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1 CLIMATE CHANGE

1. Sustainable Livelihoods and Adaptation to Climate Change (SLACC)

Context:

The Hyderabad-based National Institute of Rural Development and Panchayati Raj (NIRDPR) has launched a World Bank-supported training programme of Sustainable Livelihoods and Adaptation to Climate Change (SLACC) to help Rural Poor Farm Holds adapt to Climate Change and sustain their livelihoods.

Key-highlights

- **Launched by**: Hyderabad-based National Institute of Rural Development and Panchayati Raj (NIRDPR).
- **Objective:** To help Rural Poor Farm-based Households adapt to Climate Change and sustain their livelihoods.
- **Parent programme**: Launched under the **National Rural Livelihood Mission.**
- **Coverage**: Total 638 drought and flood-prone villages of Madhya Pradesh and Bihar are being covered on pilot basis.
- **Funding: by** the **Special Climate Change Fund** which is set up under the United Nations Framework Convention on Climate Change.
- Programme aims to create a cadre of over 200 certified climate-smart' community resource persons.
- The cadre will further **disseminate the climate resilient technologies** to farming communities.

Aajeevika - National Rural Livelihoods Mission (NRLM)

- Aajeevika - National Rural Livelihoods Mission (NRLM) was launched by the **Ministry of Rural Development (MoRD)**, Government of India in June 2011.
- Aided in part through investment support by the World Bank, the Mission aims at creating efficient and effective institutional platforms of the rural poor, enabling them to increase household income through sustainable livelihood enhancements and improved access to financial services.

2. Climate vulnerability index

Context:

Environmental think tank **Council on Energy, Environment and Water (CEEW)** has carried a first-of-its-kind district-level climate vulnerability assessment, or **Climate Vulnerability Index (CVI).**

What is Climate Vulnerability Index?

- The **Climate Vulnerability Index (CVI)** helps map critical vulnerabilities and plan strategies to enhance resilience and adapt by climate-proofing communities, economies and infrastructure.
- The CVI maps:
  - exposure (that is whether the district is prone to extreme weather events)
  - sensitivity (the likelihood of an impact on the district by the weather event)
  - adaptive capacity (what the response or coping mechanism of the district is)
- Instead of looking at climate extremes in isolation, the study looks at the combined risk of hydro-met disasters, which is floods, cyclones and droughts, and their impact.
- The study does not take into consideration other natural disasters such as earthquakes.

Key-highlights of the Index

In the Index, CEEW has analyzed 640 districts in India to assess their vulnerability to extreme weather events such as cyclones, floods, heatwaves, droughts, etc.

- **Most vulnerable: Assam, Andhra Pradesh, Maharashtra, Karnataka and Bihar** are most vulnerable to extreme climate events such as **floods, droughts and cyclones in India.**
  - While 27 Indian states and union territories are vulnerable to extreme climate events, 463 districts out of 640 are vulnerable to extreme weather events.
- **Most climate-vulnerable districts**: **Dhemaji and Nagaon** in Assam, Khammam in Telangana, Gajapati in Odisha, Vizianagaramin Andhra Pradesh, Sangli in Maharashtra, and Chennai in Tamil Nadu are among India's most climate-vulnerable districts.
- **Population in vulnerable districts:** More than 80 per cent of Indians live in districts vulnerable to climate risks – that is 17 of 20 people in India are vulnerable to climate risks, out of which every five Indians live in extremely vulnerable areas
  - More than 45 per cent of these districts have undergone "unsustainable landscape and infrastructure changes''.
- 183 hotspot districts are highly vulnerable to more than one extreme climate events
- 60% of Indian districts have medium to low adaptive capacity in handing extreme weather events – these districts don't have robust plans in place to mitigate impact
- **North-eastern states** are more vulnerable to floods
- **South and central** are most vulnerable to extreme droughts
- 59 and 41 per cent of the total districts in the eastern and western states, respectively, are highly vulnerable to extreme cyclones.

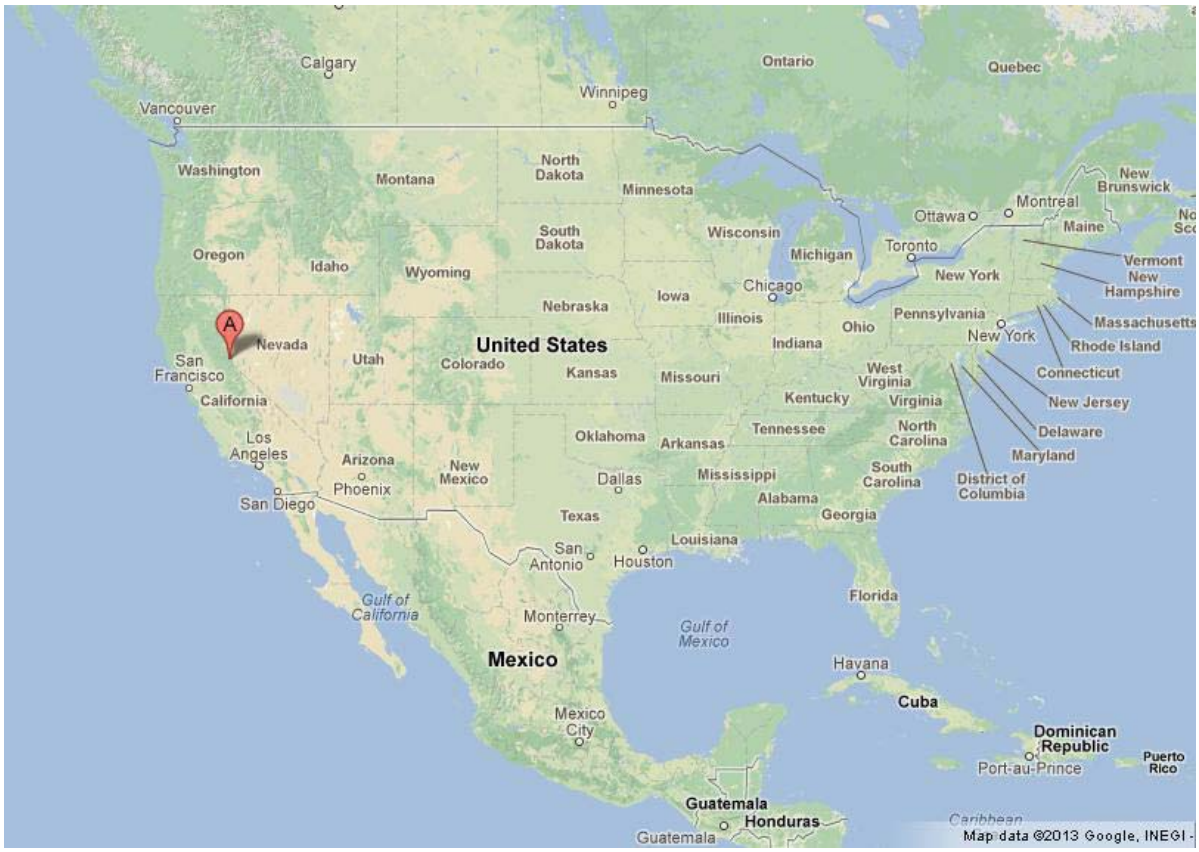
3. US's Lake Tahoe

Context:

The **Lake Tahoe** in the US has dropped below its natural rim and halted flows into the Truckee River due to drought fueled by climate change. It is a historically cyclical event that's occurring sooner and more often than it used to.

Key-points

- Lake Tahoe is the **largest alpine lake** in North America and the second deepest lake in the US after Crater Lake in Oregon.
- Alpine lakes are dams or ponds at higher altitude, usually above tree line or sea level.



Important Lakes in North America

- Great Lakes, chain of deep freshwater lakes in east-central North America comprising Lake Michigan, Superior, Ontario, Erie and Huron.
- The lakes provide a natural border between Canada and the United States, except for Lake Michigan.

Impact of Climate Change on Lakes

- **Less ice Covered:** If the air temperature rises by 4 ° C, more than 1,00,000 lakes and pools with less ice cover are at risk of ice free winters.
- **LSWT Rising:** Overhead Lake Water Templates have grown worldwide, equal to or higher than the air temperature.

- **Increased evaporation rate:** It is projected that the global evaporation rate will increase by 16% by 2100, with regional variations depending on factors such as ice cover, stratification, wind speed and solar radiation.
  - The tendency for the lakes to form separate and distinct thermal layers during warm weather is called Stratification of the lake.
- **Affecting Lake Water Storage:** Global lake water storage is sensitive to climate change, but with substantial regional variability, and the magnitude of future changes in lake water storage remains uncertain.

4. New climate crisis goal: Net zero by 2070

Context:

As part of a **five-point action plan**, the Indian government has announced that the country will reach **carbon neutrality by 2070.**

What is 'net zero'?

- Net Zero refers to a **balance where emissions of greenhouse gases are offset by the absorption of an equivalent amount from the atmosphere.**
- It is seen as a critical measure to successfully tackle climate change and its devastating consequences.

