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Biodiversity

1 Sukhna Lake becomes a 'living entity'™

Context: The Punjab and Haryana high court has declared Sukhna Lake a “living entity” or “legal person” with rights, duties and liabilities of a living person. It also declared all citizens of Chandigarh as loco parentis (in the place of a parent) to save the lake from extinction.

About:

- Sukhna Lake is situated at the foothill of Shivalik Hills in the city of Chandigarh. The famous Rock Garden of Chandigarh is located on the banks of this lake.
- The Lake was created in 1958, by damming a seasonal stream **Sukhna Choe**, which cascade from the Shivalik Hills.
- Sukhna Reservoir was also designed by **Le Corbusier (Chief Architect of Chandigarh city)** and the **Chief Engineer P L Verma** in the year 1974.
- Several migratory birds like cranes, Siberian ducks, storks etc., can be seen during the season.

The decision:

- Sukhna Lake has been declared a legal entity/legal person/juristic person/ juridicial person/ moral person/artificial person with distinct persona with corresponding rights, duties and liabilities of a living person
- The court observed that Sukhna Lake is required to be declared as a legal entity for its survival, preservation and conservation.
- The Chandigarh administration has been directed to declare it a wetland within a period of three months.
- The HC also ordered that all structures in Sukhna’s catchment area (which was demarcated by the Survey of India in 2004) should be demolished, and affected owners whose building plans have been approved should be relocated in the vicinity of Chandigarh and they should be compensated with ₹25 lakh each.

Similar examples:

- In 2008, **Ecuador** became the first country to enshrine the legal rights of nature in its constitution.
- **Bolivia** passed a similar law in 2011.
- Meanwhile, **New Zealand** in 2017 became the first country to grant the **Whanganui river** legal rights, followed by the Indian state of **Uttarakhand**, when it declared the **Yamuna** and **Ganges** rivers “living entities” (a verdict that was later stayed by the Supreme Court).

- El Salvador recognized its forests as living entities and stated that each person must commit to caring for, preserving, and respecting forests.
- In 2019, the city of Toledo, Ohio, passed what is known as the Lake Erie Bill of Rights to protect its shores, making it one of several U.S. communities to have passed legislation recognizing the rights of nature.
- In July 2019, **Bangladesh** became the first country to grant all of its rivers the same legal status as humans.

What does being “living entity” means?

- Rights are the obligations that society and state have for establishing sustainable relationships.
- With this ruling, Sukhna Lake is no more voiceless water body, but “person” with legal rights.
- As “juristic person”, the lake, have a right to be legally protected from any kind of harm or destruction.
- Polluting it, henceforth, could entitle to human rights violation for which it can take legal recourse.
- From now, the lake can be a party to disputes and rights violation, represented by court-appointed individuals who can file and contest cases on its behalf.
- Over the last few years, various environmentalists, social leaders have called for recognizing rights of nature in the country. Now, it is hoped that such examples and recognitions can inspire many other countries to take similar actions.

2

How India can be an opportunity for cheetah, and why it will take time?

Context: The reintroduction of cheetahs in India can be very useful for the species, and very important for the biodiversity of India’s grassland ecosystems, an expert explains.

About:

- There are 31 cheetah populations spread in 23 countries and we all know that population is declining due to human cause at this point, like human-wildlife conflict, a decline of prey, loss of habitat, illegal wildlife trade etc.
- For example, in Namibia, a small CITES quota exists of cheetahs as legal trophy-hunting, and possibly up to 200 more are removed by farmers as laws there say that you can take the animal if there is the fear of loss of life or property.
- Plus, the illegal trade is coming from the Horn of Africa where cubs would be snatched from the wild; their mother is either killed or not killed.

What role does the Cheetah Conservation Fund (CCF) play in Namibia?

- They, like any other predators, would prefer prey rather than livestock.
- It is important to maintain that balance to have enough prey for the predators. Getting rid of predators can cause more problems, as it opens up territories and other dispersal animals come into the open territory.
- For instance, research has shown that removing jackals increases the jackal population due to their reproductive behaviour.
- The more you kill jackals, the higher is the jackal population.
- In Namibia, there are still issues, but the government is aware that cheetahs are the one species

that is being affected by human-wildlife conflict and everybody is making plans.

- There are an estimated 1,500 adult and adolescent cheetahs.

If India goes ahead with its plan to reintroduce the cheetah, what will be the factors at play?

- If India is willing to give it a try, it can be very useful for the species, and very important for the biodiversity of India's grassland ecosystems and helping cascade facts as to what a top predator can do in helping other species which are in that ecosystem, like the Indian bustard and the caracal, both needing help for their survival.
- India is indeed a different continent from Africa, but then cheetahs are very adaptable.
- Just what we know from international captive facilities and breeding programmes, cheetahs are adaptable.
- But today cheetahs need places to live in the wild. India is providing an opportunity of a new landscape, a landscape which can also assist other species within.
- It is going to assist the biodiversity here in the country as well.
- Cheetahs are not aggressive animals.
- If communities manage their livestock well, and there is a wildlife prey base, there are arid landscapes here in India that are perfect for cheetah.
- At the same time, cheetahs are also found in a variety of landscape throughout its range there in Africa, from thorn-bush Savannah to arid Savannah.

How can India address such issues?

- Put them in a proper habitat and then create awareness, supporting research projects, and realise that it is going to take several years to re-establish populations.
- Look at the population support that has gone on in the United States for species like the California condor. It was nearly extinct. That programme is ongoing for 40 years and, after 40 years, now we can call it successful.
- Cheetahs are fast too, but its reestablishment is going to be long-term and it's not going to be fast.

Have there been such relocation experiments elsewhere?

- There have been a lot of reintroductions in the southern part of Africa.
- Last year, there was the reintroduction of cheetah up into Malawi where they were extinct.
- Extinction takes time and bringing the species back takes more time and more money.

3 Coral bleaching and Great Barrier Reef

Context: Scientists have warned that the Great Barrier Reef will face a critical period of heat stress over the coming weeks; following the most widespread coral bleaching the natural world has ever endured.

About:

- The Great Barrier Reef is the world's largest coral reef system composed of over 2,900 individual reefs and 900 islands stretching for over 2,300 kilometres over an area of approximately 344,400 square kilometres.
- It is home to about 3,000 coral reefs, 600 continental islands, 1,625 type of fish, 133 varieties of shark and rays and 600 types of soft and hard corals.

- The reef is located in the Coral Sea, off the coast of Queensland, Australia.
- The Great Barrier Reef can be seen from outer space and is the world's biggest single structure made by living organisms.
- This reef structure is composed of and built by billions of tiny organisms, known as coral polyps.
- It supports a wide diversity of life and was selected as a World Heritage Site in 1981.
- Carbon pollution is causing unprecedented damage to our Great Barrier Reef. Warming ocean temperatures, a sign of climate change, is associated with the deteriorating health of the Reef.

What is coral bleaching?

- The stunning colours in corals come from marine algae called **zooxanthellae**, which live inside their tissues.
- This algae provide the corals with an easy food supply thanks to photosynthesis, which gives the corals energy, allowing them to grow and reproduce.
- When corals get stressed, from things such as heat or pollution, they react by expelling this algae, leaving a ghostly, transparent skeleton behind. This is known as 'coral bleaching'.
- Some corals can feed themselves, but without the zooxanthellae most corals starve.
- Warmer water temperatures can result in coral bleaching. When water is too warm, corals will expel the algae (zooxanthellae) living in their tissues causing the coral to turn completely white.
- Not all bleaching events are due to warm water.

Can coral recover from bleaching?

- In some instances, corals can recover from bleaching.
- If conditions return to normal and stay that way corals can regain their algae, return to their bright colours and survive.
- However prolonged warmer temperatures and other stressors, like poor water quality, can leave the living coral in a weakened state.
- It can struggle to regrow, reproduce and resist disease – so is very vulnerable to coral diseases and mortality.
- It can take decades for coral reefs to fully recover from a bleaching event, so these events mustn't occur frequently.
- If we continue burning fossil fuels at our current rate then severe bleaching events are likely to hit reefs annually by the middle of the century.
- This would be devastating for coral reefs as they would have no chance to recover.

4

Gaur back in Valmiki Reserve after an increase in grassland cover

Context: Gaur (*Bos Gaurus*), the largest extant bovine in the world, has not only returned to Bihar's Valmiki Tiger Reserve (VTR) but is also breeding there due to an increase in grassland cover.

About Gaur (Indian Bison):

- The Gaur (*Bos Gaurus*) also called the Indian bison is the largest extant bovine.
- It is native to South Asia and Southeast Asia. Gaurs are grassland specialists and their main food is grass.

- The Gaur is a social animal. They generally live in group size of about 30 to 40.
- The Indian Bison is very much prevalent in the Western Ghats. They prefer evergreen forests and moist deciduous forests.
- The species is listed as 'vulnerable' on the International Union for Conservation of Nature's Red List of Threatened Species since 1986.
- They are not found in the Himalayas with an altitude greater than 6,000 ft. They generally stick to the foothills only.
- **Threat:** Many possible threats have led to a decline in the population of the Indian Bison.
 - ▶ **Food Scarcity:** The destruction in the grasslands has led to a decline in the availability of food for these animals. Due to the planting of commercially important trees, the lush grassland has diminished which is the prime source of fodder for these wild cattle.
 - ▶ **Poaching:** The illegal hunting of the Indian bison is done for their commercial value as well as due to the high demand of gaur meat in the illegal market of Nepal – India border.
- The Indian Bison is deemed as vulnerable according to the IUCN list.
- Hence, the Indian Government has already included the protection of wild bison in the Schedule I of the Wild Life Protection Act, 1972.
- It is the State animal of Goa.
- The local names of the Gaur are:
 - ▶ Seladang — Malaysia
 - ▶ Pyoung — Myanmar
 - ▶ Gayal or Mithun — a domesticated form of gaur.

About Valmiki Tiger Reserve:

- Valmiki Tiger Reserve forms the easternmost limits of the Himalayan Terai forests in India and is the only tiger reserve of Bihar.
- Situated in the Gangetic Plains bio-geographic zone of the country, the forest has a combination of bhabar and terai tracts.
- Valmiki Tiger Reserve lies in the north-westernmost West Champaran district of Bihar.
- Name of the district has been derived from two words Champa and Aranya meaning Forest of Champa trees.
- Wild mammals found in the forests of Valmiki Tiger Reserve are Tiger, Sloth bear, Leopard, Wild dog, Bison, Wild boar etc. Several species of deer and antelopes viz barking deer, spotted deer, hog deer, sambar and blue bull are also found here.
- In Madanpur forest block a large number of Indian flying foxes can be sighted.
- The Reserve has rich avifauna diversity. Over 250 species of birds have been reported.

5 'Fall Armyworm'

Context: A pest attack, albeit confined to a district, has added to the COVID-19-related woes of Assam's farmers.

About:

- The fall armyworm (*Spodoptera frugiperda*) is a Lepidopteran pest that feeds in large numbers on leaves and stems of more than 80 plant species, causing major damage to maize, rice, sorghum, sugarcane but also other vegetable crops and cotton.

- The caterpillar stage of a moth, the Fall Armyworm is not a picky eater though. Besides corn, it likes to feed on the leaves and stems of more than 350 plant species, including rice, sorghum, sugarcane and wheat.
- An adult female moth can lay up to a thousand eggs in her lifetime. They are also terrific fliers and can travel up to 100 km in a single night.
- Fall armyworm is native to tropical and subtropical regions of the Americas.

Why north-eastern states are prone to such attacks?

- In India, FAW found suitable environmental conditions and appropriate host plants.
- But taking into account environmental conditions and availability of host species the Eastern side of India is more vulnerable to the pest in the near future.
- The north-eastern states with their “high humidity and moderately high temperatures” are suitable for the spread of FAW.

Pest attacks in India:

- In India, pest attacks are on rise, yet no significant step has been taken by the central government or state government.
- The threats farmers face from pest attacks are often localised but underlines the multitude of risks apart from those related to monsoon failure or a crash in crop prices.
- Major pest attacks in India:

Major Pest Attacks in India	
States	Pest
Haryana	Grasshopper, Heliothis spp., Diamond back moth
Jammu & Kashmir	Sanjose-scale, Blast, Late blight
Tamil Nadu	Red hairy caterpillar
Jharkhand	Neck blast
Uttar Pradesh	Diamond back moth, Top borer
Andaman & Nicobar	Fruit & Shoot borer
Kerala	Stem borer, Rhinoceros beetle
Assam	Spodoptera mauritia, Spodoptera litura.

6 ‘Protection of indigenous Amazonians’

Context: Over 200 organisations sign statement on protection of indigenous Amazonians. They demanded a ban on all industrial activity and proselytisation in indigenous territory in addition to proper health services and law enforcement.

About:

- The Amazon basin is the largest tropical rainforest in the world, covering a size approximately equal to the lower 48 United States.

- 6-8 million square kilometers of forest house approximately 10% of the world's biodiversity and 15% of its freshwater.
- These **"lungs of the world"** provide ecological services for the planet, but also a source of livelihood for hundred of indigenous groups and forest dependent peoples.
- **Amazon tribes:** It is also the ancestral home of 1 million Indians. They are divided into about 400 tribes, each with its own language, culture and territory.
- **Countries:** The Amazon is a vast region that spans across eight rapidly developing countries: Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname and French Guiana, an overseas territory of France. Brazil is home to approximately 65% of the Amazon basin.
- The forests of the Amazon basin have been used for food and resources for thousands of years by native peoples; products such as rubber, palm fruits, and Brazil nuts, as well as countless medicines have been derived from the forest.

What's the demand?

- Governments and other entities should enact urgent policies to ensure that the novel coronavirus (SARS-COV-2) does not result in massive deaths within indigenous communities, especially in the Amazon, over 200 international organisations demanded on April 21, 2020.
- These demands include:
 - ▶ A moratorium on all industrial activities on or surrounding indigenous lands including mining, oil drilling, logging, and agribusiness operations
 - ▶ The barring of all religious proselytisation
 - ▶ The affirmation of the right of indigenous peoples to self-determination and self-protection during the pandemic
 - ▶ Adequate and culturally-appropriate public health services
 - ▶ Rigorous law enforcement on organised crime threats in and around indigenous territories
 - ▶ The creation of urgent action working groups to deal with the health, food, and security emergencies that have arisen during this pandemic

7 ECO-SENSITIVE ZONES

Context: The Ministry of Environment, Forest and Climate Change (MoEF&CC) declared the National Chambal Sanctuary in Madhya Pradesh as eco-sensitive zone (ESZ).

