

Environment

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1. KERALA TO CURB ALIEN PLANTS 'GROWTH IN NBR'

Context

The Forest and Wildlife Department is planning to adopt steps to arrest the rampant growth of invasive plants, especially *Senna spectabilis*, in the forest areas of the Nilgiri Biosphere Reserve (NBR), including the Wayanad Wildlife Sanctuary.

About

The need:

- The spread of invasive plants, especially *Senna spectabilis*, is posing a major threat to the forest areas of the reserve, owing to its quick growth and coppicing character.
- Invading larger areas: A recent study of the Ferns Nature Conservation Society recorded the presence of the plant in 78.91 sq km area of the sanctuary. The tree species was found in nearly 10 sq km area of the 344.44 sq km sanctuary around five years ago. Now, it had invaded to more than 50 sq km of the sanctuary.
- Emerging as a trap for open lands: Due to mass flowering and drying of bamboo species in Wayanad, lots of open spaces were created which had been occupied by *Senna spectabilis*. The vayal ecosystem (marshy land) of the forest area now has this plant in large numbers.
- Threat to tiger reserves: With the adjacent tiger reserves (Bandipur and Nagarhole tiger reserves in Karnataka and the Mudumalai tiger reserve in Tamil Nadu) also under threat.

What are the Invasive alien species?

- Invasive alien species are plants, animals, pathogens and other organisms that are non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health.
- In particular, they impact adversely upon biodiversity, including decline or elimination of native species - through competition, predation, or transmission of pathogens - and the disruption of local ecosystems and ecosystem functions.
- In 2016, the Zoological Survey of India (ZSI) has for the first time compiled a list of 157 alien invasive animal species.
- Out of the total species, 99 are found in the marine ecosystem, while 58 are found on land and in freshwater habitat.
- The species found on land and in freshwater comprise of 19 fish species, 31 species of arthropods, 3 of molluscs and birds, 2 of mammals and 1 of reptile.
- Among 99 alien invasive marine species, genus *Ascidia* accounts for maximum number of species (31), followed by Arthropods (26), Annelids (16), Cnidarian (11), Bryzoans (6), Molluscs (5), Ctenophora (3), and Entoprocta (1).

- Some important species include: African **apple snail (*Achatina fulica*)**, **Papaya Mealy Bug (*Paracoccus marginatus*)**, **Cotton Mealy Bug (*Phenacoccus solenopsis*)**, **Amazon sailfin catfish (*Pterygoplichthys pardalis*)** and others.

Senna Spectabilis:

- Senna spectabilis* is a medium to large tree from tropical America, listed in the Global Compendium of Weeds as an 'environmental weed', 'garden thug', and 'naturalised weed'.
- The species is extremely fast-growing, flowers and sets seed profusely, and re-sprouts readily when cut.
- An adult tree grows up to 15 to 20 metres in a short period of time and every year distributes thousands of seeds after gregarious flowering.
- The thick foliage arrests the growth of other indigenous tree and grass species and causes food shortage for the wildlife population, especially herbivores.

Why alien plants are so dangerous?

- Greatest threat to biodiversity: Invasive alien species, introduced and/or spread outside their natural habitats, have affected native biodiversity in almost every ecosystem type on earth and are one of the greatest threats to biodiversity.
- Contributor to animal extinction: Since the 17th century, invasive alien species have contributed to nearly 40% of all animal extinctions for which the cause is known (CBD, 2006).
- Problem for ecology and economy: The problem continues to grow at great socio-economic, health and ecological cost around the world. Invasive alien species exacerbate poverty and threaten development through their impact on agriculture, forestry, fisheries and natural systems, which are an important basis of peoples' livelihoods in developing countries.
- This damage is aggravated by climate change, pollution, habitat loss and human-induced disturbance.

2. INDIA CLIMATE REPORT 2019

Context

Recently, India Meteorological Department (IMD) has released India Climate Report 2019.

About

- The India climate report 2019 confirms that the extreme weather events have become par for the course in the country.
- This is what climate scientists have been claiming for more than half a decade.
- It notes that excessive heat, cold and rainfall killed 1,562 people in 2019.
- In 2019, the mean temperature was 0.36 above normal while the country also recorded excess rainfall during both the southwest and northeast monsoons.
- Intense dry spells were interspersed with floods in several parts of the country.
- This is a phenomenon that policymakers will increasingly be called to factor while drawing up projects in areas as diverse as agriculture, urban planning, water resources and disaster management.
- The IMD report should be seen in conjunction with long-term meteorological trends.
- The World Meteorological Organisation, for example, reckons that the decade starting 2011 remains on track to be the warmest on record.
- At the same time, data from the European Centre for Medium Range Forecast shows that the relative humidity in the mid-troposphere in the Subcontinent has increased by about 2% in the past four decades.

- Such warming has increased the capacity of oceans to form intense cyclonic disturbances.

Causes of India's vulnerability to Climate Risk

- India's increasing vulnerability is due to severe rainfall, heavy flooding and landslide.
- The state of Kerala was especially impacted. The floods were described as the worst of the last 100 years.
- India was struck by two cyclones in October and November 2018 that also nearly killed 1,000 people.
- India also suffered from extreme heat. While human death toll was kept considerably low due to public measures, the economic damages were quite severe

What needs to be done?

- Increasing their resilience calls for efficient rainwater storage and use.
- The changing dynamics of weather also demand cooperation between states that share a river basin.
- This year, Maharashtra and Karnataka debated over opening the gates of the Almatti dam on the Krishna. By the time the two states agreed over the amount of water to be discharged from the dam, the damage was already done.

Conclusion

- It's clear that dealing with exceptional weather will require interventions at the national, state and local levels.
- The Statement on Climate of India 2019 drives home the urgency of such interventions.
- However, there is still no specific UN climate finance facility to reimburse the loss of land, culture and human lives.
- So far, the industrialised countries have refused to even negotiate it in 2019 Climate summit (CoP 25) at Madrid recently.
- The word climate body must wake up in establishing a financial facility to reimburse the loss of land, culture and human lives due to climate change.

3. GLOBAL MARINE ECOSYSTEM MEET IN KOCHI

Context

Recently, the third international conference on Marine Ecosystems-Challenges and Opportunities (MECOS) was held in Kochi in January, 2019.

About

- The conference is aimed at reviewing the concerns involved in marine ecosystem and formulating strategies for the better and sustainable utilisation of marine wealth by enhancing livelihood options.
- The symposium is organized by the Marine Biological Association of India.
- It will also serve as a platform for discussions on a range of topics, including the impact of the climate crisis on marine ecosystems and an unusual warming of the Arabian Sea.
- The conference would focus on the Sustainable Development Goal of the United Nations, SDG-14 which says 'conserve and sustainably use the oceans and its resources for sustainable development'.

Significance

- Healthy oceans, coasts and related ecosystems are crucial for economic growth and food production.

- Billions of people worldwide, especially the world's poorest rely on healthy oceans to provide jobs and food underscoring the urgent need to sustainably use and protect this natural resource.
- However, numerous issues such as depletion of resources, marine pollution, extreme weather conditions and rising sea surface temperature pose a threat to the sustainable utilisation of marine resources.
- Hence, the conference would come up with a roadmap to deal with these issues.

Conclusion

- Eminent marine scientists, oceanographers, fishery researchers and marine bio-technologists from across the globe has assembled in Kochi and stressed the need for the preservation or marine ecosystem.
- Moreover, the symposium itself has been designed in an eco-friendly way.
- No printed materials and single-use plastics will be used at the symposium.
- Natural materials will be used for presenting mementos to the guests and certificates will be sent to the participants in digital form.
- This will have stronger impact on the behavior of people as well the state and non-state actors to play a major role in marine ecosystem conservation.





1. 'ASIA PACIFIC DROSOPHILA RESEARCH CONFERENCE'

Context

Pune is set to host the fifth edition of the **Asia Pacific Drosophila Research Conference (APDRC5)**, which is being organised in the country for the first time by the **Indian Institute of Science Education and Research (IISER)**.

About

About Asia Pacific Drosophila Research Conferences

- The Asia Pacific Drosophila Research Conferences (APDRC) are biennial events that aim to promote the interaction of Drosophila Researchers in the Asia-Pacific region with their peers in the rest of the world.
- The conference includes sessions, like Gametogenesis & Stem Cells, Pattern Formation, Morphogenesis & Mechanobiology, Hormones & Physiology, Cellular Neurobiology, Behavioural Neurobiology, Infection & Immunity, and Ecology & Evolution.
- The 5th Conference (6th Jan to 10th Jan) will feature 430 delegates: 330 Indian and 100 foreign.
- It will see the participation of two Nobel laureates, professors Eric Wieschaus and Michael Rosbash, known for their seminal contribution to the fields of developmental biology and chronobiology respectively.
- The last four editions of this conference took place in Taipei, **Seoul, Beijing** and

What is Drosophila?

- The fruit fly (*Drosophila melanogaster*, 'Drosophila' hereafter) is the most extensively used and one of the most well understood of all the model
- Drosophila is ideal for the study of genetics and development.
- Several discoveries in biology have been made using this. Its genome is entirely sequenced and there is enormous information available about its biochemistry, physiology and behaviour.
- The complete genome sequence of the Drosophila was published in 2000.
- Its genome is 168,736,537 base pairs in length and contains 13,937 protein-coding gene

Why Drosophila is vital for humans?

- **Close similarities:** The relationship between fruit fly and human genes is so close that often the sequences of newly discovered human genes, including disease genes, can be matched with equivalent genes in the fly. 75 percent of the genes that cause disease in humans are also found in the fruit fly.
- **Easy observation:** Drosophila has a short, simple reproduction cycle. It is normally about 8-14 days, depending on the environmental temperature. This means that several generations can be observed in a matter of months.

- **Inexpensive researches:** Fruit fly is small (3 mm long) but not so small that they can't be seen without a microscope. This allows scientists to keep millions of them in the laboratory at a time. They are inexpensive to maintain in the laboratory.
- **Polytene chromosomes:** Drosophila has 'polytene' chromosomes, which means that they are oversized and have barcode-like banding patterns of light and dark. During early Drosophila research scientists could therefore easily identify chromosomal re-arrangements and deletions under the microscope.
- The long and distinguished history of research devoted to the study of the fruit fly means that a remarkable amount is now known about its biology.

The Indian Institute of Science Education and Research:

- The Indian Institute of Science Education and Research Pune is a premier institute dedicated to research and teaching in the basic sciences.
- It was established in 2006 by the Ministry of Human Resource Development. In 2012, it was declared as an Institute of National Importance by an Act of Parliament.

2. DELHI GETS ITS FIRST SMOG TOWER

Context

- The Supreme Court had directed the Centre and the Delhi government to prepare a plan to install 'smog towers' across the capital to deal with air pollution.

