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Table of Contents

1. National Action Plan for Vulture Conservation 2020-2025.....	1
2. Jal Shakti Abhiyaan.....	3
3. Himalayan Serow	4
4. State of Global Air 2020.....	5
5. World Wetlands Day	10
6. Fishing Cat	11
7. Tree City of the World- Hyderabad ...	12
8. Green Hydrogen.....	14
9. Indian Wild Ass.....	16
10.NDC Synthesis Report	18
11.World Water Day	20
12.Plastic Pollution.....	22
13.Kolar Leaf Nosed Bat	24
14.Whale Sharks	26
15.Disk Footed Index.....	27
16.Great Indian Bustard.....	28

Note:

The YouTube links for all the topics are embedded in the name of the Topic itself

1. National Action Plan for Vulture Conservation 2020-2025

Introduction

- India has nine species of vultures in the wild. These are the-
 - ✓ Oriental White-backed Vulture (*Gyps bengalensis*)
 - ✓ Slender billed Vulture (*Gyps tenuirostris*)
 - ✓ Long billed Vulture (*Gyps indicus*)
 - ✓ Egyptian Vulture (*Nephron percnopterus*)
 - ✓ Red Headed Vulture (*Sarcogyps calvus*)
 - ✓ Indian Griffon Vulture (*Gyps fulvus*)
 - ✓ Himalayan Griffon (*Gyps himalayensis*)
 - ✓ Cinereous Vulture (*Aegypius monachus*)
 - ✓ Bearded Vulture or Lammergeier (*Gypaetus barbatus*).

The population of three species i.e.

- ✓ White-backed Vulture
- ✓ Slender billed Vulture
- ✓ Long billed Vulture
- In the wild has declined drastically over the past decade.
- The decline of *Gyps* genus in India has been put at 97% by 2005.
- The International Union for Conservation of Nature (IUCN) has declared all these three species in its highest risk category -Critically Endangered.

Importance of Vultures

- The ecological, social and cultural significance of vultures in India may be summed up as -
 - ✓ Scavenging on animal carcasses of animals and thereby helping keep the environment clean
 - ✓ Disposal of dead bodies as per the religious practices of the Parsi community.
- Removal of a major scavenger from the ecosystem will affect the equilibrium between populations of other scavenging species and/or result in increase in putrefying carcasses.
- In the absence of carcass disposing mechanisms, vulture declines may lead to an increase in the number of putrefying animal carcasses in the country side.
- In some areas the population of feral dogs, being the main scavenging species in the absence of vultures, has been observed to have increased.
- Both increases in putrefying carcasses and changes in the scavenger populations have associated disease risks for wildlife, livestock and humans.

- In the absence of any alternative mode of disposal of animal carcasses, they continue to be disposed off in the open, and with increasing numbers of feral dogs, there is increased risk of spread of rabies, and livestock borne diseases like anthrax.
- The decline in vultures has also affected the traditional custom of the Parsis of placing their dead in the 'Towers of Silence' for vultures to feed upon.

Threat to Vultures

- Neck drooping' was first observed in Keoladeo National Park, where birds would exhibit this behaviour for protracted periods over several weeks before collapsing and falling out of trees, at the point of, or just prior to death.
- Visceral gout, an accumulation of uric acid within tissues and on the surfaces of internal organs, was observed in 85% of dead vultures found. Death was caused by renal failure, Experiments showed that captive vultures are highly susceptible to Diclofenac, and are killed by kidney failure within a short time of feeding on the carcass of an animal treated with the normal veterinary dose.

Action Plan for Vulture Conservation 2020 - 2025

- The action plan was approved by the National Board for Wildlife (NBWL) October 5, 2020. An earlier one was formulated in 2006 for three years.
- The new plan has laid out strategies and actions to stem the decline in vulture population, especially of the three Gyps species:
 - ✓ 1. Oriental white-backed vulture (*Gyps bengalensis*)
 - ✓ 2. Slender-billed vulture (*Gyps tenuirostris*)
 - ✓ 3. Long-billed vulture (*Gyps indicus*)
- This would be done through both ex-situ and in-situ conservation.
- The plan has also suggested that new veterinary non-steroidal anti-inflammatory drugs (NSAIDs) be tested on vultures before their commercial release. NSAIDs often poisons cattle whose carcasses the birds prey on.

Features

- Important objectives for the Action Plan for Vulture Conservation 2020-2025 (APVC) are:
 - ✓ Prevent the poisoning of the principal food of vultures, the cattle carcasses, with veterinary NSAIDs, by ensuring that sale of veterinary NSAIDs is regulated and is disbursed only on prescription and by ensuring that treatment of livestock is done only by qualified veterinarians.
 - ✓ Carry out safety testing of available molecules of veterinary NSAIDs on vultures. The new molecules should be introduced in the market only after they are proved to be safe following safety testing on vultures.
 - ✓ The Drugs Controller General of India must institute a system that automatically removes a drug from veterinary use if it is found to be toxic to vultures. Such a system would ensure that drugs other than diclofenac that are toxic to vultures like aceclofenac and ketoprofen are banned for veterinary use.

- ✓ Conservation breeding of red-Headed vultures and Egyptian vultures and the establishment at least one vulture-safe zone in each state for the conservation of the remnant populations in that state. It is proposed to set up one centre each in Uttar Pradesh, Tripura, Maharashtra, Karnataka and Tamil Nadu, which will cover most parts of the country.
- ✓ Four rescue centres have been proposed for different geographical areas like Pinjore in the north, Bhopal in Central India, Guwahati in Northeast India and Hyderabad in South India.
- ✓ Coordinated nation-wide vulture counting, involving forest departments, the Bombay Natural History Society, research institutes, non-profits and members of the public.
- ✓ A database on emerging threats to vulture conservation, including collision and electrocution, unintentional poisoning, etc.

2. Jal Shakti Abhiyaan

- It is a time-bound, mission-mode water conservation campaign.
- It ran in 2 phases in 2019: During Monsoon and During Retreating-Monsoon. (In 2020: Combined with various MNREGS works because of Covid-19).
- It was meant for all States and Union Territories.

Jal Shakti Abhiyaan Undertaken By

- DEPARTMENT OF DRINKING WATER AND SANITATION (MINISTRY OF JAL SHAKTI)
- During the campaign, officers, groundwater experts and scientists from the Government of India worked together with state and district officials in India's most water-stressed districts for water conservation and water resource management.
- The JSA aims at making water conservation a Jan Andolan through asset creation and extensive communication.

Water-stressed Districts

- Districts with critical or over-exploited groundwater levels as per the Central Ground Water Board (CGWB) 2017.

JSA For Other Districts

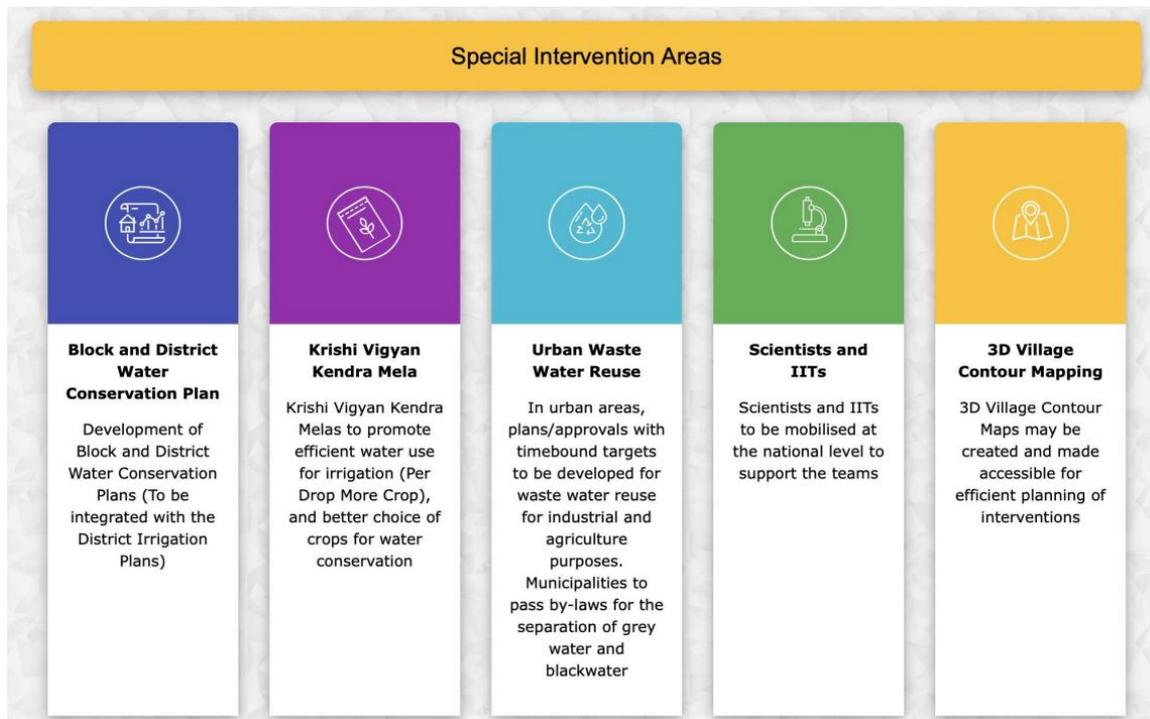
- For states without critical and over-exploited groundwater levels, districts with the least availability of groundwater in comparison to the rest of the districts in the state have been selected.