About:

- The MoEF&CC notified an area to an extent of zero to two kilometres around the boundary of National Chambal Sanctuary as the National Chambal Sanctuary ESZ.
- The MoEF&CC has also directed the Madhya Pradesh government to prepare a Zonal Master Plan, which shall provide for restoration of denuded areas, conservation of existing water bodies, management of catchment areas, watershed management, groundwater management, soil and moisture conservation, needs of local community and such other aspects of the ecology and environment that need attention.

Eco Sensitive Zones (ESZ)/ Eco-Sensitive Area (ESA)

- National Wildlife Action Plan (NWAP) (2002-2016) advocated the region around the Protected Areas (PAs) to be very vital in preventing the isolation of patches. Such zones would also form the important 'ecological corridors' and should be regulated to let the biodiversity survive in the long run.
- The NWAP indicates that all identified areas around PAs and wildlife corridors to be declared as ecologically fragile under the Environment (Protection) Act, 1986.

- ESZs are declared around PAs through Notification under the provisions of Environment (Protection) Act, 1986 and Rules made thereunder.
- MoEF&CC has issued “Guidelines for Declaration of ESZ around National Parks and Wildlife Sanctuaries” in 2011 with consultations among the states/UTs. It prescribes general procedures to be followed while considering declaration of an ESZ.
- Nature of Activities in ESZ: 2011 Guidelines specify activities that are to be prohibited, regulated and permissible in the ESZ –
- Prohibited-** commercial mining, polluting industries, major hydroelectric projects etc.

8 'Snow Leopard'

Context: In the latest sighting of rare species, a pair of snow leopards has been sighted in Nanda Devi National Park in Uttarakhand.

About:

- Snow leopards (*Panthera uncia*) are considered medium-sized cats, standing about 24 inches at the shoulder and weighing around 30-55kg.
- Status: The snow leopard is listed as Vulnerable on the IUCN-World Conservation Union’s Red List of the Threatened Species.
 - In addition, the snow leopard, like all big cats, is listed on Appendix I of the Convention on International Trade of Endangered Species (CITES), which makes trading of animal body parts (i.e., fur, bones and meat) illegal in signatory countries.
 - It is also protected by several national laws in its range countries.
- Habitat:** Snow leopards can be found throughout high mountain ranges, including the Himalayas and the southern Siberian mountains in Russia. They can also be found in the Tibetan Plateau and across a range that stretches from China to the mountains of Central Asia.
 - In India, their geographical range encompasses a large part of the western Himalayas including the states of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Sikkim and Arunachal Pradesh in the eastern Himalayas.

Taxonomy	
Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Carnivora
Family	Felidae
Genus	Pantera

Threats to Leopard:

- Poaching:** Poaching is the biggest threat for snow leopards that happens in the dark. Between 2008 and 2016 alone, one snow leopard has reportedly been killed and traded every day - 220 to 450 cats per year. The true extent of the problem is thought to be even bigger.
- Mining:** The snow leopard also faces threats from mining and other developmental activities that could destroy the mountain ecosystem it relies on.
- Threat to food:** Leopard’s main prey species (wild sheep and goat) are also threatened by unsustainable or illegal hunting. If their populations decline, so do the snow leopard’s.
- Climate change:** Temperatures are on the rise across the world and the changes impact the entire ecosystem: vegetation, water supplies, animals – and they threaten to make up to a third of the snow leopard’s habitat unusable.

Conservation of snow leopards in India:

- The Government of India has identified the snow leopard as a flagship species for the high altitude Himalayas.

- It has developed a centrally-supported programme called Project Snow Leopard for the conservation of the species and its habitats.
- Currently, India has 516 snow leopards, out of which 86 are in Uttarakhand. The rest are living in regions of Himachal Pradesh, Jammu and Kashmir, Sikkim, and Arunachal Pradesh.
- These instances clearly show nature is rejuvenating during the nationwide lockdown in the wake of the ongoing pandemic.

9 'Trimeresurus Salazar'

Context: Recently, a team of researchers has discovered a new species of venomous snake in Arunachal Pradesh and named it Trimeresurus Salazar.

About

- The venomous snake was discovered in the thick evergreen forests of the Pakke Tiger Reserve in Arunachal Pradesh during a field expedition by researchers in July 2019.
- The new species is named after J.K. Rowling's fictional Hogwarts School of Witchcraft and Wizardry's co-founder, Salazar Slytherin.
- The new species belongs to the group of green pit vipers from which it differs from its closely related species in bearing a rusty red or orange lateral stripe along the head and the entire body.
- The Salazar pit viper belongs to a genus of "charismatic venomous serpents with morphologically as well as ecologically diverse species."
- The comparison of DNA sequences and skull morphology of closely related species highlights the distinctness of the new species.
- This pit viper has orange to reddish stripe near its lips. It has more teeth compared to the other venomous snakes.
- This new pit viper happens to be the fifth variety of reptile to have been discovered in Arunachal Pradesh in a little more than a year.

What are Pit Vipers?

- Pit vipers are some of the most beautiful, and most dangerous, snakes in the world. They exist on several different continents, and within a wide variety of habitats.
- All of the snakes in this group are members of the Viperidae family of snakes -- vipers for short. But not all of the Viperidae are pit vipers.
- They are masters of the hunt, armed with some amazing "tools" for finding and killing their prey.
- Pit vipers are widespread throughout the world. These venomous snakes can be found across parts of Europe, Asia, and both North and South America.
- They have adapted to survive in a wide variety of habitats, ranging from deserts to jungle.
- About 15 pit viper snakes are found in India, seven of which have been found in northeast before.

Pakke Tiger Reserve:

- Pakke Tiger Reserve lies in the foothills of the Eastern Himalaya in the East Kameng district of Arunachal Pradesh.
- It is considered one of the best protected national parks in the country. Pakke is also known for its amazing sightings of four resident hornbill species.

- While the new discovery is indeed exciting for herpetology experts, it also raises concern on the loss of habitat in the region.
- It is where a highway between Sejosa and Bhalokpong is threatened to cut through Pakke Tiger Reserve, where a lot of reptiles thrive.

10

'Puntius sanctus'

Context: Velankanni in Tamil Nadu has thrown up a new species of small freshwater fish of the family Cyprinidae.

About:

- The silver-hued fish has been christened **Puntius sanctus** — 'sanctus' is Latin for holy after the popular pilgrim town.
- Encountered in a small waterbody in Venlankanni, Puntius sanctus is small, it grows to a length of 7 cm.
- It found use both as food and as an aquarium draw.
- The Puntius species are known locally as 'Paral' in Kerala and 'Kende' in Tamil Nadu. They are purely freshwater fishes.
- While the genus shows great species richness in Kerala and Tamil Nadu, the specimen from Velankanni bears "distinct differences" from its Puntius cousins.
- Its physical characteristics included a protractible mouth, a pair of maxillary barbels (a sensory organ near the snout), 24-25 lateral line scales and 10 pre-dorsal scales.
- The identification of Puntius sanctus also indicated that many of our inland waterbodies were still unexplored.
- Bioscience Research has published an article on the discovery.

Cyprinidae family:

- Cyprinidae family, also commonly called the carp family or the minnow family, is a large family of freshwater fish containing many of the carp-like fishes and minnow types.
- They can be found throughout Asia, most of Africa, Europe, and North America.
- The only place they are not to be found is South America and Australia.
- They come in all sizes from giant game fish to numerous small species less than 2 inches (5 cm).
- Examples Included in the Cyprinidae family are well-known aquarium favorites such as barbs, danios, rasboras, and various freshwater sharks.

ZooBank:

- ZooBank is the official registry of Zoological Nomenclature, according to the International Commission on Zoological Nomenclature (ICZN).
- Currently, ZooBank accommodates the registration of four different kinds of data objects:
 - ▶ **Nomenclatural Acts:** Published usages of scientific names for animals, which represent nomenclatural acts as governed by the ICZN Code of Nomenclature. Most of these acts are 'original descriptions' of new scientific names for animals, but other acts may include emendations, lectotypifications, and other acts as governed by the ICZN Code.

- ▶ **Publications:** Publications that contain Nomenclatural Acts, as defined above.
- ▶ **Authors:** Anyone who is an author of one or more Publications (as defined above), or who is a contributor to ZooBank content.
- ▶ **Type Specimens:** Type specimens for scientific names of animals. The registration of Type Specimens is considered provisional and is not yet fully implemented in ZooBank.

11 INDIA'S FIRST DOLPHIN OBSERVATORY

Context: The Bihar government is setting up India's first observatory for the Gangetic dolphins in Bhagalpur district.

About:

- Observatory is constructed at Vikramshila Gangetic Dolphin Sanctuary (VGDS).
- Observatory will aim to promote eco-tourism.
- There would be no adverse impact on the river's ecology as the observatory is being constructed on a Sultanganj-Aguwani Ghat bridge over the Ganga.

About Gangaetic dolphin

- IUCN Status: Endangered -They prefer deep waters, in and around the confluence of rivers. They can only live in freshwater and are essentially blind.
- They are reliable indicator of the health of the entire river ecosystem. ◦ It is also National Aquatic Animal of India.
- It can be found in the Ganges Brahmaputra-Meghna and Karna phuliSangu river systems of Nepal, India, and Bangladesh.

12 Asiatic Lions' population raised by 29% over five years'

Context: June 5 census of Asia's exclusive population indicates population of Asiatic Lions have risen by 29% over five years.

About:

- Asiatic lions (*Panthera leo persica*) were once distributed upto the state of West Bengal in east and Rewa in Madhya Pradesh, in central India. At present Gir National Park and Wildlife Sanctuary is the only abode of the Asiatic lion.
- Also known as the "Indian lion" and the "Persian lion", it is one of five pantherine cats. Others are:
 - ▶ Bengal tiger
 - ▶ Indian leopard
 - ▶ Snow leopard
 - ▶ Clouded leopard
- **Conservation status: They are listed in-**
 - ▶ Schedule I of Wildlife (Protection) Act 1972

- ▶ Appendix I of CITES
- ▶ Endangered on IUCN Red List
- **Threat:** Factors which are threats to the lion conservation are encroachment, forest fire, natural calamities, grazing, collection of fuelwood, Non-timber forest produce (NTFP), poaching, tourism, religious pilgrimage and accidental lion deaths due to human causes

The increase

- The number of Asiatic lions have risen to an estimated 674 in the **Gir forest region** and other revenue areas of coastal Saurashtra.
 - ▶ There are 161 male, 260 female, 45 sub adult male, 49 sub adult female, 22 unidentified and 137 cubs.
 - ▶ The male-female ratio was healthy in the Gir region with 161 males vs 260 females.

The Census

- The Lion Census is conducted once every five years.
- This year, the Census was due on June 5-6 this year, but was postponed after the lockdown was announced on March 24.
- The first Lion Census was conducted by the Nawab of Junagadh in 1936; since 1965, the Forest Department has been regularly conducting the Lion Census every five years.

- The 2015 Census had counted 523 lions, up from 411 in 2010. But 12 lions were killed in a flash flood in Amreli just a month after the 2015 census, followed by deaths of more than two dozen lions in an outbreak of **canine distemper virus (CDV)** and **babesiosis** in 2018.
- A babesiosis outbreak was reported in Gir (east) this summer too, and around two dozen lions are reported killed.
- Once seen as threatened by extinction, the lion population has grown by almost 29% from the last count in 2015.
- Today, Asiatic lions are present in Protected Areas and agro-pastoral landscapes of Saurashtra covering nine districts, over an expanse of about 30,000 sq. km.

What led to this growth?

- This rise in population is powered by-
 - ▶ Community participation
 - ▶ emphasis on technology
 - ▶ wildlife healthcare
 - ▶ proper habitat management
 - ▶ steps to minimise human-lion conflict

13 'Conserving the Mangroves'

Context: To conserve mangroves, GMR Energy has been directed to stop dredging in mudflats off Kakinada coast in Andhra Pradesh to protect the mangroves.

Highlights:

- The company was directed by the State Forest Department to remove a bund close to the mudflat adjacent to the company's 220 MW barge-mounted power plant., comes in the backdrop of some environmentalists and former top bureaucrats flagging off environment concerns.

- The directive to remove the bund is aimed at protecting the mangrooves and the flora and fauna in the region.
- Not only is the mudflat under threat, there is potential for mangrove cover being affected and possibly lead to destruction of the prime habitat of birds, especially-
 - ▶ endangered Great knots (*Calidris tenuirostris*)
 - ▶ Indian skimmers (*Rynchops albiocollis*), which are listed as a vulnerable species.

Mudflats

- Mudflats refer to land near a water body that is regularly flooded by tides and is usually barren (without any vegetation).
- Also known as tidal flats, mudflats are formed upon the deposition of mud by tides or rivers.
- This coastal landform usually occurs in sheltered areas of the coast like bays, coves, lagoons, estuaries, etc. Since most of the sedimented area of a mudflat is within the intertidal zone, the mudflat experiences submersion under water and exposure twice daily.
- Mudflats protect the inland landforms from erosion. They act as a barrier to waves from eroding land in the interior.

What is dredging?

- Dredging is the removal of sediments and debris from the bottom of lakes, rivers, harbors, and other water bodies.
- It is a routine necessity in waterways around the world because **sedimentation**—the natural process of sand and silt washing downstream—gradually fills channels and harbors.
- It is also performed to reduce the exposure of fish, wildlife, and people to contaminants and to prevent the spread of contaminants to other areas of the water body.
- Removing large parts of the seabed and dumping it elsewhere can have a major impact on the ecosystem, particularly sensitive areas such as coral reefs and fish nurseries.
- Dredging impacts marine organisms negatively through entrainment, habitat degradation, noise, remobilization of contaminants, sedimentation, and increases in suspended sediment concentrations.

