries with an investment of around Rs 10,000 crore. The further addition of 2G bio refineries across the country will encourage infrastructural investment in the rural areas.
- **Employment generation:** One 2G bio refinery may contribute 1200 jobs in plant operations, village level entrepreneurs and supply chain management.
- **Additional income to farmers:** The conversion of surplus grains and agricultural biomass to ethanol can help in price stabilization.

17

Waste to Wealth

CONTEXT: Bio-gas is fast becoming a popular source of fuel in rural areas. Bio-gas fuels such as 'Gobar Gas' has gained popularity displacing LPG as a source of clean fuel.

- 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.
- Currently, of 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.**
- The **untapped waste has a potential of generating 439 MW of power** from 32,890 TPD of combustible wastes including Refuse Derived Fuel (RDF), 1.3 million cubic metre of biogas per day or 72 MW of electricity from biogas and 5.4 million metric tons of compost annually to support agriculture.
- 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'.

Biogas

- Biogas is a mixture of about **55% methane** and **45% CO₂** and other trace contaminant gases. The gas is created from **anaerobically** decaying organic matter.
- Organic residues can be sensibly utilised and do not need to be simply disposed of.
- Biogas manure can replace mineral fertiliser.
- Biogas plants can be utilised by both urban and rural population, industry as well as households.

Reasons for Popularity of Bio-Gas

- **Local Procurement:** Unlike LPG which requires transportation through cylinders, bio-gas (such as gobar gas) can be sourced and produced locally. Eg. – The centralized biogas plant at Lambra in Punjab.
- **Hassle Free Availability:** Villagers no longer need to book cylinders and wait for delivery. Biogas production is location independent and the feasibility is dependent only on the feedstock, which is organic waste. Hence, biogas projects are feasible irrespective of the terrain and geography.
- **Cheaper than LPG:** Bio-gas production and supply cost is cheaper than LPG cylinders. Hence, many rural households are switching towards gobar-gas.
- **Waste to Wealth:** Bio-gas generation reflects efficient conversion of waste into clean energy. It leaves no residue and burns as efficiently as LPG.
- **Swacchh Bharat Abhiyan:** Cow dung and local waste are chief source of solid waste in rural areas. Using this waste to produce energy will help to achieve the objective of Swachh Bharat Abhiyan – Grameen.
- **Generates Additional Revenue for Farmers:** Farmers can supplement their income by selling cow-dung to gobar-gas plants.
- Helps **Sustain Bovine Population**
- **Reduces Cost and Headache of Maintaining Waste:** Earlier households and panchayat were responsible for waste disposal. With 'waste-to-energy' it can be handled efficiently.

Future aspects:

- ▶ Shifting to cleaner fuels generated through waste will help in **reducing pollution and also achieving cleanliness.**
- ▶ Cleaner fuel will also help in **reducing instances of women related health issues** due to unclean fuel – asthma, cataract, etc.
- ▶ It is a renewable source of energy. It is **aligned with India's objective** to achieve Intended Nationally Determined Contributions (INDCs).

18

National REDD+ Strategy

CONTEXT: Union Ministry of Environment, Forest and Climate Change (MoEFCC) has released National Reducing Emissions from Deforestation and Forest Degradation (REDD+) strategy for India.

National REDD+ Strategy

- It aims to achieve climate change mitigation by incentivizing forest conservation.
- It has been prepared by **Indian Council of Forestry Research & Education (ICFRE), Dehradun.**
- It is one of the 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 specialised skills among the youth.
- **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 ecosystems.
- 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:

- Paris agreement on climate change also recognizes role of forests in climate change mitigation and calls upon country Parties to take action to implement and support REDD+.
- India has communicated in its Nationally Determined Contribution under Paris Agreement, that **it will capture 2.5 to 3 billion tonnes of Carbon dioxide through additional forest and tree cover by 2030.** 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 a positive cost effective contribution for climate change mitigation.

19

Ensemble Prediction Systems (EPS): IMD's new forecast model

CONTEXT: The **Ministry of Earth Sciences** has commissioned two very high resolution (12 km grid scale) state-of-the-art global Ensemble Prediction Systems (EPS) **for generating operational 10-days probabilistic forecasts of weather.**

Ensemble forecasting:

- It is a method used in **numerical weather prediction** whereinstead of making a single forecast of the most likely weather; a **set of forecasts is produced.**
- This set of forecasts aims to give an indication of the **range of possible future states** of the atmosphere.
- There are two main sources of uncertainty that must be accounted for when making an ensemble weather forecast: **initial condition uncertainty and model uncertainty.**
- The EPS involves the generation of multiple forecasts **using slightly varying initial conditions.**
- The frameworks of the new EPSs are among the **best weather prediction systems in the world** at present. Very few forecasting centres in the world use this high resolution for short-medium range probabilistic weather forecasts.
- The quality of weather and climate services provided by the Ministry has improved significantly due to:
 - ▶ augmenting atmospheric and ocean observing systems in the region,
 - ▶ improving the high performance computational capability to 8.0 petaflops,
 - ▶ implementing high-resolution global models
 - ▶ advanced data assimilation techniques for ingesting data from Indian and International satellites
 - ▶ conducting cutting edge research and investing in human resources development.
 - ▶ The successes in predicting the Tropical Cyclones Phailin/Hudhud, heavy rainfall events and heat waves are the best examples of the improvement in prediction capability during the recent years.

20

Solar Geo-Engineering (Solar Radiation Management (SRM))

CONTEXT: Attempts to fight global warming and the consequent climate change.

Solar Radiation Management:

◦ A process through which the reflectivity (albedo) of the Earth's atmosphere or surface is increased, in an attempt to offset some of the effects of GHG-induced climate change.

◦ The technique mimics big volcanic eruptions that can cool the Earth by masking the sun with a veil of ash or similar other things.

Methods of Solar Geo-Engineering:

◦ **Space:** Space Sunshades by using mirrors in space, placing vast satellites at Lagrange Point 1, space parasol, etc.

◦ **Stratosphere:** Options like injection of sulphate aerosols into the stratosphere.

◦ **Cloud:** Cloud Seeding e.g. Marine Cloud Brightening (by spraying a fine seawater spray in the air), seeding of high cirrus clouds with heterogeneous ice nuclei.