Five target interventions

- It is to be done by focusing on:
 - ✓ Accelerated implementation of five target interventions.



Special Interventions Areas



Jal Shakti Abhiyaan & UPSC

UPSC Mains 2020

- What are the salient features of the Jal Shakti Abhiyan launched by the Government of India for water conservation and water security? (Answer in 150 words) 10 marks.

3. Himalayan Serow

Introduction

- A Himalayan serow has been sighted for the first time in the Himalayan cold desert region.

What is a Himalayan Serow?

- A biologist has described a Himalayan serow as resembling a cross between a goat, a donkey, a cow, and a pig.
- It's a medium-sized mammal with a large head, thick neck, short limbs, long, mule-like ears, and a coat of dark hair.
- They are herbivores, and are typically found at altitudes between 2,000 metres and 4,000 metres (6,500 to 13,000 feet).

- It is considered a flagship species due to its specialized habitat requirements of dense and undisturbed forests.
- They are known to be found in eastern, central, and western Himalayas, but not in the Trans Himalayan region.
- There are several species of serows, and all of them are found in Asia.
- The Himalayan serow, or *Capricornis sumatraensis* thar, is restricted to the Himalayan region.
- Taxonomically, it is a subspecies of the mainland serow (*Capricornis sumatraensis*).

Why in news?

- The animal was spotted near Hurling village in Spiti, Himachal Pradesh.
- Spiti lies in the cold mountain desert region of the western Himalaya, and its valley floor has an average elevation of 4,270 metres above sea level, making the sighting special as Serows are generally not found at this altitude.
- This is the first recorded human sighting of the serow in Himachal Pradesh.
- The animal has been spotted a few times earlier in the state, but that has always been through camera traps.
- The animal has also been spotted in the Rupi Bhaba Wildlife Sanctuary, and in the higher reaches of Chamba.
- The Sanctuary is locally well known for its extensive alpine pastures as well as the numerous treks, trails and passes that connect it with the neighboring Great Himalayan National Park and Pin Valley National Park.

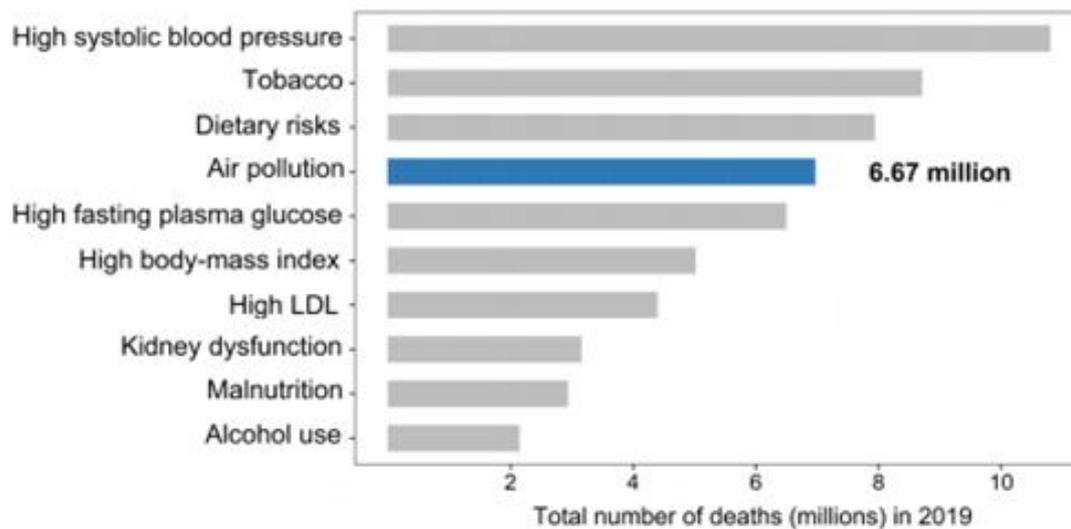
Conservation Status

- According to the International Union for Conservation of Nature (IUCN), Himalayan serows have experienced significant declines in population size, range size and habitat in the last decade, and this is expected to continue due to intensive human impact.
- Previously assessed as 'near threatened', the Himalayan serow is now been categorised as 'vulnerable' in the IUCN Red List of Threatened Species.
- It is listed under Schedule I of The Wildlife Protection Act, 1972, which provides absolute protection.
- CITES - Appendix I

4. State of Global Air 2020

- Recently, a global study, State of Global Air 2020 (SoGA 2020) has been released by the Health Effects Institute (HEI).
- HEI is an independent, nonprofit research institute funded jointly by the USA's Environmental Protection Agency and others.
- Air pollution was the 4th leading risk factor for early death worldwide in 2019, surpassed only by high blood pressure, tobacco use, and poor diet.
- It is the first-ever comprehensive analysis of air pollution's global impact on newborns.

FIGURE 1 Global ranking of risk factors by total number of deaths from all causes in 2019.



Findings

- India, Bangladesh, Pakistan and Nepal are among the top ten countries with the highest PM_{2.5} (particulate matter) exposures in 2019 and all of these countries experienced increases in outdoor PM_{2.5} levels between 2010 and 2019.

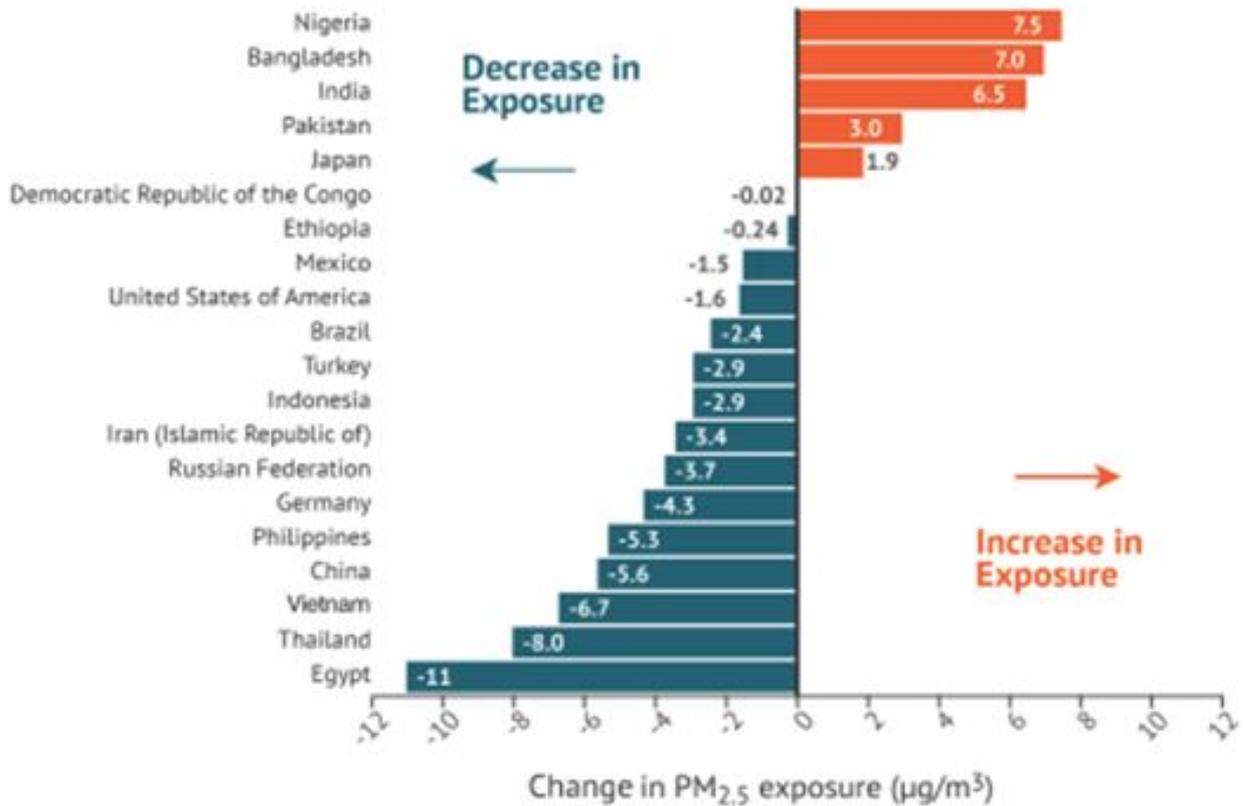
TABLE 1 Top 10 countries with the highest population-weighted annual average PM_{2.5} exposures in 2019

Country	PM _{2.5} Concentration (µg/m ³)	95% Uncertainty Intervals*
India	83.2	76.1 to 90.7
Nepal	83.1	62.9 to 107
Niger	80.1	42.2 to 145
Qatar	76.0	59.2 to 96.6
Nigeria	70.4	45.4 to 105
Egypt	67.9	47.8 to 92.8
Mauritania	66.8	37.6 to 108
Cameroon	64.5	43.8 to 92.6
Bangladesh	63.4	55.1 to 73.8
Pakistan	62.8	49.9 to 77.5

* The 95% uncertainty intervals are a measure of scientific uncertainty. They reflect a range of values, from the 2.5th to the 97.5th percentile of a possible distribution of values, within which the true concentration is likely to fall.

FIGURE 4 Change in population-weighted annual average PM_{2.5} exposure in the 20 most populous countries, 2010–2019.