The threatened species

The Great Knot (*Calidris tenuirostris*)

- The Great Knot is a medium-sized shorebird with a straight, slender bill of medium length and a heavily streaked head and neck.
- It is an international migratory wading bird that travels vast distances between the northern hemisphere breeding grounds and southern hemisphere summer feeding grounds around the coastal fringe of Australia (including Victoria) where it frequents coastal wetlands and sand flats.
- **Family:** The great knot (*Calidris tenuirostris*) belongs to the family of sandpipers and knots, the Scolopacidae.
- **IUCN Red List Category:** Endangered

Indian skimmers (*Rynchops albiocollis*)

- The Indian skimmer grows to a length of 40-43 cm. It has black upper parts, white forehead, collar and lower parts, long, thick, deep orange bill with a yellow tip and longer lower mandible. In flight, it has a white trailing-edge to wing and a short forked tail with blackish central feathers.

- More widespread in winter, the Indian skimmer is found in the coastal estuaries of western and eastern India.
- It occurs primarily on larger, sandy, lowland rivers, around lakes and adjacent marshes and, in the non-breeding season, in estuaries and coasts.
- **Family:** The Indian skimmer is one of the three species that belong to the skimmer genus *Rynchops* in the family *Laridae*.
- **IUCN Red List Category:** Vulnerable

14

‘China removes Pangolin scales from the list of ‘approved ingredients’

Context: China has officially removed pangolin scales from the list of ‘approved ingredients’ from traditional medicine, a move aimed at protecting the most trafficked species in the world.

About:

- Pangolins are a group of Asian and African mammals that are covered in hard scales, curl up into a ball to defend themselves, and are sadly the most heavily trafficked animal in the world.
- They have got small heads but long snouts and even longer tongues for slurping up ants from inside ant nests, leading some people to call them scaly anteaters.
- **Species:** There are eight pangolin species, four Asian and four African-
 - ▶ Chinese pangolin, *Manis pentadactyla*
 - ▶ Indian pangolin (also known as thick-tailed pangolin), *M. crassicaudata*
 - ▶ Sunda pangolin (all known as Malayan pangolin), *M.*
 - ▶ Philippine pangolin, *M. culionensis*
 - ▶ Tree pangolin (also known as white-bellied pangolin), *Phataginus tricuspis*
 - ▶ Long-tailed pangolin (also known as black-bellied pangolin), *P. tetradactyla*
 - ▶ Giant pangolin (also known as giant ground pangolin), *Smutsia gigantea*
 - ▶ Cape pangolin (also known as ground pangolin, Temminck’s ground pangolin, South African pangolin or steppe pangolin), *S. temminckii*
- **Status:** All eight species are threatened with extinction, and are listed on the IUCN Red List as either Vulnerable, Endangered or Critically Endangered.

Species	Status
Chinese pangolin	Critically Endangered
Indian pangolin	Endangered
Sunda pangolin	Critically Endangered
Philippine pangolin	Critically Endangered
Tree pangolin	Endangered
Long-tailed pangolin	Vulnerable
Giant pangolin	Endangered
Cape pangolin	Vulnerable

15 'Largest mass calving recorded by Saiga'

Context: The smallest and most threatened population of saiga in Kazakhstan has experienced its largest mass calving in recent years.

About:

- The Saiga antelope (*Saiga tatarica* and *S. borealis mongolica*) is a large migratory herbivore of Central Asia found in Kazakhstan, Mongolia, the Russian Federation, Turkmenistan, and Uzbekistan. It is mostly found in Kazakhstan.
- There are currently five subpopulations of saiga.
- The largest population inhabits central Kazakhstan (Betpak Dala) the second largest group is found in the Urals in Kazakhstan and Russian Federation others belong to Kalmykia in the Russian Federation and the Ustyurt Plateau region in southern Kazakhstan and north-western Uzbekistan.
- Saiga is the critically endangered antelope of Asia's steppes.
- The saiga generally inhabits open dry steppe grasslands and semi-arid deserts.
- It often changes the location of their calving, sometimes traveling hundreds of kilometers every year.
- These unusual antelopes have a distinctive large, bulbous nose and live in what used to be vast nomadic herds, but sadly their numbers are plummeting

Conservation status:

- The IUCN Red Book assesses the saiga as critically endangered and CITES includes this species in its Appendix II.
- The species is listed under the CMS Appendix II.

The increased population

- 530 calves have been born to the Ustyurt Plateau population of saiga. They represent the largest number of calves recorded in recent years.
- In 2019, only four calves were found, down from the 57 calves found in 2018.
- The Ustyurt population was as large as 265,000 adult individuals in the late 1980s. However, the break-up of the Soviet Union led to large-scale poaching which caused this population along with others dwindle and decline.

16 'New fungi species discovered in China'

Context: A subterranean expedition by a group of researchers in China has led to the discovery of new novel fungal species on bat carcasses.

About:

In total, seven species were found across two carcasses.

- The four new species are
 - ▶ *Mortierella rhinolophicola*
 - ▶ *M. multispora*
 - ▶ *M. yunnanensis*
 - ▶ *Neocosmospora pallidimors*.

- Neocosmospora pallidimors is particularly important as the Neocosmospora genus is known to contain numerous aggressive pathogens that can infect mammals.
- Three out of the four new species belong to Mortierella, a genus of well-known saprophytic fungi (meaning they obtain nutrients through dissolving organic matter).
- FDusarium incarnatum, Mucor hiemalis and Trichoderma harzanium comprised the final three species.

Why Bats are important for research?

- One bat can host many different viruses without getting sick. They are the natural reservoir for the Marburg virus, and Nipah and Hendra viruses, which have caused human disease and outbreaks across different countries.
- Their tolerance of viruses, which surpasses that of other mammals, is one of their many distinctive qualities.
- They are the only flying mammals, they devour disease-carrying insects by the ton, and they are essential in the pollination of many fruits, like bananas, avocados and mangoes.
- They are also an incredibly diverse group, making up about a quarter of all mammalian species.
- But their ability to coexist with viruses that can spill over to other animals, in particular humans, can have devastating consequences when we eat them, trade them in livestock markets and invade their territory.

Are they responsible for COVID-19?

- The novel coronavirus disease (COVID-19) pandemic has shifted the spotlight on bats.
- Bats carry several viruses and pathogens in their bodies; but it is only when they get transferred to other living beings that the host is affected.
- White-nose syndrome, caused by fungi Pseudogymnoascus destructans, has claimed at least six million bat lives since 2006.
- This fungal growth happens during their hibernation and has been observed in North American bats.
- Bats can asymptotically carry the fungus. Though it has caused many deaths among bats in North America, it has not ravaged other global regions. It can appear in other places also.
- Studies have also estimated that if bats disappear from North America, it would result in a staggering \$3.7-billion loss to agriculture. This is because bats provide critical ecosystem services; they feed on pests and pollinate fruits.

17 India's Tiger Census of 2018 sets a Guinness world record

Context: The fourth cycle of the All India Tiger Estimation 2018 has entered the Guinness World Record for being the world's largest camera trap wildlife survey.

About:

- The citation at the Guinness World Record website says the fourth iteration of the survey - conducted in 2018-19 - was the most comprehensive to date, in terms of both resource and data amassed.
- The All India Tiger Estimation done quadrennially is steered by the National Tiger Conservation Authority with technical backstopping from the Wildlife Institute of India and implemented by State Forest Departments and partners.
- India is home to nearly 75 percent of the global tiger population and has already fulfilled its resolve of doubling tiger numbers; made at St. Petersburg in 2010, well ahead of the target year of 2022.

All India Tiger Estimation 2018

- The tiger numbers stood at **2,967 at last count in 2018, a 33 percent jump** from 2,226 in 2014.
- **Top 5 Performing States:** Madhya Pradesh saw the highest number at 526, followed by Karnataka (524), Uttarakhand (442), Maharashtra (312), and Tamil Nadu (264).
- **States with a decline in tiger population:** Chhattisgarh and Mizoram. While all other States saw a Positive increase.
- **Madhya Pradesh's Pench Sanctuary and Kerala's Periyar sanctuary** emerged as the best-managed tiger reserves in the country.
- **Maximum improvement** in the tiger population since 2014 recorded in **Sathyamangalam Tiger Reserve in Tamil Nadu.**
- The Dampa and Rajaji reserves, in Mizoram and Uttarakhand respectively, were left at the bottom of the ladder with a score of 42.97% and 44.53%.
- No tiger has been found in the Buxa (West Bengal), Palamau (Jharkhand), and Dampa (Mizoram) reserves.

18 Decrease in Dolphin Number

Context: According to the latest census report prepared by the Madhya Pradesh forest department dolphins' number in Chambal River has been reduced by 13 percent in four years.

About:

- According to the latest census report of the Madhya Pradesh forest department, there are just 68 dolphins left in 435-kilometer-long Chambal river sanctuary which passes through three states (Madhya Pradesh, Uttar Pradesh, and Rajasthan).
- According to the census report, dolphins' number in Chambal River has been reduced by 13 percent in four years. The decreasing trend is continuing from 2016 when there were 78 dolphins.
- The maximum carrying capacity of dolphins in Chambal is 125.
- The dolphins were spotted for the first time in 1985 in Chambal River near Etawah. That time, the number was more than 110 but poaching reduced the number.
- The Forest Department of MP has collaborated with the scientists of Wildlife Institute of India (WII) to research safeguarding and increasing the population of dolphins in Chambal.

Reasons for Decline:

- Unfavorable habitat
- Illegal extraction of sand from the river bed.
- In 2006, the Supreme Court's Central Empowered Committee (CEC) ordered a ban on mining in the sanctuary area to save the flora and fauna of the river.
- Water withdrawal projects in Morena, Dholpur, and Kota are disturbing the whole ecosystem of the river and decreasing the water level and flow.

Gangetic Dolphin

- **Scientific Name:** Platanista gangetica.
- It is India's national aquatic animal and is popularly known as '**Susu**'.
- **Habitat:** It is found in parts of the Ganges-Meghna-Brahmaputra and Karnaphuli-Sangu river systems in India, Nepal, and Bangladesh.

- ▶ They are distributed across seven states in India: Assam, Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, Jharkhand, and West Bengal.
- ▶ It requires at least 3 metre depth and 266.42-289.67 m³ per sec flow of water for sustainable habitat.
- **Characteristics:** It has rudimentary eyes and uses echolocation (through ultrasonic sound) to navigate and hunt.
- **Protection Status:**
 - ▶ **IUCN Status:** Endangered
 - ▶ **Wildlife (Protection) Act, 1972:** Schedule 1
 - ▶ **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):** Appendix-I.

Chambal River

- It is a major tributary of Yamuna which is 960 km long.
- It is the chief tributary of the Yamuna River and rises in the Vindhya Range just south of Mhow, western Madhya Pradesh state.
- Flow: Madhya Pradesh, Rajasthan, and Uttar Pradesh.
- Right Bank Tributaries: Parbati, Kali Sindh, Shipra.
- Left Bank Tributaries: Banas, Mej.
- Main Power Projects/ Dam: Gandhi Sagar Dam, Rana Pratap Sagar Dam, Jawahar Sagar Dam, and Kota Barrage.
- The National Chambal Sanctuary is located along river Chambal on the tri-junction of Rajasthan, Madhya Pradesh and Uttar Pradesh.
- It is known for critically endangered gharial, the red-crowned roof turtle, and the endangered Ganges river dolphin.

19 Indian Bullfrog

Context: As the monsoon arrives, the Indian Bullfrog has made its presence felt in the rainy season.

About:

- At any other time during the year, the Indian Bullfrog roams alone and has a varied dull olive green-brown appearance, camouflaging well with their immediate surroundings.
- When the rain comes down, their breeding season begins, and the males, now yellow, with two blue vocal sacs, set out in search of females that are generally larger.

Indian Bullfrog

- **Scientific Name:** Hoplobatrachus tigerinus.
- **Common Name(s):** Indian Bullfrog, Bull Frog, Golden Frog, Tiger Frog, Tiger Peters Frog.
- **Distribution:** This species is found throughout most wetland areas of India, Bangladesh, northern Pakistan, southern parts of Nepal and Myanmar. It has also been introduced to the Maldives and Madagascar.

- **Habitat:** It is mainly aquatic, inhabiting mostly freshwater wetlands, both natural and artificial. It is absent or uncommon in forested areas and coastal regions.

Conservation Status:

- **IUCN Status: Least Concern**
- **Appendix II** of CITES.
- **Schedule IV** of the Indian Wildlife (Protection) Act, 1972.

Key Points:

- The bullfrogs are **prolific breeders**: they have short breeding seasons, and each egg clutch can contain up to 5,750 eggs. Its tadpoles are carnivorous and eat other tadpoles (including their own species).
- They can be identified by the pointed snout and long hind limbs, which help them jump.
- These are **nocturnal and formidable ambush predators**.

20 World Tiger Day

Context: Union Environment Minister released a detailed report of Tiger Census on the eve of Global Tiger Day.

About:

- Global Tiger Day is an annual celebration to raise awareness for tiger conservation, held annually on 29 July. It was created in 2010 at the Saint Petersburg Tiger Summit.
- **Name of the report:** 'Status of Tigers, Co-predators and Prey in India Report'.
- The detailed report assesses the status of tigers in terms of spatial occupancy and density of individual populations across India.
- In addition to the summary report released by the Prime Minister of India on the "Status of Tigers in India" in July 2019, this detailed report compares information obtained from the earlier three surveys (2006, 2010, and 2014) with data obtained from the 2018-19 survey to estimate population trends at country and landscape scales, patch colonization and extinction rates along with information on likely factors responsible for changes in tiger status at the fine spatial resolution of 100 km.
- The report evaluates the status of habitat corridors connecting major tiger populations and highlights vulnerable areas that require conservation attention for each landscape.
- The report provides information on major carnivores and ungulates regarding their distribution and relative abundance.
- The detailed report of the 4th All India Tiger Estimation is unique in the following ways;
 - ▶ Abundance index of co-predators and other species has been carried out which hitherto was restricted only to occupancy
 - ▶ Sex ratio of tigers in all camera trap sites has been carried out for the first time.
 - ▶ Anthropogenic effects on tiger population have been elaborated in a detailed manner.
 - ▶ Tiger abundance within pockets in tiger reserves has been demonstrated for the first time.
- India's tiger population now stands at 2967 which is 70 percent of the global tiger population.
- Efforts are been made to provide water and fodder to animals in the forest itself to deal with the challenge of human-animal conflict which is causing deaths of animals.
 - ▶ For this LIDAR based survey technology will be used for the first time. (Lidar is a method for measuring distances by illuminating the target with laser light and measuring the reflection with a sensor.)

