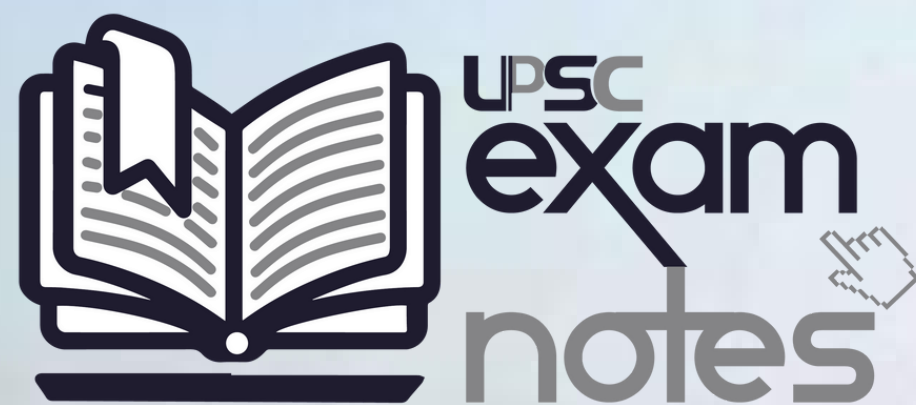




ENVIRONMENT & ECOLOGY
REVISION MODULE
(APRIL 2022 - DECEMBER 2022)



ENVIRONMENT & ECOLOGY MODULE

(APRIL 2022 – DECEMBER 2022)



Table of Contents

GREAT INDIAN BUSTARD	1
ENDANGERED SPECIES.....	3
1. Introduction	3
2. Rhinoceros & Elephants	3
3. Anti-Poaching Measures	4
4. Challenges	4
MAHUA	5
1. Introduction	5
2. Mahua-Omnipresent	5
3. Uses.....	6
4. Backed by Science	6
5. Boon / Ban.....	7
6. Excess	7
7. Epilogue	8
HORNBILLS	8
NEW GLOBAL BIODIVERSITY FRAMEWORK	10
1. Context.....	11
2. Biodiversity Importance.....	11
3. What is Kunming Montreal Global Biodiversity framework?.....	11
3.1 Key Points	12
5. What funding arrangements are planned?.....	13
FOREST RIGHTS.....	13
SARSA RIVER POLLUTION	16
1. Context.....	16
2. Key Points	16
3. Sarsa River	16
4. Pollution in the River Sarsa.....	17
5. Guidelines to prevent pollution	17
MARINE PLASTIC POLLUTION	18



CoP27	21
CITES	28
GREAT NICOBAR	31
MANGROVE ALLIANCE FOR CLIMATE (MAC)	35
BHARAT STAGE EMISSION	37
1. Context.....	37
2. Bharat Stage emissions standards.....	38
3. Difference between BS-IV and BS-VI	38
4. BSI, BSII, BSIII, BSIV, and BSVI emission norms	39
5. Effect on Automobile Industry.....	40
WORLD NETWORK OF BIOSPHERE RESERVE (WNBR)	41
CORONAL HOLES	43
BLUE-FLAG BEACHES	44
BIOGAS.....	46
LIVING PLANET REPORT 2022.....	49
LIFE FOR CLIMATE ACTION	50
1. Context.....	51
2. Key Points	51
3. Paris Agreement and the COP26 summit	51
4. LIFE, a fresh perspective	52
4.1 Needed guiding frameworks	52
4.2 Goals of LIFE	52
4.3 Global Vision	53
4.4 LIFE mission	53
5. India's track record.....	53
6. Onus on the developed world.....	53
7. Panchamrit Targets	54
GRADED RESPONSE ACTION PLAN (GRAP)	54
Why in News.....	55
What is a Graded Response Action Plan (GRAP)	55
Has GRAP Helped?	55



Actions under GRAP	57
Severe+ or Emergency	57
Severe	57
Very Poor	57
Moderate to Poor	58
KEIBUL LAMJAO CONSERVATION	59
ONE WATER APPROACH	61
COASTAL REGULATION ZONE	66
1.Context	66
2.Key Points	66
3.The CRZ Rules	66
1991 Rules	67
4.Evolution of Rules	67
5.Shailesh Nayak Committee	67
2018 CRZ Rules	68
6.The Current situation	68
CRZ-IIIA	68
CRZ-IIIB	68
7.Cases in Kerala	68
BAN ON SINGLE-USE PLASTICS	69
1.Context	69
2.Harmful effects	70
3.Resolutions	70
4.Plastic waste management rules in India	70
5.Steps taken by GoI	71
6.Role of Manufacturers	71
7.Challenges	71
8.Conclusion	72
HIGH SEAS TREATY	72
1. Context	72
2. What is High Seas Treaty?	72



3. What are the High Seas?	73
4. Significance of High Seas	73
5. About BBJN	74
VEHICULAR POLLUTION	74
FORESTS LAWS IN INDIA.....	77
2.Key Points	78
3.Forests in law	78
4.Forest Conservation Act, 1980.....	78
5.Chhattisgarh case	79
6.Orange and a grey area	79
7.Policy Jam	80
8.Compensatory Afforestation	80
ARCTIC WARMING.....	81
1.Key points	81
2.Arctic Amplification.....	81
3.Previous studies	82
4.Consequences	82
5.Impact on India.....	83
6.Epilogue	84
CARBON MARKET	84
1.Context.....	84
2.Key takeaways.....	84
5.Conclusion.....	85
ENVIRONMENT IMPACT ASSESSMENT (EIA)	86
2.About EIA	87
3.Issues of Regulations	87
4.OBSERVATION BY AGENCIES.....	87
5.Reasons behind.....	88
6.How to fix a Problem.....	88
GREAT BARRIER REEF	88
LIFESTYLE FOR ENVIRONMENT (LiFE).....	92



HASDEO ARANYA REGION.....	95
1.Context.....	95
2.Private member resolution	95
3.Importance of the Hasdeo-Aranya region.....	96
4.Controversy	96
5.Withdrawal.....	97
6.Will mining stop after the resolution is passed?.....	97
FLY AWAY	98
1.Context.....	98
2.What is Fly Away?	98
3.Fly Away's in Indian Sub-Continent	98
4.Conservation of Migratory Species (CMS) Convention.....	101
Raptor MoU	102
5.Conclusion.....	102
LION'S FUTURE CHEETAH'S PAST.....	102
2.RELEASE (In Phased Manner).....	103
3.Target milestone	103
4.Problems.....	103
5.KEY TERMS	104
5.1.What is a flagship species?.....	104
5.4.What is a keystone species?	105
5.5.What is an indicator species?	106
BANNI GRASSLANDS.....	106
Eco-Sensitive Zone (ESZ)	109
GLOBAL ENVIRONMENT FACILITY	114
1.Context.....	115
3.Biodiversity woes	116
4.Global Environment Facility (GEF)	116
5.Financial Mechanism.....	117
Trust Fund	117
KEIBUL LAMJAO NATIONAL PARK.....	117



CONSTITUTION - PROTECTION OF WILDLIFE	119
1. Background	119
2. Supreme Court verdict	119
Red Dunes Desert.....	120
1. Key Points	120
2. How did they form?	122
BONN CLIMATE CONFERENCE	123
ENVIRONMENTAL PERFORMANCE INDEX	125
Green hydrogen: Fuel of the future	129
1. Context	129
2. What is green hydrogen?	129
3. Why is India pursuing green hydrogen?	130
4. How much green hydrogen is India producing?	130
Advantages of hydrogen as a fuel	131
OLIVE RIDLEY TURTLES	131
Forest Conservation Act 1980	134
1. Context	134
2. Definition of Forests	134
3. What is the Forest Conservation Act (FCA)?	135
4. FCA Amendments	135
5. Deemed forest	136
GM CROPS	136
2. Key points	137
3. Several Approaches	137
4. CRISPR-Cas-9	137
PM-KUSUM	138
Three Components of PM-KUSUM Yojana	139
UN BIODIVERSITY CONFERENCE	140
HUMAN-ANIMAL CONFLICT	143
1. Introduction	143
LAND-BASED PATHOGENS	146



FOREST FIRES	148
Electric vehicles catching fire	152
1.Context	152
2.Key Points	152
SEABIRDS	154
TIGER CONSERVATION IN INDIA.....	156
KAREWAS	159
1.About	159
2.Geological Distribution.....	159
3.Economic Importance	159
4.Conservation.....	160



SUBJECT WISE TEST SERIES

NECESSARY FOR EVERYONE

01



MODERN INDIAN HISTORY - 1

Covered all the Important topics from Modern Indian history & It is important for Prelims

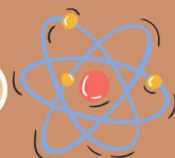
02



ECONOMY - 2

All the important topics from NCERT and Current Affairs topics from Economy

03



SCIENCE & TECHNOLOGY - 2

All the important topics from Current Affairs of Science & technology

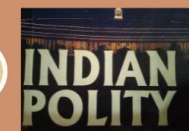
04



ENVIRONMENT & ECOLOGY - 2

All the Important topics from Current Affairs and Subject books

05

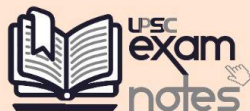


POLITY - 2

All the Important Topics from reference books like Laxmikanth and Current Events

www.upsccexamnotes.com

9642608080, 8971134181



Abode for Affordable Success

CURRENT AFFAIRS TEST SERIES FOR 2023

NECESSARY FOR EVERYONE



10 Tests

We have covered each and Every Topic Which were prominent in the National and International Current Affairs in the Test Series

**Starting from
04th April**

**At Just 999
(incl.GST)**

www.upsceexamnotes.com

9642608080, 8971134181



GREAT INDIAN BUSTARD

1. Context

The Supreme Court asked if the project Great Indian Bustard could be launched on the line of "Project Tiger".

2. About Great Indian Bustard

Found-This bird is mainly found in Rajasthan and Gujarat. Great Indian Bustard historic range included much of the Indian subcontinent. But it has shrunk to just 10% of that. It is locally known as "Godawan"



3. Status

- International Union for Conservation of Nature (IUCN) status – critically endangered.

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)-Appendix 1
- Convention on Migratory Species (CMS)-Appendix 1
- Wildlife (Protection) Act, 1972-Schedule 1

4. Habitat

- Great Indian Bustard prefers grasslands.
- Terrestrial birds spend most of their time on the ground, feeding on insects, lizards, grass, seeds, etc.
- Flagship species-Great Indian Bustard is considered the flagship bird species of grassland and hence a barometer of the health of grasslands ecosystems.

5. Threats

Power Transmission Lines –among the greatest threat to the Great Indian Bustard are overhead transmission lines.

Due to their poor frontal vision, the birds cannot spot the power lines from a distance and are too heavy to change course when close. Thus they collide with the cables and die.

Hunting

Attack by feral dogs and wild pigs

- The natural habitat of Bustards is also an ideal space for setting up wind turbines and solar panels.
- Habitat loss due to widespread agriculture.
- According to the Wildlife Institute of India (WII), in Rajasthan, 18GIBs die every year after colliding with power lines.

6. Steps Taken

The Supreme Court ordered all overhead power transmission lines in core and potential Great Indian Bustard habitats in Rajasthan and Gujarat be made underground.

The court sought reports from the chief secretaries of the two states in six weeks on the installation of bird diverters (reflector-like structures strung on power cables) in priority areas. SC asked them to assess the length of transmission lines that need to go underground.

The captive breeding programme of the Great Indian Bustard was spearheaded by the wildlife institute of India, Dehradun

ENDANGERED SPECIES

1. Introduction

- Kaziranga National Park is considered the greatest conservation success story in 2005 when it completed a century.
- It is attributed to a rhino protection force that shoots alleged poachers at sight.
- More than 55 armed men were killed within the boundary of the 1,300 Sq. Km tiger reserve for unauthorised entry since 2012-13.

2. Rhinoceros & Elephants

- The population of the one-horned rhino was about 12 when Kaziranga became a protected area in 1905.

As per the State of Rhino Report 2022, the number of poor-sighted herbivore's number in Kaziranga is about 2,613, more than 65% of its total population of 4,014 across 11 habitats in India & Nepal.

- A decade ago, the rhino population in these domains was 2,454.
- Some conservationists say the focus on rhinos is too much which has made other animals in its domains beneficiary.

- For instance, the number of tigers has increased in Assam at a rate higher than elsewhere in India.
- A 2010 report shows that Kaziranga has the highest density of tigers 32.64 per 100 Sq. Km. in the world.
- India is home to nearly 60% Asian elephants & the last count of the species in 2017 had put the number at 29,964.
- The number of elephants in India has increased in the past few years, the species is listed as "**Endangered**" on the IUCN Red List of threatened species & Schedule I of The Wildlife Protection Act.

3. Anti-Poaching Measures

- The strengthening of the anti-poaching mechanism in India & Nepal with more manpower, capacity-building of frontline staff & equipping forest guards with better fighting gear have helped protect the rhino.
- The sentiments of local people attached to the rhino have been a factor in the sharp drop in the number of rhinos killed, from 54 in 2013-14 to 1 each in 2021-22.
- The threat from poachers cannot be wished away because of the illegal wildlife trade in next-door Myanmar & Southeast Asia.

While poaching remains a major threat to rhinos, alien invasive plant species grabbing key grassland habitats in rhino-bearing areas in the last decade has emerged as a bigger threat to the animal in India & Nepal.

4. Challenges

- The largest land-dwelling mammal is under continuous threat of poaching & conflict with humans.
- The incidents of poaching for ivory have come down, and human-elephant conflict has been increasing.
- On average, about 500 humans & 100 elephants are killed every year across the country.
- The elephant population is not uniformly distributed in the country.
- South Indian states of Karnataka, Kerala, Andhra Pradesh, and Tamil Nadu are home to nearly 44% of India's elephant population.

- Fragmentation of elephant habitats & construction of linear & power infrastructure has led to many elephant deaths.
- The change in land use, particularly bringing erstwhile forested areas under agriculture has aggravated the conflict.
- The Ministry of Environment, Forest & Climate Change launched Project Elephant in 1992 to ensure the long-term survival of elephants in their natural habitats.
- The number of elephant reserves in India is 32 with the latest addition in Agasthyamalai Elephant Reserve in 2022.
- Elephant corridors, linear narrow habitat linkages which allow elephants to move between secure habitats are crucial for conservation.
- About 101 elephant corridors have been identified in the country which needs to be secured for the conservation of elephants.

MAHUA

1. Introduction

- Many Adivasi communities like Munda, Gond, Oraon, Baiga, Ho & Santhal depend on Mahua even before they are born.
- These people live by the tropical deciduous forests of India, spreading from the drier parts of Gujarat in the west to the Chotanagpur Plateau in the east.

2. Mahua-Omnipresent

- From birth, through marriage, till funeral, mahua is intertwined with cultural life.
- In daily life, mahua is omnipresent from food to fodder, medicine to alcohol.
- Would-be mothers of the tribal people are fed a simple chutney made of mahua flowers which are believed to be healthy.
- Mahua is a part of wedding rituals & mahua liquor is served at the ceremony.

Mahua (*Madhuca Indica*), the seed does not spread its roots in the soil but also blooms within the Adivasi. For them, "**Mahua is not a tree, it's our way of life**".

3. Uses

- Like Mahua flowers, mahua seeds are non-timber forest products.
- A major portion of the seeds collected by the tribals is solid in the one or two oil presses of nearby towns & the rest is for household consumption.
- The oil from the seed is used to light lamps or in cooking.
- It is used for treating skin disease, rheumatism, bilious fever, and constipation among other things.
- Seeds & flowers are galactagogues which boost breast milk production & are good for new mothers.
- After oil extraction, the leftover seed cake is utilised as an insecticide, cattle feed or manure.

4. Backed by Science

- The seeds yield 34-37% of oil.
- Locals use the oil as an adulterant of 'Ghee' after some rudimentary processing.
- World Health Organization (WHO) don't consider this as edible in its raw form, as it contains aflatoxin, a toxic component.
- The processing of the oil can get rid of the aflatoxin & makes it edible as per safety standards.
- More than oil, the cocoa butter extender prepared from mahua seed oil is a prized product, which is used to make chocolate / other confectionaries.
- This oil is a potent biodiesel. The researchers have developed & tested the Mahua Oil Biodiesel (MOB) with promising results.
- These products offer a wonderful scope that can alter the socio-economic conditions of the tribal communities.
- The fuel properties adhere to international quality standards.
- MOB or blends of MOB with diesel is a good competitor for diesel, with reliable performance & lower emissions.
- The flour prepared with the leftovers is suitable for making bakery products.

- Due to the presence of foaming agents, it is used for preparing laundry soaps.
- A few studies have identified the chemical components of the seeds & developed bio-insecticides & bio-pesticides.

5. Boon / Ban

India has a huge opportunity to materialise the potential of mahua seeds, but there remain some serious caveats.

The price of MOB and its blends could vary between Rs. 48 - Rs.60 per litre, whereas the price of conventional diesel was around Rs.65 per litre in 2017. It's unclear what price for mahua seeds was considered and how that could have impacted the calculation. Five years later, when diesel price is now hovering around Rs.100 per litre and India is mulling over alternatives, the importance of mahre biodiesel becomes more relevant.

For mahua oil or butter, research hasn't shown us any direction, but the existing market for them has. There exists a non-tribal market for mahua oil and butter.

Anyone can buy it from leading E-Commerce sites, where mahua oil price varies from Rs.65 - Rs.1700 per litre, presumably depending on its usefulness and quality, and mahua butter is available at Rs.125 per 100 grams.

If this non-tribal market base can be expanded and popularised, then it can provide better economic opportunities to the Adivasis. Considering they will receive a fair share of the profit, it can strengthen and sustain their traditional livelihoods.

6. Excess

- Mahua is a slow-growing tree and its population is declining in multiple pockets throughout its range.
- It's been speculated that seed harvesting practices by Adivasi communities may be the reason for this decline.

- The ripe mahua fruits fall from the trees and tribals collect these seeds from the ground below the canopy where the chances of seed germination and seedling survival are negligible.

Due to the high concentration of seeds here, there are susceptible to fungal attack, grazing and other threats, and face high mortality. This phenomenon is called the seed shadow effect.

- If not collected, the seeds are going to rot & not add to the population.
- Since the oil content of mature seeds is higher, fruits were not plucked.
- The seed harvesting practice is very much non-invasive for the trees & highly sustainable.

7. Epilogue

- The composite picture is bright & not gloomy. It can be concluded that at least seed harvest is not detrimental to the mahua population.
- Many seeds are left untouched & not grazed.
- There lies an opportunity to encash the non-tribal market for mahua seed-derived products, without exerting any impact on trees.
- Eliminating the exploitation & realising the outside market presents a win-win opportunity for the tribals & trees will go a long way.
- Mahua is an immensely important tree species for the functioning of the dry forest ecosystem & for the Adivasis.
- Since mahua trees are maintained as an agroforestry practice, it helps to maintain the local biodiversity.

HORNBILLS

1. Introduction

- The logo for India's G20 presidency was unveiled recently at the Hornbill festival in Nagaland.

- This festival showcases the art, culture & cuisine of Nagaland, including the most magnificent birds in India.
- The Great Hornbill is found in the Himalayan foothills, the Northeast & the Western ghats.
- With a wingspan of 5 feet, it presents an awesome spectacle while landing on a perch.
- The wreathed hornbill, the brown hornbill, and the rufous-necked hornbill are slightly smaller & only found in Northeast India.
- A great place to spot the oriental pied hornbill is the Rajaji National Park, Uttarakhand.
- The Malabar grey hornbill's loud laugh echoes in the western ghats.
- The smallest of the group, the Indian grey hornbill is found all over & is often spotted in urban settings like Theosophical Society gardens, Chennai.
- Their large, heavy beaks pose some limitations for balance, the first two vertebrae are fused.

Hornbill is the state bird of Arunachal Pradesh & Kerala.

Large beaked toucans are observed in Central & South America as an example of convergent evolution & they have the same feeding ecology.



2. Tall Trees

- Hornbills prefer tall trees for their nests, with their height being 1.5 meters or more.
- There is a mutualism between these birds & the trees where they nest.
- As large fruit-eating birds, hornbills play a vital role in dispersing the seeds of about 80 rainforest trees.
- Trees like Cup-calyx white cedar suffer a 90% decline in seed dispersal beyond the parent tree when the hornbill population decline.
- The towering Tualang tree of Southeast Asia is entwined in folklore that it is considered taboo to feel this tree.
- It is the preferred habitat of the helmeted hornbill.
- The fruiting season coincides with the birds' reproductive cycle.
- Traditional ecological knowledge stresses the value of hornbills in dispersing the seeds, which are expectorated from birds' throats.

3. Hunting

- Tall trees are the first targets of illegal logging & there is a slow decline in hornbill numbers, as reflected in bird counts.
- It is slow because these birds are long-lived for nearly 40 years.
- Their large size makes them prone to hunting.
- The helmeted hornbill of Sumatra & Borneo is critically endangered because of its helmet-like casque called red-ivory, which is highly-priced.
- Hornbill population appears to be faring better in South India.
- The Nature Conservation Foundation, Mysuru collected data to show that forest plantations are not suited for hornbill populations.
- The adaptable nature of hornbills is seen in their feeding on the fruits of the African Umbrella tree, which was introduced as a shade tree in coffee plantations.

NEW GLOBAL BIODIVERSITY FRAMEWORK



1. Context

The Convention on Biological Diversity (CBD), the United Nations agreement to conserve and sustainably use earth's biodiversity, got a boost at a conference held in Montreal recently when 188 of 196 member governments agreed on a new framework to halt the sharp and steady loss of biological species.

2. Biodiversity Importance

Biodiversity often called the web of life, biodiversity signifies the variety of species on earth, which are all connected and sustain the balance of ecosystems, enabling humans to coexist. They interact with the environment to perform a host of functions.

The CBD states that only about 1.75 million species have so far been identified, including numerous insects, while there may be some 13 million species.

Some familiar ecosystem services rendered by diverse living forms, of which plants and animals are the most visible, include providing humans with food, fuel, fiber, shelter, building materials, air and water purification, stabilization of climate, pollination of plants including those used in agriculture, and moderating the effects of flood, drought, extreme temperatures, and wind.

Disruption of these produces severe impacts such as failed agriculture, aberrant climate patterns, and cascading losses of species that accelerate the degradation of the earth.

3. What is Kunming Montreal Global Biodiversity framework?

The Global Biodiversity Framework is considered equivalent to the Paris Agreement on climate change in terms of its significance for protecting biodiversity.

The 15th Conference of Parties (COP15) to the UN Convention on Biological Diversity (CBD) adopted the Kunming-Montreal Global Biodiversity Framework (GBF) on December 19, 2022. The framework has 23 targets that the world needs to achieve by 2030.

The targets are ambitious, considering that biodiversity is in a poor state. In 2020, the world failed to meet the last set of targets, the Aichi Targets. Countries would need to ensure success this time around.

This agreement means people around the world can hope for real progress to halt biodiversity loss and protect and restore our lands and seas in a way that safeguards our planet and respects the rights of indigenous peoples and local communities.

3.1 Key Points

- Through Kunming-Montreal Global Biodiversity Framework (GBF), countries agreed to protect 30 percent of the planet by 2030.
- The countries pledged to achieve 23 targets to reverse ecosystem degradation under four overarching goals for the survival of the natural world.
- Under the Global Biodiversity Framework (GBF), countries also agreed to reduce harmful government subsidies worth 500 billion dollars annually, while vowing to identify subsidies that are harmful to biodiversity by 2025.
- Its other targets include reducing the use of pesticides by half and raising annual international financial flows from developed to developing countries to at least 20 billion dollars by 2025, and to at least 30 billion dollars by 2030.

4. Convention on Biological Diversity(CBD)

Opened for signature in 1992 at the Earth Summit in Rio de Janeiro, and entering into force in December 1993, the CBD is an international treaty for the conservation of biodiversity, the sustainable use of the components of biodiversity, and the equitable sharing of the benefits derived from the use of genetic resources.

With 196 Parties, the CBD has near universal participation among countries. The Convention seeks to address all threats to biodiversity and ecosystem services, including threats from climate change, through scientific assessments, the development of tools, incentives, and processes, the transfer of technologies and good practices, and the full and active involvement of relevant stakeholders including indigenous peoples and local communities, youth, women, NGO's,

sub-national actors and the business community. The Cartagena Protocol on Biosafety and the Nagoya Protocol on Access and Benefit-sharing is a supplementary agreement to the CBD.

Cartegena Protocol: The Cartagena Protocol, which entered into force on 11 September 2003, seeks to protect biodiversity from the potential risks posed by living modified organisms resulting from modern biotechnology. To date, 173 parties have ratified the Cartegena Protocol.

The Nagoya Protocol: The Nagoya Protocol aims to share the benefits arising from the utilization of genetic resources fairly and equitably, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies. Entering into force on 12 October 2014, it has been ratified by 135 parties.

5. What funding arrangements are planned?

- By 2030, the GBF hopes to see at least \$200 billion raised per year from all sources towards the implementation of national action plans. In terms of international funding, developing countries should get at least \$20 billion a year by 2025 and at least \$30 billion by 2030 through contributions from developed countries.
- The Global Environment Facility (GEF), a multilateral body that partners with countries and agencies, has been asked to establish in 2023, and until 2030, a Special Trust Fund to support the implementation of the GBF.

FOREST RIGHTS

1. Introduction:

- 39 areas were declared by UNESCO in 2012 as being critical for biodiversity in the Western Ghats, out of 10 are in Karnataka.
- Before recognising areas as world heritage sites, UNESCO seeks the opinion of the inhabitants on the implication of the possible declaration on their lives & livelihoods.

- The primary stakeholders were Scheduled Tribes (STs), other dwellers include Scheduled Caste (SC), Backward Classes, minorities & the general category.

2. Forest Rights Act:

- The majority of the forest dwellers claimed land measuring not more than one acre.
- It is clear that the claims were nowhere closer to the ceiling of four hectares permitted under the Forest Rights Act (FRA).
- The rejection rate of the other traditional forest dwellers was two times more than the STs.
- The wastelands & forest lands which have not been notified as protected forests or reserved forests are known as Revenue lands or Paisari Bhoomis.
- In the case of the STs, the reasons were attributed to fresh encroachments, the claimants not living on the lands claimed, and claimed lands being called revenue lands.
- In the case of other traditional forest dwellers, it was mainly failure to produce evidence of dependency & dwelling on forest land for 75 years.
- The FRA is a good law which recognizes the rights of the STs because of their overall backwardness.
- Many people felt that there should be a closure to this act & the process cannot go on forever with new claims emerging on regular basis.
- Presenting the declaration of the world heritage site in a positive light, they said that illegal tree-felling & poaching have come down following the stringent implementation of rules in protected areas.
- The people in the villages falling under eco-sensitive zones said they had started experiencing severe restrictions on their entry into forests.
- Development activities like road repair were stopped.
- Farming is not allowed in a normal way, a slight sound demurs, and the use of fertilizers is not allowed to be carried into the forest.
- The people are prohibited from cutting trees falling on their houses to undertake repair work or move the earth.
- A striking revelation was that these restrictions were in enforcement from the time these areas were declared as protected areas & not necessarily after their declaration as world heritage sites.

- The increasing animal insurgency is causing damage to the crops of the farming forest dwellers.
- Those who don't have recognition over their lands are not given compensation for the loss.
- Monkeys & snakes released from urban settings into the forests enter their houses. The monkeys do not survive in the wild for long.
- Owning livestock in villages close to forests is more challenging than in regular revenue villages.
- In the areas where irrigation projects have come up, the affected people reported that grazing lands were taken over by the government to compensate for the forest land lost to projects.