About

- Smog towers are structures designed to work as large-scale air purifiers.
- They are usually fitted with multiple layers of air filters, which clean the air of pollutants as it passes through them.
- The 20-metre (65 feet) high tower will trap particulate matter of all sizes suspended in the air.
- Large-scale air filters shall draw in the air through fans installed at the top before passing it through the filters and releasing it near the ground.
- The filters installed in the tower will use carbon Nano fibres as a major component and will be fitted along its peripheries.
- The smog tower is expected to purify around 2,50,000 to 6,00,000 cubic meter air per day and release fresh air in return.

Who developed it?

- The project is collaboration between the Indian Institute of Technology (IIT) Bombay, IIT-Delhi and the University of Minnesota.
- The latter having helped design a similar tower of over 100 metres in China's Xi'an city.
- The Central Pollution Control Board (CPCB) will also be involved with the project.

Why does Delhi need smog towers?

- Delhi has in recent years been battling alarmingly toxic air quality every winter.
- Delhi's overall AQI in the "severe" category, according to the ministry of earth sciences' air quality monitor system of air quality and weather forecasting and research (SAFAR).

Other examples in the world

- China, which has been battling air pollution for years, has two smog towers — in its capital Beijing and in the northern city of Xi'an.

- The Xi'an tower is dubbed the world's largest, and has reportedly brought down PM 2.5 by 19% in an area of around 6 sq km in its vicinity.
- The 100-metre (328 feet) high tower has produced 10 million cubic metres of clean air every day since its launch, and on severely polluted days, is able to bring down smog close to moderate levels.
- The tower in Beijing, built by Dutch artist Daan Roosegaarde, has been able to compress the carbon waste generated during purification to produce gemstones.
- Upon compression for 30 minutes, the smog particles turn into dark gems, which are used for rings and cufflinks.

3. BHITARKANIKA CENSUS FINDS AN INCREASE OF 15 SALTWATER CROCODILES FROM LAST YEAR

Context

The population of the saltwater or estuarine crocodile (*Crocodylus porosus*) has increased in the water bodies of Odisha's Bhitarkanika National Park and its nearby areas in Kendrapara district, with forest officials counting 1,757 individuals in this year's annual reptile census on January 3, 2020.

About

About the census

- The Bhitarkanika National Park, famous for the endangered saltwater crocodiles, has seen an increase of the rare species to 1,671, an annual census conducted by the Forest Department this year has found.
- The enumerators also sighted around 12 albino crocodiles and four giant crocodiles more than 20 feet long in the water bodies of Bhitarkanika during the census.
- In the Bhitarkanika area 1,580 and outside it 91 crocodiles were identified. In the Kanika 1,284, Rajnagar 296, Mahakalapada 69, Gahirmatha 22 were spotted.
- The peak winter is the ideal time to carry out the census as it exposes more than 50% of mud banks.

Bhitarkanika National Park

- Bhitarkanika National Park is located in northeast Kendrapara district in Odisha.
- It obtained the status of a Ramsar site in 2002.
- It is surrounded by Bhitarkanika Wildlife Sanctuary. Gahirmatha Beach and Marine Sanctuary is to the east, separating swamp region and mangroves from the Bay of Bengal.
- The national park and wildlife sanctuary is inundated by the rivers Brahmani, Baitarani, Dhamra, Pathsala.
- It hosts many mangrove species, and is the second largest mangrove ecosystem in India.
- The national park is home to saltwater crocodile, Indian python, king cobra, black ibis, darters and many other species of flora and fauna.
- This huge area of mangrove forests and wetlands is intersected by a network of creeks with Bay of Bengal on the East.

Saltwater Crocodile

- The saltwater crocodile is a crocodylian native to saltwater habitats and brackish wetlands from India's east coast across Southeast Asia and the Sundaic region to northern Australia and Micronesia.
- It has been listed as Least Concern on the IUCN Red List since 1996.
- The saltwater crocodile is often claimed to be the largest living crocodylian.

- Saltwater crocodiles can live more than 70 years.
- Saltwater crocodiles are most commonly found in coastal waters or rivers where they can swim between freshwater and brackish water.
- Saltwater crocodiles communicate using several sounds, including barking, hissing, growling and chirps.





1. INDIA FACES GRAVE DANGER TO SOIL BIODIVERSITY: WWF

- According to Global Soil Biodiversity Atlas prepared by World Wide 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.

2. FLOODS TRIGGER INFLUX OF ALIEN FISH SPECIES IN KERALA

Context

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

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.

3. 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.

About

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.





1. RHINOS TO BE RE-INTRODUCED IN UTTARAKHAND

Context

The Uttarakhand State Wildlife Board has cleared a proposal by the Wildlife Institute of India (WII) to introduce rhinoceroses in the Corbett Tiger Reserve (CTR) to boost tourism and revive the habits of species that survive on low-height grass.

About

- According to officials, around 10 rhinos will be brought in CTR in the first phase and subsequently, 10 more would be added.
- Experts claim that protecting these rhinos from poaching will be the only challenge for the state's forest department staff after the move.
- The geographical terrain and environmental conditions in CTR are suitable for rhinos.
- The ideal sites chosen in Corbett are valley habitats bounded on either side by the lower Himalayas (north), Shivalik Hills (south) and the Ramganga Reservoir (east), which would also act as natural barriers to rhino movement outside these area, thereby minimising conflict with people.

Benefits from this move-

- According to wildlife experts, rhinos reduce the size of elephant grass by eating it.
- This would mean that species that thrive on lower-height grass — Hog Deer, Cheetal, Sambar and Swamp Deer, among others — would also be encouraged.
- According to WII experts, the rhino's range was once continuous across the flood plains of the Indus, Ganges and the Brahmaputra, but today, it is limited to small fragmented pockets in India and Nepal as a result of anthropogenic pressures.
- Re-introduction into habitats in its historic range would not only create safety-net populations for the species but also restore their ecological role in these faunally-degraded habitats.

About One-horn Rhino-

- The Indian rhinoceros also called the greater one-horned rhinoceros and great Indian rhinoceros, is a rhinoceros species native to the Indian subcontinent.
- It is listed as Vulnerable on the IUCN Red List.
- The Indian rhinoceros once ranged throughout the entire stretch of the Indo-Gangetic Plain, but excessive hunting and agricultural development reduced its range drastically to 11 sites in northern India and southern Nepal.
- It inhabits the alluvial grasslands of the Terai and the Brahmaputra basin.
- The Indian rhinoceros is regionally extinct in Pakistan.
- There are about 2,600 rhinos in India, with more than 90% of the population concentrated in Assam's Kaziranga National Park. Outside Kaziranga, rhinos are found in West Bengal, Uttar Pradesh, and Bihar.

- Kaziranga National Park in Assam, India, holds about 70% of the world population. This is worrisome for two reasons – the park may have reached its carrying capacity and might not be able to support any more rhinos; and the entire species' population could be decimated because of a disease outbreak, natural disaster, or another acute threat.

About Jim Corbett National Park-

- It is the oldest national park in India and was established in 1936 as Hailey National Park to protect the endangered Bengal tiger.
- It is located in Nainital district and PauriGarhwal district of Uttarakhand and was named after Jim Corbett, a well known hunter and naturalist.
- The park was the first to come under the Project Tiger initiative in 1973.

Indian Rhino Vision 2020

- **It is an ambitious effort to attain a wild population of at least 3,000 greater one-horned rhinos spread over seven protected areas in the Indian state of Assam by the year 2020.**
- IRF has partnered with the Assam Forest Department, the Bodoland Territorial Council, the World Wide Fund for Nature (WWF), and the US Fish & Wildlife Service to address the threats facing Indian rhinos.

2. WHY INDIA NEEDS A PROJECT DOLPHIN

Context

The government is planning to launch a programme called "**Project Dolphin**", along the lines of "Project Tiger" to enhance the population of these dolphins.

About

About the Gangetic river dolphin

- The Gangetic river dolphins can only live in freshwater, are blind and catch their prey in a unique manner, using ultrasonic sound waves.
- The Gangetic river dolphins were officially discovered in 1801 and are one of the oldest creatures in the world along with some species of turtles, crocodiles and sharks, according to the World Wildlife Fund (WWF).
- They once lived in the Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu river systems of Nepal, India, and Bangladesh, but are now mostly extinct from many of its early distribution ranges, as per WWF.
- In 2009, the Gangetic dolphin was declared India's National Aquatic animal. Gangetic dolphin has been notified by the Assam as the state aquatic animal too.
- It is placed under the "endangered" category by the International Union for Conservation of Nature (IUCN).
- They are distributed across seven states in India: Assam, Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, Jharkhand and West Bengal.
- Their numbers have dwindled in the last few decades mainly because of direct killing, habitat fragmentation by dams and barrages and indiscriminate fishing.

Efforts made in India to protect the dolphins?

- Setting up of the Conservation Action Plan for the Gangetic Dolphin (2010-2020), which has identified threats to Gangetic dolphins and impact of river traffic, irrigation canals and depletion of prey-base on dolphin populations.



- Gangetic dolphins have been included in Schedule -I of the Wildlife Protection Act, 1972, which means they have the highest degree of protection against hunting.
- They are also one among the 21 species identified under the centrally sponsored scheme, "Development of Wildlife Habitat".

Threats to Gangetic river dolphin

- **Pollution:** It faces a number of threats such as dumping of single-use plastics in water bodies, industrial pollution, and fishing.
- **Restrictive Flow of Water:** The increase in the number of barrages and dams is also affecting their growth as such structures impede the flow of water.
- **Poaching:** Dolphins are also poached for their flesh, fat, and oil, which is used as a prey to catch fish, as an ointment and as a supposed aphrodisiac.
- **Shipping & Dredging:** It is also called a blind dolphin because it doesn't have an eye lens and uses echolocation to navigate and hunt.

3. OCEAN DEOXYGENATION

Context

Marine life, fisheries increasingly threatened as the ocean loses oxygen – IUCN report

About

- **International Union for Conservation of Nature (IUCN)** has released a report titled "**Ocean deoxygenation: Everyone's problem**".
- The report is the largest peer-reviewed study so far into the **causes, impacts and possible solutions** to ocean deoxygenation; and was released **by IUCN at COP25 to the UNFCCC**.
- With this report, the **scale of damage climate change is wreaking upon the ocean** has come into stark focus. As the warming ocean loses oxygen, the delicate balance of marine life is thrown into disarray.
- Large areas of the open ocean are increasingly threatened with low levels of dissolved oxygen. It is **harming marine ecosystems which were already under stress** from ocean warming and acidification.
- The potentially **dire effects on fisheries and vulnerable coastal communities** make the decisions taken at the UN Climate Change Conference (CoP25) even more crucial.
- "To drive action towards restoring ocean health" is one of the key themes of **IUCN World Conservation Congress** in Marseille in 2010.

What is the problem?