21 LOCUST ATTACK IN INDIA

Context: India is gearing up for what could be one of its worst locust invasions in decades. Outbreaks of the insect attack have been reported from Gujarat, Rajasthan, Maharashtra, Madhya Pradesh, Punjab, Haryana and Uttar Pradesh

Background:

- The swarms that have been attacking India in the recent past are unique in their strength and nature, but India frequently battles desert locust onslaughts.
- They usually arrive in July-October. In the 2019- 20 cropping season, around 3.75 lakh hectares of crops were devoured by locust attacks in India with a loss of over Rs 100 crore.
- Locusts have destroyed over 2 lakh hectares of crops in India since the beginning of May, and threaten another 6 lakh hectares of crop.
- Experts attribute the current deep invasion of locusts to the fact that while rabi crops have been harvested, kharif sowing is yet to begin.
- The low availability of crops is leading the swarms to devour leaves on trees, and vegetable, fruit and cotton crops, and move deeper into India in search of fodder.
- The swarm that is currently attacking India and other nations has its roots in heavy cyclones and rainfall over the past two years, a trend that has been attributed to climate change.

What are locusts?

- A locust is a special type of short-horned grasshopper. The type recently spied in Africa and Asia has been identified as the desert locust (*Schistocerca gregaria*).
- The desert locust is of about a dozen species of short-horned grasshoppers that are known to change their behaviour.
- The desert locust typically lives in the Arabian peninsula, in the arid regions of east Africa.
- Desert locusts can fly over 130 km a day, and stay in the air for a long time.
- Desert locusts normally live and breed in semiarid/ desert regions. For laying eggs, they require bare ground, which is rarely found in areas with dense vegetation. The female can lay eggs only in bare sandy soils at 5-10 cm depth.
- Female locusts can lay eggs at least thrice in their lifetime (roughly three to five months), at intervals of 6-11 days. Populations are said to have the capacity to multiply up to 20-fold in three months.
- Locust plague cycles – defined as a period of two or more consecutive years of widespread breeding, swarm formation and crop destruction.

22 DEHING PATKAI WILDLIFE SANCTUARY

Context: Amid the controversy regarding coal mining inside Dehing Patkai wildlife sanctuary, the state forest department has said that no final approval has been accorded for the mining.

About the Sanctuary:

- The **Dehing Patkai Wildlife Sanctuary**, also known as the Jeypore Rainforest is a part of Dehing Patkai Elephant Reserve.
- It is located in the districts of Dibrugarh and Tinsukia.

- Dehing Patkai is a deciduous rainforest interspersed with semi-evergreen and lush green flora, the only patch of virgin rainforest in Assam.
- It comprises of Jeypore, Upper Dehing and Dirok.

23 CORAL BLEACHING AND GREAT BARRIER REEF

Context: Scientists have warned that the Great Barrier Reef will face a critical period of heat stress over the coming weeks; following the most widespread coral bleaching the natural world has ever endured.

About:

- The Great Barrier Reef is the world's largest coral reef system composed of over 2,900 individual reefs and 900 islands stretching for over 2,300 kilometres over an area of approximately 344,400 square kilometres.
- It is home to about 3,000 coral reefs, 600 continental islands, 1,625 type of fish, 133 varieties of shark and rays and 600 types of soft and hard corals.
- The reef is located in the Coral Sea, off the coast of Queensland, Australia.
- The Great Barrier Reef can be seen from outer space and is the world's biggest single structure made by living organisms.
- This reef structure is composed of and built by billions of tiny organisms, known as coral polyps.
- It supports a wide diversity of life and was selected as a World Heritage Site in 1981. Carbon pollution is causing unprecedented damage to our Great Barrier Reef. Warming ocean temperatures, a sign of climate change, is associated with the deteriorating health of the Reef.

What is coral bleaching?

- The stunning colours in corals come from marine algae called **zooxanthellae**, which live inside their tissues.
- This algae provide the corals with an easy food supply thanks to photosynthesis, which gives the corals energy, allowing them to grow and reproduce.
- When corals get stressed, from things such as heat or pollution, they react by expelling this algae, leaving a ghostly, transparent skeleton behind. This is known as 'coral bleaching'.

24 GAUR BACK IN VALMIKI RESERVE AFTER AN INCREASE IN GRASSLAND COVER

Context: Gaur (*Bos Gaurus*), the largest extant bovine in the world, has not only returned to Bihar's Valmiki Tiger Reserve (VTR) but is also breeding there due to an increase in grassland cover.

About:

- The Gaur (*Bos Gaurus*) also called the Indian bison is the largest extant bovine.
- It is native to South Asia and Southeast Asia. Gaurs are grassland specialists and their main food is grass.
- The Gaur is a social animal. They generally live in group size of about 30 to 40.
- The Indian Bison is very much prevalent in the Western Ghats. They prefer evergreen forests and moist deciduous forests.

- The species is listed as 'vulnerable' on the International Union for Conservation of Nature's Red List of Threatened Species since 1986.
- They are not found in the Himalayas with an altitude greater than 6,000 ft. They generally stick to the foothills only.
- **Threat:** Many possible threats have led to a decline in the population of the Indian Bison.
- **Food Scarcity:** The destruction in the grasslands has led to a decline in the availability of food for these animals. Due to the planting of commercially important trees, the lush grassland has diminished which is the prime source of fodder for these wild cattle.
- **Poaching:** The illegal hunting of the Indian bison is done for their commercial value as well as due to the high demand of gaur meat in the illegal market of Nepal – India border.
- The Indian Bison is deemed as vulnerable according to the IUCN list.
- Hence, the Indian Government has already included the protection of wild bison in the
- Schedule I of the Wild Life Protection Act, 1972.

About Valmiki Tiger Reserve:

- Valmiki Tiger Reserve forms the easternmost limits of the Himalayan Terai forests in
- India and is the only tiger reserve of Bihar.
- Situated in the Gangetic Plains bio-geographic zone of the country, the forest has a combination of bhabar and terai tracts.
- Valmiki Tiger Reserve lies in the north-westernmost West Champaran district of Bihar.
- Name of the district has been derived from two words **Champa** and **Aranya** meaning a **Forest of Champa trees**.
- Wild mammals found in the forests of Valmiki Tiger Reserve are Tiger, Sloth bear, Leopard, Wild dog, Bison, Wild boar etc. Several species of deer and antelopes viz barking deer, spotted deer, hog deer, sambar and blue bull are also found here.

Climate Change

1 'Atmospheric methane concentration at record levels'

Context: Global atmospheric concentration of methane 2019 levels are the highest since record-keeping began in 1983, according to a new preliminary estimate released by the United States National Oceanographic and Atmospheric Administration (NOAA).

About:

- Methane (CH₄) is a colorless, odorless, and highly flammable gas composed of one carbon atom and four hydrogen atoms.
- It can be produced naturally and synthetically, and when burned in the presence of oxygen, it produces carbon dioxide and water vapor.
- Methane is the primary component of natural gas and is used to produce heat and electricity around the world.
- Methane is also used in chemical reactions to produce other important gases like hydrogen and carbon monoxide and carbon black, a chemical compound that's found in some types of rubber used in car tires.

Key-highlights:

- Global atmospheric concentration of methane has hit an all-time high — to 1,875 parts per billion (ppb) in 2019 from 1,866 ppb in 2018.
- Not only is the 2019 figure the highest since record-keeping began in 1983, the increase during the year was the second-largest single-year leap in over two decades.
- In a paper published in 2019, NOAA scientists found that the increase in methane emissions between 2013 and 2018 was 50 per cent higher than in the previous five-year period.

Sources of methane:

- There are both natural and human sources of methane emissions.
 - ▶ The main natural sources include wetlands, termites and the oceans. Natural sources create 36% of methane emissions.
 - ▶ Human sources include landfills and livestock farming
- Cows and other grazing animals host microbes in their stomachs, gut-filling hitchhikers that help them break down and absorb the nutrients from tough grasses. Those microbes produce methane as their waste.
- The manure that cattle and other grazers produce is also a site for microbes to do their business, producing even more methane.

- Rice paddies are a lot like wetlands: When they're flooded, they're filled with calm waters low in oxygen, which are a natural home for methane-producing bacteria.

Why methane is a concern?

- **Most potent GHG:** Of all the greenhouse gases, methane is one of the most potent because of its ability to efficiently absorb heat in Earth's atmosphere.
- **Long-lasting:** Methane lasts for maybe a decade in Earth's atmosphere before it begins to react with a free radical called hydroxyl and turns into carbon dioxide, where it can stay there for centuries.
- **Sea level rise:** Greenhouse gases like methane heat up the atmosphere, and as much as 90 percent of that excess heat is absorbed by the oceans. This heat causes seawater to expand in volume. This effect, along with glacial melting, causes sea levels to rise.
- **Thermal expansion:** Scientists have known for a long time that carbon dioxide heats Earth's atmosphere and oceans, causing them to expand, but they only recently discovered that short-lived greenhouse gases like methane and CFCs (gases that contain chlorine or fluorine) also spur thermal expansion.

2 Green Bonds

Context: State Bank of India has listed Green Bonds worth \$100 million on India INX's Global Securities Market Platform (GSM)

Green Bonds:

- Green bonds are debt instruments issued by financial, non-financial or public entities where the proceeds are 'ear-marked' for use towards financing 'green' projects.
- As per official 'green bonds requirements for Indian issuers' published (in 2016) by Securities and Exchange Board of India (SEBI), debt security shall be considered as 'Green' or 'Green Debt Securities', if funds raised are to be utilized for assets falling under any of the following broad categories:
 - Renewable and sustainable energy (wind, solar etc.)
 - Clean transportation (mass transportation)
 - Sustainable water management o Climate change adaptation
 - Energy efficiency (efficient and green buildings) o Sustainable waste management (recycling, waste to energy etc.)
 - Sustainable land use (including sustainable forestry and agriculture, afforestation etc.)
 - Biodiversity conservation

3 'Petersberg Climate Dialogue (PCD)'

Context: The 11th Petersberg Climate Dialogue (PCD) took place in a virtual format and brought together ministers from 30 countries to discuss climate action.

About:

- The Petersberg Climate Dialogue series was launched in 2010, after the Copenhagen Climate Change Conference, and has been held annually.
- The event is hosted annually by **Germany**. The Dialogue facilitates open discussions in small groups on key issues in international climate policy.

- The Dialogue is intended to “create a space for close and constructive exchanges among ministers” on climate action.

A decisive meeting for climate diplomacy:

- The Dialogue is of particular importance this year as **COP26**, originally scheduled for November, has been postponed to an unknown date in 2021 due to the coronavirus.
- At the summit, the EU was set to announce its intention to raise its current climate target for 2030.
- Under the **Paris Accord**, governments promised to do so every five years, taking into account the latest scientific findings.

Paris Accord:

- The Paris Agreement is a landmark environmental accord that was adopted by nearly every nation in 2015 to address climate change and its negative impacts.
 - The deal aims to substantially reduce global greenhouse gas emissions in an effort to limit the global temperature increase in this century to 2 degrees Celsius above preindustrial levels, while pursuing means to limit the increase to 1.5 degrees.
- However, current commitments are not enough to keep global warming below 2°C.
 - The European Commission has decided to increase the EU’s climate target from the current 40% reduction in emissions to 50 or 55%.
 - However, the German government has not yet agreed on which of the two figures it would support.
 - The Commission is currently conducting a public consultation, looking to propose a new target in September.

4 Heat Waves

Context: The India Meteorological Department (IMD) has warned that the summer will be hotter by an average of above 1 degree celsius than the normal.

About:

- A Heat Wave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season in the North-Western parts of India.
- Heat Waves typically occur between March and June, and in some rare cases even extend till July.
- The extreme temperatures and resultant atmospheric conditions adversely affect people living in these regions as they cause physiological stress, sometimes resulting in death.

What causes heatwave?

- Heatwaves occur when a system of **high atmospheric pressure** moves into an area and air from upper levels of the atmosphere is pulled toward the ground, where it becomes compressed and increases in temperature.
- This high concentration of pressure makes it difficult for other weather systems to move into the area. Due to this, a heatwave can last for several days or weeks in an area.
- The high-pressure system also prevents clouds from entering the region, sunlight can become punishing, heating the system even more.

- The combination of all of the above factors come together to create the exceptionally hot temperatures called 'heatwave'.

Heat Wave Zone:

- The heatwave zone refers to areas prone to heatwaves. According to the Indian Meteorological Department (IMD), heatwave is recorded when:
 - ▶ the departure of maximum temperature from normal is + 4 degrees C to + 5 degrees C or more for the regions where the normal maximum temperature is more than 40 degrees C
 - ▶ the departure of maximum temperature from normal is + 5 degrees C to + 6 degrees C for regions where the normal maximum temperature is 40 degrees C or less
 - ▶ Heat Wave is declared only when the maximum temperature of a station reaches:
 - ▶ at least 40 degrees C for plains
 - ▶ at least 30 degrees C for hilly regions
 - ▶ Heatwave is also declared when the actual maximum temperature remains 45 degrees C or more irrespective of normal maximum temperature.

Background:

- This is for the second consecutive year that IMD has forecast a hotter than usual summer (March-May 2020).
- Last year, India witnessed an unprecedented heatwave spell that started early in March. By the first week of June, there were 73 spells of a heatwave.
- According to the National Disaster Management Authority (NDMA), 23 states reported heatwaves in 2019, up from 19 in 2018.
- For 2020, scientists have already warned it would be among the 10 warmest years on record.
- This is based on the weather conditions of the first two months of the year. January this year was the warmest in 141 years.
- NASA recently declared that Antarctica recorded its highest-ever temperature on record on February 6.

Threats posed by Heat Waves:

- **Health:**
 - ▶ The health impacts of Heat Waves typically involve dehydration, heat cramps, heat exhaustion and/or heat stroke. The signs and symptoms are as follows:
 - ▶ **Heat Cramps:** Edema (swelling) and Syncope (Fainting) generally accompanied by fever below 39°C i.e. 102°F.
 - ▶ **Heat Exhaustion:** Fatigue, weakness, dizziness, headache, nausea, vomiting, muscle cramps and sweating.
 - ▶ **Heat Stroke:** Body temperatures of 40°C i.e. 104°F or more along with delirium, seizures or coma. This is a potentially fatal condition.
- **Economy:**
 - ▶ The majority of Indian people work in areas such as agriculture and construction, making the country particularly vulnerable to extreme heat and floods.