State of Global Air 2020



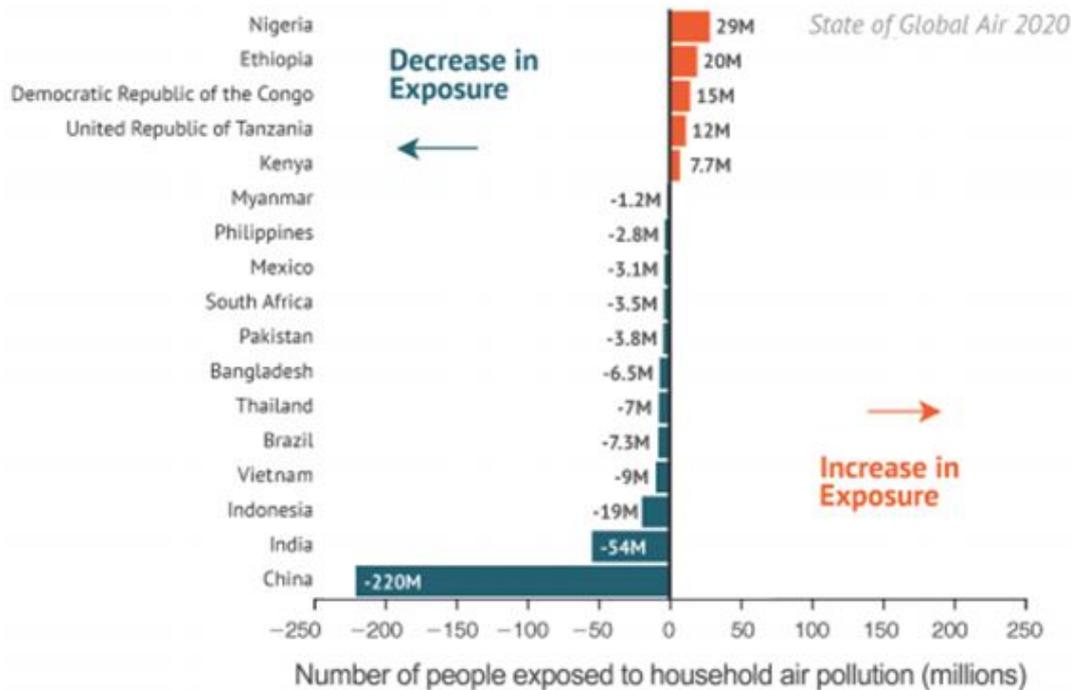
- Studies suggest that ozone levels today are 30% to 70% higher than they were 100 years ago. This increase reflects rising emissions of the chemicals that form ozone, as well as increases in global and local temperatures, which can accelerate ozone formation.
- India is also among the top ten countries with highest ozone (O₃) exposure in 2019. Also, among the 20 most populous countries, India recorded the highest increase (17%) in O₃ concentrations in the past ten years.

TABLE 2 Top 10 countries with the highest ozone exposures globally in 2019.

Country	Tropospheric Ozone (ppb)	95% Uncertainty Intervals*
Qatar	67.2	62.3 to 72.4
Nepal	67.0	65.5 to 68.6
India	66.2	66.0 to 66.3
Bangladesh	64.6	63.9 to 65.3
Bahrain	64.0	51.7 to 75.9
Pakistan	63.3	62.8 to 63.8
Kuwait	62.1	57.6 to 67.1
Iraq (Islamic Republic of)	59.5	58.8 to 60.2
Republic of Korea	57.9	56.4 to 59.3
Saudi Arabia	58.2	57.7 to 58.6

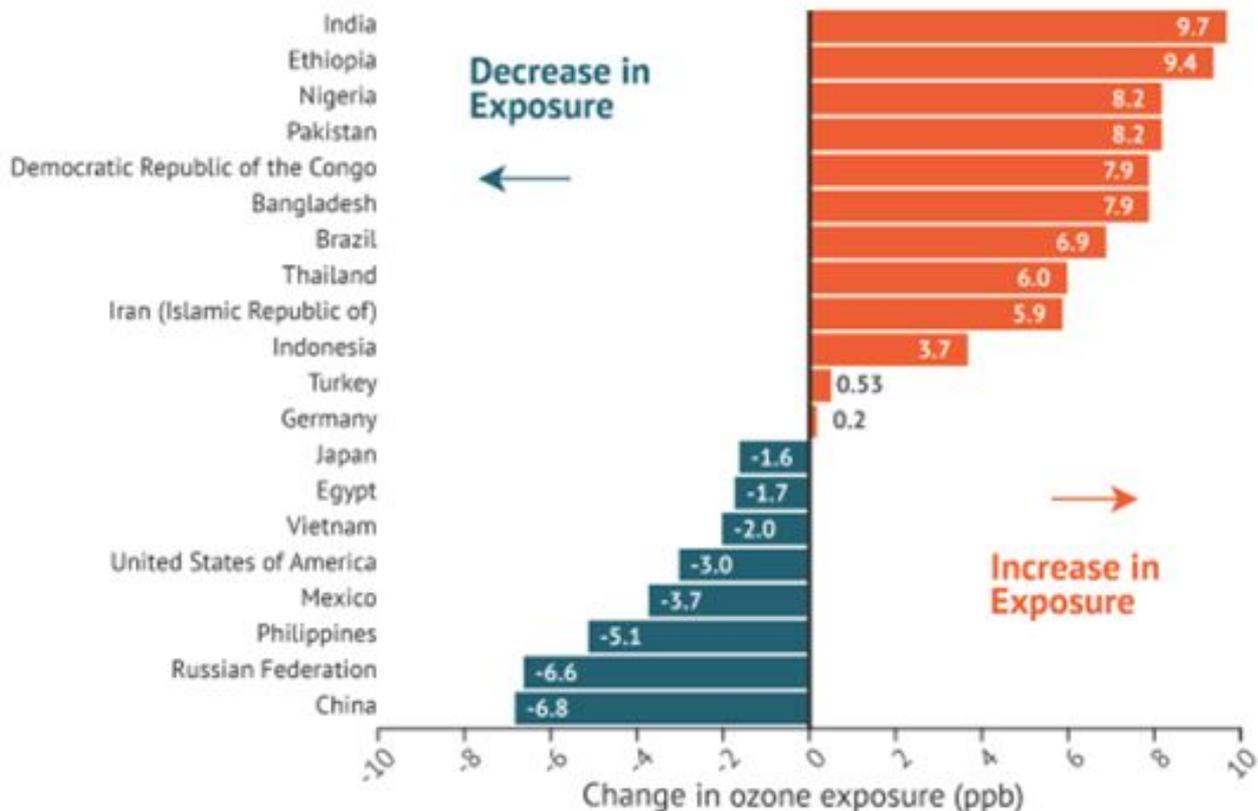
* The 95% uncertainty intervals are a measure of scientific uncertainty. They reflect a range of values, from the 2.5th to the 97.5th percentile of a possible distribution of values, within which the true concentration is likely to fall.

FIGURE 10 Change in the number of people exposed to household air pollution in the 17 countries with over 50 million people and at least 10% of their population cooking with solid fuels, 2010–2019.



- ng-term exposure to outdoor and household (indoor) air pollution contributed to over 1.67 million annual deaths from stroke, heart attack, diabetes, lung cancer, chronic lung diseases, and neonatal diseases, in India in 2019.

FIGURE 7 Change in population-weighted average seasonal 8-hour maximum ozone concentrations in the 20 most populous countries, 2010–2019.



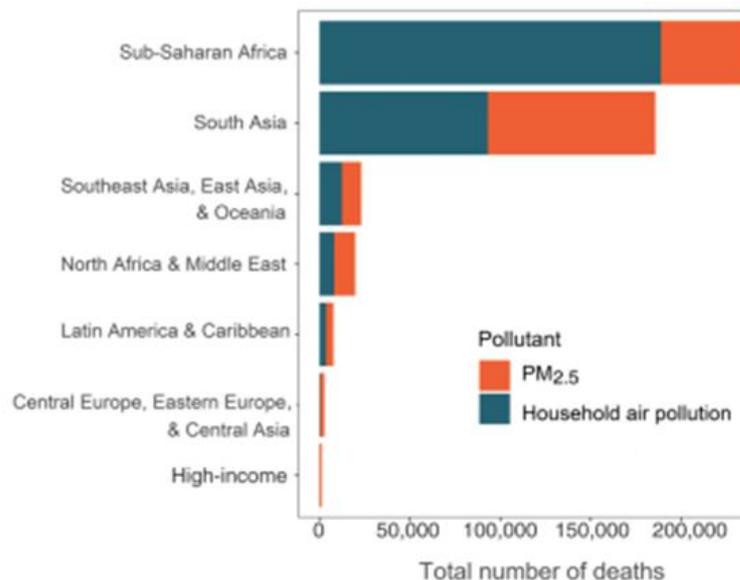
Infant Related Data:

- High PM contributed to the deaths of more than 1,16,000 Indian infants who did not survive their first month.
- Infants in the first month of life are already at a vulnerable stage and a growing body of scientific evidence-supported studies in India indicates that particulate air pollution exposure during pregnancy is linked to low birth weight and preterm birth.
- More than half of these deaths were associated with outdoor PM2.5 and others were linked to the use of solid fuels such as charcoal, wood, and animal dung for cooking.
- Although there has been a slow and steady reduction in household reliance on poor quality fuels, the air pollution from these fuels continues to be a key factor in the deaths of these youngest infants.

Air Pollution and Covid-19:

- Although the link between air pollution and Covid-19 is not completely established, there is clear evidence linking air pollution and increased heart and lung disease. Also, there is growing concern that exposure to high levels of air pollution during winter months in South Asian countries and East Asia could exacerbate the effects of Covid-19.