◦ **Surface:** Options like whitening roofs, growing more reflective crops, etc.

Existing Concerns with Solar Radiation Management:

◦ Physical potential and technical feasibility of the method, its environmental and political consequences need be understood with clarity.

◦ Integrated research effort considering the social, technical, ecological physical and ethical issues related to the method needs to be carried out.

◦ It may stop the rise in global temperatures but would not directly reduce concentrations of greenhouse gases, therefore is not a complete solution for Global Warming.

◦ Stratospheric aerosols might delay the regeneration of the ozone layer and can also lead to decrease in rainfall thereby affecting food supplies and the flow of rivers.

◦ Local imbalances in radiative forcing could lead to regional climate shifts.

◦ Impact on precipitation and the hydrologic cycle is not very well understood.

◦ No regulatory framework or international governing body to test the methods used in Solar Radiation Management

Solar Radiation Management Governance Initiative:

◦ Partnership between the Royal Society and the Academy of Sciences for the Developing World (TWAS) and Environmental Defense Fund (EDF).

◦ Aims to ensure that any geo-engineering research that goes ahead – inside or outside the laboratory – is conducted in a manner that is responsible, transparent and environmentally sound.

◦ International links developed by SRMGI – an important dimension of the project – will help promote cooperation on research governance in the future.

21

Maharashtra's Project on Climate Change Resilient Agriculture (PoCRA)

CONTEXT: Maharashtra Government have signed US \$420 million loan agreement with World Bank for Project for Climate Resilient Agriculture.

- **Regions:** Marathwada and Vidarbha regions of Maharashtra.
- **Loan Provider:** World Bank's **International Bank for Reconstruction and Development (IBRD).**
- **Four components of the Project:**
 - ▶ Promoting Climate-resilient Agricultural Systems
 - ▶ Post-harvest Management and Value Chain Promotion
 - ▶ Institutional Development, Knowledge and Policies for a Climate resilient Agriculture
 - ▶ Project Management

Aim of the Project:

- **Increasing climate resilient practices in agriculture** and ensuring that farming continues to remain a financially viable activity for the farmers.
- To be implemented in **rural areas** largely dependent upon rain fed agriculture.
- Take up series of **activities at farm and watershed level.**
- Scale up **climate-resilient technologies** such as micro irrigation systems, expand surface water storage and facilitate aquifer recharge, directly contributing to more efficient use of scarce water resources.
- **Reduce risks of climate-related crop failure** and **enhance farmer's income** by adopting climate-resilient seed varieties that are drought, salt tolerant and heat resistant.
- **Mainstream climate resilient agriculture agenda** in various local institutions that deliver agricultural services to farming community.
- **Improve capacity of farmer producers organizations** to operate as sustainable, market-oriented enterprises.

Significance of the Project:

- Benefit over **7 million people** spread over area of **3.0 million hectares.**
- Covers **5142 villages** across **15 most climate vulnerable districts** of Maharashtra.
- **Mitigate emission of Green House Gases (GHGs) through carbon sequestration** which involves planting trees in upper catchment areas and afforestation.
- Support Maharashtra government to **shift towards new paradigm** that puts **climate resilience at core of agricultural growth and rural development** in the state.

Initiatives to reduce carbon emissions from Farming

CONTEXT: The Government had approved the eight Mission under the National Action Plan for Climatic Change (NAPCC). 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 under the **National Mission for Sustainable Agriculture (NMSA)**, which is **one of the eight Mission under the National Action Plan for Climatic Change (NAPCC)** are:
 - ▶ 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)

Soil, water and crop management practices that reduce carbon emission include:

- **Increasing the area under System of Rice Intensification (SRI)** as an alternative to transplanted paddy.
- Deployment of **zero tillage drill machines** and other **residue management equipment** which enable planting of rabi crop in the standing residue of rice crop to avoid its burning.
- **Alternate wetting and drying, direct seeded rice system** of rice cultivation, use of slow release **nitrogen fertilizers, integrated nutrient management practices**, leaf colour chart-based nitrogen application, use of urea super granules etc.
- Mandatory **Neem coating of urea**.
- Promotion of micro irrigation under **Pradhan Mantri Krishi Sinchai Yojana (PMKSY)-Per Drop More Crop**.
- Planting of trees under **National Food Security Mission (NFSM)**, **Bringing Green Revolution to Eastern India (BGREI)**, **Sub-Mission on Agro Forestry (SMAF)** and **National Bamboo Mission (NBM)**.
- 45 models of **Integrated Farming System (IFS)** have been developed for replication in Krishi Vigyan Kendras (KVKs) and in the States for enabling climate resilient agriculture.
- **Climate resilient villages** by **Indian Council of Agricultural Research (ICAR)**, in each of 151 districts.
- **Climate Vulnerability Atlas** under National Innovations in Climate Resilient Agriculture (NICRA).
- **District Agriculture Contingency Plans** for 633 districts in order to give real time agro advisories for overcoming climate risks.

23

National Water Informatics Centre (NWIC)

CONTEXT: National Water Informatics Centre (NWIC) has recently been created under the Ministry of Water Resources, River Development and Ganga Rejuvenation.

- NWIC would be a **repository of nation-wide water resources data**.
- NWIC is expected to provide a **'Single Window' source of updated data on water resources & allied themes**; and also provides **value added products and services** to all stake holders for **water management and sustainable development**.

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 stake holders 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 modeling 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.

24**Ganga Gram Project**

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

Important Facts about River Ganga

- 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 at national level, b) State level committee chaired by Chief Secretary assisted by SPMG at state level and c) District level committee chaired by the District Magistrate.
- The program emphasizes on improved coordination mechanisms between various Ministries/Agencies of Central and State governments.

25 Deep Ocean Mission

CONTEXT: Ministry of Earth Sciences, Government of India has launched 'Deep Ocean Mission'. This will improve India's position in ocean research field.