- ▶ Rising temperatures could also affect the government's ability to lift people out of poverty, because of the effect of extreme heat on how much a person is able to produce in a given period of time, something economists refer to as productivity.
- **Agriculture**
 - ▶ Heatwaves can be particularly damaging to agriculture and especially at night as various crops require cool night temperatures.
 - ▶ Besides, heat stress for livestock also rises when animals are unable to cool off at night. They can experience declines in milk production, slower growth, and reduced conception rates.

5 How Agroforestry could solve the climate crisis?

Context: Agriculture and climate change are deeply intertwined. Agriculture is responsible for almost 30 per cent of global greenhouse gas (GHG) emissions and is the root cause of 80 per cent of tropical deforestation. Agroforestry, an agricultural method that nurtures natural ecosystems, could reverse these disturbing trends.

About:

- Agroforestry is the interaction of agriculture and trees, including the agricultural use of trees.
- This comprises trees on farms and in agricultural landscapes, farming in forests and along forest margins and tree-crop production, including cocoa, coffee, rubber and oil palm.
- Interactions between trees and other components of agriculture may be important at a range of scales:
 - ▶ in fields (where trees and crops are grown together)
 - ▶ on farms (where trees may provide fodder for livestock, fuel, food, shelter or income from products including timber)
 - ▶ landscapes (where agricultural and forest land uses combine in determining the provision of ecosystem services)
- It is a resilient and future-proof sustainable agricultural method that could effectively mitigate the climate crisis.
- This climate-smart farming system enables economically-viable production while significantly restoring land, mitigating climate change, safeguarding local biodiversity and strengthening food and nutritional securities for the growing population.
- With agroforestry, degraded land can be transformed into food-growing carbon sinks.

What is leading to CO2 emissions?

- **Animal Agriculture:** Animal agriculture is responsible for 18 percent of greenhouse gas emissions, more than the combined exhaust from all transportation.
 - ▶ Intensive agriculture characterised by monocultures and aimed at feeding farm animals is one of the sectors that generate the highest amount of CO2 emissions.
- **Livestock:** Livestock and their byproducts account for at least 32,000 million tons of carbon dioxide (CO2) per year or 51% of all worldwide greenhouse gas emissions.
 - ▶ The biggest single source is methane from cow burps and manure.
 - ▶ Manure left on pasture emits nitrous oxide, a greenhouse gas with a much stronger global warming impact per ton than carbon dioxide.
 - ▶ Enteric fermentation—a natural digestive process that occurs in ruminant animals such as cattle, sheep and goats—accounts for about 40% of agricultural production emissions in the past 20 years.

6 'Largest Arctic Ozone hole closes itself up'

Context: Scientists have revealed that the largest hole ever observed in the ozone layer above the Arctic last month has healed itself.

About:

- The ozone layer protects Earth from Sun's harmful ultraviolet rays. It is found in Earth's stratosphere, a layer of the atmosphere around 10–50 kilometres above sea level.
- Stratospheric ozone is constantly produced by the action of the sun's ultraviolet radiation on oxygen molecules (known as photochemical reactions).
- Ozone is found in two different parts of our atmosphere.
 - ▶ **Ground level or "bad" ozone:** It is a human health irritant and component of smog. It is found in the lower atmosphere (troposphere) and has nothing to do with the "ozone hole."
 - ▶ **High level or "good" ozone:** It occurs in the stratosphere and accounts for the vast majority of atmospheric ozone.
- Although ozone is created primarily at tropical latitudes, large-scale air circulation patterns in the lower stratosphere move ozone toward the poles, where its concentration builds up.

Ozone:

- Ozone is a special form of oxygen, made up of three oxygen atoms rather than the usual two oxygen atoms.
- It usually forms when some type of radiation or electrical discharge separates the two atoms in an oxygen molecule (O₂), which can then individually recombine with other oxygen molecules to form ozone (O₃).

How ozone works?

- The sun emits electromagnetic radiation at different wavelengths, meaning energy at different intensities.
- The atmosphere acts like a multi-layer shield that protects Earth from dangerous solar radiation.
- The stratospheric ozone layer absorbs ultraviolet (UV) radiation, preventing dangerous UV rays from hitting Earth's surface and harming living organisms.
- Ozone is good at trapping a type of radiation called ultraviolet radiation, or UV light, which can penetrate organisms' protective layers, like skin, damaging DNA molecules in plants and animals.
- There are two major types of UV light: UVB and UVA.
 - ▶ **UVB** is the cause of skin conditions like sunburns, and cancers like basal cell carcinoma and squamous cell carcinoma.
 - ▶ **UVA** light is even more harmful than UVB, penetrating more deeply and causing a deadly skin cancer, melanoma, and premature aging.

Formation of hole in the ozone layer:

- The hole formed earlier this year and reached its maximum size in March some 11 miles above the surface of the Earth.
- It was the largest ozone hole ever documented over the Arctic, beating the previous record holder, which was observed during the 2011 winter.

- Scientists had attributed the forming of the hole in the ozone layer above the North Pole to unusually low temperatures in the atmosphere above the region.
- The researchers from the German Aerospace Center (DLR) discovered the hole using data from the Copernicus Sentinel-5P satellite.

Reason behind Ozone depletion:

- Ozone depletion occurs when chlorofluorocarbons (CFCs) and halons—gases formerly found in aerosol spray cans and refrigerants—are released into the atmosphere (see details below).
- CFCs and halons cause chemical reactions that break down ozone molecules, reducing ozone's ultraviolet radiation-absorbing capacity.

Reasons behind recovery:

- According to the scientists the recovery of the hole is not due to the reduced pollution levels due to COVID-19 lock down. The closing was because of a phenomenon called the polar vortex.
- High-altitude currents called polar vortex are responsible for bringing cold air to north pole and the subsequent healing of the ozone layer.
- The day is an opportunity for people to celebrate turtles as well as mobilize efforts in protecting them and their habitats globally.

7

CLIMATE ADAPTATION AND RESILIENCE FOR SOUTH ASIA (CARE) PROJECT

Context: The World Bank Board of Executive Directors approved a \$39.5 million CARE Project to bolster climate action in South Asia.

Climate Adaptation and Resilience for South Asia (CARE) Project :

- The Project will build resilience to climate threats and disasters by sharing regional data and knowledge.
- It will help in developing regional standards and guidelines for infrastructure, and promoting climate resilient policies and investments.
- The project will help develop a public platform to inform climate planning and investments, and fund technology to support resilience in South Asia.
- It will fund a public domain platform known as Regional Resilience Data and Analytics Service, with information about weather hazards, climate variability, and sector specific data to help policymakers assess climate risks.
- It will also assess climate impacts in districts across Bangladesh, Nepal, and Pakistan to support agriculture, livestock, water, and transport.
- The \$39.5 million CARE project includes a \$36 million grant from the International

8

'Bio Fuel'

Context: Researchers at the Indian Institute of Technology Hyderabad are using computational methods to understand the factors and impediments in incorporating biofuels into the fuel sector in India.

About:

- Bioenergy is energy derived from biofuels. Biofuels are fuels produced directly or indirectly from organic material – biomass – including plant materials and animal waste.

- **Making of biofuels:** Biofuels is derived from
 - ▶ agricultural crops, including conventional food plants or from special energy crops
 - ▶ forestry, agricultural or fishery products or municipal wastes
 - ▶ agro-industry, food industry and food service by-products and wastes
- **Advantages:** The following are the advantages of biofuels:
 - ▶ Unlike fossil fuels, biofuels are produced from renewable resources.
 - ▶ There are less pollutant emissions from biofuels. Ethanol reduces carbon monoxide emissions as it ensures complete combustion.
 - ▶ Biofuels do not contribute to global warming as carbon dioxide released, is taken up by their feedstocks.
 - ▶ Biofuels are cost-effective when compared to fossil fuels.
 - ▶ Unlike other alternative energy sources like wind and solar energy, a relatively small amount of biofuels can produce a significant amount of energy, which is best suited for transport applications.

9 Canada's Milne ice shelf collapsed

Context: The collapse of Canada's Milne ice shelf — the country's last one — in a corner of the country's Ellesmere Island, has increased fears of the Arctic region being under severe stress due to global warming.

About:

- Located on the northwestern coast of Ellesmere Island in Nunavut, the Milne Ice Shelf is about 4,000 years old.
- The Milne ice shelf lost more than 40 percent of its ice over two days end of July 2020.
- The shelf's sudden collapse was a close call for scientists studying ice loss in that precarious location, said Arctic ice researcher Derek Mueller.
- The Milne ice shelf lost more than 40 percent of its ice over two days end of July 2020.
- This has increased concerns over the rapid melting of ice and the breaking of old ice shelves — large floating pieces of ice that form when a glacier or ice sheet flows into the sea surface.
- This also meant the last known **epishelf lake** — a water body dammed by the ice shelf and floating on the ocean surface — in the northern hemisphere and on the Milne ice shelf, no longer exists.

What are Ice shelves?

- An ice shelf is a thick, floating slab of ice that forms where a glacier or ice flows down a coastline. Ice shelves are found only in Antarctica, Greenland, and Canada. Thicknesses of floating ice shelves range from 100-1,000 meters.
- Ice shelves are formed by forces of gravity from ice along the shore. Gravity constantly pressures the movement of ice from the land to the shelf. Ice shelves lose mass when chunks break off and slide into the ocean water. Shelves gain mass by snow accumulation on the upper surface.
- Ice shelves can date as back as far as hundreds to thousands of years. They are thicker than long-term sea ice, but not as large as glaciers.
- The world's largest ice shelves are the Ross ice shelf and the Filchner-Ronne ice shelf in Antarctica.

Ellesmere Island

- Canadian ice shelves are attached to Ellesmere Island. The Ayles ice shelf broke up in 2005, the M'Clintock ice shelf broke from 1963 to 1966, and the Markham ice shelf broke up in 2008.
- The only Canadian shelves still existing was the Milne ice shelves.
- Ellesmere Island has been losing ice for more than a century.
- About 100 years ago, a vast, single ice shelf extended along the island's northern coast, spanning more than 3,300 square miles (8,600 square km).
- By 2000, the shelf was reduced to around 405 square miles (1,050 square km) divided among six large ice shelves — including Milne Ice Shelf — as well as a few smaller ones, Carleton University representatives said.
- Since 2003, there have been five major calving events on the Ellesmere Island coast, and there's no question that climate change is driving the drastic ice loss.

The recipe for ice shelf break up

- Temperatures from May to early August in the region have been 5 degrees Celsius warmer than the 1980 to 2010 average, University of Ottawa glaciology professor Luke Copland said.
- The high temperatures combined with a warming pattern that is much faster than the rest of globe are to blame for the disintegration of the ice shelves.
- Above-normal air temperatures, offshore winds and open water in front of the ice shelf are all part of the recipe for ice shelf break up.

10 Did Death Valley Just Hit the Highest Temperature Recorded Ever

Context: California's Death Valley registered a temperature of 54.4 degrees Celsius or 129.9 degrees Fahrenheit on August 16, 2020, which, once verified, could be the hottest temperature ever recorded on Earth.

About:

- Death Valley is a desert valley in Eastern California, in the northern Mojave Desert, bordering the Great Basin Desert.
- The valley is bounded on the west by the Panamint Range and on the east by the Black, Funeral, and Grapevine mountains of the Amargosa Range.
- It is one of the hottest places on Earth, along with deserts in the Middle East and the Sahara.
- As the hottest, driest and lowest national park, Death Valley is a land of extremes. Highlights
- The temperature was recorded at the United States National Weather Service's automated weather station at Furnace Creek, near the border with Nevada, at 3:41 pm local time on the afternoon of August 16.
- The all-time highest temperature ever recorded is 134°F or 56.7°C on July 10, 1913, at the Greenland Ranch in the Death Valley.
- However, since the temperature-recording mechanisms a century ago were not as advanced, many have doubted if that reading was reliable.

Why Death Valley is so hot?

- Death Valley's crazy heats are caused by a combination of the lack of water, geography, and materials that make up the valley.
- Lack of water: The average yearly rainfall in Death Valley is only 2 inches. This is less than many other deserts in the world, averaging around 10 inches of rain annually. This intense lack of

water also creates a lack of plants in the area resulting in the expanses of sand in the valley open to constant heating by the sun.

- Geography: The lower levels of mountain ranges create an interesting phenomenon of trapping the hot air within the valley. Sand and rocks make up the valley floor which radiate a large amount of heat. However, because of the geography, this hot air cannot escape.
- Instead, the hot air rises along the valley walls, cools slightly and then falls back to the valley floor to be heated even more by the hot sand and low elevation air pressure. This concept of movement by heating and cooling is called convection and exists in many other life circumstances like the boiling of water or in a kitchen oven.

What is 'Heat Dome'?

- The high temperature recorded on August 16 is said to be a result of a so-called 'heat dome' that is smothering the west coast of the United States. The National Oceanic and Atmospheric Administration or NOAA describes it thus:
- High pressure circulation traps hot ocean air like a lid or a cap trapping heat at the surface and favouring the formation of a heat wave.
- To summarize, a heat dome is a pocket of hot air that is trapped in the upper atmosphere and refuses to move.
- While it stagnates there, it heats everything around it, forcing hot air down to the ground, where the air lingers.
- The combination of hot air and humidity will drive the heat index much higher, making the event doubly dangerous.
- Additionally, one of the most dangerous features is that the temperature may not reduce very much at night. This makes an endangered person more endangered, and results in even more deaths

11 'Petersberg Climate Dialogue (PCD)'

Context: The 11th Petersberg Climate Dialogue (PCD) took place in a virtual format and brought together ministers from 30 countries to discuss climate action.

About:

- The Petersberg Climate Dialogue series was launched in 2010, after the Copenhagen Climate Change Conference, and has been held annually.
- The event is hosted annually by Germany. The Dialogue facilitates open discussions in small groups on key issues in international climate policy.
- The Dialogue is intended to "create a space for close and constructive exchanges among ministers" on climate action.

A decisive meeting for climate diplomacy:

- The virtual XI Petersberg Climate Dialogue was **co-chaired by Germany and the United Kingdom (UK)** and was attended by about 30 countries including India.
- The Dialogue is of particular importance this year as **COP26**, originally scheduled for November, has been postponed to an unknown date in 2021 due to the coronavirus.
- At the summit, the EU was set to announce its intention to raise its current climate target for 2030.
- Under the **Paris Accord**, governments promised to do so every five years, taking into account the latest scientific findings.