- **Ocean deoxygenation** is one of the most pernicious, yet under-reported side-effects of human-induced climate change.
- Oxygen loss from warming of oceans has alarming consequences for **global oceanic oxygen reserves**, which have already **reduced by 2% over a period of just 50-years** (from 1960 to 2010).
- Ocean regions with low oxygen concentrations **are expanding**, with around 700 sites worldwide now affected by low oxygen conditions – up from only 45 in the 1960s.
- In the same period, volume of **anoxic waters – areas completely depleted of oxygen** – in the global ocean has **grown four times**.
- If situation continues as is, the ocean is **expected to lose 3–4% of its oxygen** inventory globally **by the year 2100**.
- But impact witnessed at the **local level will be far more severe** compared to that seen on average at the global level.

- For example, impact will be more severe in **mid to high latitudes**.
- Most of the losses are predicted to be concentrated in **upper 1000m of the water column**, which is the richest in marine biodiversity.

What are the causes?

- The primary causes of deoxygenation are:
 - **Eutrophication** (increased nutrient run-off from land and sewage pollution).
 - **Nitrogen deposition** from burning of fossil fuels.
 - Widespread impacts from **ocean warming**.
- Ocean oxygen loss is closely related to **ocean warming and acidification** caused by **anthropogenic carbon dioxide emissions** and biogeochemical consequences related to **anthropogenic fertilization** of the ocean.
- As the **ocean warms, its water hold less oxygen and become more buoyant**, resulting in reduced mixing of oxygen-rich water near the surface with the ocean depths, which naturally contain less oxygen.
- Nutrient pollution causes oxygen loss in coastal waters. **Fertiliser, sewage, animal and aquaculture waste cause excessive growth of algae**, which in turn deplete oxygen as they decompose.

What is the impact?

- The loss of oxygen from world's ocean is increasingly **threatening fish species and disrupting ecosystems**.
- Deoxygenation is starting to **alter the balance of marine life, favouring low-oxygen tolerant species** (e.g. microbes, jellyfish and some squid) at the **expense of low-oxygen sensitive ones** (many marine species, including most fish).
- Some of the **ocean's most productive biomes** – which support one fifth of the world's wild marine fish harvest – are formed by ocean currents carrying nutrient-rich but oxygen-poor water to coasts that line the eastern edges of the world's ocean basins.
- As naturally oxygen-poor systems, these areas are **particularly vulnerable to even small changes in ocean oxygen**.
- Impacts here will ultimately ripple out and affect hundreds of millions of people.
- Species groups such as **tuna, marlin and sharks** are particularly sensitive to low oxygen because of their **large size and energy demands**.
- These species are starting to be **driven into increasingly shallow surface layers** of oxygen-rich water, making them more **vulnerable to overfishing**.
- Very low ocean oxygen **can also affect basic processes like the cycling of elements** crucial for life on Earth, such as **nitrogen and phosphorous**.

What should be done?

- There is urgent need to dramatically **raise our ambitions to tackle climate change**, before human actions irreparably impact and change the conditions favourable for life on earth.
- To curb ocean oxygen loss alongside other disastrous impacts of climate change, world leaders must **commit to immediate and substantial emission cuts**.
- There is need to decisively **curb greenhouse gas emissions** as well as **nutrient pollution from agriculture and other sources**.



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

- The National Wildlife Board has given its approval for the Trishna Gas project of ONGC which falls in the Trishna Wildlife Sanctuary in the Gomati district of Tripura.
- ONGC has discovered 10-12 gas bearing wells in the Trishna Wildlife sanctuary. Oil and Natural Gas Corporation (ONGC) Tripura Asset would soon start extracting natural gas from Trishna Wildlife Sanctuary in Belonia subdivision of Gomati 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.**

2. NILGIRITAHR: CLIMATE CHANGE THREATENING 60% OF ITS HABITAT

Context

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

Study Analysis:

- Historically, the NilgiriTahr 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

NilgiriTahr:

- **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**.

3. 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.

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" RavindraSinha** 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 are 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**



1. CLIMATE EMERGENCY COP 25

Context

As announced by the UNFCCC Secretariat on 1 November 2019, the COP Bureau agreed that COP 25 will take place from 2-13 December, in Madrid, Spain.

About

- The 2019 United Nations Climate Change Conference, also known as COP25, is the 25th United Nations Climate Change conference.
- It was held in Madrid, Spain, under the presidency of the Chilean government.
- The conference incorporates the 25th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), the 15th meeting of the parties for the Kyoto Protocol (CMP15), and the second meeting of the parties for the Paris Agreement.

Why climate emergency?

- In the climate lexicon, tipping points are thresholds beyond which certain impacts can no longer be avoided even if temperatures are brought down later. Examples include the loss of the Amazon rainforest or of the West Antarctic ice sheet.
- Recent IPCC reports, including last year's Global Warming of 1.5°C and this year's Special Report on the Ocean and Cryosphere in a Changing Climate, suggest that tipping points could be exceeded even between 1 and 2°C of warming.
- This is worrying as we are on track to a 3.2 degree warmer world, suggests the UNEP's Emissions Gap Report.
- The report addresses biosphere tipping points such as Amazonian deforestation, which can trigger abrupt carbon releases into the atmosphere, amplify climate change and reduce remaining emission budgets.

It calls on governments to:

- Increase implementation across all thematic areas to realize multiple benefits;
- Create the conditions needed for non-Party action;
- Continue and strengthen the Global Climate Action agenda within the UNFCCC process post- 2020;
- Align finance flows with finance needs, and;
- Strengthen the completeness and robustness of the reporting of results from climate action.

Several issues been discussed in the meeting

- The Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM);
- International climate finance;

- Capacity building;
- Matters relating to least developed countries (LDCs);
- The forum on the impact of the implementation of response measures;
- Gender and climate change;
- Common time frames for Nationally Determined Contributions (NDCs) to the Paris Agreement
- The Koronivia joint work on agriculture;
- National adaptation plans (NAPs)
- The Local Communities and Indigenous Peoples Platform (LCIPP)

2. THE WORLD SOIL DAY

Context

The World Soil Day (WSD) was observed across the world on December 5, 2019.

About

- The day is observed annually to highlight the importance of healthy soil and advocate for the sustainable management of soil resources. The theme for WSD 2019 was '**Stop Soil Erosion, Save Our Future**'.

Historical background:

- In 2002 **the International Union of Soil Science (IUSS)** voted for a resolution to dedicate 5th December every year as World Soil Day to promote the importance of Nature and human wellbeing.
- **Food and Agriculture organization (FAO) supported this initiative together with the Kingdom of Thailand leadership** as a part of "Global soil partnership".
- FAO took the initiative to establish Soil Day. Consequently, unanimously approved it in its FAO conference 2013.
- **Later in 2013, December with FAO's request, UN adopted World Soil Day in its 68th UN General Assembly.** Further, announced that the day would be observed on 5th December every year.
- Especially, this is a tribute to late **King BhumibolAdulyadej of Thailand** for his contribution in improving quality and sustainable management of soil.
- Thereby, FAO has been celebrating world soil day since 2012.

Highlights about the World Soil Day:

- Annually, to celebrate the day, World Soil Day award is distributed to honour the contributions made by people. That is, **FAO gives two awards in line with this day-**
 - ▶ **The King Bhumibol World Soil Day Award-** an annual award that honours individuals, communities, organizations and countries that organized remarkable and engaging World Soil Day activities or campaigns in the previous year.
 - ▶ **The Glinka World Soil Prize-** An annual award for dynamic change-makers dedicated to solving one of our world's most pressing environmental issue: soil degradation. It honours individuals and organizations whose leadership and activities have contributed, or are still contributing to the promotion of sustainable soil management and the protection of soil resources.

3. AIR QUALITY INDEX AND SAFAR

About Air Quality Index

- The AQI is an index for reporting daily air quality.
- It tells you how clean or polluted your air is, and what associated health effects might be a concern for you.
- The AQI focuses on health affects you may experience within a few hours or days after breathing polluted air.
- AQI is calculated for eight major air pollutants: Ground-level ozone, PM10, PM2.5, Carbon monoxide, Sulphur dioxide, Nitrogen dioxide, Ammonia, Lead.
- There are six AQI categories, namely Good + Satisfactory, Moderately polluted, Poor, Very Poor, and Severe.

About SAFAR

- The System of Air Quality and Weather Forecasting And Research (SAFAR) is an initiative introduced by the Ministry of Earth Sciences (MoES)
- The system is indigenously developed by the Indian Institute of Tropical Meteorology (IITM), Pune and is operationalized by the India Meteorological Department (IMD).
- The giant true colour LED display gives out real-time air quality index on 24x7 basis with colour coding along with 72-hour advance forecast.
- The system will be an integral part of India's first Air Quality Early Warning System operational in Delhi.
- SAFAR will accelerate public awareness and preparedness of air pollution and weather extremes.
- It will also lead to better understanding of linkages among emissions, weather, pollution and climate. It will monitor all weather parameters like temperature, rainfall, humidity, and wind speed and wind direction.
- In addition to regular air quality parameters like PM2.5, PM10, Sulphur Dioxide, Ozone, Nitrogen Oxides, Carbon Monoxide, the system will also monitor the existence of Benzene, Toluene and Xylene.
- SAFAR system would benefit cost savings to several other sectors like agriculture, aviation, infrastructure, disaster management skill, tourism and many others, which directly or indirectly get affected by air quality and weather.



1. 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.

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.

2. 'HIGHEST NUMBER OF WETLAND SPECIES IN KAZIRANGA'

Context

- Kaziranga recorded 96 species of wetland birds — one of the highest for wildlife reserves in India, according to the second wetland bird count conducted recently.

Key-highlights of the Survey:

- The survey registered a total of 19,225 birds belonging to 96 species under 80 families. It covered four ranges of the park:
 - ▶ Agoratoli
 - ▶ Bagori
 - ▶ Kohora
 - ▶ Burapahar
- More than half the birds (9,924) and 85 of the 96 species were recorded in **Agoratoli Range**. This was because **Sohola**, the largest of Kaziranga's 92 perennial wetlands, is in this range.

- With 6,181 individuals, the **bar-headed goose** led the species count, followed by the common **teal** at 1,557 and **northern pintail** at 1,359. All three belong to the family
- The other species with sizeable numbers include **gadwall, common coot, lesser whistling duck, Indian spot-billed duck, little cormorant, ferruginous duck, tufted duck, Eurasian wigeon, Asian openbill, northern lapwing, ruddy shelduck** and **spot-billed pelican**.

Background:

- The first wetland bird survey in Kaziranga, a UNESCO World Heritage Site since 1985, was conducted in 2018.
- The first waterfowl census in 2018 had yielded 10,412 birds covering 80 species, belonging to 21 families.

What are the Wetlands?

- Wetlands are areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.
- The primary factor that distinguishes wetlands from other landforms or water bodies is the characteristic vegetation of aquatic plants, adapted to the unique hydric soil.
- Wetlands play a number of ecological functions, such as water purification, water storage, processing of carbon and other nutrients, stabilization of shorelines, and support of plants and animals.