Half the world heritage sites in Karnataka fall under protected areas- 1 National Park, and 4 Wildlife Sanctuaries; the remaining are reserved forests.

3. Current Status:

- The respondents had the lands claimed under the FRA even though their applications were rejected or still pending.
- In many places, they were apprehensive that people were accepting the resettlement packages & moving out of protected areas for good.
- If half the village population moved away, it would become difficult for the remaining ones to live their normal life.
- Most forest dwellers said that they were still deprived of basic facilities & other government benefits extended under various schemes & programmes as they don't possess the 'Records of Rights, Tenancy & Crops'.
- The government must address this issue in consonance with the rules of the Act.
- The issue becomes complicated when the people refuse to 'relocate' on grounds of their attachment to the land fearing extinction of their culture & religious roots.
- The government must bring more clarity to the Act to avoid conflicts between the government agencies conserving biodiversity & people living in the forest for decades & centuries.
- The conservation of biodiversity requires special attention.
- Forest dwellers willing to live in the forest must be allowed to stay.

- Many of them comply with the norms of the eco-sensitive zones because they do not depend on modern development needs like the use of fertilizers & mobile phones.
- In the same breath, those wanting to experience the fruits of development must be relocated as per their choice of new place & suitable package.
- This can be possible only when the areas declared as protected are arrived at after consultations with the local population.
- This did not transparently take place at the time of the declaration of the world heritage site when protected areas were notified.

SARSA RIVER POLLUTION

1. Context

As Sikhs across India and the rest of the World observe the 356th Birth Anniversary of Guru Gobind Singh, a rivulet in north India associated with a key moment in his life is gasping for breath.

2. Key Points

- The Sarsa was where the Guru's family got separated in the winter of 1704, never to be together again.
- The rivulet is thus important in Sikh Consciousness. But one of India's largest manufacturing hubs located near it has made the water completely unfit for human consumption.
- Pharmaceutical waste being discharged either directly or indirectly into the Sarsa from the Baddi-Barotiwala-Nalagarh (BBN) industrial complex has affected the River's biota and made the lives of people living along its banks difficult.
- The pharma waste could also be causing the area to become prone to antimicrobial resistance which is a ticking time bomb.

3. Sarsa River

- The Sarsa originates in the Shivalik hills in Himachal Pradesh.

- It flows through Solan district borders Punjab, enters Rupnagar district in Punjab and eventually flows into the Sutlej.
- On December 21, 1704, a pitched battle had taken place on the banks of the Sarsa between the Khalsa and Mughal armies.

4. Pollution in the River Sarsa

- The BBN complex is spread over 380 square kilometres in the Solan district near the Sarsa.
- BBN hosted around 500 small, medium and large pharma units and accounted for 35 per cent of Asia's total medicine production.
- The rapid industrialisation and a lax attitude towards safe disposal and management of pharma waste have raised concerns about the effects of pollution on the environment and health.
- The water of the Sarsa river, which flows downstream through Baddi is **black and emanates a foul odour**.
- The collected water samples from the Sarsa river by covering a stretch of 20 km from four sampling spots, before and after the amalgamation of Common Effluent Treatment Plant treated pharmaceutical effluents into river water samples.

The impact of concentration of heavy metals (Cadmium, Manganese, cobalt, lead, copper, zinc and iron) and identify the most contaminated sampling spot responsible for heavy metal contamination in river water samples.

- The concentration of each heavy metal was within the permissible limits before amalgamation and dwindled gradually after amalgamating pharmaceutical effluents into the river water samples.

5. Guidelines to prevent pollution

- The Water (Prevention and Control of Pollution) Act, of 1974 lays down guidelines about the penalties to be imposed on those who are polluting water resources.
- Those who pollute water are liable for a prison sentence of up to six years under the Act.
- There is also the Air (Prevention and Control of Pollution) Act of 1981 which has to be followed.

MARINE PLASTIC POLLUTION

1. Introduction

Marine plastic pollution is a global menace. There is a need for regular and standardized monitoring of marine litter to understand long-term changes in marine litter pollution and for the successful development and implementation of mitigation strategies.

2. Land-Based Sources

Based on a fixed percentage of the mismanaged plastic waste entering the oceans (15% for the low-range estimates and 40% for the high-range estimates), they estimated that between 4.8 and 12.7×10^6 t of plastic entered the global oceans.

3. Ocean-Based Sources

Plastic waste can also enter the ocean directly from ocean-based sources such as the fishing industry, commercial and recreational shipping, and offshore platforms.

4. Micro Plastic Survey of India

Under the Coastal Ocean Monitoring and prediction system (COMPAS) programme by ICMAM-PD now the national centre for Ocean Research of the Ministry of Earth Sciences, accumulation of marine debris was reported along the coast of Great Nicobar Island, Andaman. This is the first Indian scientific publication and it is reported that 8% of the total solid waste is produced in plastic waste the top three cities that contribute the most to pollution are Delhi, Kolkata and Ahmedabad.

Plastic pollution in India increased by 39.7% and now stands at 9.46 million tonnes of plastic waste per year when five years ago it was 5.7 million tonnes per year. However 15% of the plastic waste produced is recycled in India and

the rest is sent to landfills, incinerators or dumped into the oceans and rivers. Rivers contribute to about 67% of the total marine plastic debris in the World.

5. Tamilnadu Coast

Tamilnadu coast has a long coastline but stands second in plastic production in India and the plastic waste reaching through rivers and land run-off and ghost gear dumped cause serious problems to the flora and fauna as well as the livelihood of the fishing communities along the coast. The Government of Tamilnadu banned the usage of Thin plastic (Polymers of thickness below 40 microns).

Thermocol (30.82%), Plastic bags (28.30%), Bottles and Caps (13.84%), straws (12.83%), and food wrappers (8.97%) comprises the majority of microplastic debris.

6. Biodiversity-Gulf of Mannar Biosphere

The Gulf of Mannar is an important biodiversity hotspot as it supports numerous marine ecosystems and provides a sense of economic security for Tamilnadu due to its fisheries resources. Anthropogenic influences on the environment leading to pollution and climate change are the major causes of biodiversity degradation worldwide.

7. Abandoned, Lost or Discarded Fishing Gear (ALDFG)

Abandoned, Lost or Discarded Fishing Gear (ALDFG) is a serious problem worldwide as there is a lack of data. Most of these wastes are due to shipping or fishing accidents, bad weather etc. and while most of the lost gear is retrieved by the fishers, the little that remains causes serious problems to the marine ecosystem. About 20% of all the plastic debris in the oceans is from ALDFG according to UNEP.

8. Microplastics

- Plastics are made from non-renewable sources such as crude oil and hence they are hard to decompose as the polymers are bonded through covalent bonds, a strong bonding force. Microplastics are about 5mm in diameter and are always disposed into the environment through anthropogenic sources.

- The majority of the plastic debris (~94%) in the Oceans disintegrates into microplastic while the remaining 6% remains as microplastic.
- Microplastics show a high affinity to other toxicants, making them more dangerous to the organisms ingesting them.
- Calculating the amount of microplastic entering the ocean can be challenging as they are small and the rate at which plastics degrade is unknown. The large discharge causes harm to the natural ecosystems and inevitably affects humans too.
- Under the Marine plastics survey programme of NCCR, the distribution of microplastics was studied in Coastal locations in the Bay of Bengal and Arabian Sea in particular along the international waters.
- The most dominant type of microplastics found in the water column is microfiber/lines. The major types of polymers identified in the study are Polypropylene (PP), High-Density Polythene (HDPE), Low-Density Polythene (LDPE) and Poly(amide-6) (Nylon).
- One of the main plastics, polyethene terephthalate (PET) is found in clothes and when these clothes are washed small plastics known as Microplastics are released.

9. Swachh Sagar, Surakshit Sagar

Commemorating the 75th year of India's Independence, a coastal cleanup drive was carried out at 75 beaches across the country for 75 days over a 7500 km long coastline. This unique first-ever national campaign culminated on "International Coastal Cleanup Day" on 17 September 2022. This drive was aimed to remove 1500 tonnes of garbage from the sea coast which will be a huge relief to marine life and the people staying in coastal areas.

10. Discussion

The biodiversity of India is unique, and steps must be taken to ensure its safety. Plastic pollution is a concerning issue as consumption and discharge have increased but no steps have been taken by India to study, monitor and reduce plastic usage. While the petrochemical sector is the backbone of plastic production, it is also considered a yardstick for measuring global growth; where plastic processing and production are of vital importance.

CoP27

1. Introduction:

The COP27 is significant due to the agreement on loss & damage. But the meeting did not address several other pressing issues.

Recently COP27 got concluded in Egypt. It was the first climate summit held in Africa since 2016. The next conference will be hosted by Dubai in 2023.

2. COP:

- The Conference of Parties (COP) is the apex decision-making body of the United Nations Climate Change Framework Convention (UNFCCC).
- The UNFCCC was formed in 1994 to stabilize greenhouse gas emissions & to protect the earth from the threat of climate change.
- A key task for the COP is to review the national communications & emission inventories submitted by parties. Based on this information, the COP assesses the effects of the measures taken by Parties & the progress made in achieving the ultimate objective of the Convention.
- The COP meets every year unless the Parties decide otherwise. The first COP meeting was held in Berlin, Germany in March 1995. The COP meets in Bonn, the seat of the secretariat unless a Party offers to host the session.
- As the COP Presidency rotates among the five recognized UN regions- Africa, Asia, Latin America, Caribbean, Central & Eastern Europe, Western Europe & others. There is a tendency for the venue of the COP to also shift among these groups.

3. COP 27:

- As per un.org, the 27th conference of the Parties to the United Nations Framework Convention on Climate Change (COP27), which took place in the Egyptian coastal city of Sharm el-Sheikh, concluded with a historic decision to establish & operationalize a loss & damage fund.
- UN Secretary-General Antonio Guterres said that more needs to be done to drastically reduce emissions now. The world still needs a giant

leap in climate ambition. The red line that must not be crossed is the line that takes earth over the 1.5⁰ temperature limit.

- From 6 to 20 November, COP27 held high-level & side events, key negotiations, and press conferences, hosting more than 100 heads of State & Governments, over 35,000 participants & numerous pavilions showcasing climate action around the world & across different sectors.

4. Major Takeaway:

- India & other countries engaged constructively & actively on the subject of loss & damage, which refers to the destruction caused by climate change-induced disasters. For instance, the money needed for relocating people displaced by floods was a long-pending demand of poor & developing countries, including India.
- The new loss & damage fund is a testament to the perseverance & tenacity of climate-vulnerable countries & civil society groups.

5. Loss & Damage Fund:

- The decision by nations around the world to establish a fund to help poor countries hit hard by a warming planet was one of the most significant since UN climate talks began 30 years ago.
- It was an unequivocal confirmation that poor countries, with limited resources, are being most impacted by extreme weather events like floods, heat waves, and storms & at least at some level, industrialized nations that have done the most to contribute to climate change have a responsibility to help.

6. History behind Loss & Damage:

- In the early 1990s, the alliance of small island states, a group of low-lying coastal & small island countries, began calling for the establishment of loss & damage funds as the United Nations was creating a framework to deal with climate change on an international level. Since then, the idea was always a part of annual UN climate summits.
- It was often talked about on the margins of negotiations, something developing nations & activists would push for while many rich nations used their weight to squash the idea. For the first time, at this year's

COP27, it was included in the agenda & became the centrepiece of discussions.

7. Funding:

- The fund will initially draw on contributions from developed countries & other private & public sources, like international financial institutions, with an option for other major economies to join down the line.
- The final text points to identifying & expanding sources of funding, something the US & others had pushed for during negotiations, suggesting that nations that are both high-polluting & considered developing under the criteria, should pay into the fund.
- During the talks, China said money for the new fund should come from developed countries, not them. But there's precedence for China to voluntarily pay into climate funds if the US does too. When the Obama administration pledged \$3 billion to the Green Climate Fund in 2014, China also paid \$3.1 billion for the fund.
- More details of who pays will be decided by a committee that plans to get the fund going within a year.
- The deal says the fund will assist developing countries that are particularly vulnerable to the adverse effects of climate change, though there will be room for middle-income countries that are severely affected by climate disasters to get paid. Pakistan which was devastated by flooding that put a third of the country underwater or Cuba, recently battered by Hurricane Ian, could be eligible.
- The loss & damage fund will fit in with other institutions, and agencies that are out there doing humanitarian work, helping people rebuild, dealing with migration & refugee crises, dealing with food security, and water security will need to be worked out, said David Waskow, the World Resource Institute international climate director. Those details will also be hammered out by the committee in the coming year.

8. Facts about Loss & Damage Funds:

8.1. Rebuilding Trust:

- Beyond financial help, setting up the fund is seen as a huge step forward, but how it's ultimately viewed will depend in part on how fast it can be set up. In the closing session, Antigua's Lia Nicholson said

the transitional committee should be set up immediately & given clear mandates.

- This loss & damage fund must become the lifeboat that we need it to be. There is a credibility gap because of past broken promises.
- In 2009, rich nations agreed to provide \$100 billion a year to help developing countries transition to green energy systems & adapt to climate change. However, to date, that initiative has never been fully funded.

9. Repercussions:

- One of the main reasons that rich nations long opposed such a loss & damage fund was the fear that it would open them up to long-term liability.
- Despite the passage, that concern is very much still at play, as evidenced by how negotiators made sure the language of the fund didn't say liability & that contributions were voluntary.
- Despite those caveats, the establishment of such a fund could have repercussions, both legal & symbolic, in climate circles & beyond. For example, several Pacific Island nations have been pushing for the International Court of Justice to consider climate change.
- They argue that international laws must be strengthened to protect their rights in the case that their lands are engulfed by rising seas. The establishment of a loss & damage fund could bolster those arguments.

10. Major Misses of COP27:

- The Sharm el-Sheikh climate meeting will probably always be remembered for its decision to set up a loss & damage fund. This decision has earned it a place among the major milestones in the global response to climate change.
- But on most other parameters, the Sharm el-Sheikh meeting, the 27th session of the Conference of Parties to the UN Framework Convention on Climate Change or COP27, proved to be an underachiever.
- The meeting was built up as the implementation COP or the meeting that would accelerate the actions being taken on climate change. The final agreement had little to justify that expectation.

11. Mitigation:

- Going into the conference, it was expected that COP27 would respond to the growing urgency for greater emission cuts. Most scientific estimates now suggest that the 1.5⁰ Celsius target for temperature rise is likely to be breached within a decade.
- With current efforts to reduce emissions, the world is headed to a temperature rise of about 3⁰ Celsius from pre-industrial times by the end of this century.
- There were different ways in which COP27 was expected to respond to this. One of the ideas, floated by the European Union, was to ask every country to strengthen their respective climate actions every year from now to 2030, a radical suggestion that was unlikely to have met with approval from most countries. As of now, the countries have to upgrade their climate actions every five years. The latest upgrade was just this year.
- Another idea was to call for a phase-down of all fossil fuel use. This was unlikely to have done much to reduce emissions in the short term but would still have been meaningful towards the larger objective of curbing the use of the main cause of global warming.
- The idea, proposed by India, was initially expected to be opposed by developed countries, especially since their dependence on oil & gas has increased in the last year. However, after initial hesitation, both the EU as well as the United States backed the proposal. The opposition came from within the ranks of the developing countries, especially from the oil-producing Gulf nations. The matter was not pushed.
- The least that was hoped for on this front was an inclusion of a stronger mention of the goal of pursuing the 1.5⁰ Celsius target. It would have been little more than a statement of intent. But even that was not agreeable to all.
- The only decision in this regard was to continue the discussions on a work programme set up last year to urgently scale up mitigation action. COP27 decided that two global dialogues would be held each year as part of this work programme.

12. Adaptation:

- Most of the conversation on climate actions is focused on mitigation efforts. Developing countries, which are more vulnerable to the impacts of climate change, have often argued that adaptation is not given sufficient attention.

- Adaptation involves efforts that help a country negate or deal with the impacts of climate change.
- At the Glasgow climate meeting, an effort was initiated to define global goals on adaptation, just as the 2⁰ or 1.5⁰ Celsius targets serve as the global goal for mitigation.
- Defining global adaptation is much more complex, considering that the benefits of adaptation occur locally, not at a global level. If at all, there would be multiple global goals on adaptation. It was hoped that COP27 would make some progress in identifying the adaptation goals.
- However, nothing much was delivered on this track, except for expressing support for the Glasgow-Sharm el-Sheikh work programme that is scheduled to finish its work next year.
- Another expectation was to see some money flowing in for adaptation purposes. Developing countries have been demanding that at least half of climate finance should be directed towards adaptation projects. Some countries, including the United States, did promise some money, but it wasn't more than a trickle.
- An important initiative on adaptation came from the UN Secretary-General, who unveiled plans of the World Meteorological Organisation (WMO) to set up early warning systems in areas that do not have them. About one-third of the world, including about 60% of Africa, is not equipped with early warning & climate information systems.
- The WMO said this needs to be corrected in the next five years. The COP27 agreement said it fully supported the initiative & invited development organisations & international financial institutions to help the effort.

13. Finance:

- The biggest disappointment, not surprisingly, came in matters related to money. The developed countries have not yet delivered on their promise to mobilise USD 100 billion every year, something that should have happened in 2020.
- All that the COP27 agreement, did about this was to express serious concern. Interestingly, the COP27 agreement for the first time quantified the financial needs for climate action. It said about USD 4 trillion had to be invested in the renewable energy sector every year till 2030 if the 2050 net zero targets were to be achieved.

- Additionally, at least USD 4-6 trillion was required every year for global transformation to a low-carbon economy. About USD 5.9 trillion was needed by the developing countries in the pre-2030 period, just to implement their climate action plans.
- The developed countries have said they will ensure the USD 100 billion flow from 2023. A parallel discussion is going on to scale up this amount from 2025. Additionally, the COP27 agreement has urged international financial institutions to simplify their procedures & priorities, so that it is easier for developing countries to access money for climate actions.

Though the idea of loss & damage reparations is nearly as old as global climate change negotiations, mitigation & adaptation dominated COPs for nearly 3 decades. There was a growing feeling amongst countries with the highest vulnerability to climate change, but with a minuscule GHG footprint, that their concerns were not being addressed. The devastating floods in Pakistan led to the amplification of the demands for climate reparations.

14. Actions of India:

14.1. Sectoral transformations are key:

- India has prioritised 6 strategic sectors-electricity, transport, urban, industry, carbon dioxide removal & forests.
- Of these, electricity & industry sectors together account for over three-fourths of India's CO₂ emissions, while rapid changes are happening in the transport & urban systems.
- Finance & investments-According to a council on energy, environment & water assessment, India will need \$ 10 trillion to achieve the 2070 net-zero target.

14.2. Changes to Life:

- Life is India's call for citizens, communities, industry leaders & policymakers of the world to adopt a lifestyle for the environment.
- Investment in research & innovation-Identifying multiple technologies in the energy & industry sectors that need to be explored & scaled up.
- Innovations in business models are equally important to push low-carbon technologies.

15. Adaptation, Resilience & international cooperation:

The need for strengthening basic infrastructure like irrigation systems & disaster-resilient buildings, institutional infrastructure for better disaster response & raising incomes to bolster the capabilities of individuals & communities to adapt to the long-term impacts of climate change. This needs international cooperation & multilateral initiatives & platforms.

16. Carbon Pricing:

- Through the emission-trading scheme as a key instrument creation of a domestic carbon market.
- In a country like India, small & marginal farmers form the majority & agricultural production decisions are made as a response to government policies like minimum support prices, import protection & credit availability.
- Since actions towards GHG mitigation from food, land, and agriculture have immense co-benefits concerning human nutrition, soil health & water conservation should be central to domestic strategies.
- Changing food habits & adopting sustainable agricultural practices are the key to climate change mitigation.
- The National Hydrogen Mission launched in 2021 aims to make India a green hydrogen hub.
- The country has clean energy plans like 20% ethanol blending with petrol to burn less fossil fuel by 2025 & an electric vehicle project has been on the government's anvil for at least 5 years.

CITES

1. Introduction:

- CITES-Convention on International Trade in Endangered Species of Fauna & Flora.
- Elephants' remains are one of India's most powerful cultural & religious symbols.

- A pioneer in banning even the domestic trade in ivory in 1986, India was at forefront of global elephant conservation initiatives.
- India surprised many at the conference of CITES by voting against the proposal of re-opening the international trade in ivory.
- The proposal to allow a regular form of controlled trade in ivory from Namibia, Botswana, South Africa, and Zimbabwe was defeated 83-15 in Panama City.

2. CITES Agreement:

- CITES is an international agreement among 184 countries' governments to ensure that international trade in wild animals and plants do not threaten the survival of the species.
- The convention entered into force in 1975 & India became the 25th party-a state that voluntarily agrees to be bound by the Convention.
- All import, export & re-export of species covered under CITES must be authorised through a permit system.
- CITES Appendix-1 lists species threatened with extinction, import or export permits for these are issued rarely & only if the purpose is not primarily commercial.
- CITES Appendix-2 includes species not necessarily threatened with extinction but in which trade must be strictly regulated.

The Conference of the Parties (CoP), every two years, the supreme decision-making body of CITES, applies a set of biological & trade criteria to evaluate proposals from parties to decide if a species should be in Appendix-1, 2.

3. Tussle Over Ivory:

- The international ivory trade was globally banned in 1989 when all African elephant populations were put in CITES Appendix-1.
- The populations of Namibia, Botswana & Zimbabwe were transferred to Appendix 2 in 1997, and South Africa's in 2000 to allow two 'one-off sales' in 1999 & 2008 of ivory stockpiled from natural elephant deaths & seizures from poachers.
- Namibia's proposal for allowing a regular form of controlled trade in ivory by delisting the elephant populations of 4 countries from Appendix 2 was rejected at CoP-17(2016), and CoP-18(2019).
- At the ongoing CoP-19, the proposal was moved by Zimbabwe but met the same fate.

- The 4 African countries argue that their elephant populations have bounced back & their stockpiled ivory if sold internationally, can generate much-needed revenue for elephant conservation.
- Opponents of the ivory trade counter that any form of supply stokes demand & that sharp spikes in elephant poaching were recorded across the globe after the one-off sales allowed by the CITES in 1999, and 2008.

4. India-Ivory Trade:

- The endangered Asian elephant was included in CITES Appendix-1 in 1975, which banned the export of ivory from Asian range countries.
- In 1986, India amended The Wildlife Protection Act, of 1972 to ban even domestic sales of ivory.
- After the ivory trade was globally banned, India again amended the law to ban the import of African ivory in 1991.
- In 1981 when New Delhi hosted CoP3, India designed the iconic CITES logo in the form of an elephant.

5. Important Conference of Parties (CoP)

5.1.1992-CoP8:

In Kyoto, Japan, Indian delegate Arin Ghosh, then director of the project tiger, noted a polarisation of parties. One for sustainable use & trade in wildlife, the other favouring total ban & stricter control, with the latter, fortunately, outnumbering the former.

5.2.1994-CoP9:

At Lauderdale, US, India opposed the down-listing of the elephant population of South Africa from Appendix 1 to 2.

5.3.1997-CoP10:

At Harare, Zimbabwe, India opposed the proposal to down-list the southern African elephant populations, expressing "Concern over, repercussion for Asian Elephant, particularly about poaching."

5.4.2000-CoP11:

At Gigiri, Kenya, India moved a proposal along with the host country to uplist all elephant populations in Appendix 2 to 1.

At CoP17, 18, India voted against a proposal to re-open trade in ivory from the southern African states.

In Johannesburg, South Africa, India expressed its willingness to share its experiences of protecting elephants & supporting rural development without
--

recourse to trade in ivory.

6. Changes:

- After protracted negotiation, India signed an agreement with Namibia to fly in Cheetahs.
- India agreed to promote sustainable utilisation & management of biodiversity by supporting advances in this area of bilateral cooperation at international forums including meetings of CITES.
- Namibia sought India's support under this agreement for the longstanding proposal to re-open the ivory trade at CITES.
- Indian Government has not received any written communication from the Republic of Namibia regarding the lifting of the ban on the ivory trade.
- Though the agreement signed between the Government of the Republic of Namibia & Government of the Republic of India includes wildlife conservation & sustainable biodiversity utilization as one of the areas of cooperation, this cannot be construed as support for lifting the ban on trade in endangered species.

7. Epilogue:

When the proposal on the ivory trade was put to vote at CoP19, India chose to abstain & not vote against it.

GREAT NICOBAR

1. Context:

The Ministry of Environment, Forest & Climate Change gave environmental clearance for the ambitious Rs 72,000 crore development project on the strategically important Great Nicobar Island.

The project is to be implemented in three phases over the next 30 years.



2. Proposal:

- A "Greenfield city" was proposed, including an International Container Transshipment Terminal (ICTT), a greenfield international airport, a power plant, and a township for the personnel who will implement the project.
- The proposed port will allow Great Nicobar to participate in the regional & global maritime economy by becoming a major player in cargo transshipment.
- The port will be controlled by the Indian Navy, while the airport will have dual military-civilian functions.
- Roads, public transport, water supply & waste management facilities & several hotels have been planned to cater to tourists.
- 130 sq km of forests have been sanctioned for diversion & 9.64 lakh trees are likely to be felled.
- Development activities are proposed to commence in the current financial year & the port is expected to be commissioned by 2027-28.

- More than 2.5 lakh direct & indirect jobs are likely to be created on the island throughout development.

3. The Island:

- Great Nicobar, the southernmost of the Andaman & Nicobar Islands, has an area of 910 sq km.
- The Andaman & Nicobar islands are a cluster of about 836 islands in the eastern Bay of Bengal, the two groups of which are separated by the 150-km wide Ten Degree Channel.
- The Andaman islands lie to the north of the channel & the Nicobar islands to the south.
- Indira point on the southern tip of Great Nicobar Island is India's southernmost point, less than 150km from the northernmost island of the Indonesian archipelago.
- Great Nicobar is home to two national parks, a biosphere reserve & the Shompen & Nicobarese tribal people, ex-servicemen from Punjab, Maharashtra, and Andhra Pradesh who were settled in the 1970s.
- The Shompen are hunter-gatherers who depend on forest & marine resources for sustenance.
- The Nicobarese, who lived along the west coast of the island, were mostly relocated after the 2004 tsunami.
- An estimated 237 Shompen & 1094 Nicobarese now live in a 751 sq km tribal reserve, some 84 sq km of which is proposed to be denotified.
- Approximately 8,000 settlers who live on the island are engaged in agriculture, horticulture & fishing.
- The Great Nicobar Island has tropical wet evergreen forests, mountain ranges reaching almost 650m above sea level & coastal plains.
- Fourteen species of mammals, 71 species of birds, 26 species of reptiles, 10 species of amphibians & 113 species of fish are found on the island, some of which are endangered.
- The leatherback sea turtle is the island's flagship species.

4. Purpose:

- The island has a lot of tourism potential, but the government's greater goal is to leverage the locational advantage of the island for economic & strategic reasons.
- Great Nicobar is equidistant from Colombo to the southwest, Port Klang & Singapore to the southeast, positioned close to the East-West international shipping corridor.
- The proposed ICTT can potentially become a hub for cargo ships travelling on this route.
- The proposal to develop Great Nicobar was first floated in the 1970s & its importance for national security, and consolidation of the Indian Ocean Region was repeatedly underlined.
- Increasing Chinese assertion in the Bay of Bengal & the Indo-Pacific has added great urgency to this imperative in recent years.