Paris Accord:

- The Paris Agreement is a landmark environmental accord that was adopted by nearly every nation in 2015 to address climate change and its negative impacts.
- The deal aims to substantially reduce global greenhouse gas emissions in an effort to limit the global temperature increase in this century to 2 degrees Celsius above preindustrial levels, while pursuing means to limit the increase to 1.5 degrees.

12 CLIMATE CHANGE & CARBON SEQUESTRATION

Context: A recent report by the Institute for Applied Systems Analysis (IAASA) published in journal Scientific Reports attempts to shed light on ecosystem processes crucial to carbon sequestration and its impact on ecosystems functioning.

About:

- Carbon dioxide is the most commonly produced greenhouse gas. Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide.
- It is one method of reducing the amount of carbon dioxide in the atmosphere with the goal of reducing global climate change.

How trees fight against climate change

- Trees have an iconic status in the fight against climate change and in the environmental movement in general.
- The question is how much carbon can forests suck up? What is the mitigation potential of forests?
- In 2019's special report on climate change and land, the **Intergovernmental Panel on Climate Change (IPCC)** estimated that the mitigation potential from reducing deforestation and land degradation — while highly uncertain — was at best about a sixth of annual energy sector emissions alone.
- The IPCC further concluded that forests “do not continue to sequester carbon indefinitely”, noting that any sequestration gains are “at risk from future loss (or sink reversal) triggered by disturbances such as flood, drought, fire, or pest outbreaks, or future poor management.”
- The world has seen a spectacular example of these risks in Brazil and Australia in recent months.
- Evidence of the uncertainty of estimates of carbon stored in forests is mounting.
- A study last year by the University of Queensland found greenhouse gas emissions from damage to tropical rainforests are being underestimated by a factor of six.
- Even more worryingly, a study by the University of Leeds concluded that tropical forests were losing their ability to sequester carbon and may soon become net emitters, rather than net sinks.

Pollution

1 Black carbon deposits on Himalayan glaciers

Context: According to new research by scientists from NASA and Chinese Academy of Sciences, soot deposited on Tibetan glaciers has contributed significantly to retreat of the world's largest non-polar ice masses – the Himalayan glaciers.

SC's take on the issue

- According to research, **black carbon deposits** on Himalayan ice **threaten earth's "third pole"**. Tibet's glaciers are retreating at an alarming rate.
- **The study:** To better understand the role that black soot has on glaciers, researchers trekked high into the Himalayas to collect ice cores that contain a **record of soot deposition that spans back to the 1950s**.
 - ▶ Researchers collected **ice cores** at five locations on the Tibetan Plateau.
 - ▶ The amount of soot at site number five, **Zuoqiupu glacier**, increased by **30 percent** between 1990 and 2003.
 - ▶ Rise in soot levels at Zuoqiupu follows a dip that followed the **enacting of clean air regulations in Europe in the 1970s**.
 - ▶ According to another study, black carbon concentrations **near the Gangotri glacier rose 400 times** in summer due to forest fires and stubble burning from agricultural waste and triggered glacial melting.
- **Techniques used in the study:** Scientists use satellite instruments such as the Moderate Resolution Imaging Spectroradiometer (**MODIS**) **aboard the NASA satellites Terra and Aqua** to enhance understanding of the region's albedo.
 - ▶ A new **NASA climate satellite called Glory** will carry a new type of **aerosol sensor** that should be able to **distinguish between aerosol types** more accurately than previous instruments.

Black soot/Black carbon – details

- Black soot is generated from **industrial pollution, traffic, outdoor fires, and household burning of coal and biomass fuels**.
- Soot **absorbs incoming solar radiation** and can **speed glacial melting** when deposited on snow in sufficient quantities.
- Soot includes **black carbon**, as well as **organic carbon**.
- Many **industrial processes produce both** black carbon and organic carbon, but often in different proportions.
- Burning **diesel fuel produces mainly black carbon**.

- **Burning wood** produces mainly **organic carbon**.
- Since **black carbon is darker** and **absorbs more radiation**, it's thought to have a **stronger warming effect** than organic carbon.
- The fine particles **absorb light and about a million times more energy** than carbon dioxide.
- Black carbon results from **incomplete combustion of fossil fuels and biomass**.
- It is said to be the **second-largest contributor to climate change after CO₂**.
- Unlike CO₂, which can stay in the atmosphere for years together, **black carbon is short-lived** and remains in the atmosphere only for days to weeks before it descends as rain or snow.
- **India is the second-largest emitter of black carbon** in the world, with emissions expected to increase dramatically in the coming decades. **Indo Gangetic plains** are said to be the largest contributor.

Warming of Tibetan Plateau

- **Temperature increase:** Temperatures on the Tibetan Plateau – sometimes called Earth's "third pole" – have warmed by 0.3°C (0.5°F) per decade over the past 30 years, about **twice the rate of observed global temperature increases**.
- **The retreat of glaciers:** Fifty percent of the glaciers were retreating from 1950 to 1980 in the Tibetan region; that rose to **95 percent in the early 21st century**.
 - ▶ Some glaciers are retreating so quickly that they **could disappear by mid-century** if current trends continue.
 - ▶ **General plateau-type glaciers** – mostly found in Tibet – **are retreating faster** than valley types.
 - ▶ The number of **glacial lakes at high altitudes is increasing**. If this burst, they pose a danger.
- **Black soot is the cause:** Black soot is responsible for as much as **half of the glacial melt**, and **greenhouse gases** are responsible for the rest.
 - ▶ During the last 20 years, the black soot **concentration increased two- to three-fold** relative to its concentration in 1975.
- **Reason for black carbon increase: Black carbon**, which is **caused by incomplete combustion**, is especially prevalent in **India and China**. The main reason for the increase in black carbon in the region is **accelerated economic activity** in India and China over the last 20 years
 - ▶ Most soot in the region **comes from shipping, diesel engines, coal-fired power plants, and outdoor cooking stoves**.
 - ▶ According to one study, black carbon emitted in India **increased by 46 percent** from 1990 to 2000 and by another **51 percent** from 2000 to 2010.
- **Mechanism of black soot related warming: Atmospheric aerosols** are tiny particles containing **nitrates, sulfates, carbon and other matter**, and can influence the climate. Unlike other aerosols, **black carbon absorbs sunlight, similar to greenhouse gases**.
 - ▶ But unlike greenhouse gases, black carbon does not heat the surface; **it warms only the atmosphere**.
 - ▶ This warming is **one of two ways in which black carbon melts snow and ice**.
 - ▶ The second effect results from the **deposition of the black carbon on a white surface**, which produces an **albedo effect that accelerates melting**. Dirty snow absorbs far more sunlight—and gets warmer faster—than pure white snow.
 - ▶ Black carbon can have a powerful effect on **local atmospheric temperature**. A small amount of black carbon tends to be **more potent** than the same mass of sulfate or other aerosols.

Importance of Himalayan glaciers

- **Replenish Himalayan rivers:** Himalayan glaciers help replenish many of Asia's most important rivers – including the **Indus, Ganges, Yellow, and the Brahmaputra** – such losses can have a profound impact on billions of people who rely on these rivers for freshwater.
 - ▶ One-quarter of the population of China is in western regions where **glacial melt provides the main dry season water source.**
- **Seasonal freshwater supply:** While rain and snow would still help replenish Asian rivers in the absence of glaciers, the change can **hamper efforts to manage seasonal water resources** by **altering when freshwater supplies** available in areas already prone to water shortages.
 - ▶ Reduced black soot emissions, in addition to reduced greenhouse gases, is required to avoid the demise of Himalayan glaciers and retain the **benefits of glaciers for seasonal freshwater supplies.**

2

Mud packs and other remedies to save the Taj from pollution, age and insects

Context

The Taj Mahal complex has been spruced up for the visit of United States President. The red sandstone corridors had been cleaned of weather stains, the fountains had been scrubbed, and extra flower beds had been added to the gardens.

About:

- The graves of Emperor Shah Jahan and his queen Mumtaz Mahal had received special "Multani mitti" (Fuller's clay) mud pack treatment".
- Mud packs have been one of the ASI's favoured ways to remove the yellow stains that have appeared over the years on the Taj Mahal's white marble facade.
- The treatment traditionally employed to clean marble surfaces help restore the natural shine and colour of the monument.
- The clay is applied in the form of a thick paste that absorbs the grime, grease and bird droppings on the marble, before being washed off using distilled water.
- Mud packs were applied on the surface of the monument first in 1994, and then again in 2001, 2008, and, most recently, beginning 2014.
- Increasing pollution in the air over the Gangetic Valley affecting the Taj has been a reason for concern for archaeologists and conservationists for long now.
- The Taj Mahal was completed in 1653 as a mausoleum for the Emperor's favourite wife, Mumtaz Mahal, who died in childbirth.
- The Taj was declared a Unesco World Heritage site in 1983.

Taj Trapezium Zone:

- The Taj Trapezium Zone (TTZ) spreads over 10,400 sq km across the districts of Agra, Firozabad, Mathura, Hathras and Etah in Uttar Pradesh and Bharatpur district of Rajasthan.
- Since 1994, no new factory can be established in this protected area around the Taj Mahal.

Insect attacks

- The source of this problem comes from the dry river Yamuna, which has become devoid of any ecological flow.
- These insects, as has been stated in the Archaeological Survey of India's report, breed in the polluted matter in the river, and then attack the Taj Mahal.
- Earlier, there were fish in the river, which ate the insects and their larvae, but now, due to the serious water pollution, there is no sign of any aquatic species in the river.
- Other monuments that stand on the banks of the river Yamuna, such as the Tomb of Itimad-ud-Daulah, the Mehtab Bagh, and portions of the Agra Fort, too, have been affected by these insect attacks.

3 Bharat Stage Emission Standards

Context: The government has notified BS-VI emission norms for quadricycles, paving the way for higher production of the new category of vehicle that was introduced less than two years ago.

What is quadricycle?

- A quadricycle is the size of a three-wheeler but with four tyres and is fully covered like a car.
- It has an engine like that of a three-wheeler. This makes it a cheap and safe mode of transport for last-mile connectivity.
- A quadricycle cannot be more than 3.6 metres long, should have an engine smaller than 800cc, and should not weigh more than 475 kilograms.
- In 2018, the government had introduced the quadricycle segment with necessary standards to produce the vehicle.
- It had approved the vehicle for both commercial and private use.
- India's automobile industry has been urging the ministry to set BS-VI emission standards for quadricycles, after the norms were rolled out for other segments starting 1 April, 2020.
- Currently, only a few automobile players in India manufacture quadricycles.
- After the government had allowed the introduction of the vehicle in 2018, Bajaj Auto Ltd was the first to commercially launch 'Qute' under this segment.

The new notification:

- This notification completes the process of BS VI for all L, M, and N category vehicles in India. The emission norms are in line with EU with World Motorcycle Test Cycle (WMTC).
 - ▶ WMTC is a system of driving cycles used to measure fuel consumption and emissions in motorcycles.
 - ▶ The methods are stipulated as part of the Global Technical Regulation established under the United Nations' World Forum for Harmonisation of Vehicle Regulations, also known as WP.

What is Bharat Stage Emission Standards?

- Bharat stage (BS) emission standards are laid down by the government to regulate the output of air pollutants from internal combustion engine and spark-ignition engine equipment, including motor vehicles.
- The central government has mandated that vehicle makers must manufacture, sell and register only BS-VI (BS6) vehicles from April 1, 2020.

- The first emission norms were introduced in India in 1991 for petrol and in 1992 for diesel vehicles.
- Followed these, the catalytic converter became mandatory for petrol vehicles and unleaded petrol as introduced in the market.

The difference between BS-IV and BS-VI:

- Both BS-IV and BS-VI are unit emission norms that set the maximum permissible levels for pollutants that an automotive or a two-wheeler exhaust can emit.
- Compared to the BS4, BS6 emission standards are stricter.
- Whereas makers use this variation to update their vehicles with new options and safety standards, the biggest modification comes in the permissible emission norms.
- The following are the key differences between BS4 and BS6 emission norms:
 - ▶ **Diesel Particulate Filter (DPF) and Selective Catalytic Reduction (SCR)** are being introduced with the roll-out of Bharat Stage VI norms, which were not a part of Bharat Stage IV.
 - ▶ **Real Driving Emission (RDE)** will be introduced in India for the first time with the implementation of Bharat Stage VI emission norms.
 - ▶ RDE will measure a vehicle's emission in real-time conditions against laboratory conditions.
 - ▶ **Onboard Diagnostics (OD)** has been made mandatory for all vehicles with BS6.
 - ▶ **Sulphur and Nitrogen Oxide** The most crucial difference between BS6-grade fuel and BS4-grade fuel will be in terms of Sulphur and Nitrogen Oxide content.
 - ▶ The sulphur traces in BS6 fuel is five times lower (10 ppm) as compared to sulphur traces in BS4 fuel (50 ppm).
 - ▶ Further, nitrogen oxide level for BS6-grade diesel engines and petrol engines will be brought down by 70% and 25%, respectively.

4 PETCOKE

Context: Directorate General of Foreign Trade (DGFT) (under Ministry of Commerce and Industry) has laid out a procedure for allocation of quota for import of calcined pet coke (CPC) for Aluminium industry and raw petcoke for CPC manufacturing industry for the financial year 2020-21.

Background:

- In 2017, Environment Pollution Control Authority (EPCA) had recommended that the distribution, sale and use of furnace oil and petcoke be strictly banned in National Capital Region because of high sulphur content.
- Following this, Supreme Court (SC) banned use of petcoke in New Delhi and neighbouring states of Haryana, Uttar Pradesh and Rajasthan, after the air pollution level in the national capital reached hazardous level.
- In 2018, petcoke was banned for use as fuel nationwide following SC Judgement in M. C. Mehta Vs Union of India.
- Its import was allowed for only cement, lime kiln, calcium carbide and gasification industries, when used as the feedstock or in manufacturing process.
- However, later Government permitted imports of a certain quantity of pet coke, used for fuel purpose, for anode making by aluminium industry. o Before its import ban, India was world largest consumer of pet coke.
- Presently, SC has fixed the import limit for raw petroleum coke at 0.5 metric tonne per annum (mtpa) and calcined petroleum coke at 1.4 mtpa.