Ramsar Convention on Wetlands:

- The Convention on Wetlands, called the Ramsar Convention, is the intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources.
- It is the only global treaty that focuses specifically on wetlands.
- The Convention was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975.
- At present, there are 27 Ramsar Wetlands Sites in India

Quick facts on Kaziranga National Park:

- **Important species:** Kaziranga National Park a world heritage site is famous for the Great Indian one-horned rhinoceros. Besides rhinoceros, it is inhabited by tigers, elephants, panthers and bears, and thousands of birds.
- **Location:** It is located fairly in the Golaghat and Nagaon regions of Assam in India and also placed beside the Brahmaputra River on the North and the Karbi Anglong mountains on South India. Kaziranga National Park is the abode of 37 highways which is passed through the park.
- It has been declared as National Park in 1974. It has been **declared as a world heritage site by UNESCO**.
- **Legal protection:** The property receives the highest legal protection and strong legislative framework under the provisions of the Indian Wildlife (Protection) Act, 1972 and Indian Forest Act, 1927/Assam Forest Regulation 1891.

3. A GIANT FISH IS DECLARED EXTINCT

Context

One of the largest freshwater fish has been declared extinct in a study published in the journal Science of the Total Environment.

About

- The Chinese paddlefish (*Psephurus gladius*) was an iconic species, measuring up to 7 m in length, dating back from 200 million years ago, and therefore swimming the rivers when dinosaurs ruled the Earth.

- Its ancestral home was the Yangtze River.
- Chinese researchers made this conclusion based on the Red List criteria of the International Union for Conservation of Nature (IUCN).
- The Red List has several categories for extinction
- “Extinct in the wild” means a species survives only in a captive environment
- “Locally extinct” means a species has ceased to exist in a particular area but may exist in other areas.
- “Functionally extinct”, which means the species continues to exist but it has too few members to enable to reproduce meaningfully enough to ensure survival.
- “Globally extinct”, it means a species has no surviving member anywhere. Such a conclusion is reached when there is no reasonable doubt left that its last member has died.

Other facts

- Declaring a species extinct is an elaborate process. It involves a series of exhaustive surveys, which need to be taken at appropriate times, throughout the species’ historic range and over a time-frame that is appropriate to the species’ life cycle and form.
- Once declared extinct, a species is not eligible for protective measures and conservation funding; therefore, the declaration has significant consequences.
- In the case of the Chinese paddlefish, the researchers made the conclusion over long-term surveys. It was once common in the Yangtze, before overfishing and habitat fragmentation — including dam building — caused its population to dwindle from the 1970s onwards.
- Between 1981 and 2003, there were just around 210 sightings of the fish.
- The researchers estimate that it became functionally extinct by 1993, and extinct sometime between 2005-2010.





1. CLOUD SEEDING TECHNOLOGY

About

- Cloud seeding is a kind of a weather modification technology to create artificial rainfall. It was pioneered by atmospheric scientist Bernard Vonnegut.
- It works only when there are enough pre-existing clouds in the atmosphere.
- Rain happens when moisture in the air reaches levels at which it can no longer be held, and cloud seeding aims to facilitate and accelerate that process by making available chemical 'nuclei' around which condensation can take place.
- These 'seeds' of rain can be the **iodides of silver or potassium, dry ice** (solid carbon dioxide), or **liquid propane**. The seeds can be delivered by plane or simply by spraying from the ground.
- It is also known by other terms such as man-made precipitation enhancement, artificial weather modification, and rainmaking.

Where all has it been tried earlier?

- Cloud seeding is not new to India and it has earlier been attempted in Karnataka, Andhra Pradesh and Maharashtra to address drought.
- Similar experiments of cloud seeding had earlier been tried in Australia, America, Spain and France.
- In United Arab Emirates, the cloud seeding technique led to creation of 52 storms in Abu Dhabi.
- Also, such seeding is routine in Russia and other cold countries where the technique is used to disperse fog at the airports.

Cloud Seeding Methods

There are three cloud seeding methods: static, dynamic and hygroscopic

- **Static cloud seeding** involves spreading a chemical like silver iodide into clouds. The silver iodide provides a crystal around which moisture can condense. The moisture is already present in the clouds, but silver iodide essentially makes rain clouds more effective at dispensing their water.
- **Dynamic cloud seeding** aims to boost vertical air currents, which encourages more water to pass through the clouds, translating into more rain. Up to 100 times more ice crystals are used in dynamic cloud seeding than in the static method. The process is considered more complex than static clouding seeding because it depends on a sequence of events working properly.
- **Hygroscopic cloud seeding** disperses salts through flares or explosives in the lower portions of clouds. The salts grow in size as water joins with them.

2. EMPEROR PENGUINS WOULD BE EXTINCT IF CLIMATE GOALS ARE NOT MET

Context

Warming climate may render Emperor Penguins, one of the most striking and charismatic animals on Earth, extinct by the end of the century, according to a new study by the Woods Hole Oceanographic Institution (WHOI).

About

- The study was a part of an international collaboration between scientists.
- Penguins are this indicator species, this canary in the coal mine, they are warning us of the future effect of climate.
- The big message is we need to listen to the penguins, and implement policies to meet the Paris agreement's objective.
- Disappearing sea ice impacts Emperor Penguins directly, as the animals use it as a home base for their nine-month breeding season and for feeding and moulting.
- Emperor Penguins tend to build their colonies on ice with extremely specific conditions — it must be locked in to the shoreline of the Antarctic continent, but close enough to open seawater to give the bird's access to food for themselves and their young.
- As climate warms, however, that sea ice will gradually disappear, robbing the birds of their habitat, food sources and ability to raise their chicks.

Emperor Penguins

- The status of the emperor penguin, one of Antarctica's most iconic species, in the Red List of International Union for Conservation of Nature (IUCN) is Near Threatened.
- The emperor penguin is the tallest and heaviest of all living penguin species and is endemic to Antarctica. Emperor Penguins are the largest penguins in the world.
- Feathers of the head and back are black and sharply delineated from the white belly, pale-yellow breast and bright-yellow ear patches.
- While hunting, the species can remain submerged around 20 minutes. They can dive deeper than any other bird.
- This is the only penguin species that breeds during the Antarctic winter.
- Emperor Penguins don't build any sort of nests at all. Their feet and brood patches are the only "nest" their chicks get.

3. GEO-ENGINEERING

Context

With intensified debate on climate change, alternate methods like geo-engineering can be considered.

About

- Also known as "**climate engineering**", geo-engineering is the intentional large-scale intervention in the Earth's climate system to counter climate change.
- It includes techniques to **remove carbon dioxide** from the atmosphere, and technologies to rapidly **cool the Earth by reflecting solar energy** back to space.

Types of geo-engineering proposals

- **Carbon dioxide removal techniques (CDR):** techniques to remove carbon dioxide from the atmosphere.
- **Ocean fertilisation using phytoplankton and iron:**
 - ▶ Phytoplankton in the ocean use photosynthesis to capture CO₂.
 - ▶ When they die, they **sink deep** into the ocean, taking all that CO₂ with them.
 - ▶ Phytoplankton **needs iron to grow**.
 - ▶ Increasing the ocean's iron content will cause the phytoplankton population to increase, thereby removing more CO₂.
- **Biochar production:**
 - ▶ Biochar is a type of charcoal made from animal wastes and plant residues (such as wood chips, leaves, and husks) which can **sequester carbon by circumventing the normal decomposition process** or acting as a fertilizer to enhance the sequestration rate of growing biomass.
- **Artificial trees:**
 - ▶ Artificial trees essentially would be a series of **sticky, resin-covered filters** that would **convert captured CO₂ to a carbonate called soda ash**.
 - ▶ Periodically, the soda ash would be washed off the filters and collected for storage.
- **Carbon filtering:**
 - ▶ Carbon burial: For example; **burning large quantities of wood in power plants** with carbon-capture technology, grazing cattle in a way designed to turn **grasslands into giant carbon sinks**, or **converting CO₂ into stones**.
 - ▶ Direct Air Capture: This technology uses huge fans to **suck air through a filter to which CO₂ chemically bonds**. When heated, the filter releases the CO₂, which can then be sold for other uses, such as growing vegetables in greenhouses, making carbonated drinks or even fuel.
 - ▶ **Solar geo-engineering, or "solar radiation management" (SRM);** technologies to rapidly cool the Earth by reflecting solar energy back to space.
- **Stratospheric aerosol injection:**
 - ▶ The idea is to **simulate the cooling effects of volcanic eruptions**, and enhancing the reflectivity of marine clouds.
 - ▶ When volcanoes erupt, they spread into the atmosphere tiny particles, commonly known as **"aerosols."**
 - ▶ Light-coloured aerosol particles can reflect incoming energy from the sun in cloud-free air, and dark particles can absorb it.
 - ▶ A small fleet of aircraft, for example, could **conceivably inject sulphate-aerosols or other reflecting particles into the stratosphere** and drive large-scale cooling.
- **Marine cloud brightening:**
 - ▶ Another idea is to increase the **Earth's 'albedo'**, which is the measure of amount of solar radiation the planet reflects back than it absorbs.
 - ▶ Because **whiter surfaces reflect more light** than darker ones, a whiter Earth will reflect more of the Sun's energy back into space, helping to keep temperatures cooler.
 - ▶ One way to do this is to **make clouds brighter and whiter**.
 - ▶ This can be done by **spraying sea water into clouds over the ocean**. The salt water will cause them to grow bigger and brighter.
 - ▶ Other proposals to increase the Earth's albedo **include painting houses white, planting crops that are pale** and perhaps even laying out **reflective sheets in deserts**.

◦ **Cirrus cloud thinning (CCT):**

- ▶ CCT is almost the **opposite of marine cloud brightening**. High-altitude Cirrus clouds are thin and wispy, so they don't reflect much solar radiation back into space, and instead trap long-wave radiation on earth.
- ▶ CCT proposes **thinning** them further **through cloud seeding, letting more long-wave radiation escape**.
- ▶ The **problem** with CCT is that the cloud seeding can have the exact opposite effect, **thickening the Cirrus formations**.

◦ **Space reflectors:**

- ▶ Technologies like **giant mirrors in space or umbrellas in orbit** can be built to reflect sunlight away and keep the planet cooler.
- ▶ All these ideas have been proposed, but would be so expensive that no one really thinks we could afford them.





1. EARTH AT RISK OF BECOMING IRREVERSIBLE HOTOHOUSE: STUDY

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.
- Maximizing 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. BHARAT STAGE IV (BS-IV) CARS

About

- This is according to the mass emission standards for flex-fuel M15 or M100 and MD 95 vehicles notified last year.
- The use of blended fuel M-15 in BS-IV cars can result in lowering of greenhouse gas emissions by about 5 to 10 %, thereby improving air quality.