5. Concerns:

- The proposed massive infrastructure development in an ecologically important, fragile region, including the felling of almost a million trees, has alarmed environmentalists.
- The loss of tree cover will not only affect the island but will also lead to increased runoff & sediment deposits in the ocean, impacting the coral reefs in the area.
- Environmentalists have flagged the loss of mangroves.
- India has translocated a coral reef from the Gulf of Mannar to the Gulf of Kutch previously.
- The Zoological Survey of India is currently in the process of assessing the relocation sustaining of coral reef.
- The government has said a conservation plan for the leatherback turtle is being put in place.
- According to the government, expediting the project is of paramount security & strategic importance.
- After the grant of stage 1 clearance, all aspects will be weighed before final approval.
- The project site is outside the eco-sensitive zones of Campbell Bay & Galathea National Park.
- The Centre said that the development area is only a small percentage of the area of the island & its forest cover.

MANGROVE ALLIANCE FOR CLIMATE (MAC)

1. Background

The Mangrove Alliance for Climate (MAC) seeks to educate & spread awareness worldwide on the role of mangroves in curbing global warming & its potential as a solution for climate change.

2. COP 27:

- 27th Session of the Conference of Parties (COP27), was held in Egypt, launching Mangrove Alliance for Climate(MAC).
- India's goal is to increase its carbon sink, New Delhi collaborating with Sri Lanka, Indonesia & other countries to preserve & restore the mangrove forests in the region.
- India is home to one of the largest mangroves-the Sundarbans & has years of expertise in the restoration of mangrove cover that can be used to aid global measures in this direction.

3. MAC:

- An initiative led by the United Arab Emirates (UAE) & Indonesia, the MAC includes India, Sri Lanka, Australia, Japan & Spain.
- UAE's Minister of Climate Change, while launching the alliance, said that their country intends to plant 3 million mangroves in the next two months, in keeping with UAE's COP26 pledge of planting 100 million mangroves by 2030.
- UAE is launching MAC in collaboration with Indonesia.
- The parties will share expertise & support each other in researching, managing, and protecting coastal areas.

4. Mangroves-Significance:

- Mangroves were the focus of conservationists for years & it is difficult to overstate their importance in the global climate context.
- Mangrove forests consist of trees & shrubs that live in intertidal water in coastal areas and host diverse marine life.
- They support a rich food web with molluscs, algae-filled substrate acting as a breeding ground for small fish, mud crabs & shrimps, providing a livelihood to local artisanal fishers.
- Mangroves act as effective carbon stores, holding up to four times the amount of carbon as other forested ecosystems.

Mangrove forests capture vast amounts of carbon dioxide from the atmosphere & their preservation can aid in the removal of carbon from the atmosphere & prevent the release of the same upon their destruction.

5. Current State of Mangroves:

- South Asia houses the most extensive areas of mangroves globally, while Indonesia hosts one-fifth of the overall amount.
- India holds around 3% of South Asia's mangrove population. Besides the Sundarbans, the Andaman region, the Kachchh & Jamnagar areas in Gujarat have substantial mangrove cover.
- Infrastructure projects, industrial expansion, the building of roads & railways, shifting coastlines, coastal erosion & storms have significantly decreased mangrove habitats.
- During 2010-2020, around 600 sq km of mangroves were lost of which more than 62% was due to direct human impacts.

6. India at COP:

India's focus currently is on concessional & climate-specific grants to drive climate finance & has teamed up with Brazil, South Africa, and China (BASIC) to negotiate agreements.

7. Demands:

- In the previous sessions of the climate conference, building consensus among the 190+ countries that are members of the UN Framework Convention on Climate Change (UNFCCC) is a tough task.
- China has ramped up the use of coal amidst energy security risks & rising tensions with Taiwan.

- The European Union, which negotiates as a single entity for its 27 members, is at the lower end of the spectrum of gas emitters but is under pressure to ease its resistance to its staunch position against the issue of loss & damage.
- This issue calls for rich & developed countries to compensate poorer, developing countries disproportionately affected by climate change's effects.
- G77 & China is the UN's largest intergovernmental organisation of developing countries.
- Pakistan, which faced devastating floods this year, will lead the group in its demand for a dedicated fund for compensation from wealthy countries.
- The Climate Vulnerable Forum, which represents 58 countries that are disproportionately affected by the consequences of climate change like Bangladesh, Maldives reportedly demands a dedicated fund in which rich polluting nations help bear the costs of loss & damage.

BHARAT STAGE EMISSION

1. Context

The Supreme Court said no Bharat Stage IV vehicle shall be sold across the country with effect from April 1, 2020.

The apex court was deciding whether a grace period should be given to automobile manufacturers for the sale of BS-VI non-compliant vehicles after April 1, 2020. At a previous hearing, advocate Aparajita Singh, assisting the top court as an amicus curiae in the air pollution matter, had opposed the government's move to give time till June 30, 2020, to automobile manufacturers

to sell their BS-VI non-compliant four-wheelers manufactured on March 31, 2020

The upgrade from BS-IV to BS-VI: what needs to be done

BS-V requires a specific fitment in the vehicle's engine. BS-VI needs one more, and each comes with issues that need fixing

FOR BS-V: DIESEL PARTICULATE FILTER, OR DPF

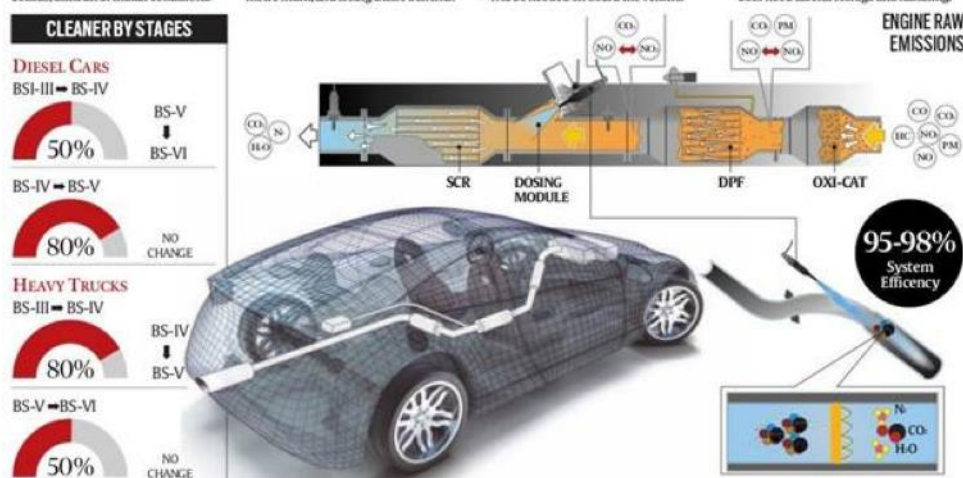
WHAT IS IT? DPF is a cylinder mounted vertically in the engine compartment. Its function is to remove particulate matter, or soot, from the diesel exhaust. It needs temperatures of 600 degrees Celsius, difficult in Indian conditions.

WHAT'S THE PROBLEM? Small cars, popular in India, have limited bonnet space, and will require a major redesign to accommodate DPF. But a bigger bonnet may result in the car breaching the sub-4-metre mark, and losing excise benefits.

FOR BS-VI: SELECTIVE CATALYTIC REDUCTION TECHNOLOGY

WHAT IS IT? An SCR module reduces the oxides of nitrogen in the engine exhaust by injecting an aqueous solution called AUS 32 into the system. AUS 32 contains ammonia, for which a separate container will be needed on board the vehicle.

WHAT'S THE PROBLEM? An anti-defect mechanism is required to put the vehicle in the limp mode if AUS 32 is not refilled. Nationwide infrastructure will be needed for supply of AUS 32, which is safe, but does need careful storage and handling.



ROADMAP FROM BS-IV TO BS-VI

BS-IV

BY APRIL 1, 2015

■ All of North India (J&K except Leh & Kargil, Punjab, Haryana, HP, Uttarakhand, Delhi and bordering districts of Rajasthan and Western UP; All of Goa, Kerala, Karnataka, Telangana, Odisha; UTs of Daman & Diu, Dadra & Nagar Haveli, Andaman & Nicobar; parts of Maharashtra and Gujarat.

FUEL SUPPLY COMMENCED

BY APRIL 1, 2016

■ Corridor spanning highway link through Gujarat and Rajasthan linking North India to ports on west coast.

FUEL SUPPLY COMMENCED

BY APRIL 1, 2017

■ Rest of the Country

BS-V SKIPPED

BS-VI

BY APRIL 1, 2020

As per order issued by the Ministry of Road Transport and Highways on May 22, 2015, all oil marketing companies and other stakeholders are required to switch directly from BS-IV to BS-VI quality fuel.

SOURCE: Report of the Expert Committee on Auto Fuel Vision & Policy, 2025, Government of India, 2014

2. Bharat Stage emissions standards

- The Bharat Stage emission standards are standards instituted by the government to regulate the output of air pollutants from motor vehicles from internal combustion engine equipment, including motor vehicles. India has been following European (Euro) emission norms, although with a time lag of five years. The BS IV norms had been enforced across the country since April 2017. In 2016, the Centre announced that the country would skip the BS-V norms altogether and adopt BS-VI norms by 2020. Implementation of the intermediate BS-V standard was originally scheduled for 2019.
- The first emission norms were introduced in India in 1991 for petrol and 1992 for diesel vehicles. Following these, the catalytic converter became mandatory for petrol vehicles and unleaded petrol was introduced in the market.

3. Difference between BS-IV and BS-VI

The main difference in standards between the existing BS-IV and the new BS-VI auto fuel norms is the presence of sulphur. The BS-VI fuel is estimated to

bring around an 80 percent reduction of sulphur, from 50 parts per million to 10 ppm. According to analysts, the emission of NO_x (nitrogen oxides) from diesel cars is also expected to come down by nearly 70 percent, and 25 percent from cars with petrol engines.

4. BSI, BSII, BSIII, BSIV, and BSVI emission norms

- The abbreviation BS, as mentioned above, refers to 'Bharat Stage'. It is prefixed to the iteration of the actual emission norms. The primary rules with the soubriquet Asian nation 2000 were introduced in the year 2000, with the second and third iterations being introduced in 2001 and 2005 with the soubriquet BSII (BS2) and BSIII (BS3), respectively.
- The fourth iteration, BSIV, was introduced in 2017 and therefore the delay between the introduction of BS3 and BS4 resulted in fast-tracking the BSVI or BS6 emission norms rather than BSV (BS5) norms.
- On 29 April 1999, the Supreme Court of India ruled that all vehicles in the country had to meet Euro I or India 2000 norms by June 1, 1999, and Euro II would be mandatory in the National Capital Region (NCR) from April 2000. Carmakers were not prepared for this transition and in a subsequent judgment; the implementation of Euro II was deferred.
- In 2002, the government accepted the report submitted by the Mashelkar committee, which proposed a road map for the rollout of Euro-based emission norms in India. It also recommended a phased implementation of future norms, with regulations being implemented in major cities first and extended to the rest of the country after a few years.
- Based on the recommendations of the committee, the National Auto Fuel policy was announced officially in 2003. The road map for the implementation of the BS norms was laid out in 2010. The policy also created guidelines for auto fuels, reduction of pollution from older vehicles, and R&D for air quality data creation and health administration.
- The standards and the timeline for implementation are set by the Central Pollution Control Board under the Ministry of Environment, Forest and Climate Change.

- Since October 2010, Bharat Stage (BS) III norms were enforced across the country. BS-IV emission norms were put in place in 13 major cities from April 2010, and the entire country from April 2017.
- In 2016, the government announced that the country would skip the BS-V norms altogether and adopt BS-VI norms by 2020.
- In a recent judgment, the Supreme Court banned the sale and registration of motor vehicles conforming to Bharat Stage IV emission standards in the entire country from 1 April 2020.
- On 15 November 2017, the Union petroleum ministry, in consultation with public oil marketing companies, decided to bring forward the date of BS-VI grade auto fuels in NCT of Delhi with effect from 1 April 2018, instead of 1 April 2020.
- The ministry asked OMCs to examine if introducing BS-VI auto fuels in the whole of the NCR area from 1 April 2019 was possible. The step was taken due to the problem of air pollution faced by Delhi, which became worse around 2019. The decision was met with disarray by the automobile companies, as they had planned their production according to a 2020 road map.
- The phasing out of the 2-stroke engine for two-wheelers, the cessation of production of the Maruti 800, and the introduction of electronic controls have been due to the regulations related to vehicular emissions.

5. Effect on Automobile Industry

The Supreme Court verdict may hit the automobile industry. The manufacturers had argued that they still have unsold stock of BS-IV vehicles and requested time till March 31, 2020, so that they are granted reasonable time to sell their stock. Using the introduction of higher-grade fuel will be beneficial only if it is done in tandem with the rollout of BS-IV-compliant vehicles. Using BS-VI fuel in the current BS-IV engines or, conversely, running BS-VI engines on the current-grade fuel, may be ineffective in curbing vehicular pollution, and may damage the engine in the long run

WORLD NETWORK OF BIOSPHERE RESERVE (WNBR)

1. Introduction:

- November 3, 2022, will be the first "The International Day for Biosphere Reserves".
- The World Network of Biosphere Reserves was formed in 1971, as a backbone for biodiversity conservation, ecosystem conservation, and living in harmony with nature.
- There are 738 properties in 134 countries, including 12 in India, 4 in Srilanka, and 3 in Maldives.
- An expert mission was planned for spring 2023 to Bhutan, India's northeast & the Sundarbans in Bangladesh.
- Bangladesh, Bhutan, and Nepal do not have biospheres yet.

2. Ideal Platform:

- WNBR, an amazing network of sites of excellence is a unique tool for cooperation through sharing knowledge, exchanging experiences, building capacity & promoting best practices.
- Help extended through the network is of great importance because the ecological carrying capacity of the planet earth was exceeded.
- To breathe clean air, have access to enough good water, eat nutritious & affordable food, and live in the dignity-human race has to live in harmony with nature.
- Living in Harmony with Nature that exists in the United Nations System is the WNBR, making these places more important today than ever before, where humans are thriving & relearning to live with nature.

Our planet was set up so uniquely in the Solar System so that ecosystems can function & provide a home for all living organisms. It is our responsibility to respect nature.

3. South Asia:

- 30 biosphere reserves were established in South Asia.
- The first one was the Hurulu Biosphere Reserve, Sri Lanka with 25,500 hectares of tropical dry evergreen forest.
- The first biosphere reserve in India was designated by UNESCO in 2000, namely the blue mountains of the Nilgiris in Tamil Nadu, Kerala, and Karnataka.
- Considering the massive long-term threats to human survivability like biodiversity loss, climate change, pollution & population dynamics, accelerated by the blind belief in technological solutions for all problems, many biosphere reserves are needed globally.
- India is an emerging superpower of unlimited opportunities which has become an important global player on environmental sustainability issues.
- Spain has a landmass of 506,000 sq. km, a population of 47.4 million and is one of the leading participating WNBRC countries with 53 properties.
- South Asia has a very diverse set of ecosystems with Bhutan, India, and Nepal combined having many glaciers, surrounded by lakes, and alpine ecosystems.
- Biosphere reserves have all developed science-based management plans where local solutions for sustainable human living & nature conservation are being tested.
- Issues of concern include biodiversity, clean energy, climate, environmental education, and water & waste management, supported by scientific research & monitoring.
- Biosphere reserves are internationally recognised sites on land, at the coast or in oceans.
- Governments alone decide which areas to nominate.
- Before approval by UNESCO, the sites are externally examined.
- If approved, they will be managed based on a plan, reinforced by credibility checks while remaining under the sovereignty of their national government.

4. Perspective:

- Some countries in South Asia do not have enough biosphere reserves.
- More financial support from the richer nations & the private sector would be desirable to advance biosphere reserves in these countries.
- Bangladesh, Bhutan, and Nepal are on the priority list.

- The existence of the new World Network of Mountain Biosphere Reserves provides a welcome opportunity for Bhutan & Nepal to establish their first biosphere reserves & participate in the world network.

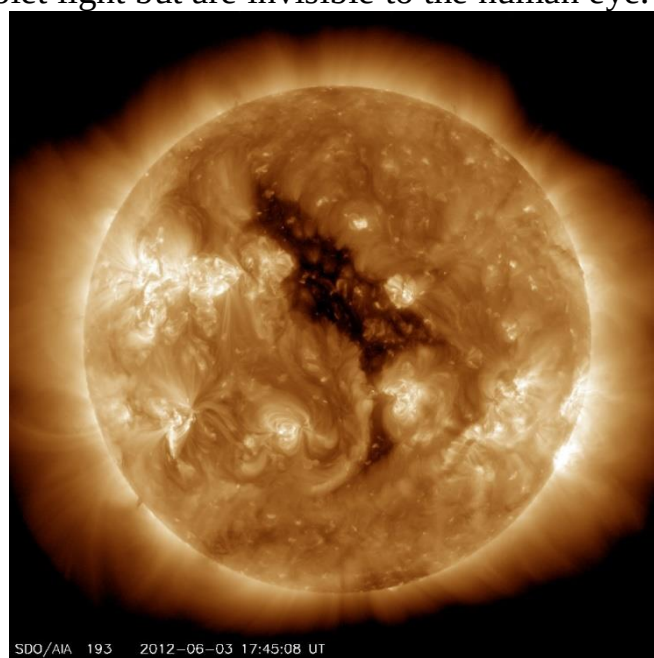
5. Epilogue:

With at least one biosphere reserve per country developed in Bhutan, Bangladesh, and Nepal until 2025; with additional biosphere reserves in India's North-east & along the coasts, it will give realisation to millions of people that a better future is truly possible-one where humans truly live in harmony with nature.

CORONAL HOLES

1. Context:

Recently NASA shared an image of a "smiling sun". Captured by the NASA Solar Dynamics Observatory, the image has dark patches on the sun's surface resembling eyes & a smile. NASA said the patches are coronal holes, which can be seen in ultraviolet light but are invisible to the human eye.



2. Coronal Holes:

- There are regions on the Sun's surface from where fast solar wind gushes out into space.
- As they contain little solar material, they have lower temperatures & thus appear darker than their surroundings.
- Here, the magnetic field is open to interplanetary space, sending solar material out in a high-speed stream of solar wind.
- Coronal holes can last between a few weeks to months, appearing throughout the Sun's approximately 11-year solar cycle.
- The coronal holes are important to understanding the space environment around the Earth through which the technology & astronauts travel.
- Coronal holes cover 6-8% of the total solar surface.
- The reasons for coronal holes are unknown.
- Scientists study these fast solar wind streams because they sometimes interact with Earth's magnetic field, creating a geomagnetic storm, which can expose satellites to radiation & interfere with communications signals.

3. Geomagnetic Storm:

- As per the US National Oceanic & Atmospheric Administration (NOAA), geomagnetic storms relate to Earth's magnetosphere.
- Magnetosphere is the space around a planet influenced by its magnetic field.
- When a high-speed solar stream arrives at Earth, it can allow energetic solar wind particles to hit the atmosphere over the poles.
- In the case of the strong solar wind, the resulting geomagnetic storm can cause changes in the ionosphere, part of the Earth's upper atmosphere.
- Radio & GPS signals travel through this layer, so communications can get disrupted.

BLUE-FLAG BEACHES

1. Context:

India now has "12 blue beaches", a certificate awarded by the prestigious international programme of cleanliness & environmental sustainability run by the global nonprofit Foundation for environmental education.

2. Blue Flag:

- Two beaches in Lakshadweep, have been accorded the "Blue Flag" tag, in the list of the world's cleanest & most eco-friendly beaches.
- The blue flag is an exclusive eco-label or certification given to coastal locations worldwide as a badge of environmental honour.
- The Blue Flag programme is run by the Copenhagen, Denmark-headquartered Foundation for Environmental Education (FEE), which contributes to the US's Sustainable Development Goals(SDGs).
- As per FEE, the iconic Blue Flag is one of the world's most recognised voluntary awards for beaches, marinas, and sustainable boating tourism operators.
- To qualify for the Blue Flag, a series of stringent environmental, educational, safety & accessibility criteria must be met & maintained.
- The Blue Flag programme started in 1987 in Europe.
- The certification is given by an international jury comprising members of the United Nations Environment Programme (UNEP), United Nations World Tourism Organisation (UNWTO), International Union for the Conservation of Nature (IUCN), and FEE.

A total of 5,042 beaches, marinas, and tourism boats in 48 countries have been awarded the label of Blue Flag.

A Marina is a small harbour where mainly pleasure boats & yachts dock.

3. Beaches in India:

- The two beaches which are awarded the eco-label are Minicoy Thundi Beach & Kadmat beach, in Lakshadweep.
- The other 10 Indian beaches on the list as per the FEE site are:
 1. Shivrajpur in Gujarat's Devbhumi Dwaraka District
 2. Ghogla beach in Diu
 3. Kasarkod in Uttara Kannada
 4. Padubidri (Udupi) in Karnataka

5. Kovalam in Chennai, Tamil Nadu
6. Rushikonda in Visakhapatnam, Andhra Pradesh
7. Golden beach in Puri, Odisha
8. Radhanagar Swarajdeep in Andaman & Nicobar
9. Kappad in Kozhikode, Kerala
10. Eden beach in Puducherry.

- Kovalam & Eden got the Blue Flag in 2021, whereas the other received the certification in 2020.

4. Do's & Don'ts:

An extraordinary Gazette Notification gave a list of permissible activities in the CRZ of the beaches, including islands, subject to maintaining a minimum distance of 10 meters from the High Tide Line (HTL), for blue flag certification.

- Portable toilet blocks
- Change rooms & shower panels
- Solid waste management plant
- Solar power plant
- Purified drinking water facility
- Beach access pathways
- Landscaping lighting
- Seating benches & sit-out umbrellas
- Cloakroom facility
- Safety watch towers & beach safety equipment
- Information boards & other signages
- Fencing
- Parking facilities

The notification said that these activities and facilities would be exempt from prior clearance under the provisions of CRZ Notification, Island Protection Zone Notification & Island Coastal Regulation Zone Notifications.

BIOGAS

1. Biogas:

- Biogas, is a renewable fuel produced using the anaerobic digestion process from organic feedstock.
- It is primarily composed of methane-50-65%, Carbon dioxide-30-40%, Hydrogen sulfide-1-2.5% & small amount of moisture.
- It was thought of as a rural economy product.
- With the advancement in research & the tremendous urge to shift to greener fuels, biogas came back into the picture to supplement the rising global energy demand.
- Biogas contributes to all 17 Sustainable Development Goals.
- Biogas can be converted to produce numerous sustainable transportation fuels.
- The removal of unwanted components like carbon dioxide, hydrogen sulphide & moisture from raw biogas yields pure methane.

Some of the common methods to purify biogas include water scrubbing, membrane separation, pressure swing adsorption & adsorption.

2.CBG-LBG:

- The high-purity biogas compressed at 250 bar pressure results in a fuel called compressed biogas(CBG).
- CBG has properties similar to compressed natural gas(CNG) & could be directly used to power CNG engines.
- The drawback of CBG is its existence in the gaseous form, which demands bigger volumes for transportation.
- Hence, it is considered more suitable to power small-sized vehicles, though heavy engines were used for short-distance driving.
- If the biogas-derived methane is liquefied by cooling it at -162°C , the fuel thus obtained is liquefied biogas(LBG).
- LBG has higher energy density that lowers storage space requirements.
- At atmospheric pressure, the energy density of liquid methane is roughly 600 times more than that of gaseous methane & 2.5 times greater than that of methane at 250 bar.
- LBG has become a viable alternative fuel for heavy-duty road transportation as it has a comparatively high energy density, low sulphur content & lower lifecycle greenhouse gas emissions than diesel.

Biomethane:

- Biomethane can be transformed into other fuels like Hydrogen & methanol.
- The primary method for producing hydrogen encourages the reforming of light hydrocarbons particularly methane, which makes up a significant portion of biogas.

3.Key Points:

- Gasification is performed by limiting the amount of oxygen & steam present in the reaction & heating the bio-.methane to high temperatures $>600^{\circ}\text{C}$.
- Syngas, which is a mixture of hydrogen & carbon monoxide, is created as a result of gasification.
- The hydrogen produced after the removal of carbon monoxide could be used in fuel cells to generate power.
- Methanol can also be generated from syngas.
- Methanol is an effective fuel with an octane rating of 100, which emits less particulate matter.
- Methanol, which is affordable than LNG or marine oils with virtually no SO_x / NO_x emissions, attracted a lot of interest from the maritime community.

4.The context in India:

- CBG is the only transportation fuel from biogas for which commercialisation efforts were made.
- The Indian Government was encouraging private businesses to set up CBG plants & provide CBG to oil marketing companies for sale as automotive & industrial fuels under the Sustainable Alternative Towards Affordable Transportation (SATAT) scheme.
- SATAT has set goal to produce 15 million tonnes of CBG from 5,000 plants by 2023-24.
- Presently, LBG, hydrogen & methanol are not produced from biogas in India.
- The reasons are the unavailability of biogas in bulk for such derivatives, absence of infrastructure to generate & market these fuels,

the deficiency of modified automobile engines as well as the lack of effective research & development push to improve process economics.

- The Indian Government & Niti Aayog have outlined roadmaps to hasten the transition towards green fuels & promote LNG, hydrogen & methanol.
- A renewable source like biogas that could be used to produce these fuels, still remains untapped.

LIVING PLANET REPORT 2022

1. Context

There has been a 69 percent decline in the wildlife populations of mammals, birds, amphibians, reptiles, and fish, across the globe in the last 50 years, according to the latest Living Planet Report by World Wide Fund for Nature (WWF).

2. Report findings

- The highest decline of 94 percent was in Latin America and the Caribbean region
- Africa recorded a 66 percent fall in its wildlife populations from 1970-2018 and in the Asia Pacific 55 percent
- Freshwater species populations globally were reduced by 83 percent, confirming that the planet is experiencing a "biodiversity and climate crisis"
- The Living Planet Index (LPI), featuring about 32,000 populations of 5,230 species across the world, showed that vertebrate wildlife populations are plummeting at a particularly staggering rate in tropical regions of the world.

WWF identified six key threats to biodiversity —

1. Agriculture
 2. Hunting
 3. Logging
 4. Pollution
 5. Invasive species and
 6. Climate change - to highlight 'threat hotspots' for terrestrial vertebrates.
- Biodiversity loss and climate crisis are intertwined issues
 - Habitat loss and barriers to migration routes were responsible for about half of the threats to monitored migratory fish species

3. Mangroves

- Mangroves continue to be lost to aquaculture, agriculture, and coastal development at a rate of 0.13 percent per year
- Many mangroves are also degraded by overexploitation and pollution, alongside natural stressors such as storms and coastal erosion,
- Mangrove loss represents the loss of habitat for biodiversity and the loss of ecosystem services for coastal communities
- Around 137 square kilometers of the Sundarbans mangrove forest in India and Bangladesh has been eroded since 1985, reducing land and ecosystem services for many of the 10 million people who live there.

4. Conclusion

"Climate change in India will impact key areas, such as water resources, agriculture, natural ecosystems, health and the food chain.

LIFE FOR CLIMATE ACTION

1. Context

The United Nations Development Programme's Human Development Report has warned that global human development measures have declined across most countries in the past two years.

2. Key Points

- Our world today is in turmoil, facing multiple, mutually reinforcing crises.
- **Even as we mount a fragile recovery from the COVID-19 pandemic, war fuels devastating energy, food and cost-of-living crisis.**
- This comes against the backdrop of the greatest existential threat of all the triple planetary crises of climate change, pollution and biodiversity loss.
- Nine of the warmest years on record have come in the past decade alone.
- **This year's record-breaking heat waves, floods, droughts and other extreme forms of weather have forced us to face these increasingly devastating impacts.**
- Climate change is a disruption multiplier in a disrupted world, rolling back progress across the global Sustainable Development Goals.