Petcoke

- It is a by-product (carbonaceous solid) of the oil refinery process mainly “the bottom of the barrel.”
- It is characterised as a high grade fuel with high calorific value of more than 8,000 Kcal per kg, having low ash content and low volatile matter but high sulphur content, up to 7%.
- Types: In its raw form, it is also called “green coke” or green petroleum coke or raw petcoke. It comes from several sources, all from the petroleum refinery industry.
- About 80% of worldwide petcoke production is “fuel-grade” petcoke (green coke), used for electricity generation and in cement kilns.
- Calcined pet coke (CPC) is obtained by processing of raw pet coke by calcining in a rotary kiln that removes residual volatile hydrocarbons.

5 LOCUST ATTACK

Context: Recently, Swarms of desert locusts invaded vast swathes of land in various Indian states which entered via Pakistan’s Sindh province

About:

- Union government issued a warning to 12 states including Rajasthan, Punjab, Haryana and Madhya Pradesh, Gujarat and Maharashtra regarding the locust attack.
- The current attack is said to be the worst desert locust attack in 26 years.
- United Nations (UN) has also warned that armies of locusts swarming across continents pose a “severe risk” to India’s agriculture this year.

Desert Locusts

- They belong to the family of grasshoppers and have life span of 90 days.
- Four species of locusts are found in India: Desert locust (*Schistocerca gregaria*), Migratory locust (*Locusta migratoria*), Bombay Locust (*Nomadacris succincta*) and Tree locust (*Anacridium* sp.).
- Desert locusts are usually restricted to the semi-arid and arid deserts of Africa, the Near East and SouthWest Asia that receive less than 200 mm of rain annually.
- They lay eggs in damp soil in the bare ground, which is rarely found in areas with dense vegetation.
- Desert locusts are “biphasic” animals, meaning they can take on two entirely different forms.
- In their “solitary” form, they are drab brown in colour and relatively harmless to crops.
- Under certain conditions (such as optimum moisture and vegetation), the insects can switch into a “gregarious form” and start forming swarms – turning electric yellow and displaying swarming behavior.

6 SUPER YEAR FOR BIODIVERSITY

Context: The year 2020 is the “Super Year For Biodiversity”, as the Strategic Plan for Biodiversity with 20 global Aichi targets adopted in 2010 ends in 2020.

Strategic Plan for Biodiversity 2011-2020 (SPB 2011-2020)

- SPB 2011-2020 was adopted by the parties to the CBD, during the tenth meeting of the Conference of the Parties (COP10) in 2010 in Nagoya, Japan, with the purpose of inspiring broad-based action in support of biodiversity over the next decade by all countries and stakeholders.

- The Strategic Plan is comprised of a shared vision, a mission and 20 targets organized under 5 strategic goals, collectively known as the Aichi Biodiversity Targets (ABTs)

7 E-WASTE

Context: Recently, the Global e waste Monitor 2020 Report was released.

About E-Waste

- It refers to all items of electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of re-use.
- According to Global e waste Monitor 2020 Report, in 2019, the world generated 53.6 Mt of e-waste, an average of 7.3 kg per capita, with 21% increase in just 5 years. It will increase by 38% between 2020 and 2030. O
- Asia generated the highest quantity followed by the Americas and Europe. Europe ranked first worldwide in terms of e-waste generation per capita with 16.2 kg per capita.

8 COOLING EMISSIONS AND POLICY SYNTHESIS REPORT

Context: United Nations Environment Programme and International Energy Agency jointly released this report.

About the report

- It is based on assessment of development and climate benefits of efficient and climate friendly cooling.
- It also lays out actions that can be taken to deliver efficient and climate friendly cooling for all. Key Findings
- Kigali Amendment to the Montreal Protocol could avoid up to 0.4°C of global warming by 2100. Kigali amendment aims to phase-down production and consumption of hydrofluorocarbons (HFCs), used as refrigerants.
- Energy efficiency improvements along with the transition away from super-polluting refrigerants, could avoid greenhouse gas (GHGs) emissions of up to 210-460 giga tonnes over the next four decades.
- Increasing demand for cooling is contributing to emissions of HFCs, CO₂, and black carbon.
- Without policy intervention, emissions from air conditioning and refrigeration are projected to rise 90% above 2017 levels by the year 2050.
- Coordinated international action on energy-efficient, climate-friendly cooling could avoid as much as 460 billion tonnes of GHGs emissions.

9 'Ecological disaster at Baghjan'

Context: Assam's pollution watchdog has told Oil India Ltd (OIL) to shut down production and drilling at all installations in Upper Assam's Baghjan oilfield following some irregularities.

About OIL

- Oil India Limited is the second largest hydrocarbon exploration and production Indian public sector company with its operational headquarters in Duliajan, Assam, India.

- A Navratna PSU, OIL is a fully integrated Exploration & Production (E&P) company in the upstream sector.
- OIL was drilling a well at Baghjan which led to a massive blowout. Baghjan is about 17 km from Doomdooma town in Tinsukia district, Assam.
- The Baghjan oil field has been in operation since 2003 and is one of the high yielding gas and oil fields of OIL.
- The Baghjan oilfield has 21 functioning wells — four of them are gas wells (including the one that reported the blowout) and 17 are oil wells.

The ecological disaster

- The ecological disaster at Baghjan in Tinsukia district was precipitated by the blowout at well number 5, reported on May 27.
- On June 9, the well—located close to the Dibru-Saikhowa national park—caught fire, leading to the deaths of two OIL firefighters.
- Around 11,000 people from the surrounding villages are now in relief camps set up by the administration.
- It affected the flora, fauna and wetlands which is close to the Maguri-Motapung wetland and the ecologically fragile Dibru-Saikhowa National Park.

Dibru-Saikhowa National Park

- Dibru-Saikhowa National Park is located in the Tinsukia district of the state of Assam.
- This was declared a wildlife Sanctuary in 1986 by the government of Assam by uniting two Reserve forest, viz., Dibru and Saikhowa including some other areas.
- Dibru-Saikhowa wildlife Sanctuary was declared as a National park in 1999.
- Dibru-Saikhowa National Park is one of the 19 biodiversity hotspots in the world. It is also a biosphere reserve.
- The park is bounded by the Brahmaputra River and Arunachal hills in the north and Dibru and Patkai hills on the south.
- It mainly consists of semi wet evergreen forests, tropical moist deciduous forest, bamboo, cane brakes and grasslands. Situated in the flood plains of Brahmaputra, at an altitude of about 118 m above sea level.

Maguri-Motapung wetland

- Located less than 10 km south of Dibru-Saikhowa National Park is Maguri Motapung beel.
- Spread over 9.6 sq. km, Maguri Motapung beel was declared an important bird and biodiversity area in 1996.
- It is host to over 110 bird species, including eight listed as threatened on the IUCN Redlist, such as the swamp grass babbler, the ferruginous duck, the white-winged wood duck and the falcated duck.
- Other rare and migratory birds that visit this wetland include the lesser adjutant, the swamp francolin, the lesser teal and the bar-headed goose.
- It is also home to 84 species of fish, including the golden mahseer.

10 INDIA'S FORESTS AND COAL MINING

Context: Giving a boost to the mining sector, the government in its announcements intended to revive the economy following the pandemic. But a boost to mining brings with it associated troubles such as land conflicts, run-ins with communities and an impact on the environment.

What is 'GO and No-Go' zones?

- The concept of declaring certain forest areas within coal blocks as "inviolable" began in 2004. The environment ministry classified certain forests as either 'go' or 'no-go' areas and banned mining from taking place in the latter.
- In 2009, the environment ministry had placed the country's forested areas under two categories - Go and No-Go - and imposed a ban on mining in the 'No-Go' zones on environmental grounds.
- Initial classification and current status of 'no-go' and 'go' zones

	Total No-Go Zones	Go-Zones
Initial classification in 2010	Total land No. of Blocks % of Land	Total land No. of Blocks % of Land
	6,52,572 hectare 605 22.29%	3,20,684 hectare 222 49%
Revised classification	6,02,850 hectare 582 23.27%	4,62,539 hectare 477 76.72%
- **BACKGROUND:**
- On June 18, 2020, Prime Minister Narendra Modi had announced that 41 new coal blocks would be opened for auction to the private sector to power its energy and industrial sectors.
- The decision was part of the announcements made by the Centre under the Aatmanirbhar Bharat Abhiyan. Status of coal mining:
- Since 1980, when the Forest Conservation Act was enacted, India has diverted 0.53 million hectares of forestland for mining, the bulk of it for coal.
- So far coal was mined keeping in mind the requirement of end use, like electricity and steel
- In 2015, the Supreme Court said that coal is a precious national asset and it should be used for specific purposes. Since 2015, 49 coal mining projects have been cleared. The coal industry in India is state-owned, but this auction of 40 new coal blocks will see the creation of a privatised, commercial coal sector in India.

11 PLASTIC POLLUTION IN ATLANTIC AT LEAST 10 TIMES WORSE THAN THOUGHT

Context: There are 12-21 million tonnes of tiny plastic fragments floating in the Atlantic Ocean, scientists have found.

About:

- Marine microplastics (10–1000 µm) belong to the continuum of the discarded plastic debris that enters the ocean from land-based and marine sources.
- The pathways of plastic input are very diverse and include riverine and atmospheric transport from coastal and inland areas illegal dumping activities erosion of legacy refuse dumps direct at-sea littering from shipping, fishing and aquaculture activities
- The ubiquitous presence of microplastics in the marine environment raises concerns over damage they could cause to oceanic ecosystems and eventually to human health.

Key-highlights of the Study

- The new study finds that the total amount of plastic making its way into the Earth's oceans is likely higher than previous estimates suggest.

- A previous study published in 2015 estimated that upward of 12 million metric tons of plastic trash made it into the oceans in 2010 alone.
- The new study estimates that there is upward of 21 million metric tons of three common types of small plastic pollution in just the top 200 meters of the Atlantic- Polyethylene Polypropylene Polystyrene

How does it impact the environment?

- Difficult to decompose: Plastic can take hundreds to thousands of years to decompose depending on the type of plastic and where it has been dumped. Harmful for the ecosystem: In the oceans, plastic pollution impacts marine life, ocean health, coastal tourism and even human health.
- Marine animals unknowingly ingest plastic and often suffocate. While all sorts of marine species are prone to get impacted by plastic pollution, typically, bigger marine species tend to get more attention because of the amounts of debris they can hold up.
- Impacting the entire food chain: Microplastics below the surface of the ocean are bad news for the whole food chain. Small ocean-dwelling creatures eat them, and the plastic makes its way into larger fish and shellfish that humans eat.

12 SAFAR

Context: With a nationwide lockdown in place, over 90 cities, including Delhi, recorded minimal air pollution in the last few days, according to SAFAR.

About:

- The System of Air Quality Forecasting and Research (SAFAR) envisages a research-based management system where strategies of air pollution mitigation go hand in hand with the nation's economic development to target a win-win scenario.
- It provides real-time air quality index 24x7, followed with the advance forecast of 72 hours.
- It measures the sun's UV-Index (UVI), Mercury and Black carbon in real time along with PM1 levels and weather parameters like PM10, PM2.5 and Sulfur Dioxide.
- It also monitors the existence of harmful pollutants like Toluene, Benzene and Xylene.
- The SAFAR system is developed by Indian Institute of Tropical Meteorology, Pune, along with ESSO partner institutions namely India Meteorological Department (IMD) and
- National Centre for Medium Range Weather Forecasting (NCMRWF).

Key-highlights:

- According to the Centre-run System of Air Quality and Weather Forecasting and Research (SAFAR), the impact of the measures taken due to the coronavirus outbreak has resulted in a drop in PM2.5 (fine particulate pollutant) by 30 percent in Delhi and by 15 percent in Ahmedabad and Pune.

Particulate Matter (PM):

- Particulate Matter (PM) is mainly a mixture of both organic and inorganic particles, such as smoke, dust, soot and others. These particles differ in size and composition.
- PM 2.5: PM2.5 is 2.5 micrometres in diameter or much more smaller. These particles are lighter and go much deeper into the human body than PM 10, which can cause greater damage to health.
- PM 10: PM10 are less than 10 micrometres in diameter. It irritates human airways, especially among asthmatics and the elderly. They make your eyes burn and throat dry.

- The level of Nitrogen Oxide (NOx) pollution, which can increase the risk of respiratory conditions, has also reduced.
- NOx pollution is mainly caused due to a high motor vehicle traffic. In Pune, NOx pollution has reduced by 43 per cent, in Mumbai, by 38 per cent and in Ahmedabad, by 50 per cent.
- In March, pollution is in the “moderate” category (Air Quality Index range: 100-200)

13**BLACK CARBON DEPOSITS ON HIMALAYAN GLACIERS**

Context: According to new research by scientists from NASA and Chinese Academy of Sciences, soot deposited on Tibetan glaciers has contributed significantly to retreat of the world’s largest non-polar ice masses – the Himalayan glaciers.

About:

- According to research, **black carbon deposits** on Himalayan ice **threaten earth’s “third pole”**. Tibet’s glaciers are retreating at an alarming rate.
- **The study:** To better understand the role that black soot has on glaciers, researchers trekked high into the Himalayas to collect ice cores that contain a **record of soot deposition that spans back to the 1950s**.
- Researchers collected **ice cores** at five locations on the Tibetan Plateau.
- The amount of soot at site number five, **Zuoqiupu glacier**, increased by **30 percent** between 1990 and 2003.
- Rise in soot levels at Zuoqiupu follows a dip that followed the **enacting of clean air regulations in Europe in the 1970s**.
- According to another study, black carbon concentrations **near the Gangotri glacier rose 400 times** in summer due to forest fires and stubble burning from agricultural waste and triggered glacial melting.
- **Techniques used in the study:** Scientists use satellite instruments such as the Moderate Resolution Imaging Spectroradiometer (**MODIS**) **aboard the NASA satellites Terra and Aqua** to enhance understanding of the region’s albedo.

Black soot/Black carbon – details

- Black soot is generated from **industrial pollution, traffic, outdoor fires, and household burning of coal and biomass fuels**.
- Soot **absorbs incoming solar radiation** and can **speed glacial melting** when deposited on snow in sufficient quantities.
- Soot includes **black carbon**, as well as **organic carbon**.
- Many **industrial processes produce both** black carbon and organic carbon, but often in different proportions.
- Burning **diesel fuel produces mainly black carbon**.
- **Burning wood** produces mainly **organic carbon**.
- Since **black carbon is darker** and **absorbs more radiation**, it’s thought to have a **stronger warming effect** than organic carbon.
- The fine particles **absorb light and about a million times more energy** than carbon dioxide.
- Black carbon results from **incomplete combustion of fossil fuels and biomass**.