M-15 fuel

- It is a blend of 15 % methanol and 85 % Gasoline.
- It is a clean burning drop in fuel which can replace both petrol & diesel in transportation & LPG, Wood, Kerosene in cooking fuel.

- It can also replace diesel in Railways, Marine Sector, Power Generation and this could be the ideal complement to Hybrid and Electric Mobility.
- Methanol Economy is the 'Bridge' to the dream of a complete "Hydrogen based fuel systems".
- M-15 in petrol and diesel will reduce pollution by 33% and 80 % respectively.
- It burns efficiently in all internal combustion engines, produces no particulate matter, no soot, almost nil SOX and NOX emissions (Near Zero Pollution).

Bharat stage emission standards

- These emission standards were set by the central government to keep a check on the pollutant levels emitted by vehicles that use combustion engines.
- The norms were introduced in 2000. With appropriate fuel and technology, they limit the release of **air pollutants** such as nitrogen oxides, carbon monoxide, hydrocarbons, particulate matter (PM) and sulphur oxides from vehicles
- These norms are based on European emission norms which, for example, are referred to in a similar manner like 'Euro 4' and 'Euro 6'. These norms are followed largely by all automakers across the globe and act as a good reference point as to how much does a vehicle pollute.
- To bring them into force, the **Central Pollution Control Board** sets timelines and standards which have to be followed by automakers.
- The higher the number gets, the stricter the Bharat Stage emission norms get which eventually means it becomes trickier (and costlier) for automakers to meet them.
- Bharat Stage VI (BS-VI) norms are two stages ahead of the present BS IV norms in regulating emissions. BS-VI norm would come into force from April 1, 2020 in India.

Difference between BS-VI and BS-IV

- The major difference is the presence of sulphur in the fuel. While the BS-IV fuels contain 50 parts per million (ppm) sulphur, the BS-VI grade fuel only has 10 ppm sulphur content.

2. 'IMPRESSIVE' TORTOISE SIGHTED IN ARUNACHAL PRADESH

Context

A team of herpetologists from the **Forest Department and two NGOs, Help Earth and Turtle Survival Alliance (TSA)**, found a pair of the rare species, **Impressed Tortoise** (Manouria Impressa) in Arunachal Pradesh.

About

More on news

- This is the first-ever recorded sighting (not discovery) in India of this tortoise which is on a **red list of threatened species**, taking the count to five and the non-marine chelonian count to 29. Chelonian is an order of reptile that includes turtles, terrapins and tortoises.
- The species has a golden brown shell and skin.
- There are only two species of tortoises under the **Manouria genus**. Northeast India was known to be the home of only the **Asian Forest Tortoise** (Manouriaemys) until the discovery of the **Impressed Tortoise**.
- The **male Impressed Tortoise** is smaller than the female which is 30 cm in length, so it is medium sized. This **Manouria species** is one-third the size of the **Asian Forest Tortoise**.
- **Turtle Survival Alliance**, an organisation working towards tortoise conservation, described it as a '**critically endangered**' tortoise species which was elusive, vulnerable, and most importantly, never been sighted in India.

- It inhabits hilly regions, moist primarily forest hill tracts of the Indo-Burma hot spot (Cambodia, China, Laos, Malaysia, Myanmar, Thailand and Vietnam). Its habitat is difficult to access and that makes its protection tough.
- The last reported range extension of the species was from **Gwa, Myanmar**. The records of **IUCN (International Union for Conservation of Nature)** show it to be **fungivorous** (fungi-eating). It is also considered difficult specie for captive breeding. The clutch size (number of eggs laid at a time) is 10-21 eggs and not much is known of its nesting behaviour.
- The impressed tortoise measures one foot, and has a 'brilliant' spine, which is bent upwards and beautifully serrated. It's a magnificent looking creature — impressive in colour and shape. **That is why it's called the impressed tortoise in the first place.**

Implications of the finding

- It hailed it as a landmark moment in turtle conservation. The implications of the finding is big since always in our country, in conservation action plan, lesser animals are sidelined, always the focus is on elephants, tigers or rhinos and may be this discovery will create an impact, very little may be but a perception change might come and more researchers will join in turtle conservation.
- With this discovery, India becomes the third most turtle-rich country in the world. There are 24 turtles (aquatic) species found in the country.





1. HANGUL

Context

A massive decline in the population of Kashmir's iconic wildlife species, the Hangul (*Cervushangluhanglu*), also known as the Kashmir stag, continues to be a big concern as conservation efforts for it, going on for years, have not yielded any significant results so far.

About

Hanguls in India:

- Today, Hangul, the state animal of Jammu & Kashmir, is restricted to the Dachigam National Park some 15 km north-west of Jammu & Kashmir's summer capital Srinagar.
- From a population of 5,000 in the early 1900s, the Hangul's numbers have constantly declined over the decades.
- According to the latest survey in 2017, the population of Hangul is 182 in Dachigam and adjoining areas.
- Earlier population estimates suggest that there were 197 Hanguls in 2004 and 186 in 2015.
- Small isolated Hangul herds of five to ten have been reported from adjoining areas of Dachigam which include Shikargah-Tral and the Overa-Aru Wildlife Sanctuary in south Kashmir.
- It was once widely distributed in the mountains of Kashmir and parts of Chamba district in neighbouring Himachal Pradesh.
- The IUCN's Red List has classified it as Critically Endangered and it is placed under Schedule I of the Indian Wildlife (Protection) Act, 1972 and the J&K Wildlife Protection Act, 1978.

Why is Hangul population declining?

- The biggest challenges in the way of conservation and population growth of Hangul are habitat fragmentation, predation and very low fawn-female ratio.
- Another challenge is the male-female and fawn-adult disparity in the Hangul population. There is a female-biased ratio of 23 males to every 100 females. The female-biased ratio and the fawn to female ratio of 30:100 are the two main reasons for the declining numbers of Kashmir's Hangul.
- Fawns are also predated upon by the dogs of security forces deployed in forests and the dogs of nomads who graze their herds in areas which are Hangul habitats.

Conservation efforts:

- An important part of the conservation project for Hangul is to study the food habits, breeding patterns and movements of the species in and out of its habitat and tagging the animals with satellite collars.
- There was a 66-hectare sheep farm in the lower part of the Dachigam National Park. Since 2002, the wildlife department had been consistently pleading with the sheep husbandry officials that the farm is acting as a huge disturbance to the habitat of the Hangul. Now the farm is removed helping in conservation of Hanguls.

- Another conservation measure taken by the wildlife department in recent years is a project for improving the population of the Hangul through ex-situ breeding. The breeding centre, along with some infrastructure over a five-acre forested area in south Kashmir's Shikargah-Tral was started a few years ago.

2. ANTHROPOCENE RECOGNISED AS AN EPOCH

Context

The pervasive and persistent signatures of modern human activity on the earth have been so striking that officially, it is being recognised and named as a new geologic epoch (Anthropocene).

About

- Recently, the Anthropocene Working Group (AWG) overwhelmingly voted to recognise Anthropocene as an epoch. The vote gives form to the efforts of scientists, notably the Nobel Laureate Paul Crutzen and Eugene F. Stoermer, who coined the term in 2000 to highlight how human activity had changed many facets of the earth.

Geochronology:

- Eon (largest)
- Era
- Period
- Epoch
- Age
- Chron (smallest)



Geological epoch:

- In geochronology, an epoch is a subdivision of the geologic timescale that is longer than an age but shorter than a period. The current epoch is the Holocene Epoch of the Quaternary Period.
- Cenozoic (current era)
 - ▶ Quaternary (current period)
 - Holocene (current epoch: The start of the Holocene epoch 11,700 years ago marks the end of the transition from the last glacial phase to a period of warming and a rise in sea level.)
 - Pleistocene
- Neogene
 - ▶ Pliocene
 - ▶ Miocene
- Paleogene
 - ▶ Oligocene
 - ▶ Eocene
 - ▶ Paleocene

Anthropocene:

- It is a proposed epoch dating from the commencement of significant human impact on Earth's geology and ecosystems.
- Human activity has been drastically changing the earth, with the greatest impacts coming from agriculture, large-scale deforestation, the industrial revolution and increase in atmospheric carbon dioxide, besides the creation of materials such as concrete and plastic.

- Unlike the others, it will be the first time that the beginning of an epoch would be based on human activity and not the consequences of changes brought about by nature.

Marker for this new epoch:

- Anthropocene Working group voted to look for unique signatures around the 1950s to define the start of the Anthropocene.
- To be chosen as a geologic marker, the golden spike must be present globally across most environments and must be a part of deposits for a geologically significant length of time.
- A decrease in deuterium excess, a proxy for climate change, owing to the reorganisation of North Atlantic Ocean-atmosphere circulation was a definitive geologic marker (or golden spike) to signify the base of Holocene.
- Now, radionuclides from atomic bomb tests from the early 1950s are emerging as a favourite golden spike candidate to define the base of the Anthropocene.

3. WASTE-TO-ENERGY

Context

DMRC becomes India's 1st project to receive Power from Waste-to-Energy.

About

More on news:

- Delhi Metro has started receiving 2 MW power from a 12 MW capacity waste-to-energy plant set up in Ghazipur and the plant will mitigate over 8 million tons of Greenhouse Gases (GHG) over the life of the project.
- DMRC will take approximately 17.5 million units per annum from this plant, however, the energy off-take will depend upon the actual generation of the plant.
- The waste-to-energy plant set up by East Delhi Waste Processing Company Limited (EDWPCL) is based on a Public Private Partnership (PPP) involving the Delhi government and East Delhi Municipal Corporation (EDMC), besides the EDWPCL.
- The plant is India's first Euro norms compliant waste-to-energy facility and the state of the art facility is set up to process above 1,500 tonnes per day (TPD) of waste and generate 12 MW of green power.
- The Delhi Metro has been working continuously towards the conservation of the environment since the inception of the organization and is the first ever rail based organisation in the world to claim carbon credits.
- The DMRC has also commissioned a facility at Rohini (Delhi) on PPP model with IL&FS Environmental Infrastructure & Services Ltd (IEISL) for recycling of Construction and Demolition (C&D) waste with a capacity of 150 tons per day.
- Currently, DMRC is producing 28 MW of solar power from the various rooftop solar power plants, which have been set up in its stations, depots and residential premises.
- The mass transit operator has also started to receive solar power from the off-site solar power plant at Rewa in Madhya Pradesh.
- In construction also, DMRC plants 10 trees for each tree that is cut. Close to 4 lakh vehicles are being removed from the streets because of the Delhi Metro.

Waste-to-Energy

- Waste-to-Energy (WtE) or Energy-from-Waste (EfW) is a form of energy recovery and the process of generating energy in the form of electricity and/or heat from the primary treatment of waste, or the processing of waste into a fuel source.