3. Paris Agreement and the COP26 summit

- The Paris Agreement and the COP26 summit in Glasgow represent urgently, collective steps countries are taking to limit emissions. Yet, the window for action is closing fast.
- Commitments we have now will not keep warming below the 1.5 °C target that gives us the best chance of averting catastrophe.
- With the narrative so focused on geopolitics, the scope for each of us to make a difference as individuals seems increasingly lost.
- While governments and industry carry the lion's share of responsibility for responding to the crisis, we as consumers play a large role in driving unsustainable production methods.

4. LIFE, a fresh perspective

- LIFE or Lifestyle for Environment, announced by Prime Minister Narendra Modi at COP26 in November 2021, brings a fresh and much-needed perspective.
- Rather than framing climate change as a "**larger than life**" challenge, Life recognises that small individual actions can tip the balance in the planet's favour.

4.1 Needed guiding frameworks

1. Information sharing and the scale of a global movement
2. Mindful choices cultivated by Life animate this spirit's actions such as saving energy at home
3. Cycling and using public transport instead of driving
4. Eating more plant-based foods and wasting less and leveraging our position as customers and employees to demand climate-friendly choices.

4.2 Goals of LIFE

- Many of the goals of LIFE can be achieved by deploying "**nudges**" and gentle persuasion techniques to encourage positive behaviour.

The UN Environment Programme (UNEP) employs proven nudging techniques such as

1. Discouraging food waste by offering smaller plates in cafeterias:
2. Encouraging recycling by making bin lids eye-catching
3. Encouraging cycling by creating cycle paths.

According to the UNEP, more than two-thirds of greenhouse gas emissions can be attributed to household consumption and lifestyles the urgent cuts to global emissions we need can only be achieved through the widespread adoption of greener consumption habits.

4.3 Global Vision

- While LIFE is a global vision, India is an excellent place to start.
- With over 1.3 billion people, if we achieve a true Jan Andolan here, the momentum generated will be enormous.
- As India leads, we see the world increasingly follow.

4.4 LIFE mission

- The LIFE mission also recognises that accountability is relative to contribution.
- Emissions across the poorest half of the world's population combine still fall short of even 1 per cent wealthiest.
- Those who consume the least, often the most vulnerable and marginalised members of society, will not be asked to consume less, but rather supported to participate in the green economy.
- Each "**Pro Planet**" stakeholder is nudged according to differentiated approaches.

5. India's track record

- Today, in Gujarat, from the Statue of Unity, this vision of LIFE is taking flight as a global mission launched by Mr Modi together with UN Secretary-General Antonio Guterres, who has come to India to show his support.
- The Prime Minister and Secretary-General are calling on all consumers across the world to become "**Pro-Planet People**" by 2027, adopting simple lifestyle changes that can collectively lead to transformational change.
- India has a proven track record of translating the aspirations of national missions into whole-of-society efforts.
- The success of the **Swachh Bharat Mission**, which mobilised individuals and communities across socio-economic strata to become drivers of collective good health and sanitation is an example.

6. Onus on the developed world

The same applies across countries. LIFE resonates with the global climate justice India has rightfully called for highlighting enhanced obligations those in

developed countries bear, to support climate adaptation and mitigation for those most affected, yet least responsible.

The average carbon footprint of a person in a high-income country is more than 80 times higher than that of a person in a least-developed country.

- It is common sense and only fair to call on the developed world to shoulder a proportionate share of this transition.
- In the words of Mahatma Gandhi, "**the world has enough for everyone's need, but not enough for everyone's greed**".

7. Panchamrit Targets

- There has never been a better time for India's climate action leadership at home and on the international stage.

From the Panchamrit targets announced by Mr Modi at COP26, to support for the International Solar Alliance, the Coalition for Disaster Resilient Infrastructure and South-South Cooperation platforms, from the World's fifth-largest economy with vibrant businesses making enormous investments in renewables and electric mobility to a world-class public digital tech stack, India brings scale, expertise and legitimacy; a well-positioned founding UN Member States bridging the G20 and G77.

- With COP27 next month and India set to assume the G20 Presidency weeks after, followed by the halfway mark to Agenda 2030 next year, we at Team UN India and our 26 entities are proud and committed partners in this mission to help give a new lease of LIFE to climate action.

GRADED RESPONSE ACTION PLAN (GRAP)

1.Context

Stringent measures to fight air pollution will come into force in Delhi and its neighboring National capital Region (NCR) towns from 15th October, as a part of the Graded Response Action Plan (GRAP).

2.What is a Graded Response Action Plan (GRAP)

In 2014, when a study by the WHO found that Delhi was the most polluted city in the world, panic spread in the center and the state government. Approved by the supreme court in 2016, the plan was formulated after several meetings that the Environmental Pollution (Prevention and Control) Authority (EPCA) held with state government representatives and experts. The result was a plan that institutionalized measures to be taken when air quality deteriorates.

The plan was notified by the Ministry of Environment, Forests & Climate change in 2017.

GRAP works only as an emergency measure.

It institutionalized measures to be taken when air quality deteriorates.

1. The plan is incremental- therefore, when the air quality moves from 'poor' to 'very poor', the measures listed under both sections have to be followed.
2. It prevents PM10 and PM2.5 levels from going beyond the 'moderate' national AQI category.

Authorities from both Haryana and UP had informed EPCA at the time that they would put in the required measures by winter 2020 for the supply of electricity from the grid.

3.Has GRAP Helped?

- The biggest success of GRAP has been in fixing accountability and deadlines.



- For each action to be taken under a particular air quality category, executing agencies are marked.
- In a territory like Delhi, where a multiplicity of authorities has been a long-standing impediment to effective governance, this step made a crucial difference.

4.Actions under GRAP

Severe+ or Emergency	(PM 2.5 OVER 300 300 $\mu\text{g}/\text{cubic metre}$ or PM10 over 500$\mu\text{g}/\text{cu. m.}$ for 48+ hours) ▪ Stop construction work. ▪ Stop entry of trucks into Delhi. ▪ Introduce odd/even schemes for private vehicles and minimize exemptions. ▪ Taskforce to decide any additional steps including shutting schools to stop.
Severe	(PM 2.5 OVER 250$\mu\text{g}/\text{cu. m.}$ or PM10 over 430 $\mu\text{g}/\text{cu. m.}$) ▪ Maximize power generation from natural gas to reduce generation from coal. ▪ Close brick kilns, hot mix plants, and stone crushers. ▪ More frequent mechanized cleaning of roads and sprinkling of water.
Very Poor	(PM2.5 121-250 $\mu\text{g}/\text{cu. m.}$ or PM10 351-430 $\mu\text{g}/\text{cu.m.}$) ▪ Increase bus and metro services. ▪ Stop the use of diesel generator sets. ▪ Enhance parking fee by 3-4 times. ▪ Apartment owners discourage burning fires in winter by providing electric heaters during winter.

	▪ Advisories to people with respiratory and cardiac conditions to restrict outdoor movement.
Moderate to Poor	(PM_{2.5} 61-120 µg/cu. m. or PM₁₀ 101-350 µg/cu. m.) ▪ Close/enforce pollution control regulations in brick kilns and industries. ▪ Heavy fines for garbage burning. ▪ Mechanized sweeping on roads with heavy traffic and water sprinkling.

KEIBUL LAMJAO CONSERVATION

1.About

- Keibul Lamjao Conservation Area comprises a core area of Keibul Lamjao National Park(KLNP) of 40 sq km, a buffer of Loktak Lake of 140 sq km and Pumlen Pat of 43 sq. km.
- This area is located in the southern part of Bishnupur district & eastern part of Thoubal District of Manipur.
- The Lokatk Lake has a unique ecosystem called "Phumdi", which means floating mats of soil and vegetation.
- Phumdi is a heterogenous mass of soil, vegetation & organic matter at various stages of decomposition. They occupy almost half of the lake area & three-fourths of the Keibul Lamjao Area.
- Phumdi in KLNP is home to Manipur brow-antlered deer(*Rucervus eldi eldi*), also known as Sangai.
- For effective in-situ conservation of sangria, the Forest Department of Manipur in collaboration with the Wildlife Institute of India planned to reintroduce sangai in a neighbouring area with similar habitat.

2.Loktak Lake:

- Loktak lake is the largest natural freshwater lake in north-eastern India.
- The lake was broadly divided into three zones-Northern, Central and southern zone on basis of Vegetation, Phumdi thickness, Drainage network, open water area location, and human activity.
- It was reported that about 0.8-2m humid areas proliferate within 6 months in the main lake, 0.1m per 6 months in the KLNP area.
- The depth of the lake varies between 0.5-4.58m with an average depth of 2.7m.

- 14 hills surrounding the southern part of the lake like Sendra, Itching, and Thanga islands.

The lake is rich in biodiversity and designated by the Ramsar Convention in 1990.

3.Human Interference:

- The lake has been a source of water for domestic generation of hydroelectric power, irrigation, habitat for several plants used as food, fishing ground, fodder, fuel, medicines, biodiversity, recreation etc.
- Loktak lake is considered as "*Lifeline of Manipur*".
- Three types of communities that live in the villages located around the KLCA are Phum dwellers, island communities, and lakeshore communities.
- Phum dwellers are people who live permanently/temporarily on phumdis, island communities-those living on islands, and lakeshore communities.
- Located in the southwestern part of KLCA, there is Moirang, a place where Indian National Army hoisted the flag on April 14, 1944. (War memorial from world war2).

4.Key Points:

- Loktak part, KLNP is surrounded by many villages inhabited by *Meitei* society, a dominant ethnic group of Manipur.
- The Meiteis have a rich culture out of which the floating huts exemplify uniqueness in their architecture.
- The *Umang-lai*(forest deity), is worshipped in almost all villages around Loktak lake & KLNP.
- The vast agricultural fields surrounding the Loktak lake are known as *Pat-Lou* meaning lake agricultural field.
- The *Punghul* method is generally employed in pat-lou in which the land was to be tilled first & the seeds were sown over it again, finally, the seeds were covered with soil by one more tilling.
- Agriculture & Fishing are the main economies of the people living in & around the lake.
- Wild rice (Kampong), and vegetables are commonly grown.

KLNP is the only floating national park in the world.

- Phumdis are composed of organic carbon(36%), nitrogen(2.08%), organic matter(24.98%), mineral matter & residue(37.94%).
- KLCA is comprised of a unique ecosystem which is rich in biodiversity. A total of 185 plant species comprising 50 families and 121 genera were recorded.
- 90 species were recorded in floating meadows & water, 19 species in a terrestrial habitat, and 76 were common to both habitats.
- 54 fish species belonging to 18 families were recorded from the lake.
- 25 species of amphibians were recorded from the lake & 32,855 water birds belonging to 58 species were recorded during the recent census.
- Globally threatened species recorded in the lake are black-necked stork and Mandarin duck.
- Among mammals, KLNP holds a population of 212 hog deer and 204 Sangai which generates considerable international interest & a perfect example of in-situ conservation.
- Sangai-Brow antlered deer refers to the peculiar shape of antlers is endangered.
- Though the population of sangria has increased over the last 10 years, risks to survival persist like encroachment on habitat, local dissatisfaction with the parks, floods, epidemic diseases, and further loss of genetic diversity.
- To recover the sangai population, pumlen pat has been identified for its reintroduction.
- The Pallet Pat is the second largest freshwater wetland in Manipur.
- The pumlen lake has rich floral & faunal diversity with 75 plant species belonging to 29 species identified.
- The faunal diversity includes invertebrates like water beetle, giant water bug, snails, egret, water cobra, viper, wild boar, hog deer, civet cats etc.

ONE WATER APPROACH

1. Background

- Water is the most crucial natural resource for every form of life, yet it remains undervalued and inadequately managed worldwide. An integrated approach towards all sources of water is the need of the hour.
- The United Nations has estimated that by the year 2050, four billion people will be seriously affected by water shortages, which might lead to multiple conflicts between countries over water sharing. At the global level, 31 countries are already facing a shortage of water and by 2025, there will be 48 countries facing serious water shortages.
- Recognising, measuring and expressing water's worth and incorporating that into decision-making is still a challenge, apart from the water scarcity.
- Failure to value water in all its forms is considered a prime cause of the mismanagement of water, according to the UN World Water Development Report 2021, published by UNESCO on behalf of the UN-Water.
- Therefore, shifting the attention from a single-minded and linear water management to a multi-dimensional integrated water management approach, that is, the 'One Water' approach, for a comprehensive, resilient and sustainable management of water resources.

2. About

- 'One Water' is the recognition that all water has value, regardless of its source. It includes managing that source in an integrated, inclusive and sustainable manner by including the community, business leaders, industries, farmers, conservationists, policymakers, academics and others for ecological and economic benefits.
- The new water management approach, that also referred to as Integrated water resources management (IWRM).
- IWRM is an "integrated planning and implementation approach to managing finite water resources for long-term resilience and reliability

meeting both community and ecosystem needs”, according to research organisation Water Research Foundation.

- “One Water is the future of the water industry when the barriers conventionally separating wastewater, stormwater, drinking water, groundwater and the reuse and re-utilisation are broken down, many benefits realised,” said Robert C Renner, Water Research Foundation.
- This approach also recognises that all water has value and by considering the potential of every form of water, none of them should be treated as a waste product, according to non-profit United States Water Alliance.

3.Unifying characters of One water approach

- **The mindset that all water has value** — from the water resources in our ecosystems to our drinking water, wastewater and stormwater.
- **A multi-faceted approach** meaning that our water-related investments should provide economic, environmental, and societal returns.
- **Utilising watershed-scale thinking and action** that respects and responds to the natural ecosystem, geology, and hydrology of an area.
- **Partnerships and inclusion** in recognising that real progress and achievements will only be made when all stakeholders come forward and together will take a decision.

4.Objectives of One Water approach

- Reliable, secure, clean water supplies
- Aquifer recharge
- Flood protection
- Minimizing environmental pollution
- Efficient use and reuse of natural resources
- Resilience to climate
- Long-term sustainability
- Equity, affordability and accessibility to safe drinking water
- Economic growth and prosperity

5. What drives adaptation of One Water Approach

- Differences in regional water availability, pricing and affordability, the seasonal and inter-annual variation in supply, water quality and quantity, and unreliability of the resource pose great challenges.
- Aged infrastructure
- supply-centric management,
- polluted water bodies,
- agricultural and industrial expansion
- following changes in consumption and production patterns,
- a changing climate and disproportionate distribution of the water also push for new water techniques.

6. About and the superiority of Integrated water resources management

- IWRM is an **“integrated planning and implementation approach to managing finite water resources for long-term resilience and reliability meeting both community and ecosystem needs”**.
- integrated planning and implementation approach to managing finite water resources for long-term resilience and reliability meeting both community and ecosystem needs”
- “One Water is the future of the water industry when the barriers conventionally separating wastewater, stormwater, drinking water, groundwater and the reuse and re-utilization are broken down, many benefits realized.”
- **IWRM is superior to the conventional water management approach in several ways as follows-**
 - In the conventional water management approach, drinking water, wastewater and stormwater are managed separately, whereas in ‘One Water’, All the water systems, regardless of its source, are connected intentionally and managed meticulously for water, energy and resource.
 - Water is recycled and reused several times in IWRM, in contrast to a one-way route from supply to use, treatment and disposal.

- Stormwater is utilized as a valuable resource to fight against water scarcity, recharge groundwater, and support natural vegetation.
- The water system includes green infrastructures and a mix of grey and green infrastructure that form a hybrid system as compared to **grey infrastructure in conventional water management**.
- The interconnectedness of surface water, groundwater, stormwater and wastewater is collectively recognized and managed by these separate but connected entities.
- Active collaborations with industry, agencies, policymakers, business leaders and various stakeholders is a regular practice in the ‘One Water’ approach, whereas collaboration is need-based in conventional water management systems.

A case study of Los Angeles

- One Water Los Angeles has integrated the city of LA’s family of regional agencies, academia, businesses, environmentalists and other stakeholders. It formulated a LA 2040 Plan through a “**Three legged stool approach**” that ensures water quality improvement, water supply augmentation and flood risk mitigation.
- It is giving a major urban smart water cycle goal by creating “short-cuts” that enhance recycling and reuse while ensuring multiple benefits.
- The ‘**One Water**’ concept is about bringing all the diverse stakeholders together to advance common-ground solutions to combat the water and urban ecology challenges.
- Every individual, every community, every sector, and every stakeholder group has a role to play in an improved decision-making network, from implementing policies to formulating plans for future developments.

COASTAL REGULATION ZONE

1.Context

The Supreme Court last week ordered the demolition, within a month, of five apartment complexes in Maradu municipality in Ernakulam, Kerala, for violating Coastal Regulation Zone (CRZ) norms.

The order came on a special leave petition (SLP) filed by Kerala Coastal Zone Management Authority (KCZMA).

2.Key Points

- While the CRZ Rules are made by the Union Environment Ministry, implementation is supposed to be done by state governments through their Coastal Zone Management Authorities.
- The states are also supposed to frame their own coastal zone management plans by the central Rules.

3.The CRZ Rules

- CRZ Rules govern human and industrial activity close to the coastline, to protect the fragile ecosystems near the sea.
- The Rules, mandated under the Environment Protection Act, 1986, were first framed in 1991.

They sought to restrict certain kinds of activities, like large constructions, setting up of new industries, storage or disposal of hazardous material, mining or reclamation and bunding, within a certain distance from the coastline.

- The basic idea is: because areas immediately next to the sea are extremely delicate, home to many marines and aquatic life forms, both animals and plants and are also threatened by climate change, they need to be protected against unregulated development.

In all CRZ Rules, the regulation zone has been defined as the area up to 500 m

from the high-tide line.

Several kinds of restrictions apply, depending on criteria such as the population of the area, the ecological sensitivity, the distance from the shore and whether the area had been designated as a natural park or wildlife zone.

1991 Rules

- Despite several amendments, states found the 1991 Rules to be extremely restrictive.
- They complained that if applied strictly, the Rules would not allow simple things like building decent homes for people living close to the coast and carrying out basic developmental works.
- The 1991 Rules also created hurdles for showpiece industrial and infrastructure projects such as the POSCO steel plant in Odisha and the proposed Navi Mumbai airport in the first decade of the new century.

4.Evolution of Rules

- The Centre notified fresh CRZ Rules in 2011, which addressed some concerns.
- An exemption was made for the construction of the Navi Mumbai airport. (The POSCO Project had failed to take off due to other reasons).
- Projects of the Department of Atomic Energy plans to set up nuclear power plants near the coast were exempted.

5.Shailesh Nayak Committee

- After even these Rules were found inadequate, however, the Environment Ministry 2014 set up a six-member committee under then Earth Sciences Secretary Shailesh Nayak to give suggestions for a new set of CRZ Rules. The committee submitted its report in 2015.
- Simultaneously, the Chennai-based National Centre for Sustainable Coastal Management defined a new high-tide line along India's entire coastline to remove ambiguities.
- Separately, the Survey of India defines a hazard line along the coasts to be used mainly for disaster management planning.

2018 CRZ Rules

Based on these and other inputs, the Environment Ministry issued fresh CRZ Rules in December 2018, which removed certain restrictions on buildings, streamlined the clearance process and aimed to encourage tourism in coastal areas.

6.The Current situation

In January, the government notified new CRZ Rules with the stated objectives of promoting sustainable development and conserving coastal environments.

CRZ-III (Rural)

For the so-called CRZ-III (Rural) areas, two separate categories have been stipulated.

CRZ-IIIA

In the densely populated rural areas (CRZ-IIIA) with a population density of 2,161 per sq km as per the 2011 Census, the no-development zone is now 50 m from the high-tide level, as against the 200 m stipulated earlier.

CRZ-IIIB

- The CRZ-IIIB category (rural areas with population density below 2,161 per sq km) continues to have a no-development zone extending up to 200 m from the high-tide line.
- The new Rules have a no-development zone of 20 m for all islands close to the mainland coast and all backwater islands on the mainland.

7.Cases in Kerala

- There have been cases of courts in Kerala ordering the demolition of resorts or apartments for violating CRZ norms earlier.
- But stakeholders have either obtained stays or have got relief in the Supreme Court.
- In 2014, a Single Bench of Kerala High Court ordered the demolition of a waterfront residential complex of DLF in Kochi

A Division Bench cancelled the demolition order but fined the builder Rs 1 crore.

- After KCZMA appealed, the Supreme Court in January 2018 upheld the verdict of the Division Bench.
- In 2013, the High Court ordered a Rs 350 crore resort in Alappuzha pulled down.
- The order was stayed by the Supreme Court.
- Kochi's Lakeshore Hospital was in the Dock for violating CRZ norms.
- But in 2003, the project got a breather from the High Court, which dismissed a public interest plea that had come after the construction had been completed.
- Some 26 resorts and hotels on Thiruvananthapuram's Kovalam beach have been served notices for violations of CRZ Rules.
- In the Kochi Municipal Corporation area, 35 violations have been reported.

BAN ON SINGLE-USE PLASTICS

1.Context

The Ministry of Environment, Forest and Climate change, Government of India, notified the Plastic Waste Management Amendment Rules, 2021. The country is taking steps to curb littered and unmanaged plastic waste pollution.

Since July 1, 2022, India has banned the manufacture, import, stocking, distribution, sale, and use of single-use plastic (SUP) items with low utility and high littering potential.

India is a party to the United Nations Environment Assembly (UNEA). In all, 124 nations are party to the UNEA, and India has signed a resolution to draw up an agreement in the future that will make it legally binding for signatories to address the full life cycle of plastics, from production to disposal.

2.Harmful effects

- Plastic waste has drastic impacts on the environment and human health.
- There is a greater likelihood of single-use plastic products ending up in the sea than reusable ones.

3.Resolutions

- India piloted a resolution on single-use plastics pollution at the 4th United Nations Environment Assembly in 2019, recognizing the urgent need for the global community to address this issue. This resolution was adopted at the UN Environment Assembly as an important step forward.
- In the recently concluded 5th session of the United Nations Environment Assembly in March 2022, India engaged constructively with all member states to develop a consensus on a resolution to drive global action against plastic pollution.
- Bangladesh became the first country to ban thin plastic bags in 2002
- New Zealand banned plastic bags in July 2019
- China issued a ban on plastic bags in 2020 with a phased implementation.
- As of July 2019, 68 countries have plastic bag bans with varying degrees of enforcement.

4.Plastic waste management rules in India

- With effect from September 30, 2021, the Plastic Waste Management Amendment Rules 2021 prohibited the manufacture, import, stocking, distribution, sale, and use of plastic carry bags whose thickness is less than 75 microns.
- From December 31, 2022 plastic carry bags whose thickness is less than 120 microns will be banned.
- Ban does not cover all plastic bags; however, it requires the manufacturers to produce plastic bags thicker than 75 microns which were earlier 50 microns.
- As per the notification, the standard shall be increased to 120 microns in December this year.

- The notification mentioned that plastic or PVC banners /hoardings should have more than 100 microns in thickness, and nonwoven plastic must be more than 60 GSM (grams per square meter)
- Non-woven plastic bags have a cloth-like texture but are counted among plastics.
- Plastic or PET bottles, counted among the most recyclable types of plastic, have been left out of the scope of the ban.

5.Steps taken by GoI

- The Indian government has taken steps to promote innovation and create an ecosystem for accelerated adoption and availability of alternatives across the country.
- To ensure effective enforcement of the ban, national and state-level control rooms will be established, as well as special enforcement teams to check the illegal sale and use of single-use plastics
- Border checkpoints have been established to prevent the movement of banned single-use plastic items between states and Union Territories.
- Central Pollution Control Board has launched a grievance redressal application to empower citizens to help curb the plastic menace.
- Government taking measures for awareness generation campaign.

6.Role of Manufacturers

- Extended Producer Responsibility (EPR) is the responsibility of a producer for the environmentally sound management of the product until the end of its life
- The guidelines provide a framework to strengthen the circular economy of plastic packaging waste and promote the development of new alternatives to plastic packaging.

7.Challenges

The Challenge is to see how the local level authorities will enforce the ban following the guidelines.

Banned items such as earbuds with plastic sticks, plastic sticks for balloons, etc are non-branded items and it is difficult to find out who the manufacturer is and who is accountable for selling because these items will be available in the market even after the issuing of guidelines.

8. Conclusion

Finding alternatives to plastic seems a little difficult however greener alternatives to plastic may be considered a sustainable option.

While the total ban on the use of plastic sounds like a great idea, its feasibility seems difficult at this hour, especially in the absence of workable alternatives.

HIGH SEAS TREATY

1. Context

The UN member states agreed on a historic treaty for protecting marine life in international waters that lie outside the jurisdiction of any country. The ‘breakthrough’ followed talks led by the UN during the Intergovernmental Conference (IGC) on Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ) where negotiations were underway for the past two weeks. The treaty is yet to be formally adopted as members are yet to ratify it.

2. What is High Seas Treaty?

- Since 2017, an Inter-Governmental Conference established by the United Nations General Assembly has been negotiating an agreement under UNCLOS that would allow for more effective management and protection of the high seas.
- This internationally legally binding instrument is often referred to as the Biodiversity in Areas Beyond National Jurisdiction Treaty, or "BBNJ treaty".
- This treaty focuses on four main areas namely Conservation and sustainable use of marine biological diversity in ABNJ including marine genetic resources, Area-based management tools, including marine protected areas, Environmental-impact assessments, and Capacity building and the transfer of marine technology.
- The draft agreement of the High Seas Treaty recognizes the need to address biodiversity loss and the degradation of ecosystems of the ocean. It places 30% of the world's oceans into protected areas, puts more money

into marine conservation, and covers access to and use of marine genetic resources as per the United Nations.

- An important negotiating point, and source of tension during the talks, was developing countries' access to benefits reaped from the commercialization of resources (especially genetic resources) extracted from the ocean. The treaty has agreed to set up an access and benefit-sharing committee to frame guidelines.

3. What are the High Seas?

- Parts of the sea that are not included in the territorial waters or the internal waters of a country is known as the High seas, according to the 1958 Geneva Convention on the High Seas.
- No country is responsible for the management and protection of resources on the high seas.
- The high seas are some of the most biologically productive in the world teeming with plankton and home to ocean giants like predatory fish, whales, and sharks.
- The seabed sequesters tremendous amounts of carbon and the ocean volume traps heat, slowing the effects of climate change on land and in the atmosphere dramatically.
- High seas begin at the borders of the country's EEZ, which extends up to 370km from the coastlines.
- However, up until today, just 1% of these high seas waters have been adequately safeguarded.

4. Significance of High Seas

- The high seas account for more than 60% of the world's ocean area and cover about half of the Earth's surface, which makes them a hub of marine life.
- They are home to around 2.7 lakh known species, many of which are yet to be discovered. The high seas are fundamental to human survival and wellbeing.
- These oceans absorb heat from the atmosphere, are affected by phenomena like El Nino, and are also undergoing acidification all of which endanger marine flora and fauna.
- Several thousand marine species are at risk of extinction by 2100 if current warming and acidification trends continue.

- Anthropogenic pressures on the high seas include seabed mining, noise pollution, chemical spills, and fires, disposal of untreated waste (including antibiotics), overfishing, the introduction of invasive species, and coastal pollution.
- Despite the alarming situation, the high seas remain one of the least - protected areas, with only about 1% of them under protection.

5. About BBJN

- The BBJN(Biodiversity of Areas Beyond National Jurisdiction) Treaty also known as the "Treaty of the High Seas", is an international agreement on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, currently under negotiation at the United Nations.
- This new instrument is being developed within the framework of the UNCLOS, the main international agreement governing human activities at sea.
- It will achieve a more holistic management of high seas activities, which should better balance the conservation and sustainable use of marine resources.
- BBJN encompasses the high seas, beyond the exclusive economic zones or national waters of countries.