FIGURE 25 Deaths attributable to particulate matter in 2019 among babies in their first month of life in the GBD Super Regions.



- Air pollution – comprising ambient PM2.5, ozone, and household air pollution— is an increasingly important risk factor contributing to death and disability worldwide.
- In 2019, air pollution ranked 4th among major mortality risk factors globally, accounting for nearly 6.75 million early deaths and 213 million years of healthy life lost.
- Ambient PM2.5 accounted for 4.14 million deaths (118 million years of healthy life lost); household air pollution accounted for 2.31 million deaths (91.5 million years of healthy life lost), and ozone accounted for about 365,000 early deaths (6.21 million years of healthy life lost).
- Taken together, these forms of air pollution accounted for more than 1 in 9 deaths worldwide in 2019.

5. World Wetlands Day

Introduction

- World Wetlands Day is celebrated every year on 2nd February.
- This day marks the date of the adoption of the Convention on Wetlands on 2nd February 1971, in the Iranian city of Ramsar on the shores of the Caspian Sea.
- The year 2021 also commemorates the 50th anniversary of the Convention on Wetlands signed on 2nd February 1971 in the Iranian city of Ramsar.

World Wetlands Day
2 February 2021
Wetlands and water



Themes 2021



- Organised by the Ramsar Convention on Wetlands, the 2021 theme focuses on the intrinsic link between wetlands and freshwater,
- Highlighting the role wetlands play in the quantity and quality of freshwater on our planet.

Themes

- It was first celebrated in 1997.

Wetlands In India

- India has nearly 4.6% of its land as wetlands
- covering an area of 15.26 million hectares
- and has 42 sites designated as Wetlands of International Importance (Ramsar Sites), with a surface area of 1.08 million hectares.
- Wetlands are regulated under the Wetlands (Conservation and Management) Rules, 2017.
- The 2010 version of the Rules provided for a Central Wetland Regulatory Authority, but new Rules of 2017 replaced it with state-level bodies and created a National Wetland Committee, which functions in an advisory role.

World Wetlands Day

WWD2020: Wetlands & Biodiversity

WWD2019: Wetlands and Climate Change

WWD2018: Wetlands for a sustainable urban future

WWD2017: Wetlands for Disaster Risk Reduction

WWD2016: Wetlands for our Future: Sustainable Livelihoods

WWD2015: Wetlands for our Future

WWD2014: Wetlands and agriculture

WWD2013: Wetlands and water management

WWD2012: Wetlands and tourism

WWD2011: Wetlands and forests

WWD2010: Wetlands, biodiversity and climate change

- On the occasion of the World Wetland Day, the Minister of State for Environment, Forest and Climate Change, announced the establishment of a Centre for Wetland Conservation and Management (CWCM), as a part of the National Centre for Sustainable Coastal Management (NCSCM), Chennai, an institution under the Ministry.
- The Centre will help in building partnership and networks with relevant national and international agencies.
- WCM would serve as a knowledge hub and enable exchange between State/ UT Wetland Authorities, wetland users, managers, researchers, policy-makers and practitioners.
- The Centre would also assist the national and State/ UT Governments in the design and implementation of policy and regulatory frameworks, management plan

6. Fishing Cat

Introduction

- Fishing cats (*Prionailurus viverrinus*) are medium-sized wild cats that owe their names to their eating habits.
- Unlike what we may imagine of feline creatures, fishing cats are well adapted to life by the water.
- They appear to be good swimmers and have partially webbed feet that may help them navigate water and wet soils.
- It is twice the size of a house cat.
- The fishing cat is nocturnal (active at night) and apart from fish also preys on frogs, crustaceans, snakes, birds, and scavenges on carcasses of larger animals.
- The species breed all year round.



Distribution

- Fishing cat is a symbolic species of floodplains, deltas and coastal wetlands of South and Southeast Asia.
- They have a patchy distribution from Sind in Pakistan to Cambodia.
- The South Asian countries of India, Nepal, Bangladesh and Sri Lanka hold the core of the global Fishing Cat population.
- In India, it is largely restricted to the floodplains of Ganga, Yamuna, Brahmaputra, Sundarbans Delta and smaller coastal wetlands along the Bay of Bengal formed by Mahanadi, Godavari and Krishna rivers.

Threats

- Habitat Destruction - The biggest threat to the fishing cat, however, is the degradation and loss of its habitat. "In the past two decades, over 50% of the Gangetic floodplain has been lost to urbanisation, infrastructure projects, industries and aquaculture.
- Shrimp Farming - Shrimp farming is another growing threat to mangrove habitats of the Fishing Cat.

- Hunting - This unique cat also faces threats from hunting for meat and skin. It is also occasionally poached for its skin.
- Poisoning - Indiscriminate trapping, snaring and poisoning.

Protection Status

- IUCN Red List - Vulnerable.
- Despite multiple threats, the Fishing Cat was recently downlisted to “Vulnerable” from “Endangered” in the IUCN Red List species assessment. CITES - Appendix II
- Indian Wildlife Protection Act, 1972 - Schedule I.
- In India, the fishing cat is listed under the Wildlife (Protection) Act of 1972 and receives the same level of legal protection as the tiger, the elephant and other threatened fauna. However, more than 90% of the cat’s range is outside protected areas and negative interactions are inevitable in human-dominated landscapes.

Conservation

- The Fishing Cat Project, launched in 2010 started raising awareness about the Cat in West Bengal.
- In 2012, the West Bengal government officially declared the Fishing Cat as the State Animal.
- As part of a programme called Know Thy Neighbours in 2017, camera traps were installed in the back yards of village homes in areas fishing cats were known to frequent. Villagers were shown the camera footage and taught how to identify the individual cats visiting their homes based on body markings.
- Last year, Chilika – the second largest coastal lagoon in the world – adopted the fishing cat as its ambassador. In collaboration with TFCP and volunteers from the community, the CDA (Chilika Development Authority) will soon be installing 100 camera traps across the lagoon to help establish fishing cat numbers and improve protection of this little-known creature.
- In 2020, fishing cat scientists, researchers and conservationists from around the world came together to form the Fishing Cat Conservation Alliance.
- The nonprofit has declared the month of February Fishing Cat February to raise awareness of the mammal and support conservation efforts.
- Recently, the Fishing Cat Conservation Alliance has initiated a study of the bio-geographical distribution of the fishing cat in the unprotected and human-dominated landscapes of the northeastern Ghats of Andhra Pradesh.

7. Tree City of the World- Hyderabad

Introduction

- Hyderabad has become the only city in India to be recognised as a ‘Tree City of the World’ by the Arbor Day Foundation and the Food and Agriculture Organization (FAO) of the United Nations.
- Hyderabad as a ‘2020 Tree City of the World’
- Hyderabad is placed alongside 119 other cities from 63 countries.

- Hyderabad has earned recognition in the Foundation's second year of the programme along with 51 other cities in the world.
- It has become a part of an important global network leading the way in urban and community forestry.
- It is the only City in India to get this recognition so far.
- The United States, Canada and the United Kingdom are the countries with the maximum cities featured on the list, with 38, 15 and 11 cities, respectively.
- The countries have been recognised for their commitment to growing and maintaining urban forests in building healthy, resilient and happy cities.

Tree City of the World programme

- According to the official website, the 'Tree City of the World' programme provides direction, assistance, and worldwide recognition for communities' dedication to its urban forest, and provides a framework for a healthy, sustainable urban forestry programme.

Eligibility

- To be eligible as a 'Tree City', cities need to conform to the following five standards:
- Standard 1: Establish Responsibility
 - ✓ The city has a written statement by city leaders delegating responsibility for the care of trees within the municipal boundary to a staff member, a city department, or a group of citizens—called a Tree Board.
- Standard 2: Set the Rules
 - ✓ The city has in place a law or an official policy that governs the management of forests and trees. These rules describe how work must be performed—often citing best practices or industry standards for tree care and worker safety—where and when they apply, and penalties for noncompliance.
- Standard 3: Know What You Have
 - ✓ The city has an updated inventory or assessment of the local tree resource so that an effective long-term plan for planting, care, and removal of city trees can be established.
- Standard 4: Allocate the Resources
 - ✓ The city has a dedicated annual budget for the routine implementation of the tree management plan.
- Standard 5: Celebrate Achievements:
 - ✓ The city holds an annual celebration of trees to raise awareness among residents and to acknowledge citizens and staff members who carry out the city tree programme.
- Hyderabad City has pledged its commitment by meeting five programme standards that show their dedication and determination towards planting and conserving trees for a greener future.

Hyderabad's Recognition

- It is in response to its commitment to growing and maintaining urban forestry through Haritha Haram programme and Urban Forest Parks.

Haritha Haram programme

- Haritha Haram is a flagship programme of the Telangana government to increase the green cover of the State from the present 25.16 to 33% of the total geographical area.
- It is to be achieved by a multi-pronged approach of rejuvenating degraded forests, ensuring more effective protection of forests against smuggling, encroachment, fire, grazing and intensive soil and moisture conservation measures following the watershed approach.

Urban Forest Parks (UFP)

- The Forest blocks in and around cities are developed into Urban Forest Parks (UFP) under this programme.
- These Urban Forest Parks will not only provide the whole some healthy living environment but also contribute to the growth of smart, clean, green, sustainable and healthy cities in the state.