The other important commitments

- India will increase its **non-fossil energy capacity** to **550GW by 2030.**
- India will meet **50% of its energy requirement from renewable energy by 2030.**
- India will reduce the total projected **carbon emissions by one billion tonnes from now to 2030.**
- India will reduce the **carbon intensity** of its economy by **45% (from a previous target of 35%).**

Important facts

- India has the **lowest per capita emissions of the world's major economies** -- emitting 5% of the total, despite accounting for 17% of the world's population.
- In absolute terms, India is the **fourth-largest carbon emitter** after China and the United States.
- China has pledged to turn carbon neutral by 2060 while the **US and the European Union** – as a block, EU nations together account for the third-largest volume of emissions – aim to do so by 2050.
- India hasn't submitted an updated **nationally determined contribution (NDCs)** with these commitments to the **United Nations Framework Convention on Climate Change (UNFCCC)** yet.

5. Net Zero Target of Saudi Arabia

Context:

Saudi Arabia, one of the world's largest oil producers, has recently announced that it will reach "net zero" greenhouse gas emissions by 2060.

Key-Points

- The announcement was made at the start of the **first-ever Saudi Green Initiative (SGI) Forum** of the kingdom.
  - The aim is the SGI to increase crop coverage, reduce carbon emissions, fight pollution, and land degradation, and preserve marine life.
- Saudi Arabia will join a global campaign to **reduce methane emissions by 30% from 2020 levels by 2030,** in accordance with **Global Methane Pledge** pressed by the **European Union (EU) and the United States.**
- While maintaining its leading role in strengthening the security and stability of global oil markets, the aim of SGI is to achieve zero-net emissions by 2060 under its **global carbon economy plan.**
- That approach focuses on unreliable pictures technology and carbon storage over efforts to reduce global dependence on fossil fuels.

About the Net Zero Target

- Net-zero is a condition in which emissions are compensated for by the absorption and removal of greenhouse gases from the atmosphere. Reaching net-zero emissions is akin to achieving **"climate neutrality."**
- Gross zero would mean stopping all emissions, which isn't realistically attainable across all sectors of our lives and industry.
- Net zero looks at emissions overall, allowing for the removal of any unavoidable emissions, such as those from aviation or manufacturing.
- Removing greenhouse gases could be via nature, as trees take carbon dioxide from the atmosphere, or through new technology or changing industrial processes.

Concerns

- Announcing the **Net Zero Carbon Targets** in a recent report by **Oxfam International, Strengthening the Net,** could be a dangerous obstacle to prioritizing reducing carbon emissions.
- More than 100 countries have set or considered net-zero or neutral target releases.

India's scenario

- India is now the **fourth largest emitter of greenhouse gases** after **China, the United States, and the European Union**, and according to the **IPCC Sixth Review Report**, it will be among the countries most severely affected countries.
- India will simply focus on advancing the goals of transition to green energy and it is unlikely that it will follow the highly recommended net-zero system.
- India is committed towards having **175-gigawatt renewable energy by 2030** under the **2015 Paris Climate Treaty and reducing carbon intensity of the Gross Domestic Product (GDP) by 33-35% by 2030.**
- The principle that India believes in is of '**common but separate responsibility'**, as developed countries should take the first steps to reduce their exports significantly.
- In addition, developed countries should compensate poor countries for the damage done to the environment as a result of their previous emissions.
- A recent study by the **Think tank Council for Energy Environment and Water Projects** revealed that, for India to reach the net-zero target even by 2070, coal consumption, especially electricity generation, will need to be peak by 2040 and drop by 99 per cent between 2040 and 2060 and the consumption of crude oil across sectors would also need to peak by 2050 and fall substantially by 90 per cent between 2050 and 2070.

6. Disappearing African Rare Glaciers

Context:

Recently, a report from the **World Meteorological Organization (WMO)** stated that Africa's rare glaciers will disappear in the next two decades due to climate change.

About the Report

- The WMO made the findings in **The State of the Climate in Africa 2020 report.**
- It details how Africa is disproportionately vulnerable to the consequences of climate change.
- The report was done in collaboration with the **African Union Commission, the Economic Commission for Africa (ECA) through the Africa Climate Policy Centre (ACPC),** and other international and regional scientific organizations.

Key-highlights of the Report

- Africa is the continent that contributes least to global warming yet it is going to suffer the most.
- While African countries contribute less than 4% of greenhouse gas emissions, the report highlighted the major impact of climate change on 1.3 billion people on the continent.
- The last three glaciers in Africa are **Mount Kilimanjaro (Tanzania), Mount Kenya (Kenya), and the Ruwenzori Mountains (Uganda)** receding so fast that they can disappear within two decades.
- In sub-Saharan Africa, climate change could once again reduce domestic production by 3% by 2050.
- The cost of adapting to climate change in Africa will rise to $ 50 billion a year by 2050.
- The **Indian Ocean island nation of Madagascar** is one where "famine-like conditions" are driven by climate change.
- Parts of South Sudan have experienced severe flooding in about 60 years.
- Further, massive displacement, hunger, and increasing climate shocks such as droughts and flooding are expected to increase in the future.
- This is a major factor in the warnings of disasters for millions of people in Africa.

Responsible reasons

- **Global Warming**
- **Sea Warming**
- **Rapid Industrial Establishment**

7. Climate crisis is child's right crisis: UNICEF

Context:

Recently, the **United Nations Children's Fund (UNICEF)** in collaboration with **Fridays for Future** launched a report named '**The Climate Crisis Is a Child Rights Crisis: Introducing the Children's Climate Risk Index'.**

About the Index

- The report introduces the new Children's Climate Risk Index (CCRI).

- It is a composite index that ranks nations based on children's exposure to climate shocks, providing
- The first comprehensive look at how exactly children are affected by the climate crisis
- Offering a road map for policymakers seeking to prioritize action based on those who are most at risk

Key-highlights of the Findings

- Approximately 1 billion children — nearly half the world's child population — live in countries that are at an **"extremely high risk"** from climate impacts.
- Almost every single child on the planet has been exposed to at least one climate or environmental stressor, such as **air pollution, flooding, heat waves, tropical storms, flooding or drought.**
- 850 million children — approximately one-third of the world's child population — are exposed to four or more stressors.
- **The 33 extremely high-risk countries for children:** including the **Central African Republic, Chad, Nigeria, Guinea and Guinea-Bissau.**
- These countries collectively are responsible for a mere nine percent of global carbon dioxide emissions.

Findings for India

- India is **one of four South Asian nations where children are most vulnerable** to the effects of climate change, which jeopardise their health, education, and protection.
- **Pakistan, Bangladesh, Afghanistan and India** are among four South Asian countries where children are at extremely high risk of the impacts of the climate crisis, with a ranking of 14th, 15th, 25th and 26th respectively.

Mapping exposure of children to different type of pollution

- 1 billion children are "highly exposed" to "exceedingly high levels of air pollution
- 920 million to water scarcity
- 820 million to heat waves
- 815 million to lead pollution
- 600 million to vector-borne diseases
- 400 million to tropical storms
- 330 million to riverine flooding
- 240 million to coastal flooding

Recommendations:

- Increase investment in climate adaptation and resilience in key services for children.
- Countries must cut their emissions by at least 45% (compared to 2010 levels) by 2030 to keep warming to no more than 1.5 degrees Celsius.
- Provide children with climate education and greens skills, critical for their adaptation to and preparation for the effects of climate change.
- Ensure the recovery from the Covid-19 pandemic is green, low-carbon and inclusive, so that the capacity of future generations to address and respond to the climate crisis is not compromised.

8. IPCC Sixth assessment report

Context:

Recently, **The Intergovernmental Panel on Climate Change (IPCC)** released the first part of the **sixth assessment report (AR6).** The two remaining parts are expected to be released next year.

About the IPCC reports

- The IPCC reports are created by 3 working groups of scientists.
  - **Working Group-I,** deals with the scientific basis for climate change.
  - **Working Group-II** looks at the expected impacts, vulnerabilities, and adaptation issues.
  - **Working Group-III** deals with the actions that can be taken for combating climate change.
- **Title of the report is Climate Change 2021:** The Physical Science Basis.
- The assessment reports are the most widely accepted scientific opinion about the climate change.
- They form the basis for government to form policies to tackle climate change.
- It also provides scientific foundation for international climate change negotiations.

Key findings of the Sixth report

- **Impact on global warming:** Global warming of 1.5°C and 2°C will be increased unless deep reductions in CO2 and other GHGs during the 21st century.
- **Net zero emission:** It noted that global net-zero by 2050 was the minimum required to keep the temperature rise to 1.5 degree Celsius.
- **Effect on monsoon:** The South West Monsoon has declined over the past few decades because of the increase of aerosols, but once this reduces, we will experience heavy monsoon rainfall.
- **Sea Temperature:** The Indian Ocean, which includes the Arabian Sea and Bay of Bengal, has warmed faster than the global average.
- **Surface Temperature:** The sea surface temperature over Indian Ocean is likely to increase by 1 to 2 °C when there is 1.5°C to 2°C global warming.
  - Earth's global surface temperature has gone up by around 1.1 °C in comparison to the average in 1850–1900.
  - Such a level hasn't been witnessed in 125,000 years.
- **Rise in sea-level:** Sea levels to rise by 2–3 meters over the next 2,000 years.
- **Precipitation & Drought:** Increased frequency and intensity of the hot extremes, marine heat waves, and the heavy precipitation along with the agricultural and ecological droughts.
- **Melting Glaciers:** Intensification and variability of the global water cycle.
- **Carbon dioxide (CO2) Concentrations:** The ocean and land carbon sinks are expected to be less effective.
- The world has already depleted 86% of its available carbon budget.