Renewable Energy

1 Bundling scheme for Renewable energy

Context: Ministry of new and renewable energy (MNRE) has proposed 'bundling' scheme to boost to renewable energy.

About:

- **MNRE 'bundling scheme':** In order to boost the renewable energy sector, MNRE has come out with the draft framework for a scheme to **supply round-the-clock (RTC) power from wind and solar plants**.
 - ▶ The scheme proposes to **sell renewable energy and thermal power together in a 'bundle'** so that buyers can get the assurance of receiving firm uninterrupted electricity supply.
- **Objective:** The scheme aims at **addressing** issues of **intermittency, limited hours of supply and low capacity utilisation** at renewable power plants, and make them more attractive for state-owned power distribution companies (**discoms**).
- **Working of the scheme:** MNRE has proposed that a government authorised intermediary agency would carry out **auctions** where power sellers can quote **single composite tariffs** for renewable energy-based power, combined with one single thermal fuel source (**coal or gas**).
 - ▶ The intermediary agency would then **sell the power to discoms**.
- **Energy structure in India:** Approximately, **70 per cent** of India's power requirements are coal-based. The higher cost of thermal power is attributed to **rising in the cost of coal imports and no significant capacity addition**. Solar and wind tariffs are cheaper than the cost of thermal power.

Details of bundling scheme

- **Renewable energy supply:** The generator is required to supply **at least 51%** of electricity sold under this scheme from renewable sources.
 - ▶ Renewable power may include a **combination of solar, wind, small hydro** with or without any energy storage system.
 - ▶ The renewable energy component bought under this scheme shall be eligible for complying with **renewable purchase obligation (RPO) norms**.
- **Composite tariff:** The composite tariff would consist of **51%** renewable energy tariff, **30%** thermal fuel cost and the **remaining** would account for the fixed thermal tariff.
 - ▶ The **proportion of thermal tariff shall be adjusted** to cover the possible changes in coal or gas prices, as per the index to be notified by the regulatory commission.

- **Responsibility with power generator:** Power generator will be responsible for supplying the composite power, hence, discoms will no more have to integrate renewable power into the grid.

2 Virtual water trade

Context: Experts are suggesting virtual water trade as one of the alternatives to ensure sustainable water consumption.

Virtual Water Trade

- Virtual water (VW) is the water 'embodied' in a product, not in real sense, but in virtual sense. It refers to the water needed to produce a product.
- Every product has a unique water footprint defined as the total volume of fresh water used to produce the goods and services consumed by the individual or community or produced by the business. For eg. on an average, 3000 liters of water are required for producing 1 kg of rice.
- Virtual water trade (VWT) refers to the import and export of hidden water in the form of products such as crop products, textiles, machinery and livestock — all of which require water for their production.
- The concept of virtual water trade was introduced by Tony Allan in 1993 to explain the imports of water intensive products in arid and semi-arid regions in the Middle East and North Africa, and has its foundations in the notion of comparative advantage (CA) propounded by David Ricardo.
- In comparative advantage theory, nations should export products in which they possess a relative or comparative advantage in production, while they should import products in which they possess a comparative disadvantage.

3 BIOETHANOL BLENDING OF PETROL

Context: The government has set targets of 10 per cent bioethanol blending of petrol by 2022 and to raise it to 20 per cent by 2030 under the ethanol blending programme to curb carbon emissions and reduce India's dependence on imported crude oil.

What are 1G and 2G biofuel plants?

- Biofuels are liquid or gaseous fuels that are produced from biodegradable fractions of products, remains from agricultural production and forestry, as well as biodegradable fractions of industrial and municipal wastes.
- However, ethanol produced from renewable energy sources is one of the most promising biofuels for the future.
- 1G bioethanol plants: 1G bioethanol plants utilise sugarcane juice and molasses, byproducts in the production of sugar, as raw material
- 2G bioethanol plants: Whereas 2G plants utilise surplus biomass and agricultural waste to produce bioethanol.
- 1G and 2G bioethanol plants are set to play a key role in making bio-ethanol available for blending but face challenges in attracting investments from the private sector.

Context: The First World Solar Technology Summit will be organized by International Solar Alliance, ISA on a virtual platform on 8th of September. Prime Minister Narendra Modi will deliver the inaugural address of the First World Solar Technology Summit.

ABOUT:

- The World Solar Technology Summit is an attempt to bring together scientists, engineers and member states to sit down together and think about what the challenges are in realising the dream of making energy affordable and abundant
- The objective of the event is to bring the spotlight on state-of-the-art technologies as well as next-generation technologies which will provide impetus to the efforts towards harnessing solar energy more efficiently.
- It will help provide a multilateral connect when global trade is increasingly being viewed through the bilateral prism.
- Discussion topics include- PV technology development and its future recent advances – including conversion efficiency improvements and declining costs – in PV modules and storage disruptive solar technologies for grid application – ground-mounted, floating or on residential and commercial rooftops solar beyond the power sector ISA Journal on Solar Energy
- ISA would also be launching the ISA Journal on Solar Energy that would help authors from across the globe to publish their articles on solar energy, during the event.

International Solar Alliance

- Officially announced during the UN Climate Change Conference in Paris in 2015, the ISA is a partnership of solar resource-rich countries.
- Countries located between the Tropic of Cancer and Tropic of Capricorn, the two regions that receive the most amount of sunlight, are mostly the members of ISA.
- Currently, 121 countries have agreed to be members of ISA. Most of these are countries with a large participation from Africa, South-east Asia, and Europe.
- Pakistan and China are not a members of the ISA.
- It is headquartered in Gurugram. The ISA aims to reduce the cost of solar technology and finance to facilitate the deployment of more than 1 TW of solar generation capacity and mobilize more than \$1 trillion (Rs74.6 lakh crore) of solar power investment by 2030 in its member countries.
- It's only been a year and a half since ISA started working in a full-fledged way. Projects worth 1.4 billion has already been tied up and is at different stages of construction. Progress so far:
- Clean energy projects now account for more than a fifth of India's installed power generation capacity.

Environmental Governance

1

DRAFT ENVIRONMENT IMPACT ASSESSMENT NOTIFICATION 2020

Context: The Ministry of Environment, Forest and Climate Change (MoEFCC) has proposed a draft Environmental Impact Assessment (EIA) notification to replace the current EIA notification 2006.

About:

- All projects that fall under the purview of the Environment Protection Act (EPA), 1986, require an environmental clearance (EC) for running its operations. They are usually given before a project commences.
- EIA notification 2006 issued under EPA regulates EC given by government for projects such as dams, mining, thermal power plants, infrastructure projects like highways, ports, airport and big construction projects etc.
- The new notification is being brought in order to make the process more transparent and expedient by implementation of an online system, further delegation, rationalisation and standardisation of the EIA process.
- The notification incorporates several scattered amendments that the government made from time to time since the 2006 notification for streamlining the process, decentralization and implementation of the directions of Courts and National Green Tribunal (NGT). Salient Features of the Draft EIA Notification and their Analysis

2

UN DECADE ON ECOSYSTEM RESTORATION

Context: The United Nations General Assembly (UNGA) proclaimed 2021–2030 as the Decade on Ecosystem Restoration.

UN Decade on Ecosystem Restoration:

- The UN Decade on Ecosystem Restoration aims to massively scale up the restoration of degraded and destroyed ecosystems as a proven measure to fight the climate crisis and enhance food security, water supply and biodiversity.
- It seeks to:
 - Showcase successful government-led and private initiatives to halt ecosystem degradation and restore degraded ecosystems.
 - Enhance knowledge exchange to implement restoration at scale.
 - Connect initiatives working in the same landscape, region, or topic, to increase efficiency and impact.

- Create links between ecosystem restoration and businesses interested in sustainable production and impact investment.
- Bring a wider spectrum of actors on board, especially from non-traditional sectors, by demonstrating the importance of environmental and socio-economic benefits of ecosystem restoration.
- Ecosystems addressed include forests, grasslands, croplands, wetlands, savannahs, inland water, coastal and marine ecosystems, and even urban environments.

3 STATE OF THE WORLD'S FORESTS REPORT

Context: Recently, United Nations Environment Programme (UNEP) and Food and Agriculture Organization (FAO) has jointly released a report titled The State of the World's Forests (SOFO) 2020.

About:

- It examines the contributions of forests, and of the people who use and manage them, to the conservation and sustainable use of biodiversity.
- It assesses progress to date in meeting global targets and goals relating to forest biodiversity.
- It describes the effectiveness of policies, actions and approaches for conservation and sustainable development alike, illustrated by case studies of innovative practices and winwin solutions.
- This issue of SOFO draws on the results of FAO's Global Forest Resources Assessment 2020 (FRA 2020).
- FRA 2020 examined the status and trends of more than 60 variables related to the extent, characteristics, condition, management and uses of forest across 236 countries and areas over the period 1990–2020.

4 'Centre issues rules for import, possession of exotic species'

Context: In the wake of the Covid-19 pandemic, the wildlife division of the Union environment ministry has issued rules for dealing with the import of exotic species and will assess the existing scale of possession within the country.

About:

- Exotic live species are both plants and animals that are moved from their source (original) habitat to a new one due to human intervention.
- An **exotic species**, known also as **introduced, alien, non-native** or **non-indigenous** species, is that foreign species that have been introduced in a zone out of its natural distribution.
- This introduction usually happens for human causes, either voluntarily or involuntarily.
- In India as in the world, much of the exotic live species is currently legal.
- There exists a large demand and market for animals like ball pythons, pocket monkeys, crocodile skinks, hissing cockroaches and a wide range of exotic birds.

Reason behind the move

- The decision comes in the wake of the Covid-19 pandemic, its suggested linkage with wet markets in China, and the zoonotic factor.
- So far there was no mechanism to regulate the process. There is no unified information system available of such stock of species at the State or Central level.

- There has been no detail about the population status, numbers poached, illegal trade hubs and dynamics of these species.
- This makes it difficult to know the impacts of illegal trade on the population status of many of these captured animals
- The Centre intends to streamline the process by officially identifying those handling such species or involved in their legal trade, as per mandates of the Convention on International Trade in Endangered Species (CITES), which India is a signatory to.

5 'Environment performance index'

Context: India secured 168 rank in the 12th edition of the biennial Environment Performance Index (EPI Index 2020).

What is EPI Index?

- The **Environment Performance Index** ranks 180 countries on 32 performance indicators across 11 categories covering environmental health and ecosystem vitality.
- The global index considered 32 indicators of environmental performance, giving a snapshot of the 10-year trends in environmental performance at the national and global levels.
- **Publisher:** The Index was developed by the Center for Environmental Law & Policy at Yale University and the Center for International Earth Science Information Network (CIESIN) at Columbia University in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission.

India's performance

- India's rank was 177 (with a score of 30.57 out of 100) in 2018. The country scored 27.6 out of 100 in the 2020 index.
- India scored below the regional average score on all five key parameters on environmental health, including air quality, sanitation and drinking water, heavy metals and waste management.

The Global Findings

- Denmark came in first place, followed by Luxembourg and Switzerland. The United Kingdom ranked fourth.
- China, which is plagued by poor air quality, has made investments that have helped it climb to 120th place, ahead of India's 168th-place ranking.
- The 11 countries lagging behind India were — Burundi, Haiti, Chad, Solomon Islands, Madagascar, Guinea, Côte d'Ivoire, Sierra Leone, Afghanistan, Myanmar and Liberia.
- All South Asian countries, except Afghanistan, were ahead of India in the ranking.

Country	Global Score in the EPI Index	Ranking in South Asia	Global ranking
Bhutan	39.3	1	107
Sri Lanka	39.0	2	109
Maldives	35.6	3	127
Pakistan	33.1	4	142
Nepal	32.7	5	145

	29.0	6	162
India	27.6	7	169
	25.5	8	178

6 UNESCO-IOC Tsunami-Ready Recognition to Odisha Communities'

Context: Odisha has achieved another milestone in disaster management. Venkatraipur in Ganjam and Noliasahi in Jagatsinghpur have been recognised by UNESCO-IOC as Tsunami-Ready Communities.

About:

- The Indian Ocean Tsunami Ready Programme of IOC-UNESCO is a community performance-based programme.
- It facilitates tsunami preparedness as an active collaboration of the community, community leaders, and national and local emergency management agencies.
- The main objective of this programme is-
 - ▶ to improve coastal community preparedness for tsunami emergencies
 - ▶ to minimize the loss of life and property
 - ▶ to ensure structural and systematic approach in building community preparedness.
- The Tsunami Ready program is implemented by the Odisha State Disaster Management Authority (OSDMA).

Tsunami

- A tsunami is a series of great sea waves caused by an underwater earthquake, landslide, or volcanic eruption.
- More rarely, a tsunami can be generated by a giant meteor impact with the ocean.
- A tsunami is not a single wave but a series of waves, also known as a wave train. The first wave in a tsunami is not necessarily the most destructive. Tsunamis are not tidal waves.

7 GOVT NOTIFIES BS-VI EMISSION NORMS FOR QUADRICYCLES'

Context: The government has notified BS-VI emission norms for quadricycles, paving the way for higher production of the new category of vehicle that was introduced less than two years ago.

What is quadricycle?

- A quadricycle is the size of a three-wheeler but with four tyres and is fully covered like a car.
- It has an engine like that of a three-wheeler. This makes it a cheap and safe mode of transport for last-mile connectivity.
- A quadricycle cannot be more than 3.6 metres long, should have an engine smaller than 800cc,

and should not weigh more than 475 kilograms.

- In 2018, the government had introduced the quadricycle segment with necessary standards to produce the vehicle.
- It had approved the vehicle for both commercial and private use.
- India's automobile industry has been urging the ministry to set BS-VI emission standards for quadricycles, after the norms were rolled out for other segments starting 1 April, 2020.
- Currently, only a few automobile players in India manufacture quadricycles.
- After the government had allowed the introduction of the vehicle in 2018, Bajaj Auto Ltd was the first to commercially launch 'Qute' under this segment.