8. Green Hydrogen

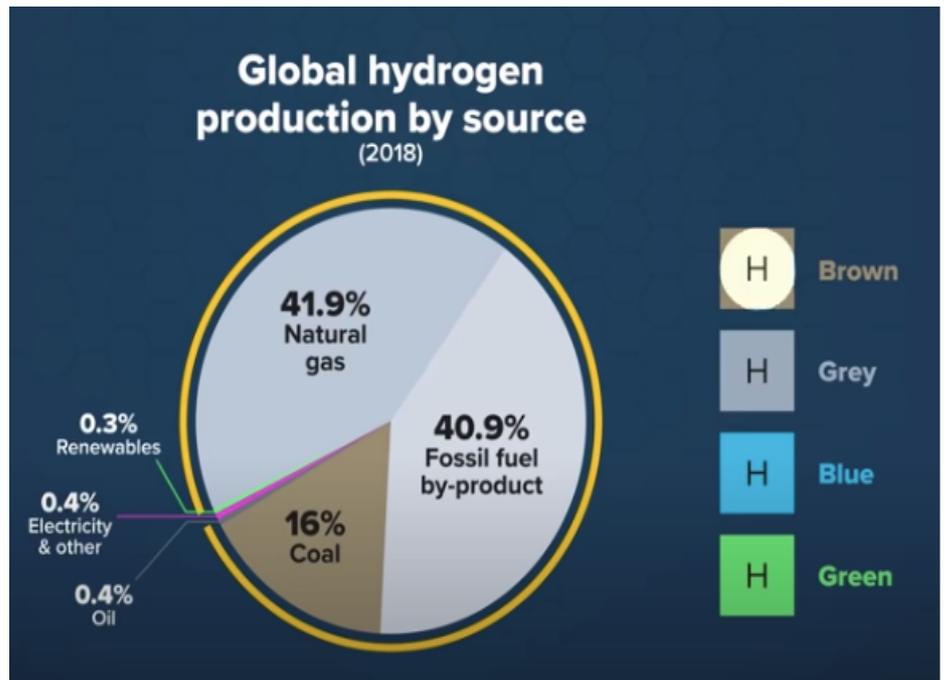
Introduction

- Hydrogen is an appealing fuel.
- A kilogram of hydrogen has about three times as much energy as a comparable amount of diesel or gasoline.
- Hydrogen is the universe's most abundant element, but here on Earth it doesn't appear pure in nature, and requires energy to separate.
- The most common technique is to extract hydrogen from water, which is two parts hydrogen and one part oxygen (hence H₂O).
- If it can be made cleanly and cheaply, it could be the key to cleaning up an array of tricky vital sectors.
- Today, most manufactured hydrogen is made by combining natural gas with steam at high temperatures.
- It's an energy-intensive process that emits considerable amounts of carbon dioxide, the main greenhouse gas driving climate change.
- But a small and growing percentage is made by splitting water into its constituent elements by zapping it with electricity, a process known as electrolysis.
- This also takes a lot of energy, but if the electricity comes from a renewable source like wind or solar power, it produces minimal harmful emissions.
- This is known as Green Hydrogen.

Types of Hydrogen

- Where the hydrogen comes from is important.

- Hydrogen, in itself, is a clean fuel.
- Manufacturing hydrogen fuel, however, is energy-intensive and has carbon byproducts.
- What is now called brown hydrogen is created through coal gasification.
- At the moment, it's mainly produced industrially from natural gas, which generates significant carbon emissions.
- That type is known as "grey" hydrogen.
- A cleaner version is "blue" hydrogen, for which the carbon emissions are captured and stored, or reused.
- The cleanest one of all is "green" hydrogen, which is generated by renewable energy sources without producing carbon emissions in the first place.



How it is produced

- With electrolysis, all you need to produce large amounts of hydrogen is water, a big electrolyzer and plentiful supplies of electricity.
- If the electricity comes from renewable sources such as wind, solar or hydro, then the hydrogen is effectively green; the only carbon emissions are from those embodied in the generation infrastructure.
- The challenge right now is that big electrolyzers are in short supply, and plentiful supplies of renewable electricity still come at a significant price.
- Compared to more established production processes, electrolysis is very expensive, so the market for electrolyzers has been small.

Expensive but getting cheaper

- Conventional hydrogen and blue hydrogen cost about \$2 per kilogram (though the price varies depending on where it's produced), while green hydrogen is around twice as much.
- That price, however, is falling steeply with renewable energy prices and cheaper costs to make equipment used for electrolysis, called electrolyzers.

Uses

- Oil refining
- Methanol production
- Ammonia production

- Steel production
- Conventional hydrogen and blue hydrogen cost about \$2 per kilogram (though the price varies depending on where it's produced), while green hydrogen is around twice as much.
- That price, however, is falling steeply with renewable energy prices and cheaper costs to make equipment used for electrolysis, called electrolyzers.

Potential Uses

- Fuel-cell hydrogen electric cars and trucks
- container ships powered by liquid ammonia made from hydrogen
- "green steel" refineries burning hydrogen as a heat source rather than coal
- hydrogen-powered electricity turbines that can generate electricity at times of peak demand to help firm the electricity grid
- as a substitute for natural gas for cooking and heating in homes.

Issues

- Like any gas, hydrogen can be compressed and stored in tanks, then used as needed. However, the volume of hydrogen is much larger than that of other hydrocarbons; nearly four times as much as natural gas, for instance.
- Its storage requires compression to 700 times normal atmospheric pressure or refrigeration to minus 253 degrees Celsius, which is near absolute zero.
- It's estimated that the cost of doing this could add anything from 60 cents to \$7 per kg, making it less competitive with other fuels.
- On top of the cost of storage, there's a problem with pipes.
- Hydrogen atoms under pressure are small enough to slip through solid steel, meaning natural gas plumbing often cannot be easily converted for pumping hydrogen.
- Appliances set up for natural gas, like stoves and heaters, would also need to be replaced or refitted to handle hydrogen.

Turquoise Hydrogen

- A more recent addition to the hydrogen-production palette is turquoise.
- This is produced by breaking methane down into hydrogen and solid carbon using a process called pyrolysis.
- Turquoise hydrogen might seem relatively low in terms of emissions because the carbon can either be buried or used for industrial processes such as steelmaking or battery manufacturing, so it doesn't escape into the atmosphere.

9. Indian Wild Ass

Introduction

- The Indian Wild Ass (*Equus hemionus khur*), also called Ghor Khar or Ghud Khur is found predominantly in the Little Rann of Kutch and its surrounding areas in Gujarat.

- It is also found in southern Pakistan, Afghanistan, and south-eastern Iran.
- Saline deserts (Rann), arid grasslands and shrub lands are its preferred environment.



Feature

- It is one of the fastest Indian animals (60 kmph)
- The coat of the animal is usually sandy and may vary from reddish grey, fawn, to pale chestnut.
- It feeds on grass, leaves and fruits of plant, crop and saline vegetation.
- Wild asses graze between dawn and dusk.
- They live either solitarily, or in small groups of twos and threes while family herds remain large.

Threats

- Threats to Wild Ass in the Little Rann of Kutch stem from increasing human activities.
- Land use patterns have changed since the Mega Narmada Dam Project which resulted in the Sardar Sarovar canals all around the protected area.
- Uninformed release of Sardar Sarovar canal excess waters into the Rann is having an impact on the micro-habitat, the short grasslands and is restricting the movement of Wild Ass and other species across the saline desert.
- In recent years Wild Ass have also been increasingly hit on the major express highway.
- The International Boundary with Pakistan has been fenced thus restricting any possibility of Wild Ass movement beyond borders.
- Although the population has somewhat increased over the past years, foaling rates in Wild Ass have been on the decline in recent years.
- Increased agricultural practices have converted lands into irrigation fields, resulting in shrinking habitat for the existing Wild Ass population.
- Religious activities, cattle breeding and influx of people have accelerated on the Islands or Bets of the Rann.
- Prosopis juliflora invasion is an additional threat to the habitat.
- An estimated 30-35% of the Wild Ass population lives outside the protected area and human-Wild Ass conflicts are increasing, particularly crop raiding.

Conservation Status

- In August 2015, the IUCN Red List has moved the Indian wild ass from the 'vulnerable' to 'endangered' category, indicating the need for heightened protection measures.
- It has been classified as 'nearly threatened' animal by IUCN in 2016.
- It is protected under Schedule 1 of the Wildlife Protection Act 1972.

- Included on Appendix I of the Convention on International Trade in Endangered Species (CITES), making international trade in this species illegal.
- Indian Wild Ass Sanctuary located in the Little Rann of Kutch is the largest wildlife sanctuary in India.
- A few years back, the Gujarat Ecological Education and Research Foundation (GEER) report had recommended that the Thar desert in Rajasthan should be developed as an alternative site for re-establishing the Indian wild ass by reintroduction a few of them.
- However, currently, the Indian wild ass sanctuary (4900 km²), located in the Little and Great Rann of Kutch in Gujarat, is the ultimate refugia of the Asiatic wild ass population in southern Asia.

Present status

- The population of the wild ass in Gujarat has seen a significant rise of over 36% in the last five years, a population estimation report published by the state forest department in 2019 has claimed.
- The population estimation exercise conducted in March 2019 counted a total of 6,082 wild asses in the Little Rann Of Kutch (LRK).
- Five years back, the population was estimated to be 4,451.
- The counting of wild ass population, kept under Schedule-I of the Wildlife Protection Act, 1972, takes place once every five years.
- GPS tracking devices and drone cameras were part of the 9th Wild Ass population estimation.