VEHICULAR POLLUTION

1. Background

- **California is to ban the sale of new petrol-only vehicles by 2035, marking a historic step in the state's attempts to tackle climate change.**
- The new rules are aimed to force car makers to accelerate the introduction to the market of cleaner vehicles.
- The move is important as California is the most populous state in the US and one of the world's biggest economies.

- Under the rules, issued by the California Air Resources Board (CARB), 35% of new vehicles sold in the state must be electric, hybrid or hydrogen-powered by 2026.
- The regulations would apply to 68% of vehicle sales by 2030, and 100% by 2035.

2. Issues associated with global vehicular pollution

- The **transport sector** accounts for a quarter of overall emissions, with road transport accounting for three-quarters of total emissions (and 15 per cent of the total global CO₂ emissions).
- Passenger vehicles account for the largest share of this, accounting for around 45 per cent of CO₂ emissions.
- If trends continue, annual GHG emissions in 2050 will be 90% higher than in 2020.

3. The Indian scenario of Vehicular pollution

- India is the fifth-largest global car manufacturer with one of the highest compound annual growth rates (10 per cent) of vehicle registration as of 2019.
- Due to economic growth, and continued aspiration for vehicle ownership, the annual car sales in India are projected to increase from the current 3.5 million to about 10.5 million — a three times increase — by 2030.
- Cars and two-wheelers will dominate the fleet with a share of about 87 per cent.
- This will increase exposure to vehicular exhaust emissions. This requires not only improvement in emissions standards but also improvement in measurement procedures for emissions testing of vehicles to keep them low-emitting on roads.
- In 2023, some major reforms in testing procedures are expected. This needs to be informed well.
- In India, vehicle technology is changing rapidly with changes in fuel quality, exhaust treatment systems of the internal combustion engines

(ICE), electrification of vehicle segments and steps toward hydrogen-powered vehicles.

- But the current and future batches of ICE vehicles are likely to have a substantial share in the on-road fleet till 2040, if not beyond. This not only requires substantial tightening of the emissions standards but also modification of technical parameters for testing of vehicles to reduce the emissions in the real world.

4. Vehicular emissions in India

- Vehicular emissions are a **major source of air pollution in urban areas.**
- Vehicular emissions typically contribute **20-30% of Particulate Matter (PM_{2.5})** at the breathing level of air quality.
- **PM_{2.5}** particles have a diameter of fewer than 2.5 micrometres (more than 100 times thinner than a human hair) and are suspended for a longer period.
- Vehicles emit approximately **290 gigagrams(Gg) of PM_{2.5}**, according to studies.
- At the same time, the transport sector accounts for around 8% of total GHG emissions in India, with Delhi accounting for more than 30%.

5. Limitations in India's effort to reduce emissions

- Vehicle technology in India is rapidly evolving, with improvements in fuel quality, exhaust treatment systems for Internal Combustion Engines (ICE), electrification of vehicle segments, and advances toward hydrogen-powered vehicles.
- However, the current and future batches of ICE vehicles are expected to have a substantial share of the on-road fleet until 2040, if not beyond.
- This will require not only substantial tightening of emissions standards but also modification of technical criteria used to test vehicles to achieve real-world emission reductions.

6. Challenges associated with petroleum-based Cars

- The fuel efficiency of petrol cars is considerably lesser than diesel cars and therefore they can be considered better mileage cars in India
- They typically have more CO₂ emission and therefore the tax amount will be more for petrol cars
- Depreciation hits the petrol cars harder and therefore petrol vehicles do not have a lot of resale value compared to diesel cars
- The petrol engine is not usable in much larger vehicles such as SUVs, pickups, and trucks

7. Role of India in a sustainable planet

- India's five new pledges are net-zero emissions by 2070, and by 2030 achieving a non-fossil fuel energy capacity of 500 GW, 50% energy requirements from renewable sources, reducing total projected carbon emissions by 1 billion tonnes and reducing the carbon intensity of the economy to less than 45%
- The Government of India **launched the National Action Plan on Climate Change (NAPCC) outlining eight National Missions on climate change**. These include National Solar Mission. National Mission for Enhanced Energy Efficiency
- To improve long-term air quality, the Indian Government **launched the National Clean Air Program (NCAP)**

FORESTS LAWS IN INDIA

1. Context

The Union Ministry of Environment, Forest and Climate Change has objected to transferring thousands of hectares of land without following due process by

Chhattisgarh from its Forest to the Revenue Department for setting up industries and for building the road, rail and other infrastructure.

2.Key Points

- While the Chhattisgarh government has described these areas as non-forest land that was earlier given "**by Mistake**" to the Forest Department, the Environment Ministry has warned that the land in question is "**undemarcated protected forests**".
- Which cannot be used for non-forest purposes without clearance under the Forest Conservation (FC) Act, 1980.

3.Forests in law

State Forest Departments have jurisdiction over two types of forests notified under the Indian Forest (IF) Act, 1927.

1. Reserve Forests (RF), Where no rights are allowed unless specified and
2. Protected Forests (PF), Where no rights are barred unless specified.

Certain forests, such as village or Nagar Palika forests are managed by state Revenue Departments.

4.Forest Conservation Act, 1980

- The FC Act, 1980, applies to all kinds of forests, whether under the control of the Forest or the Revenue Department.
- It requires statutory clearance before forests can be used for any non-forest purpose such as **industry, mining or construction**.
- In 1976, forests were included in List III (Concurrent List) Under the Seventh Schedule of the Constitution.

5. Chhattisgarh case

- The recorded forest area in Chhattisgarh covers 44.21 per cent of its geography.
- The state government says it is constrained by the limited availability of land, particularly in the tribal regions for development works.

In May 2021, the state Revenue Department sought a field survey to identify non-forest land parcels smaller than 10 hectares with less than 200 trees per hectare that had been included by mistake in "Orange Areas" under the Forest Department.

- This March, Chief Minister Bhupesh Baghel announced that over 300 sq km of the "Orange" area in the Bastar region had been handed over to the Revenue Department.

6. Orange and a grey area

- Under the Zamindari system, villagers used local malguzari (livelihood concessions) for forest firewood, grazing, etc.
- When zamindari was abolished in 1951, Malguzari forests came under the Revenue Department.
- In 1958, the government of the undivided Madhya Pradesh notified all these areas as PFs under the Forest Department.
- Through the 1960s, ground surveys and demarcations of these PFs continued either to form blocks of suitable patches to be declared as Reserve Forests or to denotify and return to the Revenue Department.
- For this purpose, Madhya Pradesh amended the IF Act, 1927, in 1965 when forests figured in the State list to allow denotification of PFs.
- The areas yet to be surveyed undermarked PFs were marked in orange on the map.

Since 2003, a case has been pending in the Supreme Court on rationalising these orange areas that have remained a bone of contention between the two Departments.

7. Policy Jam

- The transfer of PFs to the Revenue Department continued until 1976 when reports of illicit felling in Revenue areas prompted Madhya Pradesh to seek a fresh survey to shift quality forest patches back to the Forest Department.
- But before this survey could be undertaken, the new government that came to power in the state in 1978 switched the focus to settling encroachments.
- The FC Act came in 1980 and required central clearance for non-forest use of forest land.
- This led to a situation where the rights of lakhs of villagers, including those settled by the government through pattas, remained restricted.

In 2020, a task force set up by Madhya Pradesh to resolve the deadlock recommended that Patta-holders should not be considered encroachers since they were given land by government officials and they should be settled after obtaining permission from the Government of India with the cut-off year of 1976.

8. Compensatory Afforestation

- Clearance for non-forest use of forestland under the FC Act requires giving back twice the area of Compensatory Afforestation (CA) from Revenue to Forest.
- That would defeat the very purpose of the state government's action.

- Conversion of Forest to Revenue land has been exempted from CA under exceptional circumstances in the past.
- For example, when enclaves were moved out of forests, the SC allowed those to be resettled at the edge of the forests, in the absence of suitable Revenue land, as revenue villages.
- It will be a stretch, though, for such considerations to apply to thousands of hectares meant for industries.

ARCTIC WARMING

1.Key points

- 2021 was the Arctic's 7th warmest year on record.
- The Arctic is heating 4times faster than the rest of the planet.
- The warming is more concentrated in the Eurasian part of the Arctic, where the Barents Sea north of Russia & Norway is warming at an alarming rate-7 times faster than the global average.
- Earlier studies proved that the Arctic is warming 2 or 3 times faster, recent studies show that the region is fast changing which cannot be predicted accurately.

2.Arctic Amplification

- Global warming, the long-term heating of the earth's surface, hastened due to anthropogenic forces since pre-industrial times & increased the planet's average temperature by 1.1°.
- The changes are witnessed across the planet and the net radiation balance tends to produce larger changes at the north & south poles.
- This phenomenon is known as polar amplification, these changes are more pronounced at the northern latitudes & known as the Arctic amplification.

- Among many global warming-driven causes, the ice-albedo feedback, ocean heat transport, lapse rate feedback, and water vapour feedback are the primary causes.
- Sea ice and snow have a high albedo(a measure of the reflectivity of the surface), implying that they are capable of reflecting most of the solar radiation as opposed to water & land.
- Global warming is resulting in diminishing sea ice.
- As the sea ice melts, the Arctic ocean will be more capable of absorbing solar radiation, thereby driving the amplification.
- The rate at which the temperature drops with elevation decreases with warming.
- Studies show that the ice-albedo feedback & the lapse rate feedback are responsible for 40% & 15% of polar amplification respectively.

3.Previous studies

- The extent of Arctic amplification is debated, as studies show various rates of amplification against the global rate.
- Studies show that the Arctic was warming at twice the global rate before the beginning of the 21st “**Special Report on the Ocean & Cryosphere in a Challenging Climate**” in 2019, said that the Arctic surface air temperature has likely increased by more than double the global average over the last two decades.
- The Arctic Monitoring & Assessment Program(AMAP) warned that the Arctic has warmed 3times quicker than the planet.
- The chance of the sea ice completely disappearing in summer is 10 times greater if the planet is warmer by 2° C above the pre-industrial levels.
- The average annual temperature in the region increased by 3.1°C compared to the 1°C for the planet.
- Recent studies show that the mean Arctic amplification saw steep changes in 1986 & 1999, when the ratio reached 4.0, implying 4 times faster heating than the rest of the planet.

4.Consequences

- The causes & consequences of Arctic amplification are cyclical.

- The Greenland ice sheet is melting at an alarming rate & the rate of accumulation of sea ice was low since 2000.
- The Greenland ice sheet saw a sharp spike in the rate & extent of melting in July this year.
- The unusual summer temperature resulted in a melt of 6 billion tonnes of ice sheet per day, amounting to 18 billion tonnes in 3 days.
- Greenland ice sheet holds the 2nd largest amount of ice, after Antarctica.
- In 2019, this was the single biggest cause of the rise in the sea level, about 1.5 meters.
- If the sheet melts completely, the sea level would rise by 7 meters, capable of subsuming island countries & major coastal cities.
- Warming of the Arctic Ocean, seas in the region, acidification of water, and changes in the salinity levels are impacting biodiversity.
- The warming is increasing the incidence of rainfall which is affecting the availability & accessibility of lichens % of the reindeer.
- The Arctic amplification is causing widespread starvation & death among the Arctic fauna.
- The permafrost in the Arctic is releasing carbon & methane which are among the major greenhouse gases responsible for global warming.

5.Impact on India

- Scientists have pondered over the impact the changing Arctic can have on the monsoons in the subcontinent.
- The link between the two is growing in importance due to the extreme weather events the country faces, and heavy reliance on rainfall for water & food security.
- The reduced sea ice in the Barents-Kara sea region can lead to extreme rainfall events in the latter half of the monsoons.
- The changes in the atmospheric circulation due to diminishing sea ice combined with the warm temperature in the Arabian Sea contribute to enhanced moisture & drive extreme rainfall events.
- India deployed IndARC, India's first moored-underwater observatory in Svalbard, to monitor the impact of the changes in the Arctic Ocean on tropical processes like monsoons.

6. Epilogue

- According to the World Meteorological Organization's report, the sea level along the Indian coast is rising faster than the global average rate.
- The primary reason for this rise is the melting of sea ice in the polar regions, especially the Arctic.

CARBON MARKET

1. Context

In order to facilitate the achievement of more ambitious climate change targets and ensure a faster transition to a lower carbon economy, the government is seeking to strengthen a 20-year law, the Energy Conservation Act of 2001, which has powered the first Phase of India's shift to a more energy-efficient future

2. Key takeaways

The bill to amend the Energy Conservation Act of 2001, which was introduced in Parliament has two main Objectives

1. It seeks to make it compulsory for a select group of industrial, commercial and even residential consumers to use green energy, A prescribed minimum proportion of energy that they use must come from renewable or non-fossil fuel Sources
2. It seeks to establish a domestic Carbon market and facilitate trade in carbon credits

3. Carbon Market

- The creation of the domestic carbon market is one of the most significant provisions of the bill (Proposed Amendment bill)
- Carbon markets allow the trade of carbon credits with the overall objective of bringing down emissions
- These markets can create incentives to reduce emissions or improve energy efficiency
- For example, an industrial unit which outperforms the emission standards stands to gain credits and another unit which is struggling with the prescribed standards can buy these credits and show compliance with these standards
- The unit did better on the standards and earns money by selling credits while buying unit is able to fulfil its operating obligations

4.Kyoto Protocol

- Under the Kyoto Protocol, the predecessor to the Paris agreement, the carbon markets worked out well at the international level
- Kyoto Protocol had prescribed emission reduction targets for a group of developed countries
- Other countries did not have such targets, but they did reduce their emissions, and they could earn carbon credits
- These carbon credits could be sold off to those developed countries which had an obligation to reduce emissions but were unable to do so
- This system worked well for years, but the demand for carbon credit has gone down
- As the world negotiated a new climate treaty in place of the Kyoto Protocol, the developed countries no longer felt the need to adhere to their targets under the Kyoto Protocol
- A similar carbon market is envisaged to work under the Paris Agreement, but its details are being worked out

5.Conclusion

Europe

Domestic or regional carbon markets are already functioning in several places, most notably in Europe, where an emission trading scheme (ETS) works on similar principles

Industrial units in Europe have prescribed standards to adhere to, and they buy and sell credits based on their performance.

China too has a domestic carbon market

India

A similar scheme for incentivising energy efficiency has been running in India for a decade now.

BEE scheme called PAT, (perform, achieve and trade) allows units to earn efficiency certificates if they outperformed the prescribed standards

The laggards can buy these certificates to continue operating

However, the new carbon market that is proposed to be created through this amendment to the Energy Conservation Act, would be much wider in the scope

Although The details of this carbon market are not yet known, it is likely to be along the lines of European ETS, facilitating buying and selling of carbon credits

ENVIRONMENT IMPACT ASSESSMENT (EIA)

1.Context:

Demand for minor minerals such as sand and gravel has crossed 60 million tons in India.

This is the second largest extractive industry on the planet after water

2.About EIA

Process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human health impacts, both beneficial and adverse. It is a tool used to assess the positive and negative environmental, economic and social impacts of a project.

3.Issues of Regulations

- The regulatory and administrative powers to frame rules, prescribe rates of royalty, mineral concessions, enforcement, etc are entrusted exclusively to state governments.
- The Environment Impact Assessment(EIA) notifications of 1994 and 2006 made environmental clearances compulsory for mining in areas more than or equal to five hectares. However Supreme Court of India after taking cognizance of a report by the Ministry of Environment, Forest and Climate change on Environmental aspects of Quarrying of Minor Minerals(2010) directed all state governments to make the requisite changes in the regulatory framework of minor minerals, requiring environmental clearances for mining in areas less than five hectares, as a result, EIA was amended made environmental clearance mandatory for mining in areas less than five hectares, including minor minerals.
- The amended also provided for the setting up of a District Environment Impact Assessment Authority (EIAA) and a District Expert Appraisal committee (EAC).
- However a state-wise review of EACs and EIAAs in key industrial states such as Gujarat, Uttar Pradesh, Karnataka and Tamil Nadu. This shows that these authorities review over 50 project proposals in a day and the rejection rate at the state level has been a mere 1%.

4.OBSERVATION BY AGENCIES

4.1.Impact on Environment

- The United Nations Environment Programme in 2019 ranked India and China as the top two countries where illegal sand mining has led to sweeping environmental degradation.

- Centre for Science and Environment of the Yamuna riverbed in Uttar Pradesh have observed that increasing demand for soil has severely affected soil formation and the soil holding ability of land, leading to a loss in marine life, an increase in flood frequency, droughts and also degradation of water quality
- In the Narmada basin, sand mining has reduced the population of Mahseer fish from 76% between 1963 and 2015.

4.2.Impact of Exchequer

- UP is losing revenue from 70% of mining activities
- Similarly, the absence of royalty has caused a loss of rs 700 crore in Bihar
- Nonpayment of various cesses due to unregulated mining has resulted in a loss of rs 100 cr to Karnataka and 600 cr to Madhya Pradesh. In 2016-17.

5.Reasons behind

- Malfunctioning of governance due to weak institutions
- Scarcity of state resources to ensure enforcement
- Poorly drafted regulatory provisions
- Inadequate monitoring and evaluation mechanisms
- Excessive litigation that dampens state administrative capacity.

6.How to fix a Problem

- Satellite imagery can be used to monitor the volume of extraction and also check the mining process. Even for the past infractions, the NGT and administrative authorities can obtain satellite pictures for the past 10 to 15 years.
- Drones, the internet of things(IoT)and blockchain technology can be leveraged to monitor mechanisms by using a Global positioning system, radar and radio frequency locator

GREAT BARRIER REEF

1.Context

- The highest levels of coral cover, within the past 36years, were recorded in northern & Central parts of Australia's Great Barrier Reef.
- Research warned that this could be quickly reversed owing to rising global temperatures.
- This was the result of mass coral bleaching, experienced in march, 2022.

2.Coral Reefs:

- Corals are marine invertebrates or animals which do not possess a spine and are the largest living structures on earth.
- Each coral is called a Polyp and thousands of such polyps live together to form a colony, which grows when polyps multiply to make copies.
- There are two types of polyps-Hard Corals, Soft Corals.
- Hard Corals extract calcium carbonate from seawater to build a hard, white coral exoskeleton.
- Hard corals are engineers of reef ecosystems and measuring the extent of hard coral is a widely-accepted metric for measuring the condition of corals.
- Soft corals attach themselves to such skeletons and older skeletons built by their ancestors.
- Soft corals add their skeletons to the hard structure over the years. These gradually form coral reefs.



3. Great Barrier Reef

- Australia's Great Barrier Reef is the world's largest reef system stretching across 2,300 km and has nearly 3,000 individual reefs.
- It hosts 400 different types of corals, sheltering 1500 species of fish and 40,000 types of molluscs.
- Coral reefs support over 25% of marine biodiversity even as they take up only 1% of the sea floor.
- The marine life supported by reefs further fuels global fishing industries.
- Coral reef systems generate \$2.7 trillion in annual economic value through goods & service trade, and tourism.



4.New Reports

- The reefs are surveyed through in-water and aerial techniques for the past 36 years.
- The report states that reef systems are resilient and capable of recovering after disturbances like heat stress, cyclones, predatory attacks etc.
- Coral cover is measured by determining the increase in the cover of hard corals.
- The hard coral cover in northern GBR reached 36%w while in the central region reached 33%.
- The coral cover levels declined in the southern region from 38% in 2021 to 34% in 2022.
- The recovery was fueled largely by fast-growing *Acropora corals*.
- Incidentally, these fast-growing corals are the most susceptible to environmental pressures like cyclones, rising temperatures, pollution, crown-of-thorn starfish attacks etc.

5.Symbiosis

- Besides predatory attacks, and tropical cyclones, scientists say that the biggest threat is climate change-induced heat stress, resulting in coral bleaching.
- Corals share a symbiotic relationship with single-celled algae called *Zooxanthellae*.
- The algae prepares food for corals through photosynthesis and provides vibrant colouration.
- When exposed to conditions like heat stress, pollution, and high levels of ocean acidity, the zooxanthellae start producing reactive oxygen species not beneficial to corals.
- The corals kick out the pigment-producing algae from their polyps, exposing their pale white exoskeleton, leading to coral starvation as they are not autotrophs.
- Bleached corals can survive depending on the levels of bleaching and recovery of sea temperatures to normal levels.
- Severe bleaching and prolonged stress in the external environment can lead to coral death.

6.Climate Change

- Over the last couple of decades, climate change-induced rise in temperature made seas warmer than usual.
- Under all positive outlook, projections in terms of cutting greenhouse gases, sea temperatures are predicted to increase by 1.5-2⁰
- As per UN assessment 2021, the world is going to experience heating at 1.5⁰ C in the next decade, the temperature at which bleaching becomes more frequent.
- In the past decade, mass bleaching events became more closely spaced in time.
- The first mass bleaching event occurred in 1998 when the El Niño weather pattern caused sea surfaces to heat, causing 8% of the world's coral to die.
- The second event took place in 2002.
- The longest and most damaging bleaching event took place from 2014-2017.
- These events were followed by 2020 and 2022 mass bleaching.
- The aerial surveys included 47 reefs and coral bleaching was recorded in 45 of them.

7.Epilogue

The prognosis for the future disturbance suggests an increase in marine heatwaves that will last longer and the ongoing risk of Crown-of-Thorn Starfish (COT) outbreaks and cyclones.

Therefore, the observed recovery offers good news for the overall state of the GBR, there is an increasing concern about its ability to maintain this state.

LIFESTYLE FOR ENVIRONMENT (LiFE)

1. Context

In November 2021, at the Cop 26 in Glasgow Prime Minister Narendra Modi, in addition to announcing the panchamrit, or five climate-related commitments of the country, also articulated the concept of Lifestyle for the Environment (LiFE)- advocating for” mindful and deliberate utilization” by people worldwide instead of mindful and wasteful consumption.

2. Implications on rising Temperature

- It is estimated that the global economy could lose up to 18% of GDP, and India could lose \$6 trillion by 2050 if no climate action is taken
- In India alone, more than 50 % of our largely rural workforce will be negatively affected by climate change.
- Food and water security are already threatened across the world due to the climate crisis

According to United Nation Environment Programme (UNEP), if one billion people out of the global population of close to eight billion adopt eco-friendly behaviours in their daily lives, global carbon emissions could drop by approximately 20%.

such eco-friendly behaviours include turning off ACs heaters and lights when not in use as this, for instance, can conserve up to 282 kilowatts of electricity per day

Avoiding food wastage can reduce an individual’s carbon footprint by 370 kg per year. Reducing one flight trip per year can reduce per capita carbon emissions by 700 to 2800 kg.

There is an urgent need for individuals to transcend geographical, social and economic boundaries and come together as a global community to tackle the climate crisis.

India can lead the global climate debate by nudging the world toward a new model of sustainable and inclusive development through the Lifestyle for the Environment (LiFE) movement

3.About LiFE

- LiFE was launched on June 5, 2022, world Environment day by PM Modi

- VISION-harnessing the power of individual and collective action across the world to address the climate crisis.
- The objective of the movement is to nudge individuals and communities to adopt simple and specific climate-friendly behaviours in their daily lifestyles.
- LiFE is planned as a first-of-its-kind global movement, led by India in partnership with other countries that will provide the world with a unique people-powered platform to relentlessly focus on bringing individual and collective actions to the core of the climate action narrative.
- LiFE aims to activate the global community “Pro Planet People “

4. Pro-planet initiatives

- Denmark promotes the use of bicycles by limiting parking within the city centre and providing exclusive bike lanes
- Japan has its unique “Walk to School “mandate

4.1.Consume responsibly :

- The prevailing perception that climate-friendly behaviour necessarily implies a frugal lifestyle has played a major role in preventing populations worldwide from adopting a sustainable lifestyle.
- LiFE plans to methodically break down this mental model by nudging the world to consume responsibly, rather than consuming less.
- Building on the unique insights from India’s recent Jan Andolan such as Swachh Bharat Mission, LiFE will deploy a range of tested behavioural techniques, including nudges, social and behaviour change communication and norm influencing to make mindful consumption a mass movement

4.2.Produce responsibly:

If sustainable choices are not supported from the supply side any change in our consumption pattern will only be temporary.

While policies and regulations incentivize the sustainability market to a limited extent, a long-term and stable shift in what and how the market supplies will have to be triggered by what the consumers demand.

By nudging the consumption patterns of the society at scale, Life can also trigger a huge boost for the sustainability market. Several green industries and a large number of jobs are likely to be initiated as a positive externality of LiFE.

4.3.Liv responsibly:

As a global community of people with a shared natural world, a threat to one is a threat to all. In this context, through its multi-dimensional, multicultural and global approach, the LiFE movement can play a pivotal role in not merely reversing the effects of climate change but at a broader level mainstream a harmonious and mindful way of living – a staple of Indian culture and tradition practised by its people over centuries.

The time is ripe for India to lead the LiFE movement and mainstream it into the climate narrative. By December, India will assume the presidency of the G-20, a group that covers 60% of the global population, 80% of the global GDP and 75% of global exports. This puts us in a pole position to shape the global development model.

HASDEO ARANYA REGION

1.Context

Chhattisgarh Legislative Assembly unanimously passed a private member resolution urging the Centre to cancel the allocation of all coal mining blocks in the ecologically sensitive areas of Hasdeo Aranya.

2.Private member resolution

- An MLA who is not a minister whether he or she happens to be from the ruling party or not is a private member.

- A private member resolution can be brought in by a private member and if passed, it becomes an expression of what the House thinks.
- This is different from a private member bill which would become the law in case of approval.
- The State Assemblies of Punjab and Kerala passed such private member resolutions during the farm law agitation.
- Both state legislatures expressed their displeasure against the then-proposed farm laws.
The Chhattisgarh Assembly has passed a resolution urging the Centre to cancel the allocation of all coal mining blocks in the Hasdeo Region.

3.Importance of the Hasdeo-Aranya region

- It lies in the catchment area of the Hasdeo river and is spread across 1,878 sq km in North-Central Chhattisgarh.
- The Hasdeo river is a tributary of the Mahanadi river which originates in Chhattisgarh and flows through Odisha into the Bay of Bengal.
- The Hasdeo forests are also the catchment area for the Hasdeo Bango Dam Built across the Hasdeo river which irrigates six lakh acres of land is crucial to a state with paddy as its main crop.
- The forests are ecologically sensitive due to the rich biodiversity they offer and due to the presence of a large migratory corridor for elephants.

4.Controversy

- Underneath the Hasdeo Aranya is a coalfield that comprises 22 coal blocks.
- In 2010, the Centre categorised it to be a "no-go" zone for mining.
- A year later, the Ministry of Environment, Forest and Climate Change (MoEF) granted clearance for the mining of one coal block.
- At present seven blocks have been allotted to different companies.

- Of these, two the Parsa East Kete Basan (PEKB) and Chotia (I and II) are operational.
- The PEKB Phase I has been completely mined while there has been local opposition to mining and deforestation in Parsa.
- PEKB Phase II and Kete Extension are all three allotted to the Rajasthan Rajya Vidyut Utpadan Nigam Ltd (RRVUNL).

5. Withdrawal

- After the Gram Sabhas opposed mining in the Madanpur South and Gidmudi Paturia blocks, the clearances were withdrawn.
- The resolution notes that mining activities are halted in all five of these blocks.
- Four other blocks are removed for the auction after the state government requested that these are located in the catchment areas of the two important rivers Hasdeo and Mand.
- The state government is to use the same principle to stop mining in the already allocated Hasdeo coal blocks where no activity has started thus far.
- The coal blocks may be allotted elsewhere in Chhattisgarh or the rest of the mining-rich areas in the country.