- The **program on Poly metallic nodules** was initiated at CSIR-NIO with the collection of the first nodule sample from Arabian Sea on board the first Research Vessel Gageshoni on 26 January 1981.
- India was the **first country** in the world to have been given the **Pioneer Area for exploration of deep-sea mineral** viz. Polymetallic nodules in the Central Indian Ocean Basin in 1987.
- Based on the resource evaluation, India has now retained an area of 75,000 sq km with an estimated resource of about 100 million tons of strategic metals such as Copper, Nickel, Cobalt besides Manganese and Iron.
- A First Generation Mine-site (FGM) with an area of 18,000 sq km has been identified. Latest technologies for extraction of metals from the minerals have also been developed under the programme.
- Detailed environmental data has been collected for **compliance with International Seabed Authorities** requirements.
- Besides identifying the mineral resource and developing technologies for mining and extraction, the programme has also resulted in **high impact research** as well as **manpower development**.

26 Clean Seas Campaign

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

- 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

27 Blue Flag certification

CONTEXT: 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.

- 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.

28

3d-Printed Artificial Reef

CONTEXT: 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.

- 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.
- With imminent 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.

29

Bhutan, Nepal and Bangladesh to be part in India Tiger Census

CONTEXT: 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.

30

African countries launch joint initiative to save 4 carnivore species

CONTEXT: More than 30 countries hosting the **African wild dog, cheetah, leopard and the lion** in Bonn, Germany have announced establishment of African Carnivore Initiative. It is first Africa-wide commitment towards saving these carnivores.

- Supported by experts of IUCN Cat Specialist Group, these 30 range states agreed to establish work programme to guide their conservation actions in coming years.

African Carnivores Initiative

- It is umbrella initiative that targets four iconic African carnivore species African Lion (*Panthera leo*), Cheetah (*Acinonyx jubatus*), Leopard (*Panthera pardus*), and African Wild Dog (*Lycaon pictus*).
- It is unique collaboration between only two global treaties whose mandate is to conserve endangered species
- Convention on Conservation of Migratory Species of Wild Animals (CMS): It focuses on broad conservation measures, such as habitat protection, establishment of ecological corridors and mitigation of human-wildlife conflict.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): It regulates international trade and seeks to stop illegal trade.

31

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.

Prakriti programme

- 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.

32**Himalayan Research Fellowships scheme**

CONTEXT: The union environment ministry has decided to start a 'Himalayan Research Fellowships scheme' to create a young pool of trained environmental managers, ecologists, and socio-economists.

- This pool will help generate information on physical, biological, managerial and human aspects of Himalayan environment and development.
- This is among the series of programmes that MoEFCC is running for conservation and protection of Himalayas.

About the scheme

- The fellowship scheme will be executed through various universities and Institutions working in the Indian Himalayan Region (IHR).
- Preference will be given to the Institutions from north-eastern states.
- Fellowships will be awarded for a maximum period of three years.
- The financial support will be provided under **the National Mission on Himalayan Studies (NMHS)**.

33**One Planet One City Challenge Of WWF**

CONTEXT: 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). 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.

34 Smart Food Executive Council

CONTEXT: Several regional associations have formed the Smart Food Executive Council under the aegis of the Smart food Initiative that was launched in 2013.

- **Reason** – To satisfy the need for food which is **good for the consumer, good for the planet and good for the farmer**.
- **Strategy** - Staples may typically constitute 70% of a meal and are often eaten three times a day. So **diversifying the staples** will have the strongest impact on nutrition, environment and farmer welfare.

- The **Smart Food initiative** is founded by the **International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT)** and aims to build food systems where the food is good for you (highly nutritious), good for the planet and good for the smallholder farmer. It is an initiative which will initially focus on popularizing **millets and sorghum**.
- **ICRISAT** is an **international non-profit organization** that undertakes scientific research for development.
- ICRISAT have an extra specialization on crops that survive in these **harsh climates**

Resource Conservation & Management

1 2018 Earth Overshoot Day to fall on August 1

CONTEXT: 2018 Earth Overshoot Day was on August 1, the earliest date since ecological overshoot began in early 1970s.

- It is date when humanity annual demand on nature exceeds what Earth can regenerate over the entire year.
- It is calculated by Global Footprint Network and World Wide Fund for Nature (WWF).

Earth Overshoot Day (EOD)

- Previously known as **Ecological Debt Day (EDD)**, it 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 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 for that year), and multiplying by 365, the number of days in one Gregorian common calendar year.
- When viewed through an economic perspective, **EOD represents the day in which humanity enters an ecological deficit spending.**

2 National Biogas and Manure Management Programme

CONTEXT: Ministry of Power and New & Renewable Energy to set up 65,180 biogas plants under the National Biogas and Manure Management Programme (NBMMP).

National Biogas and Manure Management Programme (NBMMP)

- A **Central Sector Scheme** primarily set up for **rural and semi-urban households.**
- Aims to set up **family type biogas plants** for providing biogas as **clean cooking fuel** and a **source of lighting.**
- **Initiatives under NBMMP**
 - ▶ Under the NBMMP, about **49.6 lakh household size biogas plants** have been installed since the inception of the **National Biogas Programme** in the country.

- ▶ The programme is being implemented in **all the states and Union Territories** by the **Ministry of New and Renewable Energy (MNRE)** and **Khadi and Village Industries Commission (KVIC), Biogas Development and Training Centres (BDTCs)**.
- ▶ The MNRE has taken various steps to increase the production of biogas in the country which include introduction of **new biogas plant designs under the NBMP** such as floating design **Shakti Surabhi Model, Solid-State Deenbandhu design model** of biogas plants.

- The **biogas plants** can **generate biogas from organic substances** like cattle-dung, and other bio-degradeable materials such biomass from farms, gardens, kitchens, and night soil.

Benefits:

- It provides **clean gaseous fuel** for cooking and lighting.
- The **slurry** produced from biogas plants as a by-product is an **organic bio-manure for enhancing crop yield and maintaining soil health**.
- It **improves sanitation** in villages and semi-urban areas by linking sanitary toilets with biogas plants.
- Biogas Plants help in reducing the causes of climate change.
- Setting up a biogas plant provides the solution to **protect the households from the ill effects of indoor air pollution**.
- Social benefits to rural families by **reducing the drudgery of women** involved in collecting fuelwood and **mitigating health hazards** during cooking in smoky kitchens.
- The biogas technology dissemination helps in reducing the environment degradation and prevents the emissions of Green House Gases (GHGs) such as Carbon Dioxide (CO₂) and Methane into the atmosphere.