IPCC

- It was set up in 1988 by the **World Meteorological Organization (WMO) and the UN Environment Programme (UNEP).**
- The IPCC is an organization of governments of the members of the United Nations or WMO.

- The IPCC currently has 195 members.
- The main objective of the IPCC is to provide scientific information to governments at all levels so that they can use it to develop climate policies.
- IPCC does not engage in scientific research itself. Instead, asks scientists from around the world to go for all the relevant scientific literature that is related to climate change and draw up the logical conclusions.

9. National climate vulnerability assessment

Context:

The **National climate vulnerability assessment report** is released by **Department of Science and Technology under Ministry of Science and Technology.**

About the Report

- The report is titled as **'Climate Vulnerability Assessment for Adaptation Planning in India Using a Common Framework'.**
- **Objective:** The report identifies the most vulnerable states and districts in India with respect to current climate risk and key drivers of vulnerability.
- **Foundation:** The report is based on the vulnerability assessment of the climate impact.
- **Significance:** The mapping the parts of India which are vulnerable for climate changes will help initiating climate actions at the ground level.
  - The report will help the states for initiating climate action.
  - The assessments will contribute towards the development of more targeted climate change projects.
  - It will support the implementation of the **State Action Plans on Climate Change.**
  - It will also support the **Nationally Determined Contributions under the Paris Agreement.**
  - The assessments under the report will also support **India's National Action Plan on Climate Change.**
- **Conduction of Study:** The nation-wide exercise was jointly supported by the DST and the **Swiss Agency for Development & Cooperation (SDC).**

What are the key findings?

- The report has identified **Jharkhand, Mizoram, Orissa, Chhattisgarh, Assam, Bihar, Arunachal Pradesh, and West Bengal** as the states which are highly vulnerable to climate change.
- These states lie mostly in the eastern part of the country and require prioritization of adaptation and interventions.

10. Antarctic ice shelves

Context:

More than a third of the vast floating platforms of ice that surrounds Antarctica is at risk of collapse and releasing a huge amount of water into the sea if global temperatures reach 4C above pre-industrial levels.

About the Study

- The Researchers said that the limiting the temperature rise to 2C could reduce the risk by half.
- The study suggests that around 34% of the Antarctic ice shelves could be collapsed due to the rise in temperature by 4C.

Antarctica Ice Shelves

- **Ice shelves** are **permanent floating sheets of ice** which is connected to a landmass.
- It mostly surrounds the **coasts of Antarctica.**
- Ice shelves are important buffer that prevents glaciers on land from flowing freely into the ocean and contributing to sea level rise.
- The collapse will break the ice shelves and will allow the unimaginable amounts of water from glaciers to pour into the sea.
- The new study uses the latest modelling techniques to provide more precise projections and fill the gap in earlier methods.
- This study also highlighted the importance of limiting the global temperature increases as set out in the **Paris Climate Agreement** that promotes a global framework to avoid dangerous climate change by limiting the global warming to less than 2C above pre-industrial levels.
- With the help of study researchers identified the **Larsen C**, the largest remaining ice shelf, as at higher risk in a warmer climate situation.
- The other shelves facing the threat includes **Shackleton, Pine Island, and Wilkins.**

11. Australia marine hotspots

Context:

Three World Heritage-listed marine sites in Australia store more than 2 bn tonnes of carbon dioxide locked away in their vast seagrass meadows, coastal mangroves and tidal marshes, reports UNESCO.

The Report

- The UN organisation has released its **first global scientific assessment** of **'blue carbon'** ecosystems, which double as **World Heritage sites.**
- This was the first of its kind to quantify **blue carbon -- carbon dioxide.**
- The report quantifies the enormous amounts of so-called blue carbon absorbed and stored by those ecosystems across the **world's 50 UNESCO marine World Heritage Sites.**

Key-highlights of the Report

- Australia's six marine **World Heritage Sites** hold 40 per cent of the estimated 5 billion tons of carbon dioxide within **UNESCO sites.**
- 2 billion tonnes of carbon dioxide are locked away in three sites. The three sites mentioned are the:
  - **Great Barrier Reef in Queensland:** The Great Barrier Reef holds the biggest stocks of blue carbon across all the 50 world heritage marine sites, according to the data: 1.8bn tonnes of CO2-equivalent (C02-e).
  - **Shark Bay in Western Australia:** Shark Bay is estimated to store 164m tonnes of CO2-e, mostly in 342,000 hectares of seagrass.

- **Ningaloo coast in Western Australia**: The Ningaloo coast world heritage area is holding on to 4.6m tonnes of CO2-e, also mostly in its 26,000 hectares of seagrass.

- Although the sites make up less than 1 percent of the planet's oceans, they house 15 percent of blue carbon assets in their seagrass meadows, tidal marshes and mangroves.
- The areas are called **'carbon sinks'.**

Carbon sink is a term used to describe reservoirs of either vegetation or water which store carbon for an indefinite period of time.

Other world heritage sites with major stores of carbon

- Amazon rainforest (one of the largest carbon sinks)
- Everglades national park in the US
- Sundarbans mangrove forests in Bangladesh

Significance of blue carbon ecosystem

- Although blue carbon ecosystems represent less than one percent of the global ocean area, they store about half of the carbon dioxide via the world's oceans, absorbing carbon 30 times faster than rainforests.
- But if these blue carbon ecosystems are not conserved, they could increase global carbon emissions.
- While they're healthy, blue carbon ecosystems are excellent stores of carbon dioxide.
- But if they are damaged, they can release huge amounts of carbon dioxide stored over millennia back into the atmosphere.

12. Energy island in North Sea'

Context:

The Danish government has reportedly approved plans for the construction of **the first artificial "energy island"** in the **North Sea.**

What the energy island?

- The island would act as a hub for offshore wind development, built 80km off the coast of Denmark in the **North Sea.**
- The island covers an area of 120,000m², equivalent to 18 football fields.
- Once completed, it would store and supply energy to power nearly three million European households.
- It would also supply green hydrogen for shipping, aviation, industry and heavy transport sectors.

Impact of the development

- The latest move comes as the European Union announced transformation of its electricity system to mostly rely on renewable energy within ten years.
- It will also increase its offshore wind energy capacity approximately by 25 times before 2050.
- The project is part of Denmark's target to cut greenhouse gas emissions by 70% by 2030 from 1990 levels.

13. Glasgow Glacier: Antarctica

Context:

- Recently, the **100-km long body of ice in Antarctica**, which has been experiencing rapid melting, was formally named Glasgow after the Glasgow climate summit.
- The 26th session of the **Conference of the Parties (COP 26) to the United Nations Framework Convention on Climate Change (UNFCCC)** is being held in Glasgow, UK.

Key-Points

- **Research:** Scientists at the University of Leeds in England have studied a series of glaciers in the Getz area of Antarctica.
- The 14 glaciers in the Getz Basin of West Antarctica are shrinking at an average rate of 25% between 1994 and 2018 due to climate change. 315 gigatonnes of ice have been lost in the region over the past 25 years and have contributed to rising sea levels worldwide.

- The Getz basin is part of Antarctica's largest glacier. The shelf is subject to the increasing pressure of the ocean - a process in which relatively warm seawater melts glaciers below - than other Antarctic shelves.

Other Glaciers Named

- **The eight newly named glaciers are based on-**
  - **Stockholm Conference (1972):** One of the major outcomes of the Stockholm conference was the creation of the United Nations Environment Program (UNEP).
  - **World Climate Conference, Geneva (1979):** The World Climate Conference, now commonly called the First World Climate Conference, was held in Geneva.
  - **Rio Summit (1992):** Recommended a list of development processes called Agenda 21. It provided a concept of sustainable development to integrate economic growth and ecological responsibility.
  - **COP1 (Berlin, Germany, 1995):** The first UN General Assembly in the UN Framework Convention on Climate Change (COP-1) was held in Berlin in 1995.
  - **Kyoto Protocol (1997):** In Kyoto, developed countries agree on a common goal of reducing emissions by 5.2% below 1990 levels between 2008 and 2012.
  - **COP13 (Bali, Indonesia, 2007):** The parties agree on the Bali Road Map and the Bali action plan, which paved the way for the post-2012 outcome.
  - **COP21 (Paris, 2015):** Keeping the earth's temperature below 2.0C above pre-industrial times and trying to limit it to even more than 1.5C.
  - **Incheon:** The Green Climate Fund (GCF) is based in Incheon, South Korea.