6. Will mining stop after the resolution is passed?

- Despite the members of both the ruling Congress and the Principal Opposition BJP that is in power at the Centre adopting it, the resolution is not expected to change the existing conditions.
- Congress says the onus is on the Centre to stop mining.
- The BJP has been asking the State government to withdraw the clearances it has issued to mine developers and operators (MDOs) who handle all mining activities on behalf of the companies that hold the mining lease.
- Due to mining in PEKB and Parsa, three lakh trees will be felled which would be harmful to Chhattisgarh.

- The clearances provided by the State government such as the final clearance from the forest department and those under the Air Pollution Act and the Water Pollution Act.

FLY AWAY

1.Context

Indian five Wetlands have got Ramsar recognition as "Wetlands of International Importance"

With the addition of 5 wetlands, the number of Ramsar sites in India has gone up to 54 now, which is the highest in South Asian Countries

Wetlands in India act as foraging and resting grounds for many migratory birds during winter

2.What is Fly Away?

Flyaways are geographical areas used by single or group of migratory birds during their annual cycle.

These include breeding areas, moulting, stop-overs, staging (birds gathering before migration) and wintering areas

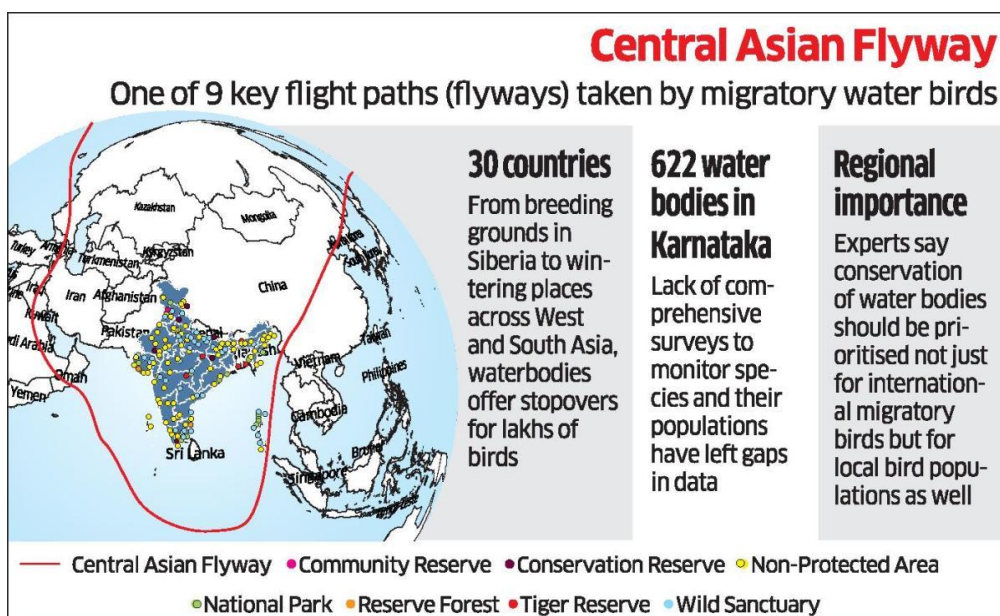
3.Fly Away's in Indian Sub-Continent

There are 9 flyaway's in the world 3 of them pass through the Indian Sub-Continent

1. Central Asian Flyaway (CAF)

- Migration route covers over 30 Countries for different waterbirds

- It connects the northernmost breeding grounds in Siberia, Russia to the Southernmost non-breeding grounds in West and South Asia, the Maldives and the British Ocean Territory
- India provides important stopover sites to over 90% of the bird species passing through this route



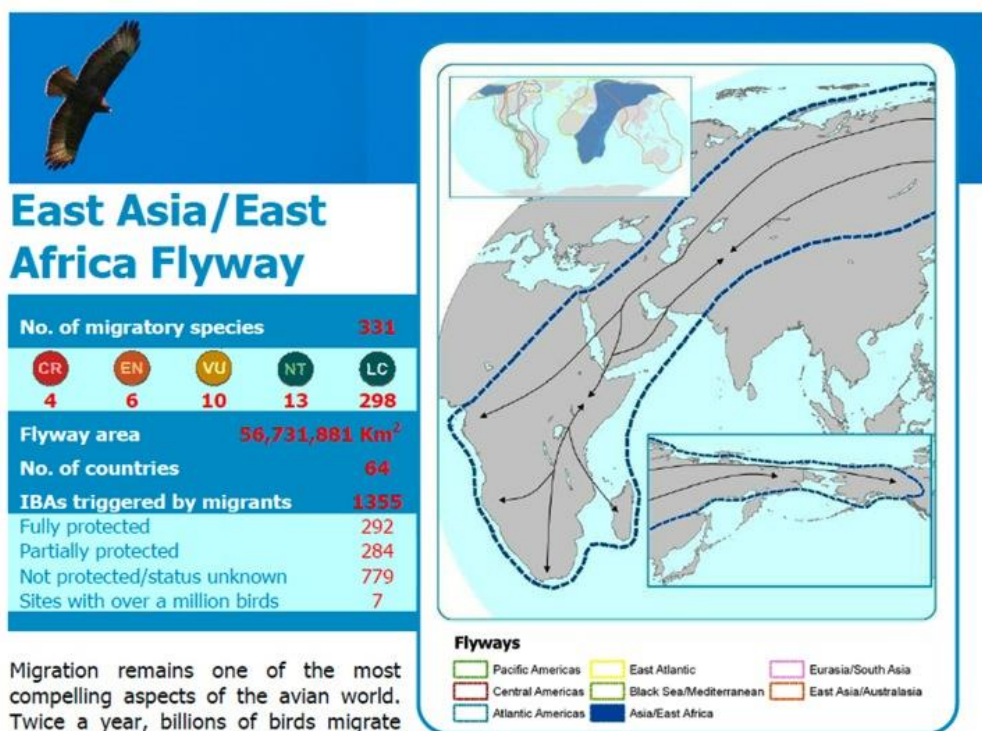
2. East Asian Australasian Fly Way (EAAF)

- It extends from Arctic Russia and North America to the southern limits of Australia and Newzealand
- It covers a large area of East Asia and all of Southeast Asia. Importantly, it includes eastern India as well as Andaman Nicobar Islands
- This flyaway region covers 30 countries of North, Central and South Asia and the Trans Caucasus
- It covers at least 279 populations of 182 migratory species, including 29 globally threatened and near threatened species



3. Asian East African Flyaway (AEAF)

- It extends from Arctic Russia to South Africa and Madagascar in Africa
- In the Indian Sub-Continent covers the area from west of the Tibetan Plateau and Himalayans including Central Asia and West Asia, North Western India also covered



4. Conservation of Migratory Species (CMS) Convention

- It is a convention for the Conservation of Migratory Species of wild Animals, it is also known as **Bonn Convention**
- It is an environmental treaty under the aegis of the United Nations Environment Program (UNEP)
- It provides a global platform for conservation and sustainable use of migratory animals and their habitats
- India is a party to the CMS

As the only global convention specializing in the conservation of migratory species, their habitats and migratory routes.

CMS complements and co-operates with a number of other International Organisations, NGOs and partners in the media as well as in the corporate sector

Raptor MoU

- Memorandum of understanding on the conservation of migratory birds of Prey in Africa and Eurasia is also known as Raptor MoU, It is an agreement under CMS
- The aim of this MoU is to promote coordinated actions to maintain the favourable conservation status of migratory birds of prey (raptors)
- India is a signatory to Raptor MoU, it is not legally binding

5.Conclusion

1. One in five of the world's 11,000 bird species migrate, some covering enormous distances
2. India organised a two-day online Meeting of Range Countries was held with a resolve to Strengthen the conservation actions for migratory birds and their habitats in the Central Asian Flyaway

LION'S FUTURE CHEETAH'S PAST

1.Context

African Cheetahs will be imported from Namibia and another 12 from South Africa, for a soft release in a compartmentalized enclosure ready at Kuno National park in Madhya Pradesh to establish the Cheetah into its “historical range”. However as underlined by the Supreme Court introduction and not reintroduction, would be the right term for the project since African Cheetahs could not have ever roamed Kuno.

2.RELEASE (In Phased Manner)

- Once cheetahs arrive in Kuno, the plan is to keep male coalitions (groups) and individual females in separate but adjoining compartments so that they can know each other before release.
- The enclosure will be stocked with natural prey to ensure that the animals get accustomed to hunting Indian prey species before their release.
- Radio-collared male coalitions will be released first after 12 months. The presence of females in the enclosure, the project's Action Plan says, will ensure that the males do not wander too far away.
- After their exploration instinct is satiated.
- In the next phase, the radio-collared females will be released, 1-4 weeks after the males, depending on how the males settle down in the new environment.

3.Target milestone

If all goes well, the population should reach its limit of 21 within Kuno in about 15 years. During this period, a few other smaller cheetah reserves will be created in Rajasthan and elsewhere in MP. For at least five years and up to 10 years, a fresh supply of cheetah will continue from Africa.

Once the greater Kuno landscape is secured and restored, the largest population is projected to go up to 36 cheetahs in 30-40 years

4.Problems

4.1.HABITAT CONNECTIVITY-Creating and maintaining a few small island populations is not quite the same as the popular idea of bringing back the cheetah that one roamed in the Indian wild.

The biggest challenge facing conservation in India is how to maintain habitat connectivity that keeps meta –populations self-sufficient (genetically viable) to perform their ecological roles.

4.2.HUMAN INTERVENTIONS-The model of establishing populations that will depend on human intervention for survival effectively reduces protected areas to glorified open zoos.

4.3.INTRODUCING EXOTIC REPLACEMENT FOR EXTINCT SPECIES-The Cheetah project also promises to benefit endangered grassland

species, such as the endangered Indian wolf and the near extinct great Indian Bustard (GIB)

In the umbrella approach of conservation, multiple species in a forest are protected in the name of a flagship species i.e. tiger. There is no justification as to why one must introduce an exotic replacement for an extinct species to save indigenous species.

Wolves for example are the keystone species in Nauradehi and would have to compete with cheetahs. The majestic GIB is potential prey for cheetahs. The project excluded Jaisalmer's Desert National Park because "putting the cheetah in with the bustard cannot be contemplated at all, because of the threats to this cost gravely endangered bird. And yet, it recommends erstwhile GIB habitats for the cheetah, in effect denying the bird any chance of habitat recovery

5.KEY TERMS

5.1.What is a flagship species?

- A flagship species is a species selected to act as an ambassador, icon or symbol for a defined habitat, issue, campaign or environmental cause. Flagship species are also known as charismatic species.
- Flagship species are the species that are on the verge of extinction.
- By focusing on, and achieving conservation of that species, the status of many other species which share its habitat – or are vulnerable to the same threats - may also be improved.
- Flagship species are usually relatively large, and considered to be 'charismatic' in western cultures.
- Flagship species may or may not be keystone species and may or may not be good indicators of biological processes. The main objectives of flagship species are:
 - The unique features of these animals help in attracting society's attention.
 - Raising awareness about the protection and conservation of these species.

5.2.Categories of Flagship Species

Flagship species can be divided into three different categories:

International Flagship Species: These are the species that are recognized throughout the world e.g. giant panda

Cultural Flagship Species: These species represent a specific culture e.g. Bornean Ironwood is specific to the Dayak tribe. It is used for medicinal purposes and night rituals.

Ecological Flagship Species: These represent species with unique diversity e.g. Malagasy Baobab found in Madagascar.

Benefits of Flagship Species

- The flagship species such as pandas and elephants help in generating revenue through visits to institutions where they are kept. This revenue helps in the protection and sustainability of species.
- The flagship species attract the public due to its unique features. This way the plight of such creatures can be brought to the notice of society and strategies can be implemented to improve their condition. This creates awareness regarding biodiversity conservation among individuals.

5.3.What is priority species?

- The terms “flagship” and “keystone” have generally consistent definitions across the conservation community, however, “priority species” is a WWF term, and is solely for planning and simple communication.
- For WWF, a “priority species” may be either a flagship or a keystone species and is chosen to represent an eco-region or region.
- A “priority species” is reflective of a key threat across that ecoregion - such that conservation of the species will contribute significantly to a broader threat mitigation outcome. It is often crucial to the economic and/or spiritual well-being of people within that ecoregion.

5.4.What is a keystone species?

- A keystone species is a species that plays an essential role in the structure, functioning or productivity of a habitat or ecosystem at a defined level (habitat, soil, seed dispersal, etc).
- The disappearance of such species may lead to significant ecosystem change or dysfunction which may have knock-on effects on a broader

scale. Examples include the elephant's role in maintaining habitat structure, and bats and insects in pollination.

- By focusing on keystone species, conservation actions for that species may help to preserve the structure and function of a wide range of habitats which are linked with that species during its life cycle.

5.5. What is an indicator species?

An indicator species is a species or group of species chosen as an indicator of, or proxy for, the state of an ecosystem or a certain process within that ecosystem.

Examples include crayfish as indicators of freshwater quality; corals as indicators of marine processes such as siltation, seawater rise and sea temperature fluctuation; peregrine falcons as an indicator of pesticide loads; or native plants as indicators for the presence and impact of alien species.

BANNI GRASSLANDS

1. Context

- The Gujarat forest department will restore 10,000 hectares of the Banni grasslands in the coming year and every year in the coming decade.
- The state plans on restoring at least 76,000 hectares of this 2,497 sq km grassland which already restored 10,000 hectares over the past couple of years.

2. Introduction

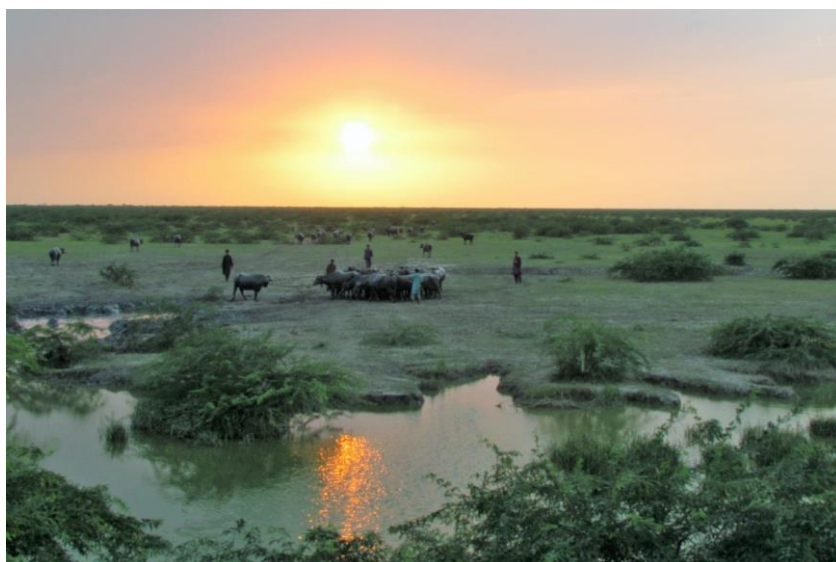
- Banni grasslands form a belt of the arid grassland ecosystem on the outer southern edge of the desert of Rann of Kutch, in Kutch district, Gujarat.
- They are known for rich wildlife and biodiversity and spread across an area of 3,847 sq. kilometres.
- It is situated from 23° 19' N to 68° 52' E.



3.Restoration:

- At the United Nations High-Level Dialogue on Desertification, Land Degradation and Drought last year, a target of restoring 26 million hectares of degraded land by 2030 was flagged.
- Forest officials say that the project was begun in 2015-16.
- The landscape of Banni has shown drastic changes with the deterioration of the grassland due to heavy uncontrolled grazing, widespread *Prosopis juliflora* (harmful exotic species), dams constructed on rivers flowing towards Banni, periodic occurrence of droughts and continuous increase in soil salinity.
- In the year 1989, this area was dominated by grasslands covering 54.57% of the area followed by saline areas devoid of vegetation or sparsely distributed vegetation covering 27.30% and *Prosopis juliflora* an alien invasive species covering 15.72% of the area.
- The Land Use Land Cover (LULC) assessment of the grassland over a 10 years interval revealed that grassland areas over the period gradually reduced, while *Prosopis juliflora* has increased, encroached more than 30%.
- Within a gap of 20 years, *Prosopis juliflora* dominant areas doubled in Banni.
- The mainstay of the restoration project is the removal of this alien species which incidentally was introduced to the area by the forest department in the 1960s to stop the ingress of the salt flats.

- With a huge 20 lakh livestock population that depends on grassland, the second part of the project envisions the production and storing of fodder for local farming.
- There exists a huge gap in demand & supply of fodder, making the livelihood of locals difficult.
- The forest division has been given a target to bring 2400 hectares under controlled grass cultivation in 2022-23 by the state government.
- This was achieved by creating 27 grass plots of varying size and cumulatively covering 2400 hectares.
- Prosopis juliflora and other unwanted vegetation were removed from these plots and a protective trench was dug around them.



4.Banni Grasslands

- Banni region emerged from the sea as a result of tectonic activities, received soils from the rivers flown from Bhutto mainland and ends in greater Rann of Kutch.
- Soils deposited by the rivers and the wind, made the land of Banni richer enough that could generate diverse grass species(40 species).
- Banni grassland supports numerous animal genetic resources like Banni buffalo, Kankrej Cattle, Sheep, Goat, Camel, and Horse.
- This grassland acts as a breeding and nesting space for more than 250 bird species, including resident and migratory birds.

- The maximum temperature ranges to 48-50⁰ C during May and June; winter temperature goes down to 5-8⁰ C during December and January.
- Average annual rainfall is very low at 317 mm with a coefficient of variation of 65%.
- Though there is inherent salinity in the soil, pastoral communities dug up birds, shallow wells of 9-12 feet deep that collect rainfall in its soil particle, for livestock and themselves.
- There are many natural wetlands, the largest one is known as Chhari-Dhandh, a saucer-shaped wetland which is recently declared a Conservation Reserve.
- Banni grasslands are responsible for the increase in salinity.
- Though the grassland is facing ecological disturbances, the recent recognition of the Banni Buffalo breed of country, establishment of dairies, and good rainfall generated hope.

Eco-Sensitive Zone (ESZ)

1. About

- As per the National Wildlife Action Plan (2002-2016), issued by the Union Ministry of Environment, Forest and Climate Change, land within 10 km of the boundaries of national parks and wildlife sanctuaries is to be notified as eco-fragile zones or Eco-Sensitive Zones (ESZ).
- While the 10-km rule is implemented as a general principle, the extent of its application can vary.
- Areas beyond 10 km can also be notified by the Union government as ESZs, if they hold larger ecologically important “sensitive corridors.”

1.1 Eco-Sensitive Zone (ESZ)

- The Eco-Sensitive Zone (ESZ) are areas in India notified by the Ministry of Environment, Forest and Climate Change (MoEFCC), GoI around Protected Areas, National Park and Wildlife sanctuaries.
- **Purpose:**
 - To create some kind of "shock absorbers" to the protected areas by regulating and managing the activities around such areas.
 - Therefore, these areas act as a buffer for protected areas and reduce developmental pressures around a wildlife sanctuary or national park.
 - They also act as a transition zone from areas of high protection to areas involving lesser protection.
- **Range:**
 - All identified areas around Protected Areas and wildlife corridors to be declared as ecologically fragile under the Environment (Protection) Act, 1986 (National Wildlife Action Plan, 2002-2016).
 - Eco-sensitive Zone could go up to 10 Kms around Protected Areas.
 - In cases where sensitive corridors, connectivity and ecologically important patches, crucial for landscape linkage, are even beyond 10 Kms width.
 - Further, Eco-sensitive zones may not be uniform all around and they could be variable in width and extent.
- **Prohibited activities:**
 - Activities like industries which cause pollution Commercial mining, sawmills, the establishment of major hydroelectric projects (HEP), commercial use of wood, Tourism, discharge of effluents or any solid waste or production of hazardous substances are all prohibited.
- **Regulated activities:**

- Activities like the felling of trees, establishment of hotels and resorts, commercial use of natural water, erection of electrical cables, drastic change of agriculture system, e.g. adoption of heavy technology, pesticides etc., widening of roads.
- **Permitted activities:**
 - Activities like ongoing agricultural or horticultural practices, rainwater harvesting, organic farming, use of renewable energy sources, and adoption of green technology for all activities are permitted.

2. Reasons for the creation of an ecologically sensitive zone

- According to the guidelines issued by the Environment Ministry on February 9, 2011, ESZs are created as “shock absorbers” for the protected areas, to minimize the negative impact on the “fragile ecosystems” by certain human activities taking place nearby. Furthermore, these areas are meant to act as a transition zone from areas requiring higher protection to those requiring lesser protection.
- The guidelines also state that the ESZs are not meant to hamper the daily activities of people living in the vicinity, but are meant to guard the protected areas and “refine the environment around them”.
- To do so, the guidelines list the activities prohibited in an ESZ, such as commercial mining, saw mills, commercial use of wood, etc., apart from regulated activities like the felling of trees. Lastly, there are permitted activities like ongoing agricultural or horticultural practices, rainwater harvesting, and organic farming, among others.

3. Judgement of Supreme Court

- On June 3, a three-judge bench of the Supreme Court heard a PIL which sought to protect forest lands in the Nilgiris in Tamil Nadu, but was later expanded to cover the entire country.
- In its judgment, the court while referring to the 2011 guidelines as “reasonable”, as reported by Live Law, directed all states to have a

mandatory 1-km ESZ from the demarcated boundaries of every protected forest land, national park and wildlife sanctuary.

- It also stated that no new permanent structure or mining will be permitted within the ESZ.
- If the existing ESZ goes beyond a 1-km buffer zone or if any statutory instrument prescribes a higher limit, then such extended boundary shall prevail, the court, as per the Live Law report, said.

4. Protests by the people

- Protests erupted across the high ranges of Kerala in response to the apex court's directions. Due to the high density of human population near the notified protected areas, farmer's groups and political parties have been demanding that all human settlements be exempt from the ESZ ruling.
- Alex Ozhukayil, the chairman of Kerala Independent Farmers' Association (KIFA) claimed that the court's decision would severely impact the livelihoods of farmers.
- He said, "The total extent of the wildlife sanctuaries in Kerala is eight lakh acres. If one km of ESZ is demarcated from their boundaries, around 4 lakh acres of human settlements, including farmlands, would come within that purview. This is a matter of sheer survival of lakhs of people."
- The ruling Left Democratic Front and the Congress-led United Democratic Front have both called for strikes in Idukki and Wayanad districts over the past weeks to oppose the 1-km order.
- Before the SC judgment, the Kerala state government had stated during an expert committee meeting of the Union Environment Ministry in March that all human settlements should be excluded from the buffer zones.
- The Kerala state government had proposed that for some national parks, such as the Thattekad Bird Sanctuary, the extent of the ESZ area should be reduced from the proposed uniform 1 km to an ESZ ranging from zero to 1 km in the eastern and south-eastern side of the national park.
- This was because the villagers occupying the densely populated settlements in these areas believed that the ESZ would restrict their agricultural and related activities.

5. Other similar challenges

Developmental activities:

Activities such as the construction of dams, roads, and urban and rural infrastructures in the ESZ, create interference, negatively impact the environment and imbalance the ecological system.

Blatant violations:

To cater to the increasing demand for eco-tourism, the land around parks and sanctuaries are being cleared through deforestation, displacement of local people etc.

Failing to recognize the rights of forest communities and curbing poaching of animals, environmental legislations undermine the ESZs in favour of developmental activities.

Climate change:

Biodiversity and climate change are interconnected, for example, the rise in global temperature has generated land, water and ecological stress on the ESZs.

Tourism-related Pollution:

As the pressure of tourism is rising, the government is developing new sites and gateways to the ESZ. The tourists leave behind garbage such as plastic bags and bottles etc. which leads to environmental degradation.

Local communities:

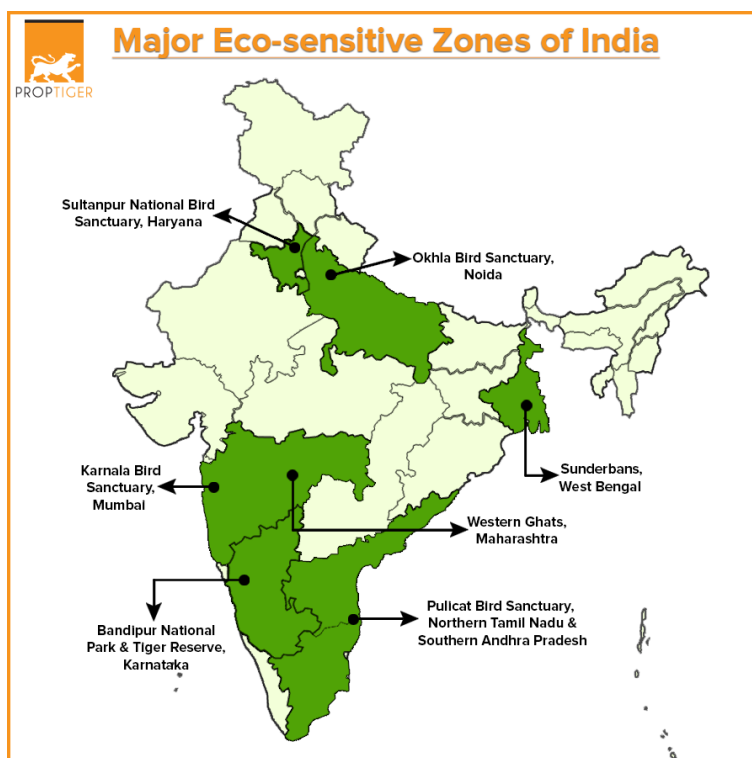
Slash and burn techniques used in agriculture, the pressure of increasing population and the rising demand for firewood and forest produce, etc. exerts pressure on the protected areas.

6. Earlier protests

- This is not the first time that Kerala has faced such protests.

- In 2013, hartals first erupted in Idukki and Wayanad after the Kasturirangan committee report recommended that 60,000 km of the Western Ghats, covering 12 of Kerala's 14 districts, be notified as ecologically sensitive areas.

7. Distribution of major ECZ in India



GLOBAL ENVIRONMENT FACILITY

1.Context

The Global Environment has promised to Provide \$5.33 billion over the next four years to address problems related to biodiversity worldwide.

It was announced at an information session of the ongoing preparatory meeting on the Post-2020 Global Biodiversity Framework meeting in Nairobi.

2.Key points

- It is the only multilateral fund focused on biodiversity.
- The amount is 30 per cent more than in the last four years.
- Biodiversity would be the focus area during these years and at least 60 per cent of the commitments will be related to biodiversity.
- It plans to provide the funds to improve food systems, ecosystem restoration, ensure clean and healthy oceans, climate change mitigation and manage chemicals and waste among other things.
- The plan is to provide \$1 million per country for in-country work and \$9 million for global technical assistance.
- This would help meet goals. But it is much less than the requirement estimated by Campaign for Nature, a non-profit.
- At least one per cent of global gross domestic product is needed each year to deal with the biodiversity crisis.
- The organisation estimates the requirement to be at least \$60 billion each year.

Earlier, a group of countries including Argentina and Brazil and Gabon called for developed countries to provide at least \$ 100 billion a year, rising to \$700 billion per year by 2030.

3. Biodiversity woes

- The world failed to meet the Aichi targets on biodiversity set for 2011-2020, due to a lack of adequate financial resources.
- In 2020, an assessment showed that none of the 20 Aichi targets had been met.
- Campaign for Nature asked developed countries to provide funds in the form of grants and not debt and also ensure that indigenous people and local communities had direct access to these resources.
- This is important in light of the recent developments from **Tanzania's Maasai Community** are being forcefully throughout from their ancestral land to make way for a luxury game reserve for the rich.
- Investing in the environment is important considering that money spent now can help avoid massive future costs that come from the degradation of nature as well as Zoonotic diseases and pandemics that can be caused due to the loss of nature.
- There is also a need to eliminate subsidies that are harmful to nature. These include subsidies on fishing or the promotion of fossil fuels.
- The Nairobi meeting is being held in preparation for the 15th meeting of the Conference of the Parties to the Convention on Biological Diversity (CoP15), Scheduled for later this year in Montreal, Canada.