3 Community Forest Resource

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.

Findings of Land Conflict Watch:

- Mapped 536 cases in which local communities are protesting.
 - These conflicts affect close to 50 lakh people and span over close to 14.6 lakh hectares of land in India.
 - These conflicts affect industrial and infrastructure projects amounting to roughly Rs 12 lakh crore in investment.
 - The majority of the land conflicts (two-third) in India are related to common lands rather than private lands. Over 44 per cent of all cases involve forestland.
 - Forest-land-linked conflicts affect 29.3 lakh people and 9.8 lakh hectares of land highlighting the simmering discontent in forested areas, including the Naxal-affected districts, of these, 118 conflicts have arisen due to direct violation of the provision of the Forest Rights Act.
- The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 or FRA was a landmark legislation that sought to restore the rights of forest dwellers over land, community forest resources and habitats, and the governance and management of forests.
 - Prior to that, most forest dwellers in the country were denied rights to their traditional forestlands since colonial times.

- But even 11 years after implementation of FRA, there is much to be desired.
- Of the total forest rights titles issued so far, the majority are of individual forest rights and only less than 4 per cent titles recognize community forest rights.
- Though recognition of individual rights is crucial as it enables the landholders to get the legal right to cultivate and invest their resources on that land to make it more productive, the community forest titles enable all the villagers, including landless people, to access, use and sell minor forest produce and use other forest resources.
- Instead of addressing the implementation problems, governments across the country have introduced conflicting policies that go against the spirit of the FRA.
- The Compensatory Afforestation Fund (CAF) Act 2016 was passed to manage the more than Rs 50,000 crore funds to be used for plantation, despite protests from tribal organizations across the country.
- The CAF Act provides total control of the massive fund to the forest bureaucracy with virtually no political accountability and consent of the gram sabha for plantation activity in their recognised and potential community forest areas.
- Diversion of forests for industrial and development projects without settling forest dwellers rights and without their free and prior informed consent has been indiscriminately carried out.

4 Brazzaville Declaration

CONTEXT: 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 and Indonesia** on the sidelines of Third Partners Meeting of Global Peatlands Initiative held in Brazzaville, Republic of Congo.
- Destroying the peatlands would be a grave assault on the Paris Agreement and the climate.

Brazzaville Declaration:

- It aims to implement coordination and cooperation between different government sectors to protect the benefits provided by peat land ecosystems.
- The agreement is the beginning of a deep collaboration between Indonesia – covered by vast expanses of peat lands – and the Congo Basin.

Peatlands:

- Peat lands are wetlands that contain mixture of **decomposed organic material**, partially submerged in layer of water, lacking oxygen.
- 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 peatlands, which are about size of England. It stores three years equivalent of global greenhouse gas emissions.
- Peatlands have grown over the course of 10,000 years, and they can be destroyed in a matter of days if the land use is not sensitive to the nature of the peatlands.

5 Nekkampur Lake (Tulsi and Ashwagandha)

- The Floating Treatment Wetland (FTW) was inaugurated on World Wetlands Day (February 2) in **Nekkampur Lake in Hyderabad** to clean and purify the polluted waterbody.

- Plants planted on FTW can clean the lake by **absorbing nitrates and other pollutants** in the water.
- It measures around 3,000 sq. ft and comprises **four layers** viz. floatable bamboo at base, styrofoam cubicles above it. The third layer consists of gunny bags and gravels on final layer to support cleaning agents (plants). Cleaning agents planted on FTW include vetivers, cattalis, canna, bulrush, citronella, hibiscus, fountain grass, flowering herbs, tulsi and ashvagandh.
- FTW's working is based on **soil-less hydroponics technique**.
- Micro-organisms growing on FTW and plant root systems 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 waterbody.

6 NITI Aayog Urges Plan to Save Springs in Himalayas

CONTEXT: Expert group constituted by NITI Aayog urges government to save springs in Himalayan region.

- Report titled "**Inventory and revival of springs in Himalayas for water security**" has noted that Indian Himalayan Region (IHR) is heavily reliant on these water sources. These springs are in danger due to urbanisation caused by push given by development and climate change.
- It says that half of the perennial springs have dried up, as a result thousand of villages faces acute water crisis.
- Almost 60% of low discharge springs that gave water to small habitations have shown decline in last few decades.
- Microbial content, sulphates and nitrates content was present in spring water as a result of anthropogenic reasons. Contamination from arsenic, fluoride and iron was from geogenic reasons.
- Presence of Coliform bacteria was from septic tanks, household waste water etc.
- Sikkim has the highest density, with 94% of its villages having springs. In western Himalayas Jammu and Kashmir has highest number of villages with springs.
- Group recommends multi disciplinary and collaborative approach of managing springs. This will involve building on the existing body of work on spring water management.
- Demographic pressure on regions water resources is the result of "growing urbanisation".
- The group recommends 8 year programme to overhaul springs in the region. This includes:-
 - Preparing digital atlas of country's spring sheds
 - Training of para hydro geologists who would lead grassroots conservation
 - Introduction of spring health cards.