- Most WtE processes generate electricity and/or heat directly through combustion, or produce a combustible fuel commodity, such as methane, methanol, ethanol or synthetic fuels.
- Incineration, the combustion of organic material such as waste with energy recovery, is the most common WtE implementation method.
- All new WtE plants in OECD countries incinerating waste (residual MSW, commercial, industrial or RDF) must meet strict emission standards, including those on nitrogen oxides (NO_x), sulphur dioxide (SO₂), heavy metals and dioxins. Modern incinerators reduce the volume of the original waste by 95-96 percent, depending upon composition and degree of recovery of materials such as metals from the ash for recycling.
- Incinerators may emit fine particulate, heavy metals, trace dioxin and acid gas, even though these emissions are relatively low from modern incinerators. Other concerns include proper management of residues: toxic fly ash, which must be handled in hazardous waste disposal installation as well as incinerator bottom ash (IBA).





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2. ADIDAS SET TO TAP INDIAN FIRM'S PET PROJECT TO CUT VIRGIN PLASTIC USE

Context

- Global sportswear giant Adidas aims at eliminating the use of virgin plastics in its products by 2024 — with a little help from a Maharashtra-based firm — the only one of its kind in the country to produce yarn out of discarded PET bottles.
- Discarded bottles are upcycled to make high-quality polyester filament yarn for Adidas products.

About

More on news:

- At its first factory set up in Nashik five years ago, Polygenta Technology Limited deploys an unique technology to break down used **PET (Polyethylene Terephthalate)** bottles and convert them into polyester filament yarn.
- The firm, with a capacity to convert 30 tonnes of PET bottles into yarn a day, plans to scale up capacity to around 100 tonnes a day in the next two years to meet demand from the likes of Adidas — one of its first clients.
- Polygenta would be converting around 8 to 10 million bottles a day in a couple of years from now. At present, the company recycle roughly two million bottles a day.
- The yarn produced by Polygenta, currently sent to Adidas' manufacturing centres to be converted into sportswear, and may also be tapped to potentially upcycle clothes made from polyester yarn.
- According to the United Nations, around 300 million tonnes of plastic are produced every year — roughly the weight of the entire human population. Of this, eight million tonnes of plastic waste ends up in the oceans; PET bottles are the main contributors to plastic waste globally and in India.
- PET material collection rate in India is nearly 80% — among the best in the world — but a good portion of these bottles are downcycled, eliminating the possibility of further recycling. Downcycling is reuse of waste in a manner that the recycled product is of lower value than the original material.

Energy efficient

- The upcycling process consumes 86% less water and 75% less energy than conventional manufacturing, but costs approximately 10% more.
- A key area where costs can be reduced is curbing the level of contamination in PET bottles. If PET bottles are disposed and collected properly, one can expect savings to the tune of ₹5 per kg. In Japan individuals dispose PET bottles after removing the caps and the labels.

3. COP-14 OF UNCCD

Key Highlights of COP-14

- **Presidency:** India will be taking over the COP presidency from China for the next two years until the next COP is hosted in 2021.
- **Participants:** At least 5,000 delegates from nearly 197 countries will be participating in the event which will be held between 29th August to 14th September 2019 at India Expo Mart Limited, Greater Noida.
- **Function:** One of the primary functions of COP-14 is to review reports submitted by Conference of Parties to convention and detailing how they are carrying out their commitments.
- **India's Land Degradation Problems:** India faces a severe problem of land degradation (meaning the soil becoming unfit for cultivation). The Indian Space Research Organisation (ISRO) in its 2016 report found that over 29% of India's land (in 2011-2013) was degraded which was 0.57% increase from year 2003-2005.

India's Flagship Project:

- Ahead of COP-14, Prakash Javadekar, Union Minister of Environment, Forest and Climate Change (MoEFCC) has launched a flagship project which is a part of a larger international initiative called 'Bonn Challenge'.
- It is aimed at enhancing India's capacity for Forest Landscape Restoration (FLR). During the pilot phase of project (initial 3.5 years), it will be implemented in Haryana, Madhya Pradesh, Maharashtra, Nagaland and Karnataka. Initially, the project will be aimed at developing and adapting best practices and monitoring protocols for country, and building capacity within 5 pilot States. Later, it will eventually be scaled up across the country through subsequent phases of project. The project will be implemented by MoEFCC in partnership with International Union for Conservation of Nature (IUCN).

Bonn Challenge

- It is a global effort towards bringing 150 million hectares of world's degraded and deforested land under restoration by the year 2020 and 350 million hectares by 2030.
- At COP-13 (2015) in Paris, India also joined the voluntary Bonn Challenge pledge and had committed towards restoring 13 million hectares (MH) of degraded and deforested land by year 2020, and an additional 8 million hectares (MH) by 2030. India's pledge is one of the largest in Asia.



1. ANTHRAX SCARE IN RESERVE AFTER DEATH OF BUFFALOES

Context

Veterinarians have confirmed anthrax as the cause of death of two Asiatic water buffaloes in central Assam's Pobitora Wildlife Sanctuary, which has the highest concentration of one-horned rhinos in the world and is often called 'Mini Kaziranga' due to similar landscape and vegetation.

About

- Anthrax is a serious infectious disease caused by gram-positive, rod-shaped bacteria known as *Bacillus anthracis*.
- Although it is rare, people can get sick with anthrax if they come in contact with infected animals or contaminated animal products.
- It can occur in four forms: skin, lungs, intestinal, and injection.
- The symptoms of anthrax depend on the type of infection and can take anywhere from 1 day to more than 2 months to appear. All types of anthrax have the potential, if untreated, to spread throughout the body and cause severe illness and even death.

Symptoms

- A group of small blisters or bumps that may itch
- Swelling can occur around the sore
- A painless skin sore (ulcer) with a black center that appears after the small blisters or bumps. Most often the sore will be on the face, neck, arms, or hands.

Types of Anthrax

1. **Cutaneous:** Most common form of anthrax infection, and is considered to be the least dangerous. Infection usually develops from 1 to 7 days after exposure.
2. **Inhalation:** Inhalation anthrax is considered to be the most deadly form of anthrax. Infection usually develops within a week after exposure, but it can take up to 2 months
3. **Gastrointestinal:** Gastrointestinal anthrax has rarely been reported. Infection usually develops from 1 to 7 days after exposure.
4. **Injection:** This type of infection has never been reported.

Who Is At Risk

Anyone who has come in contact with anthrax spores could be at risk of getting sick. Most people will never be exposed to anthrax. However there are activities that can put some people at greater risk of exposure than others.

- People Who Handle Animal Products

- Veterinarians
- Livestock producers
- Travelers
- Laboratory Professionals
- Mail handlers, military personnel, and response workers who may be exposed during a bioterror event involving anthrax spores

Prevention

- Antibiotics can prevent anthrax from developing in people who have been exposed but have not developed symptoms.
- Ciprofloxacin and doxycycline are two of the antibiotics that could be used to prevent anthrax.
- People who have been exposed to anthrax must take antibiotics for 60 days. This will protect them from any anthrax spores in their body when the spores are activated.

A History of Anthrax

- Anthrax is thought to have originated in Egypt and Mesopotamia.
- Anthrax may have caused what was known as the fifth plague, described as a sickness affecting horses, cattle, sheep, camels and oxen.
- Ancient Greece and Rome were also well acquainted with anthrax.

2. WATER MANAGEMENT

Context

With Chennai and Maharashtra water crisis, water management issues have again taken centre stage. NITI Aayog reiterated its strategy for water resources in "Strategy for new India@75" document which included adopting an integrated river basin management approach, and setting up of river basin organisations (RBOs) for major basins

What is Water Management?

- Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources. According to a recent NITI Aayog report, 21 Indian cities including Delhi, Chennai, and Hyderabad will run out of groundwater by 2020 if usage continues at the current rate. This entails immediate action plan for water resource management in India.

Water situation in India:-

- India has just 4% of the world's fresh water — but 18% of the global population.
- The single largest source of fresh water is monsoons with an annual precipitation of about 4000 BCM (billion cubic metres) which is equivalent to 1170 mm of rainfall. This is distributed both temporally and spatially. 3000 BCM is concentrated in 3-4 months of monsoons. Simultaneously, some northern states are water surplus whereas several states like Maharashtra, Tamil Nadu, and Rajasthan are water scarce.
- Out of the 4000 BCM, utilizable water is only 1120 BCM. Out of the utilizable water 690 BCM is available as surface water and 430 BCM as groundwater.
- In 1951, India's per capita water availability was 5177 cubic metres which decreased to 1545 cubic metres in 2011 and is predicted to further reduce to 1300 cubic metre by 2030

Causes for the Water vulnerability:-

- Excessive use of groundwater for irrigation in agriculture has also caused a strain in the resource. As India is one of the top agriculture producers in the world, the consumption of water for land and crops is also one of the highest.

- Water sources are contaminated with biological pollutants. Indian water bodies also have increased amount of solid wastes.
- Reduction in traditional water recharging areas and Sewage and wastewater drainage into traditional water bodies has exacerbated the water scarcity situation in the country.
- Increasing demand due to population growth, industrialisation, and rapid urbanisation have pushed the demand for water further.

Major steps and water management strategies adopted by Government:-

Ministry of Jal Shakti was formed by merging two ministries i.e. Ministry of Water Resources, River Development & Ganga Rejuvenation and Ministry of Drinking Water and Sanitation.

1. River Basin Planning

- ▶ Central water Commission has divided the country into 20 rivers basins comprising 12 major and 8 composite river basins. To address the multi-faceted nature of water management, government has introduced an integrated approach to water resources management at the national and basin level. This includes improving institutional arrangements and working practices.

2. Indian Rivers Inter-link

- ▶ The Indian Rivers Inter-link is a proposed large-scale civil engineering project that aims to effectively manage water resources in India by linking Indian rivers by a network of reservoirs and canals and so reduce persistent floods in some parts and water shortages in other parts of India

3. Watershed management programmes in India

Prime Minister Krishi Sinchayee Yojna

- ▶ (Watershed Development Component) (WDC-PMKSY) - The main objectives of the WDC-PMKSY are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover.

Neeranchal Watershed Program

- ▶ Neeranchal is a World Bank assisted National Watershed Management Project. Neeranchal is designed to further strengthen and provide technical assistance to the Watershed Component of PMKSY, in particular and all components of PMKSY, in general, to enhance its delivery capacity.

4. State specific lead in water management programmes

- ▶ Mission Kakatiya, - launched by Telangana government aims to develop minor irrigation infrastructure, and strengthen community based irrigation management
- ▶ Jalyukt-shivir - is a project of Maharashtra government which aims to make 5000 villages free of water scarcity every year.
- ▶ Mukhya Mantri Jal Swavlamban Abhiyan' - has been launched by Rajasthan for effective implementation of water conservation and water harvesting in rural areas.