4. Global Environment Facility (GEF)

- It was established on the eve of the 1992 Rio Earth Summit.
- It is a change for action on the environment and much more.
- In strategic investments, the GEF works with partners to tackle the planet's biggest environmental issues.
- It is a unique partnership of 18 agencies including United Nations agencies, Multilateral development banks, National entities and international NGOs working with 183 countries to address the world's most challenging environmental issues.
- It has a large network of civil society organisations, works closely with the private sector around the world and receives continuous inputs from an independent evaluation office and a world-class scientific panel.

5. Financial Mechanism

It is a Financial Mechanism for five major international environmental conventions.

1. The Minamata Convention on Mercury
2. The Stockholm Convention on Persistent Organic Pollutants (POPs)
3. The United Nations Convention on Biological Diversity (UNCBD)
4. The United Nations Convention to Combat Desertification (UNCCD) and
5. The United Nations Framework Convention on Climate Change (UNFCCC).

It is also an Innovator and Catalyst that supports multi-stakeholder alliances to preserve threatened ecosystems on land and in the oceans, build greener cities, boost food security and promote clean energy for a more prosperous, climate-resilient world.

Leveraging \$5.2 in additional financing for every \$1 invested.

Trust Fund

- The GEF Trust Fund was established to help tackle our planet's most pressing environmental problems.
- Funds are available to developing countries and countries with economies in transition to meet the objectives of the international environmental conventions and agreements.

KEIBUL LAMJAO NATIONAL PARK

1.Habitat:

- The Keibul Lamjao National Park (KLNP) is the world's only floating wildlife sanctuary, afloat on the waters of the Loktak Lake, Manipur.
- There are patches and rings of biomass called Phumdis, consisting of the park as a wetland ecosystem.
- A Phumdi is a carpet of dead and decaying flora, which floats on the surface of the lake.
- Tall reeds and grasses grow on the Phumdis, often reaching up to 15 feet in height.
- Roughly 240 sq km lake provides nutrition to Phumdis, as the living roots reach the lakebed during the dry season.

2.SANGAI:

- The KLNP is home to the endangered brow-antlered deer (sangai), *Rucervus eldii*.
- Sangai is the state animal of Manipur, considered one of the rarest animals.
- It is a medium-sized deer with uniquely distinctive antlers, measuring 100-11- cm in length.
- The Sangai has a maximum lifespan of 10 years.
- Rutting takes place in the spring months between February and March.
- Males compete with each other to gain control of females that whom they can mate.
- After 220-240 days of gestation, a single calf is born.

3.Danger of Extinction

- The sangai was believed to be almost extinct by 1950.
- The number of endangered deer sangai found in Manipur has increased from 204-260.
- The sangai faces a two-pronged danger to its life.
- Its habitat is degenerating by floods.
- Poachers are out there to trap and slay the deer at the slightest opportunity.

- Some poachers enter the Loktak lake, the large freshwater lake, masquerading as fishermen to poach the deer.

CONSTITUTION - PROTECTION OF WILDLIFE

1. Background

- The framers had not excepted the importance of environmental preservation.
- This aspect did receive attention later and, in 1976, the 42nd amendment incorporated the protection of wildlife and forests in the Directive Principles.
- It also included forests and protection of wild animals in the Concurrent List – Seventh Schedule (Article 256) of the Constitution.

Article 51 A (g) of the Constitution says that it shall be the fundamental duty of every citizen to protect and improve the natural environment including forests and Wildlife.

Article 48 A, The Directive Principles of State policy mandates that the State shall endeavour to protect and improve the environment and safeguard the forests and wildlife of the country.

2. Supreme Court verdict

- The Supreme Court in its decisions has relied on the directive principles to enlarge the scope and content of the fundamental rights, thereby bringing them within the ambit of justiciable rights.
- The preservation of ecology and environment, based on the principle of sustainable development to reconcile the conflicting interest of

development with the preservation of a healthy environment, has been recognized as a facet of the right to life.

- The principle adopted is that ecology and environment are not objects of ownership but are nature's gifts intended to be preserved in trust for future generations.

Article 21 protects the right to life as a fundamental right.

- Enjoyment of life and its attainment including their right to life with human dignity encompasses within its ambit, the protection and preservation the of environment, ecological balance free from pollution of air, water, and sanitation without which life cannot be enjoyed
- These specific Constitutional provisions and landmark judgments of the Apex Court form the bedrock on which protection and conservation of wildlife rest.
- They also empower civil society institutions/citizens to constructively participate in the process of protecting forests and wildlife.

Red Dunes Desert

1.Key Points

- The small desert is situated in the state of Tamil Nadu. It consists of red dunes and is confined to the Thoothukudi district.
- The Red Dunes are called **Theri** in Tamil.
- They consist of sediments dating back to the Quaternary Period and are made of **marine deposits**.
- They have very low water and nutrient withholding capacity. The dunes are susceptible to **aerodynamic lift**.
- This is the push that lets something move up. It is the **force that is the opposite of weight**.

The petrographical study (Petrography is the study of composition and properties of rocks) and **X-ray diffraction analysis** (a method used to determine a material's crystallographic structure) of the red dunes reveal the presence of heavy and light minerals.

These include:

- Limenite
 - Magnetite
 - Rutile
 - Garnet
 - Zircon
 - Diopside
 - Tourmaline
 - Hematite
 - Goethite
 - Kyanite
 - Quartz
 - Feldspar
 - Biotite
-
- The Iron-rich heavy minerals like **ilmenite, magnetite, garnet, hypersthene and rutile** present in the soil had undergone leaching by surface water and were oxidised because of the favourable semi-arid climatic conditions.
 - It was due to these processes that the dunes near Tiruchendur, a coastal town in the Thoothukudi district are red-coloured.
 - The dunes are spread over **Kuthiraimozhi theri** (2,387.12 hectares) and **Sathankulam** (899.08 ha) reserve forest of Tiruchendur taluk located on the shoreline overlooking the Bay of Bengal in the southeastern part of Tamil Nadu.

2.How did they form?

- It appears as gentle, undulating terrain. The lithology (the study of general physical characteristics of rocks) of the area shows that the area might have been a paleo (ancient) coast in the past.
- **The presence of limestone in many places indicates marine transgression.**
- The Present-day theris might have been formed by the confinement of beach sand locally, after the regression of the sea.
- The induced migration of sand grains and accumulation of dunes due to high-velocity winds from the Western Ghats blowing east.
- Another view is that these are **geological formations** that appeared in a period of a few hundred years.
- The red sand is brought from the surface of a broad belt of red loam in the plains of the **Nanguneri region** (about 57 kilometres from this area in Tirunelveli district) by southwest monsoon winds from May to September.
- The South west monsoon winds after draining the moisture behind the **Mahendragiri hill and the Aralvaimozhi gap of the Western Ghats** (about 75 Kilometers from this area), become dry and strike the plains in the foothills, where vegetation is sparse.
- Deforestation and the absence of vegetative cover in the Aralvaimozhi gap and the Nanguneri plains are considered to be the major causes of wind erosion.
- During the dry-monsoon wind blows with high velocity, the red loam is churned and driven east in huge columns of red sand till they are met by sea breeze near the coastal tract of Tiruchendur and get deposited there.
- The fine materials with light weight are picked up, suspended in the air and carried away.
- The heavy or large grains are rolled along the ground and grains of intermediate size and weight are carried out at one time and rolled to another.
- Severe gusts of wind are capable of picking up and carrying materials for short distances and larger materials can be consistently held in the air.
- Thus, some grains are carried and dropped innumerable times in the course of history.

- These processes of erosion, transport and deposit of sediments that are caused by wind at or near the surface of the earth are called Aeolian processes. They lead to continual sand redistribution.
- The formation of a dune is a most characteristic and conspicuous process.
- When the high-velocity wind blowing sand above the ground meets any obstruction like a fence post, bush, shrub or any other vegetation.
- The force of the wind is checked and the sand is deposited on the leeward side of the obstruction.
- The sand deposited also forms a further obstruction, causing more sand to be deposited and the process goes on.
- In the due course of time, a dune is formed.
- This is the way several dunes have been formed over some time in Tiruchedur.
- The forest department has taken efforts and covered major blocks with vegetation and the movement of sand has been arrested to a considerable extent.

BONN CLIMATE CONFERENCE

1. Background

- Developing countries have used various fora at the United Nations' mid-year climate change conference underway in Bonn, Germany to put forth their agenda but climate finance, the disproportionate burden of climate change and a balance between mitigation and adaptation remained pain points for them.
- The \$100 billion goals of climate finance are still unmet by developed countries and do not reflect the true needs of the developing world, stated, the finance coordinator for the Group of 77.

2. What is NET ZERO emission all about

- Put simply, net-zero means cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance.

3. Achieving NET ZERO Emission

- The seven energy and land-use systems that account for global emissions—**power, industry, mobility, buildings, agriculture, forestry and other land use, and waste**—will all need to be transformed to achieve net-zero emissions.
- Effective actions to accelerate decarbonization include shifting the energy mix away from fossil fuels and toward zero-emissions electricity and other low-emission energy sources such as hydrogen; adapting industrial and agricultural processes; increasing energy efficiency and managing demand for energy; utilizing the circular economy; consuming fewer emissions-intensive goods; deploying carbon capture, utilization, and storage technology; and enhancing sinks of both long-lived and short-lived greenhouse gasses.

4. Global efforts to reach NET ZERO

- Yes, a growing coalition of countries, cities, businesses and other institutions are pledging to get to net-zero emissions. More than 70 countries, including the biggest polluters – China, the United States, and the European Union – have set a net-zero target, covering about **76% of global emissions**. Over **1,200 companies** have put in place science-based targets in line with net-zero, and more than 1000 cities, over 1000 educational institutions, and over 400 financial institutions have joined the **Race to Zero**, pledging to take rigorous, immediate action to halve global emissions by 2030.

5. What is Climate Finance in Bonn Conference All about

- Climate finance refers to local, national or transnational financing drawn from public, private and alternative sources of financing that seek to support mitigation and adaptation actions that will address climate change.
- Higher investment in mitigation projects leads to a reduction in carbon emission — a global public good that benefits everyone, including the donor country.

- Such investments also bring international recognition for being “climate-conscious” as project outcomes are clearly visible and measurable.
- In 2009, at the **COP15 Summit in Copenhagen**, developed countries committed to jointly mobilise 100 billion dollars a year for climate finance so that developing nations can take effective actions.
- The **Paris Agreement** reaffirms the obligations of developed countries while encouraging voluntary contributions by other Parties.
- But now, the developed countries are forcing developing nations to commit to an unreasonable target of reducing carbon emissions to net-zero by mid-century.

ENVIRONMENTAL PERFORMANCE INDEX

1. Background

- India has finished at the bottom of the **Environment Performance Index-2022 released by the World Bank**.
- This means India is among **those countries in the world that have the worst environmental health**.
- Out of 180 countries that have been ranked, **India is in the bottom five with a score of 18.9**.
- **Even Bangladesh, Myanmar, Pakistan, and Vietnam have ranked better than India**.
- The country has also scored poorly on various measures such as **control of corruption, rule of law, and government effectiveness**.
- The deterioration is huge as in the EPI-2020, **India was ranked 168th out of 180 countries**.
- The score was 27.6. **Denmark was ranked first in the sustainability and environmental health categories this time**.

2. What is Environmental Protection Index all about

- The EPI was first established in 2002 as an index that measures the environmental sustainability of various countries.
- It was established as a global parameter in association with the World Economic Forum and Columbia University.
- **“EPI ranks 180 countries on climate change performance, environmental health, and ecosystem vitality. These indicators provide a gauge at a national scale of how close countries are to established environmental policy targets”,** the EPI report says.

3. Significance of the Report

- The report suggests that the economic prosperity of a country makes investing in policies on the environment possible leading to desirable income.
- The report further states that building necessary infrastructure can at large provide other environmental **benefits like clean drinking water and sanitation, reduce ambient air pollution, and control hazardous waste. “Responding to public health crises yields large returns for human well-being,”** the report states.
- The report also states that countries that have been able to focus on various sustainability measures have performed better than their lagging counterparts.”
- The report also states that countries that have been able to reduce their greenhouse gas emissions have made the greatest gains in curbing climate change. **It also noted that these efforts have positive effects on human health and ecosystems.**
- The low scores of India and other countries in the EPI suggest that they **need to step up their efforts on various sustainability measures such as climate change and air and water quality.**
- Some of the other countries that have been identified as laggards include Afghanistan and Nepal. Their low scores can be attributed to **weak governance, it added.**
- The index published recently by the Yale Center for Environmental Law and Policy and the Center for International Earth Science Information Network, Columbia University, used **40 performance indicators across 11 categories to judge countries on climate change performance, environmental health and ecosystem vitality.**

4. Prominence of the report

- The findings of the EPI are important since the **Climate Change Act (2021)** signed on November 18, 2021 is yet to be implemented in the country.
- It sought to provide a framework for achieving low greenhouse gas emissions and **also mainstream climate change actions into national plans and programmes.**

5. All about **Environmental Protection Index (EPI)**

- The 2022 Environmental Performance Index (EPI) provides a data-driven summary of the state of sustainability around the world.
- Using 40 performance indicators across 11 issue categories, the **EPI ranks 180 countries on climate change performance, environmental health, and ecosystem vitality.**
- These indicators provide a gauge at a national scale of how close countries are to established **environmental policy targets.**
- The EPI offers a scorecard that highlights leaders and laggards in environmental performance and provides practical guidance **for countries that aspire to move toward a sustainable future.**

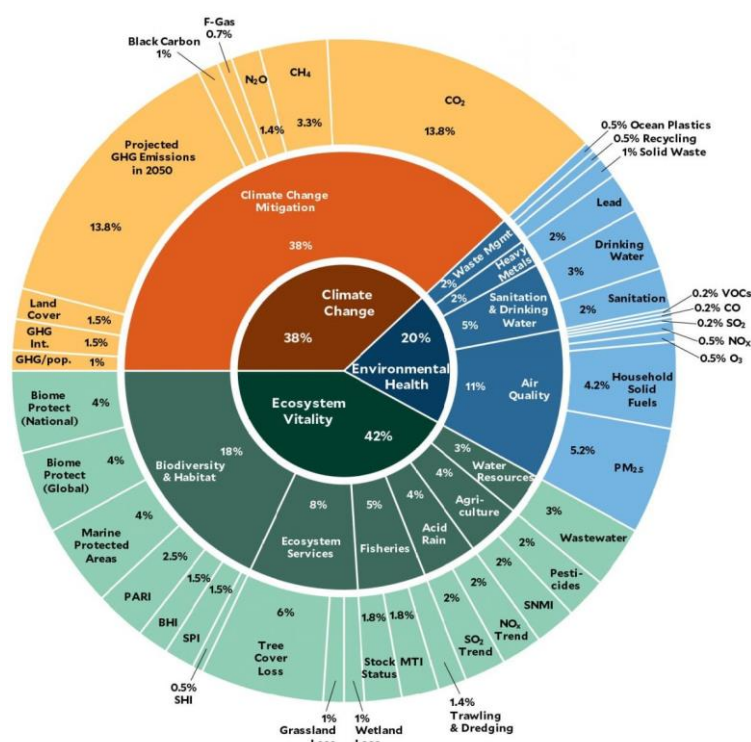
6. **Indicators of Environmental Protection Index**

- EPI indicators provide a way to spot problems, set targets, track trends, understand outcomes, and **identify best policy practices.**
- Good data and fact-based analysis can also help government officials **refine their policy agendas, facilitate** communications with key stakeholders, and maximize the return on **environmental investments.**
- The EPI offers a powerful policy tool in support of efforts to meet the targets of the UN Sustainable Development Goals and to move society toward a sustainable future.
- Overall **EPI rankings indicate which countries are best addressing the environmental challenges that every nation faces.**

- Going beyond the aggregate scores and drilling down into the data to analyze performance by issue category, policy objective, peer group, and **country offers even greater value for policymakers.**
- This **granular view** and **comparative perspective** can assist in understanding the determinants of environmental progress and in **refining policy choices.**

7. EPI Framework 2022

The framework organizes 40 indicators into 11 issue categories and three policy objectives, with weights shown at each level as a percentage of the total score.



Green hydrogen: Fuel of the future

1.Context

India will emerge as the leader in green hydrogen by taking advantage of the current energy crisis across the globe.

On April 20, India's first 99.99 per cent pure green hydrogen pilot plant was set up in eastern Assam's Duliajan.

2.What is green hydrogen?

- A colourless, odourless, tasteless, non-toxic and highly combustible gaseous substance, hydrogen is the lightest, simplest and most abundant member of the family of chemical elements in the universe.
- But a colour green prefixed to it makes hydrogen the fuel of the future.
- The green depends on how the electricity is generated to obtain the hydrogen and does not emit greenhouse gas when it is burned.
- **Green hydrogen** is produced through electrolysis using renewable sources of energy such as solar, wind or hydel power.
- **Grey hydrogen** is generated through fossil fuels such as coal and gas and currently accounts for 95 per cent of the total production in South Asia.
- **Blue hydrogen** is produced using electricity generated by burning fossil fuels but with technologies to prevent the carbon released in the process of entering the atmosphere.

3. Why is India pursuing green hydrogen?

- The Paris Agreement is a legally binding international treaty on climate change to limit global warming to below 2°C compared to pre-industrial levels in 2015.
- India is committed to reducing its greenhouse gas emissions by 33- 35 per cent from 2005 levels.
- At the Glasgow conference of 2021, India reiterated its commitment to move from a fossil and import-dependent economy to a net-zero economy by 2070.
- India's average annual energy import bill is more than \$ 100 billion.
- Increased consumption of fossil fuels has made the country a high carbon dioxide emitter, accounting for nearly 7 per cent of the global CO₂ burden.
- To become energy independent by 2047, the government stressed the need to introduce green hydrogen alternative fuel to make India a global hub and a major exporter of hydrogen.
- The National Hydrogen Mission was launched on August 15, 2021.
- To cut down carbon emissions and increase the use of renewable sources of energy.

4. How much green hydrogen is India producing?

- India has just begun to generate green hydrogen to raise non-fossil energy capacity to 500 gigawatts by 2030.
- Pure green hydrogen pilot plant in keeping to make the country ready for the pilot-scale production of hydrogen and its use in various applications.
- The research and development efforts are ongoing for a reduction in the cost of production storage and transportation of hydrogen.
- Powered by a 500 KW solar plant, the green hydrogen unit has an installed capacity to produce 10 kg of hydrogen per day and scale it up to 30 kg per day.
- A specialised blender has also been installed for blending green hydrogen produced from the unit. With the natural gas supplied by the Assam Gas Corporation Limited and supplying the blended gas to the Jorhat area for domestic and industrial use.
- Oil has engaged experts from the IIT- Guwahati to assess the impact of the blended gas on the existing facility.

Advantages of hydrogen as a fuel

- The intermittent nature of renewable energy, especially wind, leads to grid instability
- Green hydrogen can be stored for long periods. The stored hydrogen can be used to produce electricity using fuel cells.
- In a fuel cell, a device that converts the energy of a chemical into electricity, hydrogen gas reacts with oxygen to produce electricity and water vapour.
- Hydrogen acts as an energy storage device and contributes to grid stability.
- The oxygen is produced as a by-product (8 kg of oxygen is produced per 1 kg of hydrogen).
- It can also be legalised by using it for industrial and medical applications or for enriching the environment.
- The possibility of hydrogen has made many countries pledge investments with Portugal having unveiled a national hydrogen strategy worth \$7.7 billion in May.
- Renewable developers see green hydrogen as an emerging market and some have targeted the transport sector, although electric vehicles have begun to catch the imagination of consumers today.

OLIVE RIDLEY TURTLES

1.Habitat

- Turtles are an order of reptiles known as Testudines, characterized by a shell developed mainly from their ribs.
- Olive ridleys are the most abundant sea turtles in the world. They are generally found in coastal bays and estuaries and can be very oceanic.
- They typically forage offshore in surface waters or dive to depths up to 150 meters to feed on bottom-dwelling crustaceans.

- Olive Ridleys inhabit tropical and subtropical waters of the Pacific, Indian and Atlantic oceans.
- They are found throughout the mainland and in the Andaman and Nicobar Islands and to a lesser extent in the Lakshadweep islands.
- In the Andaman and Nicobar Islands, olive ridley and leatherback turtles often share nesting beaches.
- The Olive ridley is very oceanic in the Eastern Pacific.
- Orissa houses the world's largest mass nesting site for the olive ridley turtle.

The Odisha High court has taken suo moto cognizance of the death of around 800 olive ridley sea turtles due to negligence by Odisha's forest and fisheries department.

- Olive ridley turtles have powerful jaws that enable them to feed on various crustaceans such as shrimp and crabs, molluscs, tunicates and fish.
- These turtles nest solitarily and in arribadas (mass nesting of marine turtles), sometimes twice in each season.
- Arribadas may be precipitated by such climatic events as a strong offshore wind, or by certain phases of moon and tide, but there is a major element of unpredictability at all sites.
- This unpredictability and the apparent ability of gravid females to wait for weeks while holding fully-shelled eggs, may be an important aspect of the survival advantage of arribada-formation, a phenomenon usually interpreted as one that evolved as a predator-saturation device.

2. Mating

- The turtles mate in offshore waters during the breeding season, from October to February.
- Reproductive aggregations or patches occur off the mass-nesting beaches and are between 50 and 60 square kilometres in size.
- After successful mating, males return to their feeding grounds.
- The females come onto the beach to nest. They nest every year and often more than once a year.
- Clutch sizes are usually about 100-120 eggs per nest and eggs measure about 4cm in diameter.

- The eggs hatch after 45-50 days of incubation after which the hatchlings find their way to the ocean.
- Hatchlings weigh less than 30 grams and measure about 3.8 centimetres in length.
- Once hatchlings reach the sea, they are carried by currents across ocean basins.

3.About Olive turtles

- The olive ridley is the smallest of all the sea turtle species.
- It got its name from the olive green colouration of its shell(carapace).
- Olive Ridleys are known for their arribadas or synchronized mass nesting.
- An adult typically measures between 62 and 70 cm in length and weighs about 35-45 kg.
- It has a smaller head and smaller shell than the Kemp's ridley, to which it is closely related.
- Both an adult rider's front and rear flippers have 1 or 2 visible claws.
- There is sometimes an extra claw on the front flippers.
- Juveniles are charcoal grey, while adults are dark greyish-green.
- Track marks are about 70-80 cm wide, light and have asymmetrical, oblique marks that are made by forelimbs.



4.Threats

- Olive ridley turtles are categorized as Vulnerable species.
- The harvest of adults and eggs, incidental capture in commercial fisheries and loss of nesting habitat are the main threats to this species.

- In India, olive ridleys were taken in tonnes of thousands for the market after the advent of mechanization in the fishing sector. This declined after the implementation of the Indian Wildlife (Protection) Act, 1972 enforced by the forest department.
- Plastic garbage and fishing trawlers are other threats.

5. Gahirmata sanctuary

- Gahirmatha is the mass nesting spot in the Indian Ocean region and the only turtle sanctuary in Odisha.
- It is the world's largest nesting beach of olive ridley sea turtles.
- Gahirmatha was declared a turtle sanctuary in 1997 by the Odisha government after considering its ecological importance and efforts to save the sea turtles.
- Gahirmatha Marine Sanctuary is one of the three parts of the Bhitarkanika National Park. The other two include the area of Bhitarkanika National park and Bhitarkanika wildlife sanctuary.

Forest Conservation Act 1980

1. Context

The Karnataka government denotified almost 67 per cent of deemed forest in the State and reduced their area from 9.94 lakh hectares to 3.3 lakh hectares.

2. Definition of Forests

The forest also included all areas recorded as forests in any government records, irrespective of ownership, recognition and classification.

All the areas that conformed to the dictionary meaning of forest and all areas which are identified as forest by an expert committee constituted by the Supreme Court

3. What is the Forest Conservation Act (FCA)?

- Forest Conservation Act (1980) came into force to address deforestation.
- Though the Indian forest act has been in force since 1927, it was geared to allow the colonial British administration to control the extraction of timber.
- It was not aimed at preserving forests or addressing deforestation.
- States notified forest land but the FCA made it necessary to get the Centre's permission for using such forest land for Non-forestry purposes.
- The creation of an advisory committee to recommend such re-classification.

4. FCA Amendments

- There have been two major amendments to the FCA in 1988 and 1996.
- State governments, Union Territory Administrations and Central governments used to apply the provisions of the Act to the forests notified under the Indian Forest Act, 1927 or any other local law till 1996.
- Forests were under the management or control of the Forest Department.
- In the **T.N. Godavaraman Thirumulpad case (1996) Supreme Court order**,
- This judgment also paved the way for calculating the economic value of the portion of forest being razed for development work paid by project proponents.
- The creation of a compensatory afforestation fund and providing non-forestry land instead of the diverted forest.
- The state increasing forest cover and it is harder to access land for infrastructure projects for private entities.
- India aims to have at least 33 per cent of India's geographical area under forest and tree cover.
- At present, forest cover is around 22 per cent and it is very hard to increase core forest.
- The mode of the expansion includes expanding the notion of what constitutes forest land.

- It is becoming harder to use land that falls under the definition of Forest for non-forestry purposes.

5. Deemed forest

There is no formal definition for the deemed forest, even in the Forest Conservation Act 1980.

The deemed forest can be described as,

- **land with the characteristic of the forests irrespective of the ownership.**
- **Thickly wooded areas of the Revenue Department are not handed over to the Forest Department.**
- **Thickly wooded areas are recommended to be handed over to the Forest Department.**
- **Thickly wooded land was distributed to grantees but not cultivated.**
- **Thickly wooded plantations of the Forest Department could all be deemed forests.**

GM CROPS

1. Context

Norms eased for genetically modified crops.

Transgenic technology involves introducing a gene from a different species into a plant.

The Department of Biotechnology (DBT) has issued guidelines easing norms for research into genetically modified crops and circumventing the challenges of using foreign genes to change crops profile.

2. Key points

- The 'Guidelines for Safety Assessment of Genome Edited Plants, 2022' exempts researchers who use gene-editing technology to modify the genome of the plant from seeking approvals from the Genetic Engineering Appraisal Committee(GEAC).
- The GEAC evaluates research into GM plants and recommends or disapproves their release into fields.
- The GM plants that usually come for scrutiny are those that involve transgenic technology or introducing a gene from different species.
- For instance Bt-cotton, where a gene from soil bacteria is used to protect a plant from pest attack.
- The drawback of this method is that these genes may spread to neighbouring plants, where such effects are not intended.

3. Several Approaches

- Genome editing involves the use of technologies that allow genetic material to be added/removed/alterd at particular locations in the genome.
- Several approaches have been developed in genome editing.
- Gene editing can be used to make plants express properties that are not native to them.
- Environmentalist groups have opposed this exception for gene-edited crops.
- Gene editing techniques, involves altering the function of genes and can cause large, unintended consequences that can change the toxicity and allergenicity of plants.

4. CRISPR-Cas-9

One such approach is CRISPR-Cas-9, which is short for clustered regularly interspaced short palindromic repeats and CRISPR-associated protein 9.

CRISPR is a family of DNA sequences found in the genomes of prokaryotic organisms like bacteria and archaea. These sequences are derived from DNA fragments of bacteriophages that had previously infected the prokaryote. They are used to detect and destroy DNA from similar bacteriophages during subsequent infections.