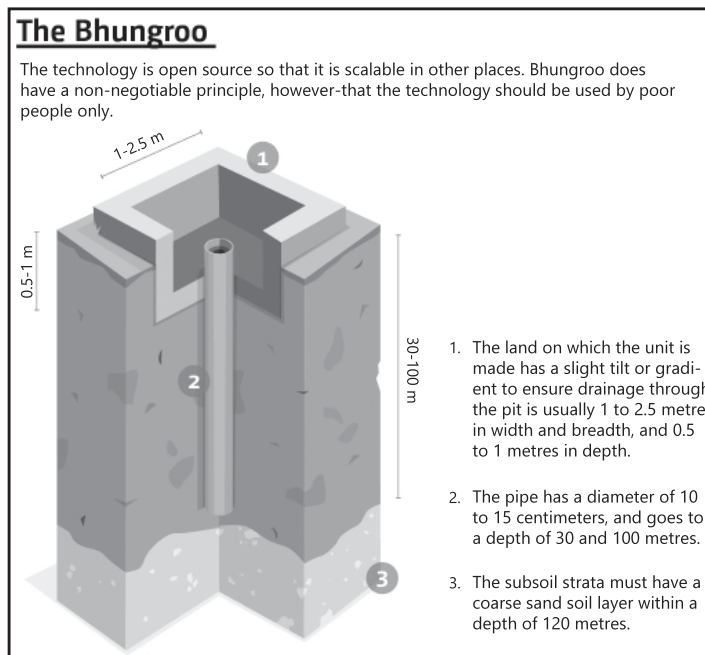
7 Bhungroo Water Harvesting System

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

Bhungroo Water Harvesting System –

- Bhungroo is a water management system that **injects and stores** excess rainfall underground and lifts it out for use in dry spells.
- Adoption of this technology has decreased salt deposits on soil and increased fresh water supply, saving farmers from drought.
- It harvests water for about **10 days per year** and can supply water for as long as **seven months**.

- Bhungroo has freed **women from debt**, given them land ownership and helped them **participate in local governance** as a result of their expertise and influence in agriculture and water.
- It provides food security and sustainable livelihoods to more than **18,000 marginal farmers** (with over 96,000 dependent family members) in India. From the first year, a typical family's annual income increases from USD 210 to USD 700. The breakeven point is reached within three years.
- It is now a **fully women-driven process**, from selecting the farmers, erecting the technology and operating and maintaining the system.



8 Google for Water Resource Management

- The Central Water Commission (CWC), India's apex technical organisation in the field of Water Resources, on June 18, 2018 signed a Collaboration Agreement with Google for flood forecasting.
- CWC would use up to date technology of Google in the field of **Artificial Intelligence**, machine learning and geo spatial mapping for **effective management of water resources particularly in the field of flood forecasting**.
- The agreement involves dissemination of flood related information to the people using the dissemination platforms developed by Google.
- This agreement will help crisis management agencies to deal extreme hydrological events in a better manner.

9 Water Scarce Cities & Composite Water Management Index (CWMI)

CONTEXT: 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.

- 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.

- **75% of households** do not have drinking water on premise. **84% rural households** do not have piped water access.
- **70%** of our water is contaminated; India is currently ranked **120 among 122 countries** in the **water quality index**.
- **Twenty-one cities**, including Delhi, Bengaluru, Chennai and Hyderabad will run out of groundwater by 2020, affecting 100 million people.
- If the trend continues, there will be a **6% loss in the country's GDP** by 2050.
- The NITI Aayog's observations are part of a study that ranked 24 States on how well they managed their water.

Composite Water Management Index (CWMI)

- CWMI seeks to enable **comprehensive and integrated national data-backed water management** in the country and promote '**competitive, cooperative federalism**' along with enabling innovation in the water ecosystem.
- CWMI will evaluate States, on the basis of **9 broad sectors with 28 different indicators** covering various aspects of **groundwater, restoration of water bodies, irrigation, farm practices, drinking water, policy and governance**.
- **Objectives of the Index:**
 - ▶ Establish a **clear baseline and benchmark for state level performance** on key water indicators.
 - ▶ Uncover and explain how **states have progressed on water issues** over time, including identifying high performers and under-performers, thereby inculcating a culture of constructive competition among states.
 - ▶ Identify **areas for deeper engagement and investment** on the part of the states.

Major Findings of the Index:

- **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.
- Tripura has moved to the top of the 'Himalayan & NE state' category by boosting rural water quality and geo-tagging of IWMP conservation assets.
- About **60%** of the States were marked as "**low performers**"
- Many of the States that performed badly on the index — **Uttar Pradesh, Odisha, Chhattisgarh** — accounted for 20-30% of India's agricultural output and is likely to be a significant food security risk for the country.
- Several of the **high and medium performers** — **Gujarat, Madhya Pradesh, Andhra Pradesh, Karnataka, Maharashtra** and **Telangana** — had faced droughts in recent years. 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.

10

South Asia Wildlife Enforcement Network (SAWEN)

Context: The Union Cabinet gave its approval for India adopting the Statute of the South Asia Wildlife Enforcement Network (SAWEN) and India and becoming its formal member in order to strengthen ties with the member countries in controlling the trans-boundary wildlife crime through communication, coordination, collaboration, capacity building and cooperation in the region.

South Asia Wildlife Enforcement Network (SAWEN)

- SAWEN, a Regional network is comprised of **eight countries** in **South Asia: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.**
- **Established:** January, 2011 in Paro, Bhutan.
- **Aim: Strong regional inter-governmental body** for combating wildlife crime by attempting common goals and approaches for combating illegal trade in the region.
- **Relevance**
 - ▶ The South Asia region is **very vulnerable to illegal traffic and wildlife crimes** due to presence of precious biodiversity and large markets as well as traffic routes for wildlife products in the South East Asian region.
 - ▶ The collaboration is considered very important for **effective conservation** of such precious biodiversity.

Indian initiatives to attain the goal:

- To take initiatives for **bringing harmonization and standardization in laws and policies** of member countries concerning conservation of fauna and flora.
- **To document the trend of poaching and illegal trade, and related threats to the natural biodiversity** within and across countries in the region.
- **To strengthen institutional responses to combat wildlife crime** by promoting research and information sharing, training and capacity building, technical support, sharing experiences and outreach.
- To encourage member countries to **prepare and implement their National Action Plans in curbing** wildlife crime and to collaborate towards effective implementation.

11

The National Wildlife Genetic Resource Bank

CONTEXT: National Wildlife Genetic Resource Bank was inaugurated at Centre for Cellular and Molecular Biology's (CCMB) Laboratory of Conservation of Endangered Species (LaCONES) facility in Hyderabad, Telanagana.

- It is **India's first genetic resource bank** where genetic material will be stored for posterity which will further the cause of conservation of endangered and protected animals.

National Wildlife Genetic Resource Bank

- It is equipped with sophisticated equipment to preserve the genetic resources that could be utilised to virtually resurrect an animal species in case it goes extinct.
- It will cryopreserve living cell lines, gametes and embryos of endangered wild animal species in India.
- For cryogenic preservation, researchers at CCMB-LaCONES will use **liquid Nitrogen** that is cooled down to as low as minus **195 degrees Celsius.**
- It will aid wild life conservation efforts by taking up artificial reproduction, conducting studies in evolution biology and wildlife medicine. Thus, it will also help in protecting India's biodiversity and environment. So far this bank has collected and preserved genetic resources of 23 species of Indian wild animals.