The path ahead:-

The most important crops of India — rice, wheat and sugarcane, are the most water consuming crops. Rice which is a major export crop consumes about 3,500 litres of water for a kilogram of grain produced. Further with constant population increase and depletion in water resources water management will increasingly become more difficult in future. The picture of the same is visible in precipitating crisis of water in southern states. Water management needs to be the central focus of efforts in the agriculture sector and the environment improvement.

3. GLOBAL SNOW LEOPARD AND ECOSYSTEM PROGRAM (GSLEP)

Context

On October 22nd 2019, India for the first time held the Global Snow Leopard and Ecosystem Program (GSLEP) at Delhi, under the aegis of ministry of environment, forest and climate change (MoEF).

About

The Global Snow Leopard and Ecosystem Protection Program (GSLEP):

- It seeks to **address high-mountain development issues using the conservation of the charismatic and endangered snow leopard as a flagship.**
- The **GSLEP is a range-wide effort** that unites range **country governments, nongovernmental and inter-governmental organizations, local communities, and the private sector** around a shared vision to conserve snow leopards and their valuable high-mountain ecosystems
- The GSLEP is a high-level inter-governmental alliance of all **the 12 snow leopard range countries.**
- The snow leopard countries namely, **India, Nepal, Bhutan, China, Mongolia, Russia, Pakistan, Afghanistan, Kyrgyzstan, Kazakhstan, Tajikistan, and Uzbekistan.**
- It majorly **focuses on the need for awareness and understanding of the value of Snow Leopard for the ecosystem.**
- The GSLEP Program (2019) was organized by the Ministry of Environment, Forest and Climate Change at New Delhi.
- The Steering Committee meetings of GSLEP is **currently chaired by Nepal and co-chaired by Kyrgyzstan.**

India: First Snow Leopard Survey

- **The inaugural session of the 4th steering committee** meeting of the Global Snow Leopard & Ecosystem Protection (GSLEP) Program **also marked the launch of the First National Protocol on Snow Leopard Population Assessment, to mark the occasion of International Snow Leopard Day (23rd October).**
- The first National Snow Leopard Survey of the nation has been developed by scientific experts in association with the Snow Leopard States/UTs namely, **Ladakh, Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh.**
- The use of technology such as camera traps and scientific surveys will help to estimate the numbers.



1. PROPOSAL TO AMEND THE DISASTER MANAGEMENT ACT OF 2005

Context

Union Cabinet is taking up the proposal to amend the Disaster Management Act of 2005.

About

- The present Act largely focuses on
 - ▶ Improving preparedness
 - ▶ Providing immediate relief
 - ▶ Protecting infrastructure
- The main drawback of the present policy is it neglects long-term recovery.

A brief about disaster management act, 2005

- It was enacted to effectively prevent, mitigate (reducing the severity) and prepare for disasters.
- It came into being on the heels of three major disasters.
 - ▶ 1999 - Super cyclone in Odisha
 - ▶ 2001 - Bhuj earthquake
 - ▶ 2004 - Indian Ocean tsunami.
- The Act mandated the creation of the National Disaster Management Authority, State Disaster Management Authorities and District Disaster Management Authorities.
- It laid down the framework, roles and responsibilities of these bodies to formulate and implement disaster management plans at their levels.

The focus of the act is preparedness, that is:

- Most States invested in resilient infrastructure, early warning systems and evacuation.
- This translated into
 - ▶ timely warnings
 - ▶ relief shelters and
 - ▶ massive evacuation exercises
- All these steps have reduced casualties.
- NDRF and SDRF have helped in providing immediate relief in the aftermath of dis

Long-term recovery

- Once the hazardous situation is passed, the important aspect is how to ensure recovery.

- We are seeing disasters from the narrow prism of providing food, water and medicines.
- At the most, some states are looking at providing shelter.
- These interventions are crucial, but long-term recovery needs much more.

What is urgently needed?

- Recovery measures should address inherent vulnerabilities pertaining to livelihoods, education, water, sanitation, health, and ecology of the disaster-affected communities.
- Intangible losses such as psychosocial needs of the communities should be given equal emphasis.
- Long-term recovery needs to be thought of alongside development in an integrated comprehensive manner by combining health, skill building and livelihood diversification schemes.
- This would ensure that communities have, at the very least, recovered to a new normal before the next disaster strikes. This understanding is crucial to the lawmakers looking to amend the Act.

2. CRYODRAKON BOREAS

Context

Cryodrakonboreas, the **largest flying animal** was a plane-sized reptile

About

- **New species of pterosaur**, the plane-sized **reptiles** that lorded over primeval skies above T-rex, Triceratops and other dinosaurs of the late Cretaceous.
- With a wingspan of 10 m and weighing 250 kg, Cryodrakonboreas rivals another pterosaur as the largest flying animal of all time
- Its remains were first **discovered more than 30 years ago in Alberta, Canada**, yet elicited scant excitement because of the misclassification.
- Like other winged reptiles living at the same time, about 77 million years ago, **boreas was carnivorous** and probably fed on lizards, small mammals and even baby dinosaurs.
- Despite their large size and wide distribution across North and South America, Asia, Africa and Europe only fragmentary remains have been unearthed, making the new find especially important.

3. DEFORESTATION, AGRICULTURE TRIGGERED SOIL EROSION 4,000 YEARS AGO

Context

Increased sediment deposits and changes in land use showed the degradation of soil during the last four millennia. Human activities such as agriculture and deforestation intensified global soil erosion 4,000 years ago, according to a study.

About

- While weathering of soil and erosion has, known to be controlled by changing climatic patterns and tectonic impacts of the planet, the new study suggests a role of human practices and land use-change.
- Soil erosion has direct impacts on climate and society, as it decreases the productivity of ecosystems and changes nutrient cycles.

- **Max Planck Institute, a Germany-based non-profit**, used radiocarbon dating techniques recorded temporal changes of soil erosion by analysing sediment deposits in more than 600 lakes worldwide. To understand the cause they analysed pollen fossil records and observed a decline in the tree cover.
- Changes in land cover were identified as the main driver of soil erosion in 70 per cent of all studied watersheds. This suggests that human practices intensified soil erosion much before the advent of industrialisation.
- Socio-economic developments during human settlements also correlated with sediment accumulation in lakes, a proxy for soil erosion.

Wetlands in Kashmir shrinking due to urbanisation

- An analysis of land cover data shows that the catchment of **Narkara wetland** in near Srinagar is now predominantly an urban setting.
- Wetlands are an integral part of the fragile ecosystem in north-western Himalaya. Jammu and Kashmir has several wetlands but those located close to urban areas are showing signs of deterioration due to land use change.
- This reduction is attributed to barren lands and agriculture being taken over by built-up area.
- The reckless urbanisation both within Narkara and its catchment not only affects the hydrology and ecology of this important semi-urban wetland but also increases vulnerability of people to flooding in this part of Himalaya because wetlands act as natural sponges and flood protection system.
- The gradual squeezing of wetlands is affecting their buffering capacity to withhold flood waters and storm water runoff.
- The catchment of Narkara is predominantly a semi-urban setting with settlements, agricultural fields and table lands locally called **karewas**, which are barren denuded landscapes. The wetland is a breeding ground for water fowl species that migrate from Russia and Central Asia during winters.





1. E-WASTE CLINIC IN MADHYA PRADESH

Context

The Bhopal Municipal Corporation (BMC) and the Central Pollution Control Board (CPCB) have signed a MOU to set up the country's first e-waste clinic in Bhopal.

About

- Electronic waste will be collected door-to-door or could be deposited directly at the clinic in exchange for a fee.
- Door-to-door collection will happen in two ways. Either separate carts for the collection of e-waste will be designed, or separate bins will be attached to existing ones meant for solid and wet waste.
- The CPCB will provide technical support at the unit and the collected hazardous waste will then be sent to Bengaluru for recycling.
- The clinic is being conceived in compliance with the Solid Waste Management Rules, 2016.
- It would be a 3-month pilot project, which, if successful, will be replicated everywhere in India.

E- waste:

- Electronic waste** or **e-waste** describes discarded electrical or electronic devices. It is a term for electronic products that have become unwanted, obsolete, and have reached the end of their useful life.
- Electronic waste products have exhausted their utility value through redundancy, replacement, or breakage and include both "white goods" such as refrigerators, washing machines, and microwaves and "brown goods" such as televisions, radios, computers, and cell phones.

E-Waste (Management) Rules, 2016:

- The rules extend to Producer, consumer, collection centre, dismantler and recycler manufacturer, dealer, refurbisher and Producer Responsibility Organization (PRO). However, micro and small industries are exempted.
- The applicability of the rules extends to components, consumables, spares and parts of EEE. Further, Compact Fluorescent Lamp (CFL) and other mercury containing lamp brought are under the purview of rules.
- Collection mechanism based approach has been adopted to include collection centre, collection point, take back system etc for collection of e - waste by Producers under Extended Producer Responsibility (EPR).

Impact on Human health-

- The complex composition and improper handling of e-waste adversely affect human health. Researchers have linked e-waste to adverse effects on human health, such as inflammation and oxidative stress – precursors to cardiovascular disease, DNA damage and possibly cancer.

- Due to the crude recycling process, many pollutants, such as persistent organic pollutants and heavy metals, are released from e-waste, which can easily accumulate in the human body through the inhalation of contaminated air.
- The primitive methods used by unregulated backyard operators (e.g., the informal sector) to reclaim, reprocess, and recycle e-waste materials expose the workers to a number of toxic substances.

2. NEW IPCC REPORT WARNS OF DIRE THREAT TO OCEAN

Context

The Intergovernmental Panel on Climate Change (IPCC) in its special report underlined the dire changes taking place in oceans, glaciers and ice-deposits on land and sea.

About

- The Intergovernmental Panel on Climate Change (IPCC), the apex referee for scientific evidence on the impact of global warming, in its 'Special Report on the Ocean and Cryosphere in a Changing Climate' found that over the 21st century, the ocean is projected to transition to unprecedented conditions with increased temperatures, further ocean acidification, marine heat waves and more frequent extreme El Niño and La Niña events.
- The report was prepared following an IPCC Panel decision in 2016 to determine the impact on the world's oceans and ice-covered regions.
- Rising seas are already threatening low-lying coastal areas that today are home to 680 million people, about 10 percent of the world's population.
- The Southern Ocean accounted for 35%–43% of the total heat gain in the upper 2,000 m global ocean between 1970 and 2017, and its share increased to 45%–62% between 2005 and 2017.
- Since the IPCC's Fifth Assessment Report came out in 2013, scientists have learned a great deal about the impacts of absorbing atmospheric carbon dioxide on the oceans and their denizens, as well as in coastal areas. Unfortunately, the ocean has largely been left out of the discussion on climate.