10.NDC Synthesis Report

Introduction

- The NDC synthesis report is prepared in response to the requests from COP 21 (Paris, 2015) and CMA 2 (Madrid, 2019) to the secretariat to prepare a synthesis report of the NDCs submitted by Parties before COP 26.
- In view of the postponement of COP 26 to November 2021 and the impact of the COVID-19 pandemic on the NDC preparation process, the secretariat decided to issue the NDC synthesis report in two editions:
 - ✓ an initial version by 28 February 2021 and the final version in advance of COP 26 (date to be determined yet).
- This report was released by the UNFCCC.
- This report measures the progress of national climate action plans in the backdrop of upcoming 26th session of Conference of its Parties (COP26) in November 2021 in Glasgow.
- This report has also urged the other countries to initiate more ambitious plans in order to reach the Paris Agreement goals.

- 2021 is a make or break year to confront the global climate emergency. The science is clear, to limit global temperature rise to 1.5C, we must cut global emissions by 45% by 2030 from 2010 levels.
- The interim report from the UNFCCC is a red alert for our planet.
- It shows governments are nowhere close to the level of ambition needed to limit climate change to 1.5 degrees and meet the goals of the Paris Agreement.
- The major emitters must step up with much more ambitious emissions reductions targets for 2030 in their Nationally Determined Contributions well before the November UN Climate Conference in Glasgow.
- This report covered the submissions from countries up to December 31, 2020.
- As per the submission, 75 countries which are Parties to the Framework Convention communicated a new or updated NDC which represents 30 per cent of global greenhouse gas emissions.

Features

- The United Kingdom and the European Union are the only regions among 18 of the world's biggest emitters that have significantly increased their greenhouse gas reduction targets.
- Of the 197 Parties to the United Nations Framework Convention on Climate Change (UNFCCC), only 75 have submitted new or updated nationally determined contributions (NDC) till December 31, 2020.
- These Parties account for 30 per cent of the global greenhouse emissions.
- Other major emitters either submitted NDCs presenting a very low increase in their ambition level or have not presented NDCs yet.
- Sixteen of the world's biggest emitters have not increased their emission reduction targets substantially or at all.
- More countries reported on mitigation co-benefits of adaptation action and economic diversification plans.
- Adaptation actions and economic diversification plans with mitigation co-benefits include -
- climate-smart agriculture, adapting coastal ecosystems, increasing the share of renewable sources in energy generation, carbon dioxide capture and storage, fuel switch and fuel price reforms in the transport sector, and moving to a circular economy for better waste management.
- While a majority of countries increased their individual levels of ambition to reduce emissions, their combined impact will help achieve only a 1 per cent reduction by 2030 compared to 2010 levels.
- Global emissions, however, need to reduce by 45 per cent in order to meet the 1.5°C goal, according to Intergovernmental Panel on Climate Change.

Conclusion

- Participating nations will get more time to review and update their NDCs.
- This will be compiled in the final synthesis report to be brought out ahead of COP 26.

- This report has shown that nations must redouble efforts and submit stronger, more ambitious national climate action plans in 2021 if they're to achieve the Paris Agreement goal of limiting global temperature rise by 2°C—ideally 1.5°C—by the end of the century.

11. World Water Day

Introduction

- To focus on the importance of freshwater, the United Nations marks March 22 every year as World Water Day.
- The theme of World Water Day 2021 is “Valuing Water”.
- It celebrates water and raises awareness of the 2.2 billion people living without access to safe water.
- A core focus of World Water Day is to support the achievement of Sustainable Development Goal 6: water and sanitation for all by 2030.

Theme

- Valuing Water.
 - ✓ The value of water is about much more than its price – water has enormous and complex value for our households, food, culture, health, education, economics and the integrity of our natural environment.
 - ✓ If we overlook any of these values, we risk mismanaging this finite, irreplaceable resource.

Celebrated Why?

- As per the UN website, the idea for this international day goes back to 1992, the year in which the United Nations Conference on Environment and Development in Rio de Janeiro took place.
- That same year, the United Nations General Assembly adopted a resolution by which March 22 of each year was declared World Day for Water, to be observed starting in 1993.
- Later on, other celebrations and events were added.
- For instance, the International Year of Cooperation in the Water Sphere 2013, and the current International Decade for Action on Water for Sustainable Development, 2018-2028.
- These observances aim to highlight that water and sanitation measures are key to poverty reduction, economic growth, and environmental sustainability.

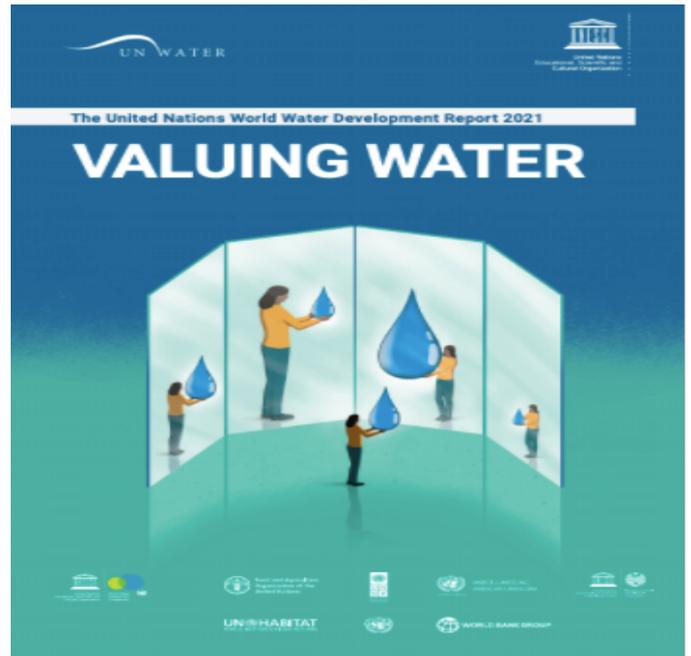
India

- In 2017, the average annual per capita water availability fell from 1820 cubic meters assessed in 2001 to 1545 cubic meters in 2011, and could reduce further to 1341 and 1140 in the years 2025 and 2050 respectively.
- Annual per-capita water availability of less than 1700 cubic meters is considered as water stressed condition, whereas annual per- capita water availability below 1,000 cubic meters is considered as a water scarcity condition.
- Due to high temporal and spatial variation of precipitation, the water availability of many regions of the country is much below the national average and can be considered as water stressed/water scarce,.

- In a 2018 report, the water and sanitation advocacy group WaterAid ranked India at the top of 10 countries with the lowest access to clean water close to home, with 16.3 crore people not having such access.
- The same report also took note of government efforts, saying, “(India) is also one of the world’s most-improved nations for reaching the most people with clean water, but faces challenges with falling groundwater levels, drought, demand from agriculture and industry, pollution and poor water resource management – challenges that will intensify as climate change contributes to more extreme weather shocks.”

Water In The Constitution

- Under Article 246, the Indian Constitution allocates responsibilities of the States and the Centre into three lists– Union List, State List, and Concurrent List.
- As most of the rivers in the country are inter-State, the regulation and development of waters of these rivers, is a source of inter-State differences and disputes.
- In the Constitution, water is a matter included in Entry 17 of List-II i.e. State List.
- This entry is subject to the provision of Entry 56 of List-I i.e. Union List.



UN WWDR 2021

- On World Water Day, 22 March, the UN World Water Development Report 2021 on 'Valuing Water' was launched.

India

- India uses the largest amount of groundwater - 24% of the global total.
- India is the third largest exporter of virtual water (groundwater that is used to grow export- oriented, water-intensive crops) -12% of the global total.

Catch The Rain Campaign

- Prime Minister has launched 'Jal Shakti Abhiyan - Catch the Rain' campaign for conserving water and stressed that every penny of MGNREGA funds be spent on rain water conservation till the monsoon arrives.
- The 'Catch the Rain' campaign will be undertaken across the country, in both rural and urban areas.
- It will be implemented from March 22 to November 30 - the pre- monsoon and monsoon period in the country.
- The campaign aims to take water conservation at grass-root level through people's participation.
- It is intended to nudge all stakeholders to create rainwater harvesting structures suitable to the climatic conditions and subsoil strata, to ensure proper storage of rainwater.

12. Plastic Pollution

Plastic Pollution

Accumulation of plastic in earth's environment



How Plastic went Viral ?