12

Conservation Assured | Tiger Standards (CA|TS) Partnership

CONTEXT: A new survey of current management methodologies at 112 sites located in 11 tigerrangecountries, including India stated that only 13 percent of the tiger conservation areas met the global standards of an accreditation system. The survey is the first and largest rapid

assessment of site-based tiger conservation across Asia and has been driven by 11 conservation organisations and tiger-range governments that are part of the CA|TS coalition.

- Half of the assessed sites (52.5 percent) report fairly strong management, although there are improvements needed.
- Despite poaching being one of the greatest threats faced by big cats, 85 percent of the areas surveyed do not have staff capacity to patrol the sites effectively.
- 61 per cent of the areas in South-east Asia have a very limited anti-poaching enforcement.

CA|TS

- It is a new **conservation tool** to set minimum standards for effective management of target species and to encourage assessment of these standards in relevant conservation/protected areas.
- The **first species-specific** CA standards are for the **tiger**.
- CA|TS aims to be a key element in realizing the ambitious goal of **doubling the global tiger population by 2022**.
- Developed by WWF and partners, the Global Tiger Forum (GTF) has endorsed CA|TS and has requested member countries to establish National Review Committees for purpose of initiating CA|TS.
- Nepal is the first TRC to implement the process; Bhutan, Bangladesh, Thailand, Indonesia, Malaysia and India are following Nepal's lead.

13 Recovery Programme For Wildlife Species

CONTEXT: 4 species -Northern River Terrapin, Clouded Leopard, Arabian Sea Humpback Whale, and the Red Panda were added to a recovery programme for critically endangered species.

- Integrated Development of Wildlife Habitats (IDWH) is a **centrally funded scheme**.
- 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.

14 New Wildlife Sanctuary at Ghodazari

- The **Maharashtra Government** has approved Ghodazari in Chandrapur district as new wildlife sanctuary in the state.
- The sanctuary, located in the North East of Tadoba, will include 159 sq km of **Brahmapuri forest**. The wildlife sanctuary located North East of Tadoba Tiger Reserve will be carved out in total of 159 sq km area covering Nagbhir, Talodhi and Chimur forest areas. It will include hilly terrain, Saatbahini hills, Ghodazari lake, MuktaiDeosthan, waterfall etc. The area is rich with flora and fauna.
- This will help in saving the forest, and will also improve tourism in nearly 40 villages in the area.

15 Kaziranga National Park

- Frontline wildlife protection guards in the world-famous Kaziranga National Park are now better **equipped with INSAS (Indian Small Arms System) and Ghatak rifles** apart from 9-mm pistols and 12-bore pump-action guns. It has been procured under a special scheme for modernisation of arms and equipments for protection of rhino-bearing areas and tiger reserves.

- Kaziranga National Park is a national park in the Golaghat and Nagaon districts of the state of **Assam**, India. The sanctuary, hosts two-thirds of the world's great one-horned rhinoceroses, is a **World Heritage Site**.
- Covering an approximate area of 430 square kilometers, Kaziranga was declared as a World Heritage Site by UNESCO for its unique natural environment in the year 1985.
- Declared as a **Tiger Reserve** in 2006.
- The park is also a domicile for large breeding inhabitants of Elephants, wild water buffaloes and Swamp Deer.

16 Organic Carbon for Carbon Sequestration

CONTEXT: While the increasing concentration of CO₂ is primarily associated with fossil fuel combustion, about 10% of the increase is estimated to be caused by changes in land use, including conversion of forest land for food production.

- Significant **carbon pools** on earth are found in **the earth's crust, oceans, atmosphere and land-based ecosystems**.

Soil Carbon

- Soil Carbon exists in two forms: **Inorganic and Organic**. Soil Inorganic Carbon is the result of both weathering of the parent materials and carbonic acid (CO₂ dissolved in water) in the soil, precipitating as carbon minerals such as calcite, aragonite, and dolomite.
- **Organic material is manufactured by plants** using carbon dioxide from the air and water. Plants (and animals, as part of the food chain), die and return to the soil where they are decomposed and recycled. Minerals are released into the soil and carbon dioxide is released into the atmosphere.
- Soil organic carbon accounts for less than 5% on average of the mass of upper soil layers, and diminishes with depth.
- In addition to helping mitigate climate change as resulted from increased soil Carbon storage, use of recycled organic materials into soils results in a range of important environmental benefits.
- Soils, especially managed agricultural soils, have the potential to store (sequester) carbon and contribute to mitigation of GHGs emissions. Increasing the amount of organic carbon in soils may not only mitigate GHG emissions, but also benefit agricultural productivity through improvements in soil health and environmental quality by reducing soil erosion.
- Soils contain roughly 2,344 Gt of organic carbon, making this the largest terrestrial pool.

17 Zero Budget Natural Farming

CONTEXT: Andhra Pradesh becomes India's first Zero Budget Natural Farming state.

- Zero Budget Natural Farming, **is a method of farming where the net cost of growing and harvesting plants is zero**. This means that farmers need not purchase fertilizers and pesticides in order to ensure the healthy growth of crops.
- The **main aim of ZBNF is elimination of chemical pesticides and promotion of good agronomic practices**.
- **Andhra Pradesh government's unique initiative to improve farmers' livelihood through zero budget natural farming (ZBNF)** is the right solution to fight climate change in the drought-prone Rayalaseema region.
- ZBNF was initially launched in September 2015 under the Centre's **Rashtriya Krishi Vikas Yojana**. Initially, 50 villages across 13 districts of the state were selected for the pilot project. Now seeing its success, government plan to extend it to other districts.
- Intercropping is an important feature of ZBNF. Farmers of Andhra Pradesh have been following it to reduce cost and increase yield. **Navdhanya concept** where nine types of crops are grown is a traditional rain-fed area practice. Under this multiple crops along with groundnut, the main crop are grown. Pulses and oilseeds are also grown by farmers as part of Navdhanya.