Evidences of Impacts of Global warming on Oceans

- Since 1993, the rate of warming in the oceans has more than doubled. **Melting of the two great ice sheets blanketing Greenland and West Antarctica is speeding up as well, accelerating sea level rise.** And West Antarctica's glaciers may already be so unstable that they are past the point of no return.
- **Warming ocean waters are yielding fewer fish** and are fueling more intense, rainier tropical storms.
- **Ocean heat waves are increasing, threatening corals and other sea life.**
- **Arctic sea ice continues to dwindle**

Concerns for India

- Global Warming is a concern for all the nations in the world including India.
- A major impact is in the Hindu Kush Himalayan Regions. Floods will become more frequent and severe in the mountainous and downstream areas of the Indus, Ganges and Brahmaputra river basins, because of an increase in extreme precipitation events... the severity of flood events is expected to more than double towards the end of the century.

How to mitigate impacts of global warming on oceans?

- The ocean isn't just part of the problem; it should be a key part of the solution.
- The 1.5°C report was a key input used in negotiations at Katowice, Poland in 2018 for countries to commit themselves to capping global temperature rise to 1.5°C by the end of the century.

- Researchers find five ways to harness ocean resources to reduce or mitigate global greenhouse gas emissions
- Build offshore wind farms and other ocean-based renewable energy to shift away from dependence on fossil fuels;
- Eliminate carbon emissions from the shipping industry;
- Restore coastal ecosystems such as mangroves and salt marshes, which not only store carbon but also provide myriad benefits, including serving as buffers against tropical storms, filtering pollutants and providing habitat for fish and other wildlife;
- Harvest more ocean-based protein sources, which have a much lower carbon footprint than any land-based animal protein;
- Store carbon in the seafloor, which theoretically has high potential for mitigating greenhouse gas emissions, but also a lot of uncertainty in terms of its environmental impact.

Conclusion

- None of these potential solutions are new concepts, but there has been little political will to invest in the necessary research and development to move them forward.
- These actions may finally get some traction in December, when nations head to Santiago, Chile, for COP25, the annual meeting to review progress of the U.N. Framework Convention on Climate Change.
- At the COP21 meeting in Paris in December 2015, 195 nations signed on to the 2015 Paris climate agreement, pledging to reduce global greenhouse gas emissions enough to keep global warming to “well below” 2 degrees C above preindustrial times. The United States was one of the signing nations, but President Donald Trump has said he plans to withdraw the country from the accord in 2020.

3. EMISSIONS GAP REPORT 2019

The road to your dreams...

Context

- The 2019 UN Environment Programme (UNEP) Emissions Gap Report paints a “bleak” picture of accelerated global greenhouse gas (GHG) emissions and a growing gap between “what we need to do and what we are actually doing to tackle climate change.”

About

- This is the tenth edition of the United Nations Environment Programme (UNEP) Emissions Gap Report.
- It provides the latest assessment of scientific studies on current and estimated future greenhouse gas (GHG) emissions and compares these with the emission levels permissible for the world to progress on a least-cost pathway to achieve the goals of the Paris Agreement.
- This difference between “where we are likely to be and where we need to be” has become known as the ‘emissions gap’.

What is the “Emissions Gap”?

- The Emissions Gap could also be called the “Commitment Gap”.
- It measures the gap between what we need to do and what we are actually doing to tackle climate change.
- The gap is the difference between the low levels of emissions that the world needs to drop to, compared with the projected level of emissions based on countries’ current commitments to decarbonisation.

Why does the Emissions Gap Matter?

- The gap is important because if we can’t close it and meet the emissions reduction target, we will face increasingly severe climate impacts worldwide.

- It is important that policymakers, and their citizens, know what the gap is so that the commitments countries are making are sufficient to close the gap.

What does the Emissions Gap Report measure?

The Emissions Gap Report measures and projects three key trend lines:

- The amount of greenhouse gas emissions every year up to 2030
- The commitments countries are making to reduce their emissions and the impact these commitments are likely to have on overall emission reduction
- The pace at which emissions must be reduced to reach an emission low that would limit temperature increase to 1.5°C, affordably.

The key “headline” messages and conclusions of the report

- GHG emissions continue to rise, despite scientific warnings and political commitments;
- To close the emissions gap by 2030, annual emissions need to be 15 GtCO₂e lower than current unconditional NDCs imply for the 2°C goal, and 32 GtCO₂e lower for the 1.5°C goal;
- Enhanced action by G20 members will be essential for the global mitigation effort. Collectively, G20 members – who account for 78% of global GHG emissions – are on track to meet their limited 2020 Cancun Pledges, but seven countries are currently not on track to meet their 2030 NDC commitments.
- “Dramatic strengthening” of the NDCs is needed in 2020. Countries must increase their NDC ambitions threefold to achieve the “well below 2°C” goal and more than fivefold to achieve the 1.5°C goal.
- Although the number of countries announcing net zero GHG emission targets for 2050 is increasing, only a few countries have so far formally submitted long-term low-emission development strategies to the UNFCCC.
- Decarbonising the global economy will require fundamental structural changes, which should be designed to bring multiple co-benefits for humanity and planetary support systems.
- Renewable and energy efficiency, in combination with electrification of end uses, are key to a successful energy transition and to driving down energy-related CO₂ emissions.
- Demand-side material efficiency offers substantial GHG mitigation opportunities that are complementary to those obtained through an energy system transformation.



1. BASEL BAN AMENDMENT

Context

Croatia became the 97th country to ratify the ban, which was adopted by the parties to the Basel Convention in 1995.

Background:

- Croatia became the 97th country to ratify the ban, which was adopted by the parties to the **Basel Convention in 1995**, to protect human health and the environment against the adverse effects of hazardous wastes. With Croatia's ratification, a necessary $\frac{3}{4}$ of the parties to the Basel Convention have ratified the agreement and has become an international law after Croatia ratified it on September 6, 2019.

Basel Convention:

- The Basel Convention on the **Control of Transboundary Movements of Hazardous Wastes and their Disposal** was adopted on 22 March 1989 by the Conference of Plenipotentiaries in **Basel, Switzerland**, in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad.
- It does not address the movement of radioactive waste.
- To implement and restrict the trade of hazardous waste between more developed countries and less developed countries an organization is formed which is known as **Basel Action Network (BAN)**

The provisions of the Convention center around the following principal aims:

- The reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal.
- The restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management.
- A regulatory system applying to cases where transboundary movements are permissible.

The Basel Convention BAN Amendment:

- The Ban Amendment was originally adopted as a decision of the second meeting of the Conference of the Parties in March 1994.
- The "Ban Amendment" provides for the prohibition by Parties listed in Annex VII (members of OECD, EU, Liechtenstein) of all transboundary movements of hazardous wastes including electronic wastes and obsolete ships which are destined for final disposal operations from OECD to non-OECD States.
- According to amendment, it was agreed that such "Annex VII Parties" prohibit and phase out all transboundary movements of hazardous wastes destined for recovery or recycling operations from OECD to non-OECD States by 31 December 1997.
- At COP-3 in 1995, Parties adopted the same as a further amendment to the Convention known as the "Ban Amendment".

- The Ban Amendment had been stalled for all these years till now due to uncertainty over how to interpret the Convention.

Ratification status of other major countries:

- According to BAN the United States, the world's most wasteful country per-capita, has not ratified the Basel Convention, nor the Ban Amendment
- Other developed countries like Canada, Japan, Australia, and New Zealand, likewise, have e-waste export problems and they too have so far refused to ratify the Ban Amendment.
- South Korea, Russia, India, Brazil, and Mexico are yet to ratify the ban.

2. NATIONAL ANIMAL DISEASE CONTROL PROGRAMME

Context

Prime Minister has launched **National Animal Disease Control Programme** and **National Artificial Insemination Programme**.

About

- **National Animal Disease Control Programme (NADCP)** has been launched for eradicating the **foot and mouth disease and brucellosis** in livestock.
- It aims to **control** the livestock diseases by 2025 and **eradicate** these by 2030.
- It aims at **vaccinating** over 500 million livestock including cattle, buffalo, sheep, goats and pigs against the FMD.
- It also aims at **vaccinating 36 million female bovine calves** annually in its fight against the brucellosis disease.

Funding: It is a 100% centrally funded programme for a period from 2019 to 2024.

Need:

- **Farmer's Income:** Animal Husbandry and other allied activities have a greater role to play in increasing farmers' income.
- **Affects Productivity:** Animal diseases impact livestock production through direct costs and indirect costs. In case of **Brucellosis, the milk output reduces by 30 per cent during** the entire life cycle of animal and also causes infertility among the animals.
- **Trade:** Brucellosis and FMD disease is common among cattle, buffalo, sheep, goats and pigs and it **has a direct negative impact on trade of milk and other livestock products.**
- **Affects Humans:** The infections can also be transmitted to the farm workers and livestock owners.

National Artificial Insemination Programme:

- The Prime Minister also launched the National Artificial Insemination Programme in all the **KrishiVigyanKendras(KVKs)**.
- It is launched across the country for **vaccination and disease management, Artificial Insemination and Productivity.**

Why previous Livestock Extension services failed:

- The trained rural youth were responsible to cater only to 8-15 villages often focused on treatment, mostly on large livestock, rather than preventive practices and awareness building.
- The trained youth who were men most of the time, had a social and psychological barrier in reaching women, who are the caretakers of livestock.
- High travel costs resulted in neglect of close monitoring and administering first aid.

3. PARTICULATE MATTER EMISSIONS TRADING

Context

Gujarat became the **world's first market for particulate matter emissions** in the world, after 155 industrial units of Surat came together for "live trading" under the Emissions Trading Scheme (ETS)

About

- The programme is a **market-based system** where the government sets a cap on emissions and allows industries to buy and sell permits to stay below the cap.
- Under the cap and trade system, **the regulator first defines the total mass of pollution** that can be put into the air over a defined period by all factories put together.
- Then, **a set of permits is created, each of which allows a certain** amount of pollution, and the total is equal to the cap.
- These permits are the quantity that is bought and sold. Each factory is allocated a share of these permits (this could be equal or based on size or some other rule).
- After this, plants can trade permits with each other, just like any other commodity on the National Commodity and Derivatives Exchange Limited (NCDEX).
- Being initiated in Surat by the Gujarat Pollution Control Board (GPCB), the emission trading scheme (ETS) was designed with the help of a team of researchers from the Energy Policy Institute at the University of Chicago (EPIC), the Economic Growth Center at Yale University and others from The Abdul LatifJameel Poverty Action Lab (J-PAL).

Significance

- It is **the first in the world to regulate particulate air pollution**, which is the single greatest threat to human health globally, the state government said.
- It kicks off a new era of cleaner production, while lowering industry compliance costs and rewarding plants that cut pollution in low-cost ways.
- It will prove that rapid economic growth, ease of doing business, and breathing clean air can all be achieved at the same time.
- It has the potential to create lasting changes for the people living in this state, as well as become a benchmark for other states in India and countries across the world.