Significance

- Over the past 40 years, satellites have observed huge iceberg calving events, changes in the flow of glaciers and rapidly thinning ice demonstrating the devastating impact of global warming.
- The naming of the glaciers after the locations of major climate treaties, conferences and reports is a great way to celebrate the international collaboration on climate change science and policy over the last 42 year.

14. G20 Climate Risk Atlas

Context:

Recently, a report named G20 Climate Risk Atlas from the Euro-Mediterranean Center on Climate Change (CMCC) has said that G20 (Group of 20) countries including the wealthiest like the US, European countries, and Australia will bear extreme impacts of climate change over the coming years.

Impact on G20 Countries

- **Heat waves**: Heat waves can last at least ten times longer in all G20 countries, with heat waves in Argentina, Brazil, and Indonesia lasting over 60 times longer by 2050.
- In Australia, bushfires, coastal floods, and hurricanes could raise insurance costs and reduce property prices by $ 611 billion by 2050.
- **GDP Loss:** GDP (Gross Domestic Product) Loss due to climate change in G20 countries increases each year, rising by at least 4% per year by 2050. This could reach more than 8% by 2100, equivalent to the double bloc economic loss from covid-19.
- Other countries will be even worse hit such as Canada, could see at least a 4% drop in its GDP by 2050 and more than 13% in 2100.
- **Rising sea levels:** Rising sea levels could wreck coastal infrastructure within 30 years, with Japan set to lose 404 billion euros and South Africa 815 million euros by 2050, on a polluting route.
- **Floods:** Expected annual damage from riverine flooding in 2050 is estimated at 376.4 billion Euros under low emissions scenario and has risen to 585.6 billion EUR under high emission scenario.

Impact on India

- Emission Scenarios
  - **Low Emissions (emission lower than in present):** Expected temperature variations will always be contained below 1.5 degrees celsius, both in 2050 and 2100.
  - **Medium emission (same as present):** Between 2036 and 2065, the maximum temperature of the warmest month in India could rise by at least 1.2 degrees Celsius in a medium emission pathway.
  - **High emission (higher than present):** By 2050 under conditions of high emissions scenario average temperature could rise to 2 degrees Celsius.
- **Rainfall:** Annual rainfall is likely to record a steep increase by 2050 and will increase by 8% to 19.3% in all emission conditions.
- **Economic Impact**: In India, declining yields of rice and wheat due to climate change could lead to economic losses of between 43 billion and 81 billion EUR (or 1.8-3.4% of GDP) by 2050.
- Demand for water in agriculture is likely to increase by about 29% by 2050 - meaning crop losses are likely to be underestimated.
- **Heatwaves:** Heatwaves in India will last 25 times as long as 2036-2065 if emissions are high (4 ° C), more than five times if global temperatures are rise to about 2 ° C, and one and a half times longer when the emission are very low and the temperature rises only reaches 1.5 ° C.
- **Agriculture Drought**: On the way to **4 ° C global heating**, agricultural drought will be 48% more frequent by 2036-2065. At 2 ° C (the maximum temperature agreed by the Paris Agreement) drops to 20% more frequently and the constraining temperature rises to 1.5 ° C (the Paris target's aspirational goal), agricultural drought will still be 13% more frequent.

- **Floods:** 18 million Indians may be at risk of flooding by 2050 if emission are high, compared to 1.3 million today.
- **Decreased workforce:** The total number of workers is expected to decrease by 13.4% under the low emission scenario by 2050 due to increase in heat and by 24% under a medium emissions scenario by 2080.
- **Food Security:** In India, declining rice and wheat production could cause economic losses of up to 81 billion Euros by 2050 and loss of 15 percent of farmers' income by 2100.

15. UNEP Production Gap Report

Context:

Recently, the **2021 Production Gap Report** was released by the leading research institutes and the **United Nations Environment Programme (UNEP).**

Key-findings

- **Production Gap Expansion:**
  - The production gap to achieve the climate goal is the widest for coal.
  - Production plans and forecasting by the Government will lead to 240% more coal, 57% more oil, and 71% more gas by 2030 than global levels associated with a limit warming of 1.5 ° C.
  - The most worrying factor is that almost all major coal, oil and gas producers are planning to increase their production till at least 2030 or beyond.

Effects of Covid-19:

- The production gap was influenced by the increased cash flow towards fossil fuels compared to clean energy in the coronavirus (Covid-19) post recovery phase.
- The Group of 20 countries (G20) has channelized $ 300 billion in fossil fuel since the beginning of the pandemic, and the sector is still enjoying huge fiscal incentives.

Indian position

- **India's first NDC (Nationally Determined Contribution), released in 2016**, promised a 33% -35% reduction in its "emissions intensity" by 2030, compared to 2005.
- The report quotes a 2020 Government of India press release, to shine a light on India's plans to raise coal production.
- The government wants to "unleash the power of coal" and become self-sufficient in 2023-24.
- It also seeks to bring about "a shift from the slope to the highest incomes from coal to high-quality coal available on the market very quickly."
- India plans to **increase coal production from 730 million tons by 2019 to 1,149 million by 2024**.
- India also aims to increase oil and gas production by 40% at the same time through measures such as speeding up the exploration license, monetization of the discoveries, and the transformation of gas marketing.

16. World's largest carbon capture and storage plant

Context:

Icelandic carbon capture company, Climeworks, has officially launched Orca, the world's largest direct air capture and storage plant that permanently removes CO2 from the air.

What is Orca?

- Orca is the world's largest direct air carbon capture and storage plant.
- It is run by Swiss company Climeworks.
- **Located in**: Hellisheidi, Iceland
- Named Orca, the plant sucks carbon dioxide directly from the air and buries it as rocks deep underground, using technology from Climeworks' Icelandic partner Carbfix.
- Orca has a capacity to capture 4,000 tons of CO2 per year.
- CO2 will be removed from the air and stored permanently, rapidly turning it into stone underground through a natural mineralization process.
- It is based on advanced modular technology in the form of stackable container-size collector units.
- These units are powerful and compact with a minimal physical footprint, making it possible for Orca to be operational in under 15 months.
- Orca runs fully on renewable energy.

How does it work?

- To collect the carbon dioxide, the **Orca plant** uses fans to draw air into a collector, which has a filter material inside.
- Once the filter material is filled with CO2, the collector is closed and the temperature is raised to release the CO2 from the material, after which the highly concentrated gas can be collected.
- The CO2 is then mixed with the water before being injected at a depth of 1,000 metres into the nearby basalt rock where it is mineralised.

How many CCS projects are there in the world?

- There are now 51 CCS facilities globally – 19 in operation, four under construction, and 28 in various stages of development with an estimated combined capture capacity of 96 million tonnes of CO2 per annum.

17. Impact of oceans warming on fish

Context:

The Intergovernmental Panel on Climate Change (IPCC) report has warned that ocean warming will continue over the 21st century and is likely to continue until at least the year 2300 even if we minimise carbon emissions.

What will be the key impacts?

- Warming oceans can cause stress, decrease the range, increase diseases and even wipe out many commonly eaten fish.

- The future ocean warming and acidification may drag down the commercial Arctic cod fishery by 2100.
- Fish will start migrate poleward or to deeper waters to stay in their ideal temperature range.
- The total number of open-water species in tropical marine zones declined by about half in the 40 years up to 2010.
- Studies suggest fish like sardines, pilchards and herring will become smaller in size and not be able to move to better environments.
- With sea temperatures rising faster than ever, fish will very quickly get left behind in evolutionary terms and struggle to survive. This has serious implications for all fish and our food security, as many of the species we eat could become increasingly scarce or even non-existent in decades to come.

Which fish will survive climate change?

- Studies suggest that the three-spine stickleback fish can adapt rapidly to changes.
- The modern version of Darwin's idea of evolution by natural selection posits that organisms with genes that favour survival and reproduction will tend to leave more offspring than their peers, causing the genes to increase in frequency over generations.

18. Machoi Glacier is Retreating

Context:

A new study conducted by the Department of Geo-informatics at Kashmir University has found that Machoi glacier in Kashmir lost 29% of its area between 1972 and 2019. The data was collected by satellite remote sensing and field studies.

What is a Glacial retreat?

- This is a process by which glaciers lose material at their "lower" section.
- It is also called wastage.
- During the retreat, the ends of the glacier do not extend as far down-valley as they previously did.
- Glaciers may retreat when the ice melts quicker than the snowfall which can accumulate and form new glacial ice.
- Higher temperatures and less snowfall are the main cause behind the many glaciers around the world retreating.

About Machoi Glacier retreat

- The Machoi glacier is located in the **Dras region** in northeast Ladakh and feeds the river dras.
- It has a mean elevation of 4,800 metres above sea level.
- The name 'Machoi' is derived from two Kashmiri words **– mach meaning 'dirt' and hoi meaning bowl.**
- The glacier's peak is pyramidal in shape and marks its accumulation zone.
- The study assessed changes in the area, frontal retreat and the mass balance (the difference between the rates at which the glacier is accumulating and losing mass) of the Machoi glacier from 1972 to 2019.