- Shocked by the harmful effects of chemical farming. **SubashPalekar** developed less-destructive alternatives. Thus began the journey of Zero Budget Natural Farming in India.

18 State Energy Efficiency Preparedness Index 2018

CONTEXT: Nationwide State Energy Efficiency Preparedness Index released: Andhra Pradesh, Kerala, Maharashtra, Punjab, and Rajasthan emerge as 'Front Runner' states.

State Energy Efficiency Preparedness Index:

- Released by: **Bureau of Energy Efficiency (BEE)** and **Alliance for an Energy Efficient Economy (AEEE)**
- **Objective:**
 - ▶ **To assess state policies and programmes aimed at improving energy efficiency.**
 - ▶ **To meet India's rising energy demand.**
- States are categorised based on their efforts and achievements towards energy efficiency implementation, as **'Front Runner', 'Achiever', 'Contender' and 'Aspirant'**.
- Perform Achieve and Trade (PAT) scheme is a flagship scheme of Government of India to improve energy efficiency of large energy consuming industries.

19 Solar City Programme

CONTEXT: The Ministry of New and Renewable Energy under its scheme "Development of Solar Cities" has approved 60 Cities including 13 Pilot and 5 Model Cities.

- The Ministry provides Central Financial support up to Rs.5 lakh for preparing Master Plan for development of green campus in the educational institutions, office complexes, residential and commercial complexes etc.
- Cities selected for the program are required to submit biannual reports on the details given in their master plans. An evaluation of the program's implementation will be undertaken at the end of the 12th Five-Year Plan, and it will then be decided whether to extend the program further.

Solar City Programme

- The Solar City aims at **minimum 10% reduction in projected demand of conventional energy** at the end of five years.
- Objectives:
 - ▶ To enable and **empower Urban Local Governments** to address energy challenges at City-level.
 - ▶ To provide a framework and **support to prepare a Master Plan** including assessment of current energy situation, future demand and action plans.
 - ▶ To oversee **the implementation of sustainable energy options** through public-private partnerships.
 - ▶ The program assists Urban Local Governments by **providing financial assistance and technical help.**
 - ▶ Preparation of a master plan for increasing renewable energy supply and energy efficiency measures in the city.
 - ▶ Setting-up institutional arrangements for the implementation of the master plan.
 - ▶ Awareness generation and capacity building activities.
 - ▶ Implementation of projects as per financial incentives under various programmes of MNRE.

Disaster Management

1

Disaster Resilient Infrastructure in India (Policies and Guidelines)

CONTEXT: International Workshop on Disaster Resilient Infrastructure (IWDR) successfully concluded in India, setting the stage for taking the dialogue on resilient infrastructure forward at the global level. The Workshop was organised by the National Disaster Management Authority (NDMA) jointly with United Nations Office for Disaster Risk Reduction (UNISDR).

National Disaster Management Authority

- An agency of the **Ministry of Home Affairs**
 - **Aim:** To coordinate response to **natural or man-made disasters** and for **capacity-building** in disaster resiliency and crisis response.
 - Established through the **Disaster Management Act, 2005**
 - **Ex-officio Chairperson:** Prime Minister
 - **Objectives:** Framing policies, laying down guidelines and best-practices and coordinating with the State Disaster Management Authorities (SDMAs) to ensure a holistic and distributed approach to disaster management.
- **Participating Parties:** Delegates including experts from **21 countries, Multilateral Development Banks, the United Nations, the private sector, and academics.**
 - **Objective:** To explore new **dimensions, opportunities** and **challenges** to **resilient infrastructure** in accordance with **Sendai Framework for Disaster Risk Reduction** and **Prime Minister's 10-point agenda.**
 - Resilient infrastructure is important not only for the aggregate economic growth but also for ending poverty and actions in present times, through investment in infrastructure, that can not only reduce risk but also stop the creation of new risks.
 - If India can be able to build complete resilience in the country, the GDP could go up by upto 2 per cent. However, the work on resilient infrastructure, needs to take into account the ongoing rapid urbanisation as unplanned urbanisation is closely linked to creation of new risks.
 - NITI Aayog, invited both **NDMA and UNISDR** to work together with it to help spread disaster awareness in society.
 - There is also **need of ranking States** in terms of their progress in Disaster Management.

Task Force on “Establishing a Coalition on Disaster Resilient Infrastructure (CDRI)”

- During the **Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR)** held in New Delhi in November 2016, the Prime Minister outlined a 10-point Agenda for disaster risk reduction.
- As per **first agenda**, “India will work with other partner countries and key stakeholders to build a coalition or centre for promoting disaster resilient infrastructure in the region. This will help generate new knowledge for hazard risk assessment, disaster resilient technologies and mechanism for integrating risk reduction in infrastructure financing”.
- A Task Force was constituted by the MHA in August, 2017, which presented its report on “Establishing a Coalition on Disaster Resilient Infrastructure (CDRI)”.
- The report provides a step-by-step implementation plan and analysis in order to build and operationalise a Coalition. The study includes:
 - ▶ Business case for the coalition
 - ▶ Analysis of best practices of international partnerships in disaster risk and other thematic areas lead by India
 - ▶ Preliminary design of the coalition
 - ▶ Roll-out plan
- International Workshop on “**Disaster Resilient Infrastructure**” was also held as per the advice of the Task Force in New Delhi to get inputs from potential partner countries.

2 National Disaster Response Force

CONTEXT: 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.

- 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 National Disaster Response Force

- **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.**

3 National Disaster Risk Index

CONTEXT: 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.

- 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 does not talk about the possibility of a natural disaster, but the **economic vulnerability** of the region and the **steps taken by the administration to mitigate** the risks.
- 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 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) for Asia and Africa

CONTEXT: 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.

RIMES:

- 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.
- **Benefits:**
 - ▶ RIMES addresses 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 provides 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 acts 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

CONTEXT: Recently the fire at the Kamala Mills (Mumbai) Compound has took 14 lives.