- ❑ WWI- short fall rubber & Natural material
- ↓
- ❑ Demand of synthetic material
- ↓
- ❑ Companies producing Plastic



Plastic Pollution- Consumption

Daily life

- ❑ Single use plastic (50% of total)

Agriculture

- ❑ Plasticulture

Construction

- ❑ PVC
- ❑ Insulation
- ❑ Fibreglasses

Auto industry,

- ❑ Cars
- ❑ Insulation

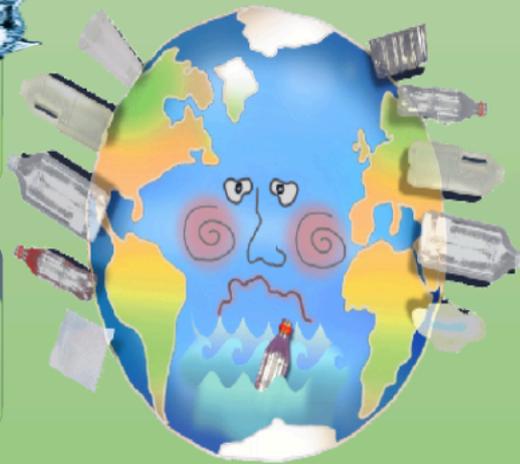
Concern , Challenges & impact

Polyethylene Terephthalate

- ❑ Bottles , soft drinks , detergents etc
- ❑ 50% of pollution

Degradation

- ❑ 500 to 1000 yrs
- ❑ Plastic to microplastic



Microplastic

- chemical composition remain same
- NE Atlantic ocean , SW Indian ocean
- 90% of seabird contain



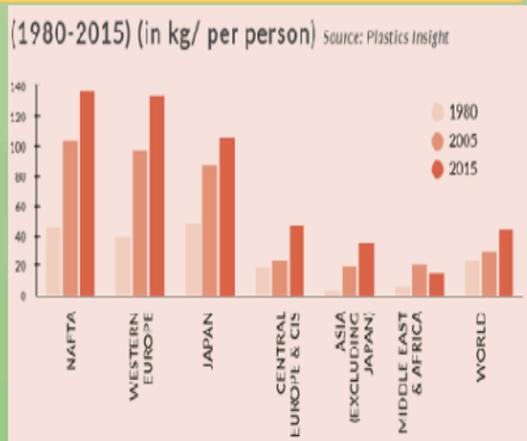
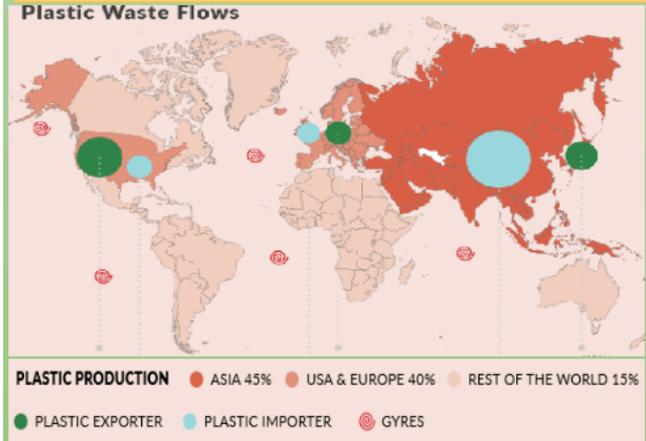
Disaster

- Flood reasons
- Toxic gasses

Ocean

- Food chain
- Marine life
- Biomagnification

Developed to developing



Solution to Plastic waste mgmt

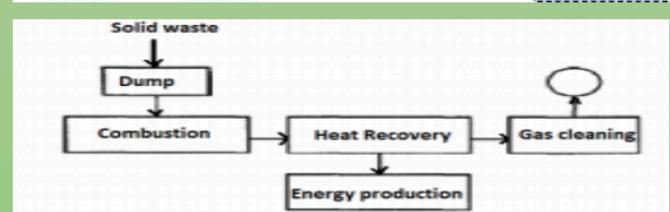
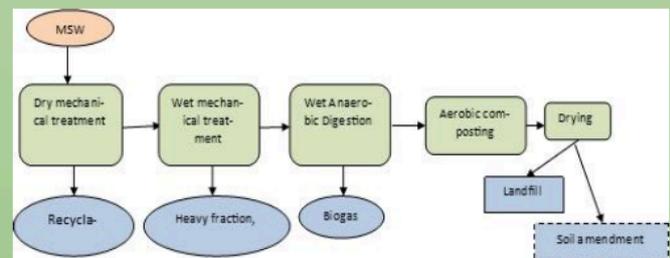
Landfill-CH4 ,GHG

Recycling

- Recyclable waste from MSW

Mixed MSW Incineration

- No need of separation.
- Leave 15-20% of original waste.



Indian effort

Plastic waste management rules 2011

- No rural areas

Plastic waste management rules 2016

- Rural areas

Local bodies



Gram Panchayat



Plastic waste management rules 2016	Rural areas
<p>EPR</p> <p>❑ Producer, Brand Owner or Importer- Collecting back system within 6 month.</p>	
<p>Carry bags</p> <p>❑ Thickness 40 micron to 50</p>	

<p>Multi layered plastic</p> <p>❑ Challenge of ML properties</p> <p>❑ Expensive recycling</p>	
<p>Uses of MLP</p> <p>❑ 3 times more waterproof</p> <p>❑ Light weight</p> <p>❑ Reduce shipping volume</p> <p>❑ Increase shelf life of product.</p>	

13. Kolar Leaf Nosed Bat

Introduction

- The Kolar leaf-nosed bat (*Hipposideros hypophyllus*), or leafletted leaf-nosed bat is a species of bat in the family Hipposideridae.
- It is endemic to India.
- It is found in only one cave in Hanumanahalli village in Kolar district, Karnataka, and its population is less than 200 individuals.
- Very little is known about this bat, its ecology, w its diet, its behaviour and what would happen to it if the cropping pattern changes in the area in which it resides.

Habitat

- It is known from only one cave in Hanumanahalli village in the Kolar district of the state of Karnataka in India.



Kolar leaf-nosed bat range

- Its natural habitats are subtropical or tropical dry forests and caves.
- Subterranean caves are one of the most fragile and understudied habitats.
- One, they are almost inaccessible, often buried underground with narrow openings in obscure places.
- Two, they shelter unpopular creatures such as bats, beetles, roaches, and other insects that have been largely ignored in conservation efforts and plans.
- However, these caves are extremely delicate and vulnerable to external changes, especially to human intervention.
- Deforestation, construction of roads, quarrying, all destroy entire caves.
- Since they largely go unnoticed, a habitat and many endemic species are often wiped out even before they are scientifically identified.

Features

- It is unique among the Hipposideros family as it has only one pair of supplementary leaflets around its nose leaf, compared to two found commonly.
- This species has not been documented anywhere else after it was first described in 1994.

IUCN Status

- Critically Endangered
 - ✓ There are petitions to have the bat protected under the Indian Wildlife Protection Act, as all bats in India are considered vermin with the exception of two species.



Conservation In India

- The Kolar leaf-nosed bat is found in only one cave, and its population is less than 200 individuals.
- Its single cave is not on protected land, and the species itself is not protected by Indian law.
- Though, the government had notified the 30 acres around the caves as a protected area.
- Any development work here, including construction of new infrastructure, will need the permission of the National Board for Wildlife.
- Its habitat is under threat due to illegal granite mining.
- Karnataka Forest Department, along with the Bat Conservation India Trust (BCIT), is on a war footing to save the remaining bats, which are endemic to the area, from extinction.
- The BCIT, which has been entrusted with drawing up a conservation plan, has also been awarded a grant to conduct further research on this species of bats.
- It has received funding from the Habitats Trust to carry out the project.

Importance of Bats

- They are least studied mammals in the country, though there are 130 species in India.
- Bats are vital for the ecology as they are pollinators, their main diet being nectar.

- Bats also help in insect control and therefore, help in the protection of crops.
- They are very adaptable creatures and therefore can often be found near human habitation or even in urban settlements, which makes them vulnerable.
- They have a bad image in the public eye, as carriers of diseases.

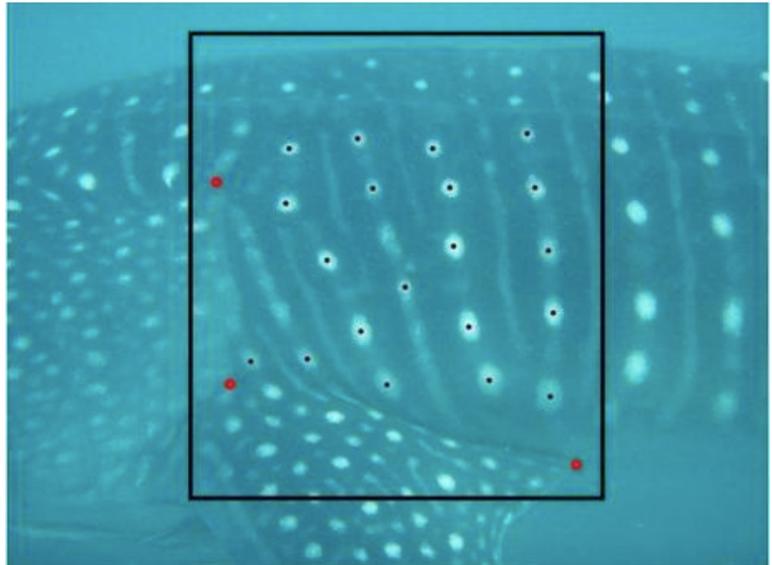
14. Whale Sharks

Introduction

- Whale sharks (*Rhincodon typus*) are the largest shark, and indeed largest of any fishes alive today.
- Whale sharks hold many records, most notably for being the largest living nonmammalian vertebrate.
- They feed on plankton and travel large distances to find enough food to sustain their huge size, and to reproduce.
- Whale sharks are found in all the tropical oceans of the world.
- Their white spotted colouration makes these gentle giants easy to distinguish, and popular with snorkelers and divers at sites where they aggregate off the coast.
- Also known as Gentle Giants.

Habitat

- Tropical oceans and warm temperate oceans. Pelagic.
- The whale shark is the biggest fish and shark in the world.
- These gentle marine giants roam the oceans around the globe, generally alone.
- However, large numbers of whale sharks often gather in areas with abundant plankton food—making them prime tourist attractions.
- The whale shark is a filter-feeder shark, which means it does not eat meat like other sharks.
- They filter sea water and feed on tiny planktons.
- The distribution of whale sharks indicates the presence of plankton and the overall health of our oceans.