Reasons behind the melting

- Glaciers melt due to climate change and depleted precipitation.
- The **Machoi glacier** is also near the Srinagar-Kargil Highway and exposed to the automobile exhaust and associated emissions.
- Machoi is also susceptible **tocryoconite holes.**

Cryoconite holes

- **Cryoconite** is a powder of **rock particles, soot, and microbes**. When it settles on a glacier-like Machoi, the soot melts off some ice and creates a hole on the glacier's surface.
- With time, aerosols and unburnt carbon particles, and other debris, settle into this hole and accelerate melting.
- Microbial life can also thrive in these places, and when they respire, they emit heat, further contributing to the melting.
- Cryoconite holes are 1 to 10 cm wide on the glacier.

Other Glacier melts of Himalaya

- Kolahoi is the largest glacier of Kashmir Himalaya.
- Thajiwas glacier
- Pensilungpa Glacier

19. Climate Change and Asia's Sinking Cities

Context:

A new report by **Greenpeace East Asia** predicted at the risks in seven regional cities, concluding that in these metropolises alone, more than 15 million people could be affected by rising sea levels and flooding by 2030.

Key findings of the report

- The cities which are at higher risk of sinking include **Taipei, Seoul, Hong Kong, Tokyo, Bangkok, Manila, Jakarta.**
- Bangkok is kept at the top among the most affected cities.
- More than ten million people will be affected in the Thai capital if a ten-year flood occurred at 2030 sea levels.
- This will jeopardize 96% of the city's GDP more than $500 billion calculated at purchasing power parity.
- The **economic risk** is also higher in Manila, where 87% of the GDP and around 1.5 million people would be at risk in 2030.
- The **City of Manila's excessive groundwater extraction** is causing it to sink by 10 cm annually.
- Out of the East Asian cities in the report, Taipei and Tokyo are expected to be most at risk.

Greenpeace East Asia

It is an office which serves the East Asia region of the global environmental organization Greenpeace.

Greenpeace East Asia runs five main campaigns:

- climate and energy
- toxics (water pollution)
- food and agriculture
- forests
- air pollution

20. Fit for 55:

Context:

Fit for 55 aims to put the bloc on course to meet its ambitious target of a 55% reduction in greenhouse gas emissions by 2030, relative to 1990 levels, aligning EU policy with the ambitious political mandates of the Green Deal and EU Climate Law.

What exactly is in the plan?

- The European Commission's plan, "Fit for 55," calls for its 27 member states to cut their output of greenhouse gases by 55% by 2030, compared with 1990 levels.
- It will align EU policy with the ambitious political mandates of the Green Deal and EU Climate Law.
- The European Union's plan is to cut its greenhouse gas emissions by more than half by the end of the decade.
- The plan will enable the necessary acceleration of greenhouse gas emission reductions in the next decade.
- **They combine:**
  - application of emissions trading to new sectors and a tightening of the existing EU Emissions Trading System
  - increased use of renewable energy; greater energy efficiency
  - a faster roll-out of low emission transport modes and the infrastructure and fuels to support them
  - an alignment of taxation policies with the European Green Deal objectives
  - measures to prevent carbon leakage
  - tools to preserve and grow our natural carbon sinks

What is required to achieve the plan?

- Oxfam estimates that cuts of more than 65% are needed for Europe to contribute its fair share of the global reductions needed to get on track to limit global heating to the 1.5°C goal of the Paris Agreement.

21. Oceans may emit more ozone-depleting gases

Context:

Recent research has found that oceans would emit more CFC-11 by 2075 than they absorb, and emit detectable amounts of the chemical by 2130.

What are the findings?

- **Solubility:** CFCs are more soluble when sea surface temperatures are low.
- **Release of CFC:** Oceans may start releasing chlorofluorocarbons (CFC), a class of ozone-depleting chemicals, at a faster rate due to rising global temperatures.
- Changes in oceanic levels of this gas have been shown to affect changes in its atmospheric concentrations.
- The oceans, which are a vast repository for gases, would emit more CFC-11 by 2075 than they absorb.
- They would emit detectable amounts of the chemical by 2130.
- The shift will occur 10 years earlier due to climate change.
- The emissions of CFC-11 from the ocean will effectively extend the chemical's average residence time, causing it to linger five years longer in the atmosphere than it otherwise would.
- By 2145, the ocean would emit CFC-11 in amounts that would be detectable by current monitoring standards.
- If the planet warms by five degrees Celsius by 2100, the ocean will become a net emitter of CFC-11 by 2065 and release detectable levels by 2140.

What are CFCs?

- **Chlorofluorocarbons (CFCs)** are fully or partly halogenated paraffin hydrocarbons.
- They contain only **carbon (C), hydrogen (H), chlorine (Cl), and fluorine (F).**
- They are produced as volatile derivatives of methane, ethane, and propane.
- **Uses:** CFCs have been widely used as refrigerants, propellants (in aerosol applications), and solvents.
- **Ozone depletion:** Because CFCs contribute to ozone depletion in the upper atmosphere, they are being replaced with other products such as hydrofluorocarbons (HFCs) including R-410A and R-134a.

Restrictions on CFCs

- CFCs are stringently controlled after 196 countries in the **United Nations** came together under the **1987 Montreal Protocol** to protect the ozone layer.

22. India's Third Biennial Update Report (BUR) at COP26

Context:

- During the **11th Facilitative Sharing of Views (FSV)** at the ongoing COP26, India made a presentation on its third **Biennial Update Report (BUR)** that was submitted to **UNFCCC.**
- India is particularly vulnerable to climate change.
- However, India is nevertheless taking several mitigation actions, spanning across the entire economy and society and has progressively continued decoupling of its economic growth from greenhouse gas emissions.

Key-highlights

- India represents 17% of the global population, its historical cumulative emissions are only 4%, while current annual GHG emissions are only about 5%.

- 24% reduction in emission intensity of its Gross domestic product over the period of 2005-2014
- The significant increase of its solar programme in the last 7 years – **India's installed solar energy capacity** has increased 17 times.
- India's increase in forest cover: India responded that people's participation has played an important role in enhancing its forest cover, and that its forests provide all the four ecosystem services.
- **On Coalition for Disaster Resilient Infrastructure (CDRI):** Disaster risk is increasing in developing countries, and this is a step to enhance international cooperation which is much needed in the current times.

23. Second World Ocean Assessment Report

Context:

The United Nations recently released the **Second World Ocean Assessment Report.**

- It is the work of hundreds of scientists appointed by the members of United Nations from all over the world.
- It follows the initial report, "**World Ocean Assessment I**" published in 2015.

Findings:

- The number of dead zones in the oceans have doubled.
- It has increased from 400 in 2008 to 700 in 2019.
- 90% of the mangroves Seagrass and marsh plant species are facing extinction.
- 30% of seabird species are facing the threat of extinction.
- Only 10% of the ocean has been explored and studied.
- The heat content in the oceans has more than doubled since 1990.
- 15% of the Sandy beaches are seeing retreating shorelines.

Dead Zones:

- Dead Zone is a common term used for **Hypoxia.**
- The largest dead zone is located in the **Arabian Sea.**
- This covers almost 63700 square miles in **Gulf of Oman.**

24. CARE Project

Context:

The Climate Adaptation and Resilience for South Asia (CARE) Project supports the region in building resilience to climate change by:

- improving the availability of regional data and knowledge
- developing guidelines, tools and capacities
- promoting climate-resilient decisions, policies and investments across key sectors in beneficiary countries

Components

- The project is implemented by **Asian Disaster Preparedness Center (ADPC)** and the **Regional Integrated Multi-Hazard Early Warning Systems for Africa and Asia (RIMES)** and supported by the **World Bank.**
  - **RIMES** implements the first component on promoting evidence-based **climate smart decision-making.**
  - **ADPC** implements the second on enhancing policies, standards, and capacities for **climate-resilient development** in South Asia.

Significance

- **Effective sharing of data:** The Project will build resilience to climate threats and disasters by sharing regional data and knowledge.
- **Promoting climate resilient policies and investments**: It will help in developing regional standards and guidelines for infrastructure, and promoting climate resilient policies and investments.
- **Information and awareness:** The project will help develop a public platform to inform climate planning and investments, and fund technology to support resilience in South Asia.
- **Beneficial for policymakers:** It will fund a public domain platform known as **Regional Resilience Data and Analytics Service**, with information about weather hazards, climate variability, and sector-specific data to help policymakers assess climate risks.

RIMES: Promoting evidence-based climate-smart decision making

- Expand Regional Resilience Data and Analytics Services (RDAS)
- Strengthen national-level sectoral Decision Support Systems (DSS) in Bangladesh, Nepal and Pakistan
- Training for climate-informed decision making

ADPC: Enhancing policies, standards and capacities for climate-resilient development

- Advisory services for policy and investment interventions
- Promote climate-resilient design and standards
- Implementation support to climate-risk management solutions
- Innovation for climate adaptation and resilience

Scenarios taken into account by the report:

- The report looks at two scenarios namely Climate-sensitive and Carbon-intensive.
- **Climate-Sensitive -** It represents a future "in which some collective action is taken to limit greenhouse gas emissions and global annual average temperatures increase 2.4°C by 2100 relative to pre-industrial levels.
- **Carbon-Intensive -** It represents a future in which no actions are taken to reduce emissions and global annual average temperatures increase 4.3°C by 2100 relative to pre-industrial levels.