- Similarly, the fire in Bawana industrial region claimed 17 lives.
- These are the kind of accident 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:**
 - ▶ Disaster Management Act 2005 stipulated the setting up of the Disaster Response Fund and the Disaster Mitigation Fund at national, state and district levels, only the National and State Disaster Response Funds have become operational till now.
 - ▶ The increasing frequency and damage to property, assets and infrastructure caused by recurring disasters makes it imperative that the provisions of the Disaster Management Act 2005 are enforced in letter and spirit.
- **Disaster Management Communication:** Presently, if a disaster strikes and regular communication networks go down, there are no contingency methods available for communication to a disaster-hit area.
- **Role of Local Level Governance:**
 - ▶ Local self-governments, both rural and urban, have emerged as important tiers of governance. For the people, they are also the nearest units of administration and are among the first responders to any crisis besides being closely knit with the communities.
 - ▶ The Disaster Management Act, 2005 mandates preparation of disaster mitigation prevention plans at District, State and National level. And visualizes the district plan as the one that lists out the vulnerable areas in the district.

Prevention and Risk Reduction of Fire Disaster

- **Smoke Alarms:** Smoke alarms cut our chances of dying in a home fire nearly in half. Smoke alarms sense abnormal amounts of smoke or invisible combustion gases in the air. We should install them both in our homes and workplaces.
- **Fire Extinguishers:** There are three home fire extinguisher ratings: "A" rated extinguishers are for wood or paper fires only; "B" rated extinguishers are for flammable liquid and grease fires; and "C" rated extinguishers are for electrical fires. We should beforehand know how to use them.
- **Fire Sprinkler Systems:** Home fire sprinklers complement the alarms' work, providing a way to fight flames immediately. In less time than it would take the fire department to arrive on the scene, home fire sprinklers can contain and even extinguish a fire. There's less damage and less chance of deadly smoke and gases reaching our family. In addition, sprinkler systems can put out fire when we are away from home.

6 Landslide Warning System

CONTEXT: Sikkim to have an advanced landslides 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.
- The system is capable of warning about 24 hours in advance.
- 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

CONTEXT: Indian Tsunami Early Warning System has been recognised as the best in the world.

- **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 'realtime'.**
- 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. These include Puri, Kakinada, Machilipatnam, Nizampatnam-Vatapalem, Chennai, Cuddalore-Puducherry, Rameshwaram, Thoothukudi, Alappuzha-Chavara and Kochi.
- 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.
- The new update of Tsunami early warning system will not cover the region of the Andaman and Nicobar Islands, a group of 572 islands in the east of the Indian mainland in the Bay of Bengal. These areas will be added later.

Miscellaneous

1

Smartphone Tech Most Damaging to Environment

CONTEXT: Smartphones and data centres are damaging to the environment and will have the biggest carbon footprint in the tech industry by 2040, researchers have found.

- Scientists came to this conclusion after calculating the carbon footprint of devices such as mobiles, laptops, tablets and desktops – as well as data centres and communication networks collectively known as information and communications technology (ICT).

Their impact on environment:

- Telecommunications networks and data centres **consume a lot of energy** to serve us and most data centres continue to be powered by electricity generated by fossil fuels. It's the energy consumption we don't see.
- The team from McMaster University in Canada found smartphones to be the most damaging of all devices in the industry, with the **bulk of their emissions coming from the production chain**.
- Not only did they discover that software is driving the consumption of information and communications technology, they also found that ICT has a greater impact on emissions than we thought, and **most emissions come from production and operation**.
- Researchers studied the carbon footprint of consumer devices such as smartphones, laptops, tablets, desktops as well as data centres and communication networks as early as 2005.
- Today, the ICT accounts for about 1.5% of global footprint. If trends continue, ICT will account for 14% of the global footprint by 2040, or about half of the transportation sector worldwide. For every text message, for every phone call, every video, there's a data centre making this happen.

2

Prevention of cruelty to animals (Karnataka Amendment) Bill

- President has given assent to The Prevention of Cruelty to Animals Act (Karnataka Amendment) Bill, 2017 that seeks **to insulate the conducting of Kambala** from the purview of the Act.
- The **Animal Welfare Board of India** and **People for the Ethical Treatment of Animals (PETA)** had launched a campaign against Kambala in 2014 after the Supreme Court banned Tamil Nadu's Jallikattu.
- **Kambala is an annual buffalo race held in the state of Karnataka**. Traditionally, it is sponsored by local Tuluva landlords and households in the coastal districts of Dakshina Kannada and Udupi.

- Kambala is traditionally a simple sport which entertains rural people of the area. The Kambala race track is a slushy paddy field, and the buffaloes are driven by a whip-lashing farmer.

3 Sagar Nidhi

- The **Indian Ocean Research Vessel (ORV), Sagar Nidhi**, went from Chennai as part of an Indo-US expedition seeking to find answers to the **vagaries of the Bay of Bengal-fed southwest monsoon**, which accounts for **70%** of India's annual rainfall.
- Sagar Nidhi will sail through the Bay of Bengal for a month collecting data on ocean conditions at different depths and locations and study the underlying principles of interaction of the uppermost layer of the ocean with the atmosphere.
- The project seeks to cast light on the complex **mechanics of the monsoon**, which have confounded researchers for a long time. The biggest challenge is the unpredictability of the weather phenomenon, including, crucially, why there are breaks in the June-September rainy season.
- The research project, which began in **2013**, is funded by the **Ministry of Earth Sciences**, under the national monsoon mission, and the US Office of Naval Research, which has been working with institutions such as Sri Lanka's National Aquatic Resources Research and Development Agency.

4 International Whaling Commission

CONTEXT: Japan is considering pulling out of the International Whaling Commission (IWC)

- **Background** - Japan currently observes the moratorium but **exploits a loophole** to kill hundreds of whales every year for "scientific purposes" as well as to sell the meat.
- It may lead to international criticism against Japan over whale conservation and deepen the divide between anti- and pro-whaling countries.

About IWC:

- It is an international body set up under **International Convention for the Regulation of Whaling (ICRW)**.
- ICRW governs the commercial, scientific, and aboriginal subsistence whaling practices of **fifty-nine member nations**. It was signed in **Washington, D.C., United States**, in 1946.
- **Headquarters** — Impington, near Cambridge, England.
- In 1986, it adopted a moratorium on commercial whaling. This ban still continues.