© WWF-Philippines

Like human fingerprints, whale sharks have a unique pattern of spots which allow individual sharks to be identified. By taking photos and cataloguing them, WWF has identified 458 different whale sharks in the Philippines.



Threats

- They are usually hauled in as bycatch with fishermen targeting economically benefiting species.
- The meat of whale sharks is not very edible, it is the liver that is the most important for commercial trade, while oil from the fish is used for water-proofing boats.
- Whale shark tourism presents a threat to the species as it can interrupt their feeding and sharks can be injured by boat propellers.
- Oil & gas drilling.



IUCN Status

- IUCN Status - Endangered
- The Whale Shark also receives international protection due to its inclusion in Appendix II of the Convention in International Trade in Endangered Species of Fauna and Flora (CITES).
- Appendix I listing the UN Convention on Migratory Species in 2017.

Conservation in India

- It was in 2001 that, in a conservation attempt, whale sharks were included in Schedule I of the Wildlife (Protection) Act of India, 1972, rendering the capture and killing of the fish a cognisable offence.
- It was the first-ever species to be protected under this Act, after which the Ganges shark (*Glyphis gangeticus*) and spartooth shark (*Glyphis glyphis*) were added to it.
- WTI launched the widely-acclaimed Whale Shark Campaign in 2004 to spread awareness on the plight of the species and its protected status among coastal communities in Gujarat.
- On the East coast, the Forest Department of Andhra Pradesh along with The East Godavari River Estuarine Ecosystem (EGREE) has been conducting awareness programmes and workshops to educate fishing communities since 2013.

15.Disk Footed Index

Introduction

- Meghalaya has yielded India's first bamboo- dwelling bat with sticky disks, taking the species count of the flying mammal in the country to 130.



- The disk-footed bat (*Eudiscopus denticulus*) was recorded in the north-eastern State's Lailad area near the Nongkhylllem Wildlife Sanctuary, about 1,000 km west of its nearest known habitat in Myanmar.

Habitat

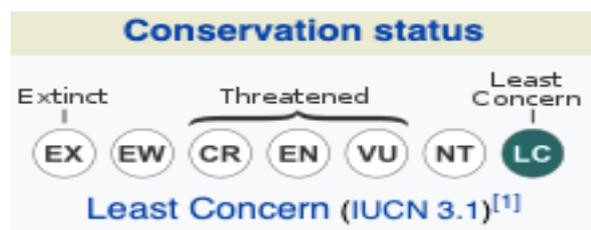
- The researchers found that though several bamboo-dwelling bat species are common throughout Southeast Asia, this particular species is rare and found only in a few localities worldwide.
- It is known to thrive in a few localities in Southern China, Vietnam, Thailand and Myanmar.
- It has been found roosting in internodal spaces of bamboo stems.
- There are a couple of other bamboo-dwelling bats in India.
- But the extent of adaptation for bamboo habitat in this species is not seen in the others.

Features

- The bat species is very distinctive in appearance with prominent disk-like pads in the thumb and bright orange colouration.
- The flattened skull and sticky pads enabled the bats to roost inside cramped spaces, clinging to smooth surfaces such as bamboo internodes.
- The disk-footed bat was also found to be genetically very different from all other known bats bearing disk-like pads.
- Scientists analysed the very high frequency echolocation calls of the disk-footed bat, which was suitable for orientation in a cluttered environment such as inside bamboo groves.
- The disk-footed bat has raised Meghalaya's bat count to 66, the most for any State in India.

IUCN Status

- IUCN Status - Least Concern



Conservation In India

- It has also helped add a genus and species to the bat fauna of India.
- India has a total of 130 bat species.

16.Great Indian Bustard

Introduction

- It is one of the heaviest flying birds in the world.
- It is the State bird of Rajasthan.
- It is considered the flagship grassland species, representing the health of the grassland ecology.

- But with less than 200 GIBs remaining in the world, most of them found in Rajasthan's 'Desert National Park', we are on the brink of forever losing a majestic bird species, which was once a strong contender to be declared as India's National Bird.

Habitat

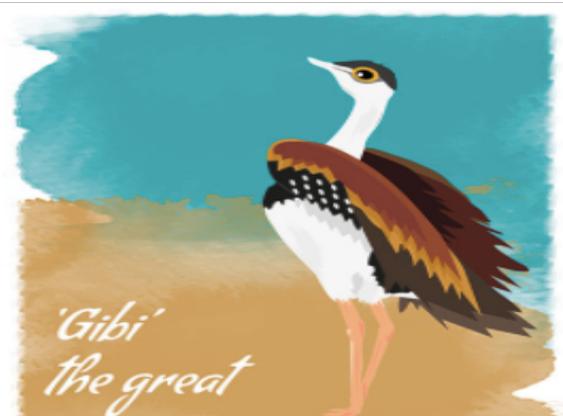
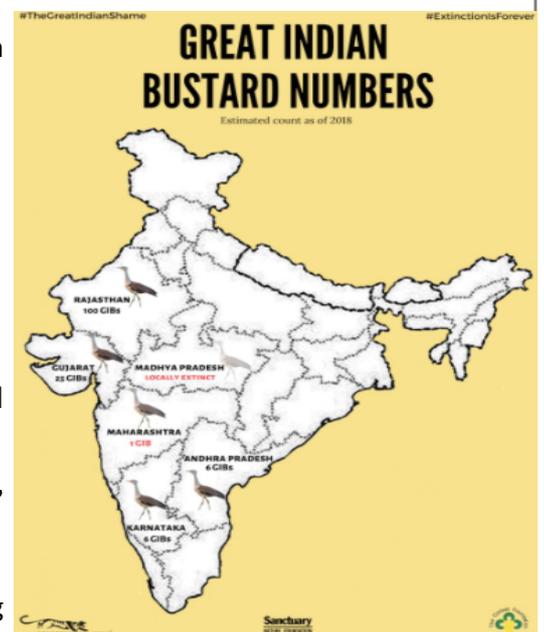
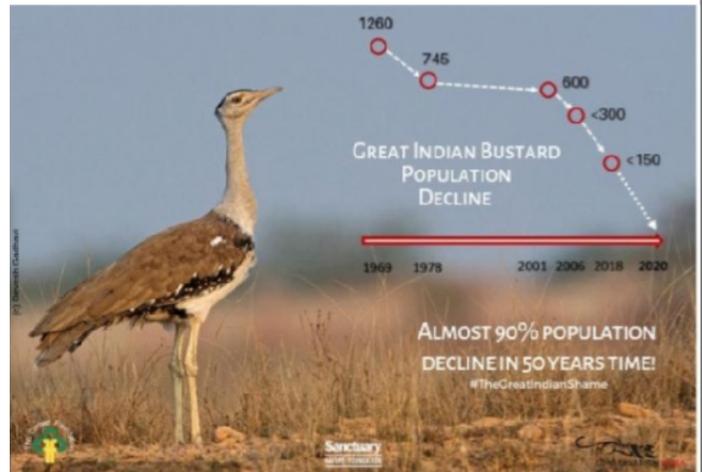
- Bustards generally favour flat open landscapes with minimal visual obstruction and disturbance, therefore adapt well in grasslands.
- Its population is confined mostly to Rajasthan and Gujarat.
- Small populations occur in Maharashtra, Karnataka and Andhra Pradesh.

Reason for Decline

- Habitat loss & fragmentation
- Change of land use pattern
- Desertification
- Ill-thought plantation of exotic & invasive species in grassland ecosystems
- Neglect of state institutions due to classification of 'grasslands' as 'wastelands'
- Conversion of grasslands to agriculture lands due to increasing irrigation potential
- Decline of nature/GIB-friendly agrarian practices
- Collision/electrocution with power transmission lines
- Wind turbines and Solar farms (photovoltaic power stations)
- Hunting
- Noise pollution disrupting natural breeding cycle.

Protection

- IUCN - Critically Endangered CITES - Appendix 1



* 'Gibi' the enchanting Great Indian Bustard, representing all the endangered species that need our love, care, and protection.



- The Great Indian Bustard, Asian Elephant and Bengal Florican have been included in Appendix I of the UN Convention on Migratory Species at the 13th Convention on Migratory Species (CMS) in Gandhinagar (Gujarat).
- Conference of the Parties (COP) to the Wildlife (Protection) Act, 1972 - Schedule 1

Conservation In India

- It is kept under the species recovery programme under the Integrated Development of Wildlife Habitats of the Ministry of Environment, Forests and Climate Change (MoEFCC).
- The MoEFCC has also launched a program called 'Habitat Improvement and Conservation Breeding of Great Indian Bustard-An Integrated Approach'.
- The objective of the programme is to build up a captive population of Great Indian Bustards and to release the chicks in the wild for increasing the population.
- Rajasthan government has launched 'Project Great Indian Bustard' with an aim of constructing breeding enclosures for the species and developing infrastructure to reduce human pressure on its habitats.

Important

- The Ministry of Environment Forest and Climate Change (MoEFCC) along with the Wildlife Conservation Society (WCS) India has come up with a unique initiative a "firefly bird diverter" for overhead power lines in areas where Great Indian Bustard (GIB) populations are found in the wild.
- The Supreme Court of India, in a recent hearing, directed that power lines in GIB landscapes should be placed underground.
- They have been satellite-tagged in the Desert National Park (DNP).
- The technique of satellite telemetry has been used for a long time in the last century to track the movements of birds.
- It usually involves a bird being fitted with a satellite transmitter weighing 170 grammes.
- Today, GPS technology is being used, giving scientists even more precise data.