PM-KUSUM

1. Background

- Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) scheme was initiated by the Government of India to increase the income of farmers and provide sources for irrigation and de-dieselize the farm sector.
- PM-KUSUM Yojana got its administrative approval in March 2019 and guidelines were framed in July 2019. This scheme was launched by the Ministry of New and Renewable Energy (MNRE) for the installation of solar pumps and other renewable power plants across the nation.
- The Ministry of New and Renewable Energy (MNRE) has launched the Pradhan Mantri Kisan Urja Suraksha even Utthan Mahabhiyan (PM KUSUM) Scheme for farmers to the installation of solar pumps and grid-connected solar and other renewable power plants in the country.
- The scheme aims to add solar and another renewable capacity of 25,750 MW by 2022 with the total central financial support of Rs. 34,422 Crore including service charges to the implementing agencies.

2. Objectives of the scheme

- Under the PM-KUSUM Yojana, farmers, groups of farmers, panchayat, and co-operative societies can apply to plant a solar pump.
- The total cost involved in this scheme is divided into three categories in which the Government will help farmers.
- The government will provide a subsidy of 60% to farmers and 30% of the cost will be given by Government in form of loans. Farmers will only have to give 10% of the total cost of the project.
- The electricity generated from the solar panel can be sold by the farmers.
- The money gained after selling electricity can further be used for starting a new business.

3. Benefits of PM-KUSUM

Below mentioned are the scheme benefits of PM KUSUM Yojana:

- Provides risk-free income for farmers
- Ability to check groundwater overexploitation
- Provides uninterrupted power supply to farmers
- Helps in the reduction of carbon footprint in agriculture
- Reduces farmer's burden of farm power subsidy

4. Components of PM-KUSUM yojana

Three Components of PM-KUSUM Yojana

4.1 Component A

- Under this scheme, workers will set up 10,000 MW of decentralized renewable energy power plants which are grid-connected on barren land
- These grids will be set up by farmers, cooperatives, groups of farmers, panchayats, Water User Associations (WUA), and Farmer Producer Organizations (FPO)
- Power projects will be set up within a radius of 5 km of the sub-station

4.2 Component B

- Under this scheme, farmers will be supported to install stand-alone solar agriculture pumps worth Rs. 17.50 lakh
- The capacity of the pumps will be up to 7.5 HP for the replacement of existing diesel agriculture pumps
- The capacity can be higher than 7.5 HP but financial support will only be provided until the 7.5 HP capacity

4.3 Component C

- This scheme is for solarisation of 10 Lakh Grid Connected Agriculture Pumps and individual farmers will be supported to solarize pumps those having grid-connected pumps
- Extrasolar power will be sold to Distribution Companies of India (DISCOMs) at a pre-fixed tariff
- Farmer's irrigation needs shall be met by using the generated solar power

UN BIODIVERSITY CONFERENCE

1. About

- The Conference of Parties comes under the United Nations Climate Change Framework Convention (UNFCCC) which was formed in 1994.
- The UNFCCC was established to work towards **the “stabilization of greenhouse gas concentrations in the atmosphere.”**

It laid out a list of responsibilities for the member states which included:

- Formulating measures to mitigate climate change
- Cooperating in preparing for adaptation to the impact of climate change
- Promoting education, training and public awareness related to climate change

2. About climate Change

- Climate change refers to long-term shifts in temperatures and weather patterns.

- These shifts may be natural, such as through variations in the solar cycle.
- But since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas.
- Burning fossil fuels generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun's heat and raising temperatures.
- Examples of greenhouse gas emissions that are causing climate change include carbon dioxide and methane. These come from using gasoline for driving a car or coal for heating a building, for example. Clearing land and forests can also release carbon dioxide. Landfills for garbage are a major source of methane emissions.
- Energy, industry, transport, buildings, agriculture and land use are among the main emitters.

3. About COP-15 (UN BIODIVERSITY CONFERENCE)

- **The COP15 theme, 'Land. Life. Legacy:** From scarcity to prosperity, is a call to action to ensure land, the lifeline on this planet, continues to benefit present and future generations.
- COP15 will **bring together leaders from governments, the private sector, civil society and other key stakeholders** from around the world to drive progress in the future sustainable management of one of our most precious commodities: land.
- Land is the bedrock of a healthy, productive society, and COP15 will explore links between land and other key sustainability issues.
- These issues will be discussed during the high-level segment including a Heads of States Summit, high-level roundtables and interactive dialogue sessions, as well as numerous other special and side events.
- COP 15 is a key moment in the fight against desertification, land degradation and drought.
- It will build on the findings of the second edition of the Global Land Outlook and offer a concrete response to the interconnected challenges of land degradation, climate change and biodiversity loss as we step into the **UN Decade on Ecosystem Restoration**.

- Drought, land restoration, and related enablers such as land rights, gender equality and youth empowerment are among the top items on the Conference agenda.
- Through its decisions adopted by UNCCD's 197 Parties, COP15 is **expected to galvanize sustainable solutions for land restoration and drought resilience, with a strong focus on future-proofing land use.**

4. Initiatives by India to tackle climate change

- Installing household and community biogas units to power clean-burning methane stoves.
- Replacing conventional wood-burning stoves with more efficient ones.
- Providing solar-powered lighting.
- Promoting scientifically and economically sound climate-smart farming techniques through the use of information technology platforms like smartphone apps.
- India's record since the 2015 Paris Accord and initiatives such as the International Solar Alliance (ISA) and Coalition for Disaster Resilient Infrastructure (CDRI)
- 'Infrastructure for the Resilient Island States (IRIS)' at the World Leaders Summit at COP26.
- India's new Nationally Determined Contributions (NDCs) and the "Panchamrit".
- National Action Plan on Climate Change (NAPCC)

5. Need of the Hour

- India's voice at COP would only be strengthened multiple times if it speaks for South Asia as a whole.
- Urgent need for a South Asian regional bank that could work with a more targeted focus and more concessional financing for the problem that faces the region.

- **“One Sun One World One Grid”** and **‘Panchamrit plans’** would pack more punch if they contain a clear road map for the region, and striving for a common South Asian taskforce

HUMAN-ANIMAL CONFLICT

1.Introduction

- Human-wildlife conflict is when encounters between humans and wildlife lead to negative results, such as loss of property, livelihoods, and even life.
- Defensive and retaliatory killing may eventually drive these species to extinction.
- These encounters not only result in suffering for both people and wildlife immediately impacted by the conflict; they can also have a global reach, with groups such as sustainable development agencies and businesses feeling its residual effects.
- The scope of the issue is significant and truly global, but we are nowhere near being able to address it at the scale needed. Elephants are not only a cultural icon in India and throughout Asia, but they also help to maintain the integrity of their forest
- Steady inroads into elephant habitats to meet the needs of an increasing human population and economic development have resulted in significant loss and fragmentation of elephant habitat
- Anthropogenic pressures have also contributed to the extreme degradation of large parts of the elephant habitat
- Human-elephant conflicts are becoming increasingly common leading to death and injury of human beings and retaliatory killings of elephants
- The elephant herd is led by the oldest and largest female cow known as the matriarch. She is usually the one who was the most closely related to the previous matriarch.

2. Rise in Human-Wildlife conflict

- As human populations and demand for space continue to grow, people and wildlife are increasingly interacting and competing for resources, which can lead to increased human-wildlife conflict.
- Along with other threats, the human-wildlife conflict has driven the decline of once-abundant species and is pushing others to the brink of extinction.
- Decreased prey base caused by poaching of herbivores has resulted in carnivores moving out of the forest in search of prey
- But the human-wildlife conflict issue has far-reaching impacts beyond the wildlife and communities immediately affected by it.
- Habitat disturbance in the wild due to human intervention.
- Habitat destruction through development projects, deforestation overgrazing by livestock and expansion of human settlements and agriculture.
- If not effectively managed, the human-wildlife conflict has the potential to negatively affect these activities and conservation much more broadly.

3. Consequences of Human-Animal Conflict

- Loss of life, injury to humans and/or animals
- Crop damage
- Loss of livestock
- Damage to human property
- Disruption to daily life

4. Steps taken to curb human-animal conflict

- Rubble Wall demarcation of the protected area
- Solar and minor voltage electric fences across the habitats.

- Hanging fences
- Elephant-proof trenches
- Involvement of the local community or the stakeholder is most important for the effectiveness of barriers
- Beehive and Chili fences
- Forest Departments are adopting fences as a biological elephant barricade which is made of thorny plant varieties.
- Radio collaring of elephants is used for tracking of movement patterns of tagged elephants and is often the best method used in wide-ranging species like elephants
- Alignment of the elephant corridor
- Community guarding is a quite successful aspect in Odisha

5. Steps were taken to protect the elephant population

- **Project Elephant**-Project Elephant was launched in 1992 by the Government of India Ministry of Environment and Forests to provide financial and technical support to wildlife management efforts by states for their free-ranging populations of wild Asian Elephants.
- **Elephant corridor**-Elephant corridors are **linear, narrow, natural habitat linkages that allow elephants to move between secure habitats without being disturbed by humans**. To secure a future for wild elephants we must ensure their uninterrupted movement between key habitats.
- **Haathi Mere Saathi**-Hathi Mere Saathi' is an initiative by the Ministry of Environment and Forests (MoEF), Government of India in collaboration with the Wildlife Trust of India (WTI), to generate groundswell support from various stakeholders for the country's National Heritage Animal.
- **The Campaign mascot Raju** - The Union Ministry of Environment and Forest has launched a nationwide campaign Gaj Yatra to protect elephants to aid elephant conservation measures from various stakeholders at the ground level

- **Monitoring illegal killing of elephants (MIKE) program**-The Monitoring the Illegal Killing of Elephants (MIKE) programme is an international collaboration that measures the levels, trends and causes of elephant mortality, thereby providing an information base to support international decision-making related to the conservation of elephants in Asia and Africa.

LAND-BASED PATHOGENS

1. Microplastics

- Microplastics are fragments of any type of plastic less than 5MM in length.
- Generally there are two sources of microplastics, either directly from industry(cosmetic exfoliants), or indirectly from physical, chemical and biological fragmentation of large plastic residues.
- If ingested, microplastics can block gastrointestinal tracts of organisms or make them into a thought of starvation, finally leading to death.

Microplastics can either float over long distances, spreading pathogens, or they can sink to oceanic depths, where filter-feeding animals reside and spread pathogens.

2. Key Points

- Land-based pathogens may piggyback on microplastics flowing into the sea, potentially posing a threat to marine life.
- Pathogens like *Toxoplasma Gondii*, *Cryptosporidium*, *Giardia*, etc., infect humans and animals and may infect marine organisms.
- *Toxoplasma Gondii*, is found in cat poop, is linked to the death of sea otters, Hector's dolphins, and Hawaiian monk seals.

- Some water-loving germs like *Vibrio* thrive in seawater.
- These microbes may get attached to microplastics, which are formed when plastics break down to form particles measuring less than 5mm in size.
- These pathogens are exposed to 2 types of microplastics. 1. polythene microbeads 2. polyester microfibers which are already submerged in seawater.
- The polythene microbeads can be traced back to cosmetics like cleansers, and exfoliants and the latter to clothing and fishing nets.
- The experiment showed that pathogens attach to both microplastics, although they showed a higher preference for microfibers.
- Microplastics might ferry pathogens into the sea and impact marine life in two ways. These particles can float and travel long distances, spreading the pathogens.
- Microplastics could sink into oceanic depths, which may be swallowed by filter-feeding animals like zooplankton, clams, mussels, oysters, abalone and other shellfish.
- Filter-feeding animals, which swallow water to filter food, are particularly susceptible to ingesting high levels of microplastics.

Disease transmission must depend on the physical transport of these pathogens from the poop of infected animals and people to a susceptible host in the ocean or a human that consumes contaminated seafood.

3. Effects

- Microplastics cause problems to humans, and marine animals.
- The problem requires collaboration across human, wildlife and environmental disciplines as we all depend on the ocean.

4. Solutions

- Adding filters on washing machines and dryers could control the release of microfibers into the environment.
- Other solutions include deploying technologies to treat stormwater and best management practices to prevent the release of microplastics from plastic industries and construction sites.

Scientists detected microplastics in air, water, food and in our bodies too. They are found hiding deep in the lungs of a human body, blood samples. These particles were fragments of polypropylene used in plastic packaging and pipes, and polyethylene terephthalate used in bottles.

FOREST FIRES

1. Background

- Discovery of fire has been a **revolutionary invention of human civilization.**
- The **nomadic life saw a sudden change** in its lifestyle after this invention.
- It is interesting to know that the **first experience of fire, which ancient human beings felt, was of a forest fire.**
- Thus forest fire has been an **integral part of human civilization.**
- The discovery of fire has perhaps been one of the greatest innovations of all time. It had so much significance in the earlier history of mankind that they started worshipping it as God.
- **Forest fire may be defined as unclosed and freely spreading combustion that consumes natural fuels.**
- When a fire burns out of control it is known as **WildFire.**
- A wildfire, bushfire, wildland fire or rural fire is an unplanned, unwanted, uncontrolled fire in an area of combustible vegetation starting in rural areas and urban areas.
- Forest fires occur every year during **summer due to natural and anthropogenic reasons, including accumulations of inflammable materials such as dry leaves, twigs and pine needles.**
- Most of the forest fires in the **country are ground fires in which low vegetation gets burnt.**
- **In 2017, the Forest Survey of India (FSI),** an organisation under the **Union Ministry of Environment, Forest and Climate Change,** developed a completely automated **satellite-based ‘forest fire monitoring and alert system’** for effective monitoring of forest fires at a national level. This was equipped with Suomi National Polar-

orbiting Partnership-Visible and Infrared Imager/Radiometer Suite sensor-based information.

- The fire alerts are disseminated through SMS and email to field staff of state forest departments.
- Currently, there are around **130,000 registered users for the service in the country, stated the minister**
- The responsibility of forest fire prevention and management lies primarily with the states and Union territories since land is a state matter.

2. **A brief overview concerning forest fire**

- A wildfire is an uncontrolled fire that sweeps across large parts of areas with combustible vegetation.
- A forest fire is a type of wildfire where an uncontrolled fire rages through vegetation generally more than **six feet in height**.
- **In natural forest systems, fire plays a very important role.**
- It is one of the methods for the natural **recycling of nutrients often helping the tree species to regenerate.**
- The fire ecology often removes **invasive weeds and helps in maintaining habitat for wildlife.**
- However, in modern-day society with **human populations cohabiting and being heavily dependent on forest resources without any long-term planning, forest fires are becoming more frequent and intense.**
- As the demands for both timber and non-timber forest produce have grown over time, the traditional way of **managing the cycle of fire is no longer practised.**
- Also, the **over-extraction of resources has led to the degradation of large tracts of forest area.**
- With climate change leading to the drying of biomass and adding organic build-up over time the forest fires are enormous and are **no longer beneficial to the forest health.**

- According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, annual carbon emissions from forest fires are in the range of **2.5 billion to 4.0 billion tons of CO₂ (MoEFCC, 2018)**.
- Globally, the raging forest fires are affecting wildlife habitats and biodiversity.
- These fires are also **displacing millions of people and taking away livelihoods**.

2. Areas prone to forest fires in India

- In February 2019, a forest fire in the **Bandipur Tiger Reserve and National Park 2019** destroyed nearly 40,000 acres killing a forest guard and injuring many others, especially those who tried to put out the fire.
- It had almost engulfed most of the northern and western portions of the reserve forest.
- **India, each year experiences forest fires across the country.**
- According to satellite detections of forest fires by the **Moderate Resolution Imaging Spectro-radiometer (MODIS)**, from 2003 to 2016, as few as 380 and as many as 445 of the country's 647 districts experienced fires each year (i.e. at least 59 per cent, **but as many as 69 percentages of districts**) (MoEFCC, 2018).
- An analysis of **fire-prone forest areas** was carried out by the Forest Survey of India (FSI) and the findings of the study indicate that about 36% of the country's forest cover has been estimated to be prone to forest fire, out of which nearly **4% of the country's forest cover is extremely prone to fire**.

3. Forest fire for ages

- Fire has been a major influencing factor in the development and management of many of the **world's forests**.
- Some forest ecosystems have evolved in response to frequent fires from natural causes, but most others are susceptible to the **effects of wildfire. Each year millions of hectares of the world's forests are consumed by fire, which results in enormous economic losses because of burnt timber; degraded real estate; high costs of suppression; damage to environmental, recreational and amnesty values; and loss of life.**
- Forest fires are not new to the world; **they have burned across the earth for millions of years.**

4. Forest Fire as a part of the ecosystem

- Fires in forests are **not unnatural**.
- It has been a natural part of the ecosystem **since the origin of forests on this planet.**
- Most of the fires are very useful and **essential for good natural forest development and regeneration.**
- Throughout historic times forest fires have been **ignited and burned naturally through the forest.**
- These low-intensity fires in the past kept the forest floor free from the natural annual build-up of litter **i.e. tree needles, dead grass, senescent leaves & twigs, thick brush, and dead trees.**
- As a result, fire has shaped vegetation patterns and wildlife distributions in the forests.
- Fire removes low-growing underbrush, cleans the forest floor of debris, opens it up to sunlight, and nourishes the soil.
- Reducing this competition for nutrients allows established trees to grow stronger and healthier.

5. Drivers of Forest Fire

- Discarded cigarettes.
- Equipment use and malfunctions.

- Vehicle crashes and engine sparks.
- Lightning.
- Indigenous culture
- Global warming and climate change

Electric vehicles catching fire

1.Context

The Union Government has constituted an expert panel to probe the recent series of battery explosions in electric vehicles (EVs)

2.Key Points

- The Ministry of Road Transport intends to issue guidelines for EVs, including ests for compliance with safety norms.
- Okinawa and Pure EV manufacturers recalled some batches of electric scooters after their vehicles caught fire.
- Electric vehicles are poised to replace petrol vehicles.
- Climate change has led to global efforts to electrify the transportation sector.
- The Cost of LI-ION (Lithium-ion) battery technology has decreased by a staggering order of magnitude in the past decade.
- The government provides incentives to usher in the transition and private industry to capture the market.
- Battery manufacturers and material suppliers vying with each other for market share.
- Li-ion batteries are complex devices requiring sophistication that can take years to perfect.

- Hurrying the development of this complex technology without careful safeguards can lead to increased safety incidents, as evidenced recently on Indian roads.

Li-ion battery

It consists of three active components; the anode, typically graphite, the cathode, typically based on nickel, cobalt and manganese-based oxide and an electrolyte, a salt of lithium in an inorganic solvent.

Accidental shorting of the electrodes is a known cause of fires in Li-ion cells.

Battery fires

Battery fires occur due to the convergence of three parts of the **fire triangle**.
heat, oxygen and fuel.

3.Safety features

- various layers are assembled with high precision with tight tolerances maintained throughout the manufacturing process.
- Thermal switches that turn off if the battery overheats and is added as the sandwich is packaged into a battery cell.
- Li-ion batteries require tight control of the state of charge and the temperature of operation to enhance safety and increase usable life.
- There should be minimal thermal variation during operation.
- Ensuring robust detention, coupled with battery performance.
- The location of the battery should protect it from external penetration, and ensure passenger safety, and overall weight distribution.
- Engineering higher safety often results in higher costs and lower driving range.

SEABIRDS

1.About

- **Seabirds** are defined as those birds living in and making their living from the marine environment, which includes coastal areas, estuaries, wetlands and oceanic islands.
- SHOREBIRDS and seabirds belonging to the order Charadriiformes are among the most conspicuous animals inhabiting our coastal environment.
- This extremely diverse order of birds is second only to passerines in terms of number of families and species. With a global distribution that ranges from the Arctic to the Antarctic, they can be found in almost any type of terrestrial habitat as well as in the sea.
- Consequently, they exhibit remarkably varied breeding strategies and migration systems.
- One of the most fascinating aspects of shorebirds is their ability to migrate.
- Over 60 per cent of shorebird species undertake short- to long-distance migrations.
- Several members make some of the most extreme migratory flights in the world, exceeding 30,000 kilometres a year.
- Migration annually takes shorebirds from breeding to non-breeding grounds where they may spend as much as eight to ten months in a year.
- Migratory birds are found across states in India including **Rajasthan, Goa, Karnataka, and Gujarat.**

2. Concerns and challenges

- Indian coasts and estuaries have been subjected to novel threats and increasing levels of pollution in the last few decades.
- Global data indicate that although estuarine and coastal systems provide vital habitats for many plants and animals, as well as a wide

variety of goods and services for millions of people, they are some of the most heavily used and threatened natural systems in the world.

- By far the largest threat to birds is the loss of habitat.
- Deforestation, the draining of wetlands, planting of non-native trees, the loss of areas to urban developments and intensive agriculture are major threats to birds.

3.State of India Bird Report

State of India's Birds 2020 (SoIB) report was released at the global conference (held at Gandhinagar, Gujarat) of the Convention on the Conservation of Migratory Species of Wild Animals.

3.1 Highlights of the Report

- **More than 50% of birds are in clear decline since 2000**, and over the last five years, 79% of birds have registered declining numbers.
- **More bird species deserve immediate conservation attention** than previously thought.
 - To the list of 67 globally threatened Indian bird species previously identified by the IUCN (as critically endangered, endangered or vulnerable), the report adds 34 more species.
 - **The number of species of high conservation concern in India is now 101.**
- Most declining groups include coastal birds, birds of prey (like eagles, kites, vultures and others) and habitat specialists.

3.2 Suggestions by the Report

- An update to the Red List of endangered species published by IUCN using the SoIB.

- Collaborative research by scientists and citizens. Targeted research to pinpoint causes of decline.
- Urgent emphasis on habitats of species of high concern, notably grasslands, scrublands, wetlands and the Western Ghats.

TIGER CONSERVATION IN INDIA

1. Background

- India is home to over **60% of the world's tigers**, so what happens here has a big impact on the fate of the world's wild tigers.
- **Tigers occupy an important place in Indian culture.**
- For ages, it has been a symbol of **magnificence, power, beauty and fierceness and has been associated with bravery and valour.**
- The combination of grace, strength, agility and enormous power has earned the tiger its pride of place as the national animal of India.
- According to the Union environment ministry, the fourth round of the country-level assessment done in **2018 showed that the estimated tiger population stood at 2,967.**

NOTE- St. Petersburg Declaration on Tiger Conservation

- This resolution was adopted In November 2010, by the leaders of 13 tiger range countries (TRCs) assembled at an **International Tiger Forum in St. Petersburg, Russia**
- It aimed at promoting a global system to **protect the natural habitat of tigers and raise awareness among people on white tiger conservation.**
- The resolution's implementation mechanism is called the Global Tiger

Recovery Program whose overarching goal was to double the number of wild tigers from about 3,200 to more than 7,000 by 2022.

- 13 Tiger range countries are **Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Russia, Thailand and Vietnam.**

2. Challenges associated with tiger conservation

- Across their range, tigers face unrelenting **pressures from poaching, retaliatory killings, and habitat loss.**
- They are forced to compete for space with dense and often growing human populations. Large-scale habitat destruction and decimation of prey populations are the major **long-term threats to the existence of the dwindling tiger population in the country.**
- Facing down habitat loss and the impact of climate change.
- Some of the biggest threats to wildlife include **illegal wildlife trade**, habitat destruction, invasive species, pollution, and climate change.
- Tiger Reserves 2018 report shows that at least half of India's 50 tiger reserves are facing threats from linear infrastructure such as roads, highways and railway lines, fragmented forest corridors, poaching, the pressure of **human-wildlife conflict**, mining etc.

NOTE- TX2

- The TX2 goal is a global commitment to double the world's wild tigers by 2022.
- The base year is 2006
- The goal has been set by the **World Wildlife Fund (WWF)** through the Global Tiger Initiative, Global Tiger Forum, and other critical platforms.

3. Estimation of Tiger Population

- The process of estimating the number of tigers in a given area is called the **‘Tiger census’**.
- The most commonly used technique in the past was the **‘Pugmark Census Technique’**.
- In this method, the imprints of the pugmark of the tiger were recorded and used as a basis for the identification of individuals.
- Recent methods used to estimate the numbers of **tigers are camera trapping and DNA fingerprinting**.
- In-camera trapping, the photograph of the tiger is taken and individuals are differentiated based on the stripes on the body
- In the latest technique of DNA fingerprinting, tigers can be identified from their scats.
- **M-STripES (Monitoring System for Tigers – Intensive Protection and Ecological Status)** is an app-based monitoring system, launched across Indian tiger reserves by the NTCA in 2010. The system would enable field managers to assist the intensity and spatial coverage of **patrols in a geographic information system (GIS) domain**.
- **LIDAR**-based survey technology will be used for the first time to provide water and fodder to animals in the forest itself to deal with the challenge of human-animal conflict which is causing the deaths of animals.

NOTE- TIGER STATUS IN INDIA

- **Indian Wildlife (Protection) Act, 1972:** Schedule I.
- **International Union for Conservation of Nature (IUCN) Red List:** Endangered.
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):** Appendix I.

4. Way Forward

- India's progress is proof that with political will, funding and the support of partners such as local communities, doubling wild tigers are possible despite the challenges conservation faces today.
- The process of tiger conservation should be more dynamic and compatible with the future possibilities of climatic changes as well.

KAREWAS

1.About

- Karewas are Plateaus which have 1300 to 1800 metre thick deposits of Alluvial Soils and Sediments like Sandstone and Limestone.
- Karewas are Formed During Pleistocene Region (2.6 million years to 11,700 years ago).
- Pirpanjal Region Naturally Blocked the Drainage region and Formed a Lake with an area of 5000 sqm. (Wular Lake).

2.Geological Distribution

- Over the Next Few Centuries Water receded, making way for Valleys and forming Karewas between Mountains.
- With Archaeological and Agricultural Importance Karewas Still holds an Important Position.
- These days People are Using these Minerals for Construction which results in a deterrent to the Karewas Gradually.

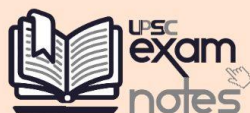
3.Economic Importance

- Karewas are being so fertile They are Ideal for Cultivate Almonds, Saffron, Apple and Other Cash Crops.
- Kashmir Saffron, which got Geographical Identification(GI) Tag for its Thicker Stigma, deep Red colour and Aroma.

4.Conservation

- Despite being so rich in Minerals and Archaeological Important Karewas are not being used for their respected Purposes.
- Between 1995 and 2005 Huge Portions of karewas in Pulwama, Budgam and Baramulla districts were razed and made Quazigund-Baramulla Railway Line.
- Srinagar Airport is built on Damodar Karewas in Budgam. This is The Most Recent Violation that took Place on December 6, 2021.
- Residents allege that the Government's decision on Clay mining is Illegal.
- The Jammu and Kashmir Land Revenue Act 1996 says the Topographic shape of Karewa or Hill cannot be changed.

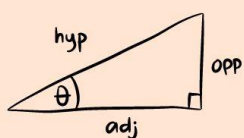




Abode for Affordable Success

CSAT TEST SERIES FOR 2023

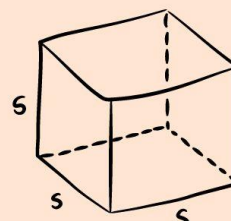
NECESSARY FOR EVERYONE



$$\sin(\theta) = \frac{\text{opp}}{\text{hyp}}$$



10 CSAT Tests



$$V = s^3$$

We have covered each and Every Topic in the
Notification
we made sure each topic has been repeated in the
Test Series

**Starting from
17th April**

**At Just 999
(incl.GST)**

www.upsceexamnotes.com

9642608080, 8971134181