Climate Action for a Resilient Asia (CARA),

The UK has announced major new support of up to £274 million at **COP26 in Glasgow** to strengthen the resilience of vulnerable communities, economies and the environment against the impacts of climate change, and promote low carbon growth across the Indo-Pacific.

What is CARA?

- Climate Action for a Resilient Asia (CARA) is a 7-year programme to deliver projects in areas known to strengthen climate resilience.
- This includes funding projects that mobilise climate finance, strengthen water security, conserve ecosystems and biodiversity, and help vulnerable communities lead local adaptation efforts.

25. Forest Landscape Restoration

Context:

Forest landscape restoration (FLR) is the ongoing process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes.

What is Forest Landscape Restoration (FLR)?

- FLR is more than just planting trees – it is restoring a whole landscape to meet present and future needs and to offer multiple benefits and land uses over time. It is about:
  - **Forests** because it involves increasing the number and/or health of trees in an area;
  - **Landscapes** because it involves entire watersheds, jurisdictions, or even countries in which many land uses interact; and
  - **Restoration** because it involves bringing back the biological productivity of an area in order to achieve any number of benefits for people and the planet.

Details:

- Community-led forest landscape restoration has been an integral part of various forest-based communities in India.
- Forest landscape restoration increases biodiversity, sequesters carbon, promotes rural livelihoods and stimulates the rural economy when applied on scale.
- Some of the community-led forest landscape restoration approaches practised by forest communities in India highlight the alternative approaches in forest governance.
  - One such instance is the approach adopted by **Jadhargaon village in Tehri Garhwal district of Uttarakhand.**
  - Another case of community-led forest landscape restoration is **Payvihir village in the Amravati Forest division in Maharashtra.**
- The main approach for carbon sequestration in India's forested areas has been to promote large-scale **monocultural plantation** activities (mostly eucalyptus and teak) under **CAMPA.**
- There is no role for the forest communities in the decision-making process of such plantation activities and no livelihood incentive for the community to restore the forested landscape.
- **Current FLR projects worldwide:**
  - Bonn Challenge Barometer
  - Land Use Stabilization
  - SUSTAIN
  - The Restoration Initiative

Paris Agreement and Bonn Challenge

- The Government of Germany and IUCN launched **voluntary Bonn Challenge** in 2011.
- India joined the **Bonn Challenge** in 2015 with a pledge to restore 21 mha of degraded and deforested land & raised it to 26 mha by 2030.
- India's **NDC targets under Paris Agreement** is to create an additional carbon sink of 2.5-3 billion tonnes of CO2 equivalent from additional forest and tree cover until 2030.
- **Article 5** in the **2015 Paris Agreement** urges countries to act on deforestation and forest degradation for enhancing sinks and reservoirs of greenhouse gases.

The **Bonn Challenge** is a global effort to bring 150 million hectares of degraded and deforested land into restoration by 2020 and 350 million by 2030.

BONN CHALLENGE

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2 SUSTAINABLE DEVELOPMENT

1 Green Buildings

Why in News?

The **Indian Green Building Council (IGBC)** has come out with **Net Zero Energy Buildings rating system** in collaboration with the World Green Building Council and the **United States Agency for International Development (USAID).**

What is green building?

- A 'green' building is a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment.
- Green buildings preserve precious natural resources and improve our quality of life.

Features of green building

- There are a number of features which can make a building 'green'. These include:
- Efficient use of energy, water and other resources
- Use of renewable energy, such as solar energy
- Pollution and waste reduction measures, and the enabling of re-use and recycling
- Good indoor environmental air quality
- Use of materials that are non-toxic, ethical and sustainable
- Consideration of the environment in design, construction and operation
- Consideration of the quality of life of occupants in design, construction and operation
- A design that enables adaptation to a changing environment

Benefits of green buildings:

- Even if the cost of design and construction of green building is high, its operational cost is low.
- It efficiently utilizes water, energy and other resources.
- It reduces waste, pollution and environmental degradation
- It reduces heat waves
- It improves persons health, productivity by healthier air quality and greater natural light.

2 Virtual Water

Context:

The virtual water trade is the idea that when goods and services are exchanged, so is virtual water. When a country imports one tonne of wheat instead of producing it domestically, it is saving about 1,300 cubic meters of real indigenous water.

What is the concept of virtual water?

- The concept of virtual, or embedded, water was first developed as a way of understanding how water scarce countries could provide food, clothing and other water intensive goods to their inhabitants.
- Virtual water flows help us see how the water resources in one country are used to support consumption in another country.
- Virtual water export is likely only to grow further in the future. Its impact on coming generations would be more catastrophic if corrective actions are not taken at the earliest.
- VWT, covering both export and import, is here to stay and cannot be avoided, just as oil import is accepted as critical for economic growth.

Impact:

- **Virtual Water Trade (VWT)** is slowly altering the global hydrological cycle in many ways.
- Several countries have begun to act early, adopting the VWT route to address worldwide water distress.
- Water-guzzling activities are getting outsourced for production to other countries.
- Thus, crops, meat, leather, chemicals and industrial goods are imported to ensure a positive water balance.
- If the future wars will be about water, then the weaponization is in using VWT.
- **'Water Value'** is the mantra for positively altering the shortfalls through imports. Unfortunately, India has fallen for this bait and is getting increasingly entrapped into agricultural exports. Agri-export houses are earnestly exporting virtual water, especially groundwater, all for a dime.

Virtual Water-Trade policy should address a number of salient points:

- Fix the upper limits of national VWT
- List the products and regions that need to be excluded from it
- Set the benchmark for water footprint for the different products
- Specifications on water types to be used
- Specification on water quality to be used
- Water use efficiency norms for different products
- Wastewater treatment and reuse

3 Green Bonds and their green Impact

Context:

Giving a push to the government's borrowing programme in 2022-23, finance minister Nirmala Sitharaman proposed to issue sovereign green bonds to mobilize resources in the Budget.

What Are Green Bonds?

- Simply put, Green bonds are financial instruments that finance green projects and provide investors with regular or fixed income payments.
- **Inception:** The first green bondwas issued in 2007 by the European Investment Bank, the EU's lending arm.
- **Issued by:** Green bonds are the bonds issued by any sovereign entity, inter-governmental groups or alliances, and corporates.
- **Aim:** The proceeds of the bonds are utilized for projects classified as environmentally sustainable.

Environmentally Sustainable Projects:

Projects defined as sustainable under the disclosure requirement for Green Debt Securities include

- climate change adaptation,
- sustainable waste and water management
- sustainable land use including sustainable forestry and agriculture
- biodiversity conservation

How they different from conventional securities?

Green bonds differ from conventional fixed-income securities in one aspect that the issuer pledges to use the proceeds to finance projects meant for positive environmental or climate effects.

Government's plan

- As a part of the government's overall market borrowings in 2022-23, **Sovereign Green Bonds** will be issued for **mobilising resources for green infrastructure.**
- The proceeds from these bonds will be deployed in public sector projects which help in reducing the **carbon intensity of the economy.**
- The government has unveiled a record borrowing of Rs 14.95 trillion in FY23.

Benefits of Green Bonds:

- Showcasing commitment towards sustainable development
- Lower interest rate
- Fulfilling green commitments
- Attracting investment
- Increasing financial flow

Challenges associated with Green Bonds:

- Misuse of funds
- Lack of guidelines
- Time-taking process

4 Push for zero-budget natural farming

Context:

The Centre has announced to promote chemical-free natural farming, to farmers across the country during the financial year 2022-23.

What is natural farming?

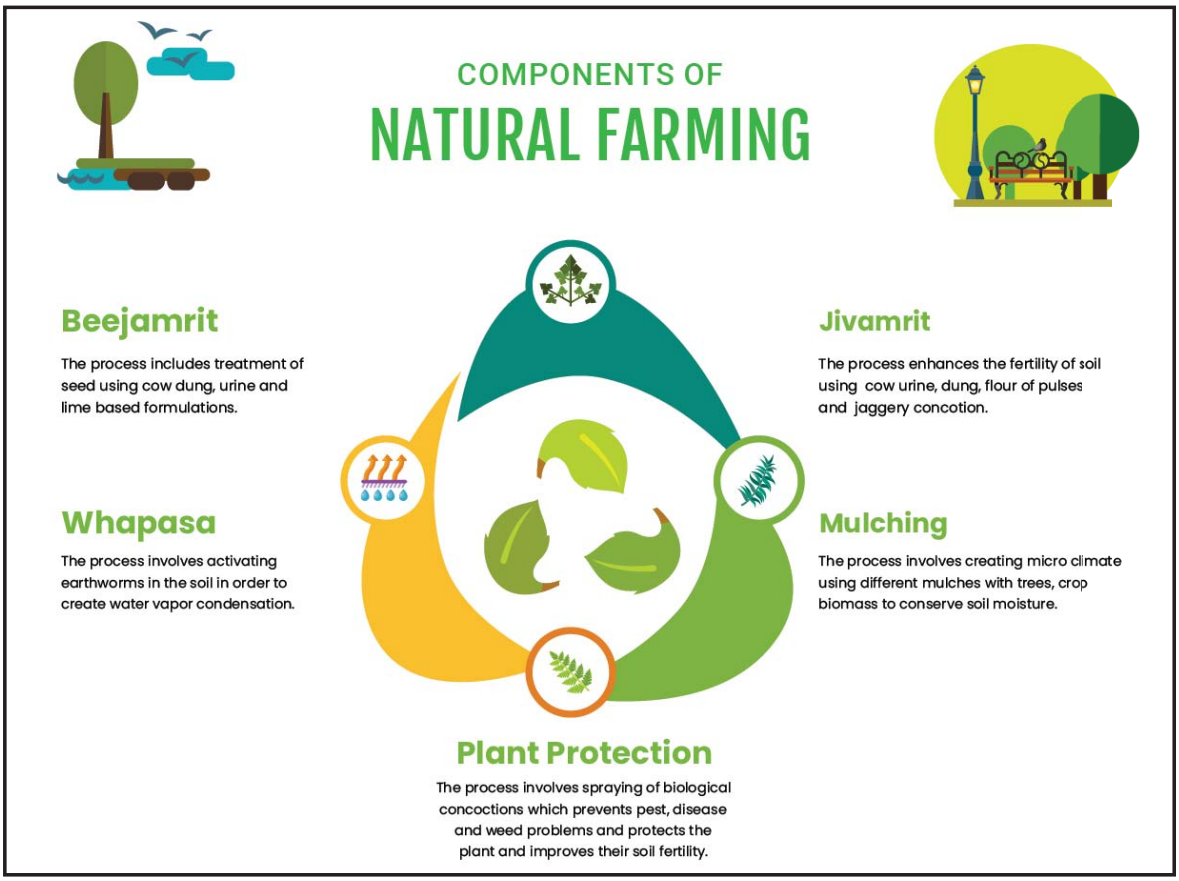
- Natural farming is a system where the laws of nature are applied to **agricultural practices.**
- This method works along with the natural biodiversity of each farmed area, encouraging the complexity of living organisms, both plants, and animals that shape each particular ecosystem to thrive along with food plants.
- In India, Natural farming is promoted as **Bhartiya Prakritik Krishi Paddhati Programme (BPKP) under Paramparagat Krishi Vikas Yojana (PKVY).**
  - It was developed by **Subhash Palekar** from Maharashtra in the mid-1990s as an alternative to the Green Revolution's methods, which led to indebtedness and suicide among farmers due to rising cost on external inputs in agriculture.

What is Zero budget natural farming (ZBNF)?

- It is a method of **chemical-free agriculture drawing from traditional Indian practices**.
- Using cow dung, urine based formulations and botanical extracts would help farmers in reducing the input cost.
- **Intercropping with leguminous crops** is one of the components of ZBNF and it improves the crop productivity and soil fertility by way of fixing the atmospheric nitrogen.
- It promotes soil aeration, minimal watering, intercropping, bunds and topsoil mulching and discourages intensive irrigation and deep ploughing.

Components of Natural Farming:

- **Beejamrit:** The process includes treatment of seed using cow dung, urine and lime based formulation.



- **Jivamrit:** The process enhances the fertility of soil using cow urine, dung, flour of pulses and jiggery concoction.
- **Whapasa:** The process involves activating earthworms in the soil in order to create water vapour condensation.
- **Mulching:** The process involves creating micro climate using different mulches with trees, crop biomass to conserve soil moisture.
- **Plant Protection:** The process involves spraying of biological concoctions which prevents pest, disease and weed problems and protects the plant and improves their soil fertility.

Significance of Natural Farming:

- Minimized Cost Of Production
- Ensures Better Health
- Employment Generation
- Environment Conservation
- Reduced Water Consumption
- Rejuvenates Soil Health
- Livestock Sustainability
- Resilience

5 Urban Lakes

Context:

Urban lakes are an important part of city ecosystems as they play a major role in providing environmental, social and economic services.

What is an 'urban lake'?

- An urban lake is an inland body of surface water surrounded by an urban environment and larger than a pond, while an urban pond is an inland body of surface water surrounded by an urban environment, but smaller than a lake.

• Importance of urban lakes

- Since the historical times cities were built along the river banks, waterways or lakes which influenced the development of urban areas.
- The water from the lakes could be used for industrial purposes or even for the day to day uses of the people.
- The lakes ease the impact of floods and droughts by the means of storage.
- These lakes can be very beneficial in replenishing the level of the groundwater as they are essential receptors for groundwater recharge, positively influencing the water quality of downstream water resources.
- Preserving the biodiversity and even the habitat of the surrounding area.
- Lakes act as the cooling agent to the atmosphere of the urban cities which proves to be beneficial to the **urban microclimate.**
- People from far and near come to visit these lakes for their serene beauty and hence these can be places for recreation and tourism.

- Moreover these lakes are the primary sources of water in many places.

- **Threats to urban lakes:**
  - Pollution
  - Eutrophication
  - Urbanization
  - Encroachment
  - Illegal mining activities
  - Cultural misuse

6 India Cooling Action Plan

Context:

Recently, **India Cooling Action Plan (ICAP)** is launched by **Ozone Cell** of **Union Minister for Environment, Forest and Climate Change (MoEFCC).**

Vision & Goal of ICAP:

- The overarching goal of ICAP is to provide sustainable cooling and thermal comfort for all while securing environmental and socio-economic benefits for the society.
- This will also help in reducing both direct and indirect emissions.
- **India Cooling Action Plan (ICAP)** provides an integrated vision towards cooling across sectors encompassing inter alia reduction of cooling demand, refrigerant transition, enhancing energy efficiency and better technology options with a 20 year time horizon.
- India is one of the first countries in the world to develop a comprehensive **Cooling Action plan** which has a long term vision to address the cooling requirement across sectors and lists out actions which can help reduce the cooling demand.

The India Cooling Action seeks to:

- **Reduce cooling demand** across sectors by 20% to 25% by 2037-38
- **Reduce refrigerant demand** by 25% to 30% by 2037-38
- **Reduce cooling energy requirements** by 25% to 40% by 2037-38
- **Recognize "cooling and related areas"** as a thrust area of research under national S&T Programme
- **Training and certification** of 100,000 servicing sector technicians by 2022-23, synergizing with Skill India Mission.
- These actions will have significant climate benefits.

Benefits above the environmental benefits:

- **Thermal comfort for all** – provision for cooling for EWS and LIG housing,
- **Sustainable cooling –** low GHG emissions related to cooling,
- **Doubling Farmers Income** – better cold chain infrastructure – better value of produce to farmers, less wastage of produce,
- **Skilled workforce** for better livelihoods and environmental protection,

- **Make in India** – domestic manufacturing of air-conditioning and related cooling equipment's,
- **Robust R&D** on alternative cooling technologies – to provide push to innovation in cooling sector.

7 Small Grants Programme

Context:

The Program is specifically designed to mobilize bottom-up actions by empowering local civil society organizations, and poor and vulnerable communities, including women and Indigenous Peoples.

About

- It is a corporate programme of the **Global Environment Facility (GEF),** launched in 1992.
- It is implemented by the **United Nations Development Programme (UNDP).**

How it works

- provides financial and technical support to bottoms up projects that conserve and restore the environment
- provides grants of up to $50,000 directly to local communities including indigenous people, community-based organizations and other non-governmental groups
- In addition, the SGP provides a maximum of $150,000 for strategic projects.

Focus areas

- Projects in Biodiversity
- Climate Change Mitigation and Adaptation
- Land Degradation and Sustainable Forest Management
- International Waters and Chemicals.

What is GEF?

- Established on the eve of the **1992 Rio Earth Summit**
- GEF works with partners to tackle the planet's biggest environmental issues.
- India is both a donor and a recipient of GEF.

8 Resolution on Peatlands

Context:

- **United Nations Environment Assembly, 2019 (UNEA-4)** in **Nairobi, Kenya**, has adopted its first ever resolution on peatlands.
- A non- legally binding resolution urges Member States and other stakeholders to give greater emphasis to the conservation, sustainable management and restoration of peatlands worldwide
- **UNEA-5** is scheduled to be held in March 2020.

What are Peatlands?

- **Peatlands** are terrestrial wetland ecosystems in which waterlogged conditions prevent plant material from fully decomposing.

- Consequently, the production of organic matter exceeds its decomposition, which results in a net accumulation of peat.
- **Presence-** Peatlands corresponds to 2.84% of the Earth's terrestrial surface. Peatlands occur in every climatic zone and continent.
- Peatlands have been found in 180 countries so far, and they occur extensively in the northern and tropical zones
- In India, peatlands have been recorded in Kerala, Arunachal Pradesh, Himachal Pradesh, and north Sikkim. Some parts of the Western Ghats have peat too.

Importance

- Peatlands are the largest natural terrestrial carbon store. They store more carbon than all other vegetation types in the world combined.
- Damaged peatlands are a major source of greenhouse gas emissions, responsible for almost 1.9 gigatonnes of CO2 annually or 5% of global anthropogenic CO2 emissions.
- IUCN recommends inclusion of peatlands in all relevant intergovernmental agreements relating to climate change, geodiversity and biodiversity.

9 Pradhan Mantri Ji-Van Yojana

Context:

The Cabinet Committee on Economic Affairs has approved the **"Pradhan Mantri JI-VAN (Jaiv Indhan- Vatavaran Anukool fasal awashesh Nivaran) Yojana".**

Facts:

- The scheme provides financial support to Integrated **Bioethanol** Projects using lignocellulosic biomass and other renewable feedstock.
- The scheme focuses to incentivise **2G Ethanol sector** and support this nascent industry by creating a suitable ecosystem.
- The ethanol produced by the scheme beneficiaries will be mandatorily supplied to **Oil Marketing Companies (OMCs)** to further enhance the blending percentage under EBP Programme.
- **Centre for High Technology (CHT),** a technical body under the aegis of Ministry of Petroleum &Natural Gas, will be the implementation Agency for the scheme.
- Under the scheme, 12 Commercial Scale and 10 demonstration scale Second Generation (2G) ethanol Projects will be provided with a **Viability Gap Funding (VGF).**

What are Biofuels?

- Biofuels are liquid or gaseous fuels that are produced from biodegradable fractions of products, remains from agricultural production and forestry, as well as biodegradable fractions of industrial and municipal wastes.
- However, ethanol produced from renewable energy sources is one of the most promising biofuels for the future.
- **1G bioethanol plants:** 1G bioethanol plants utilise sugarcane juice and molasses, byproducts in the production of sugar, as raw material

- **2G bioethanol plants:** Whereas 2G plants utilise surplus biomass and agricultural waste to produce bioethanol.
- 1G and 2G bioethanol plants are set to play a key role in making bio-ethanol available for blending but face challenges in attracting investments from the private sector.

10 UNESCO Global Geoparks

Context:

- UNESCO Global Geoparks give international recognition for sites that promote the importance and significance of protecting the Earth's geodiversity through actively engaging with the local communities.
- India does not have any **UNESCO Global geopark.**

What are UNESCO Global Geoparks?

- **UNESCO Global Geoparks** are **single, unified geographical areas** where sites and landscapes of international geological significance.
- These are managed with a holistic concept of protection, education, and sustainable development.
- At present there are **161 UNESCO Global Geoparks** in 44 countries across the world.
- The authorities under this body manage and explore the various global heritage sites and its natural and cultural heritage.
- In 2004, 17 European and 8 Chinese geoparks came together at UNESCO headquarters in Paris to form the **Global Geoparks Network (GGN).**
- A **UNESCO Global Geopark** is given this designation for a period of four years after which the functioning and quality of each UNESCO Global Geopark is re-examined.

Functions and Significance of UNESCO Global Geopark

- Maintenance of these Geoparks is done through the geo-tourism activities, like excursions, tours, and academic visits.
- Their bottom-up approach, i.e., involving local communities for combining conservation with the sustainable development gaining popularity.

11 A clean, healthy and sustainable environment is a 'universal right': UNHRC

Context:

The **UN Human Rights Council (UNHRC)** has recognized access to a clean and healthy environment as a **'fundamental right' in Geneva, Switzerland.**

What is 'right to clean environment'?

- The right to a clean environment was centered on the Stockholm Declaration of 1972.

- The Declaration emphasizes the "right to life, liberty and security of person, and the protection of human rights and fundamental freedoms".
- Fifty years later, the declaration has been legally recognized.
- The **World Health Organization** estimates that 13.7 million deaths a year, or about 24.3% of the global total are due to natural disasters such as air pollution and chemical exposure.

Environmental Management in India:

- **Article 21** of the Constitution of India states: 'No one shall be arbitrarily deprived of his nationality nor denied the right to change his nationality.

The Indian Parliament has enacted a number of laws to protect and improve the environment.

- Wildlife (protection) Act, 1972
- Water (prevention and control of pollution) Act, 1974
- The forest (conservation) Act, 1989
- The air (prevention and control of pollution) Act,1981
- The Environment (protection) Act, 1986

In addition the **Constitution (forty-two amendments) of the Act, 1976** included two important provisions namely.

- Article 48-A
- Article 51A (g)

Thus, making the Constitution of India the first in the world to provide a constitutional framework for environmental protection.

12 'Blue Flag' tag

Context:

Kovalam beach in **Tamil Nadu and Eden beach in Puducherry** have been granted **Blue Flag certification.**

The newly certified beaches

- Kovalam Beach is located on the coastline of the Bay of Bengal near the village Covelong in the Kanchipuram district about 40 kilometres away from Chennai.
- Eden Beach in situated in Chinna Veerampattinam near Puducherry.
- With this latest addition, India now has 10 beaches which have received the Blue Flag Tag. Previously certified beaches in India are as given below:
  - Shivrajpur in Gujarat
  - Ghoghla in Diu
  - Kasarkod
  - Padubidri in Karnataka
  - Kappad in Kerala
  - Rushikonda in Andhra Pradesh

- Golden in Odisha
- Radhanagar in Andaman and Nicobar

What does Blue Flag status mean?

- The Blue Flag is one of the world's most recognized voluntary eco-labels awarded to beaches, marinas and sustainable boating tourism operators.
- To qualify for a Blue Flag, a series of stringent environmental, educational, safety and accessibility criteria must be fulfilled and maintained.
- A waving "Blue Flag" is an indication of 100% compliance to these 33 stringent criteria and sound health of the beach. These criterias are divided into 4 major heads namely-
  - Environmental education and information
  - Bathing water quality
  - Environmental management
  - Conservation and safety services in the beaches
- The **Blue Flag programme** was started in France in 1985 and in areas out of Europe in 2001.

Who gives this award?

- Foundation for Environment Education (FEE) in Denmark awards the certification.
- It is accorded by International Jury comprising of members from IUCN, UNWTO, UNEP, UNESCO etc.

Foundation for Environment Education (FEE)

- **FEE is the world's largest environmental education organisation**, with members in 77 countries.
- It is a non-governmental, non-profit organisation promoting sustainable development through environmental education.
- The organization is active in five programmes:
  - Blue Flag
  - Eco-Schools
  - Young Reporters for the Environment (YRE)
  - Learning about Forests (LEAF)
  - Green Key International

Indian initiatives for sustainable development of coastal regions

- Beach Environment & Aesthetics Management Services (BEAMS)
- Integrated Coastal Zone Management (ICZM) initiatives

13 Conservation of Groundwater

Context:

In India around 70 percent of food production is done with the help of irrigation wells and India is entirely dependent on groundwater.

Groundwater conservation in India

- India constitutes **16 per cent of the world's population**, but the country has only **4% of the world's freshwater resources.**
- With the changing weather patterns and recurring droughts, India is water stressed.
- 256 of 700 districts have reported **'critical' or 'over-exploited' groundwater levels.**
- India's water supply but agriculture which consumes over 85 percent of water.
- With only 40 per cent assured irrigation, farmers depend heavily either on rains or on groundwater for their needs.
- NITI Aayog estimates that 21 major cities, including Delhi, would run out of groundwater by 2030.
- 6% of economic GDP will be lost by 2050, while water demand will exceed the available supply by 2030.

NITI Aayog's report on water scarcity

- A NITI Aayog report in 2018 stated bluntly that-
  - 600 million people, or nearly half of India's population, face extreme water stress.
  - **Three-fourths of India's rural households do not have piped, potable water** and rely on sources that pose a serious health risk.
  - India has become the world's largest extractor of groundwater, accounting for 25 per cent of the total.
  - 70 percent of water sources are contaminated and major rivers are dying because of pollution.

14 A third of India's coastline underwent erosion

Context:

As per a latest report by the National Centre for Coastal Research (NCCR) under the Union Ministry of Earth Sciences, 27% of coastline expanded between 1990 and 2018.

Key-highlights of the situation

- As much as 32 per cent of India's coastline underwent sea erosion and 27 per cent of it expanded between 1990 and 2018.
- The country's coastline is 6,631.53 kilometres long:
- **Erosion:** 2,135.65 kilometres was subject to varying degrees of erosion
- **Expansion:** 1,760.06 km expanded during this period.
- **Stable:** Nearly 2,700 km of the coastline is stable.

Coastline underwent erosion	Coast expanded state-wise
West Bengal (60 %)	Odisha (51%)
Puducherry (56%)	Andhra Pradesh (48%)
Kerala (41 %)	Karnataka (26%)
Tamil Nadu (41 %	West Bengal (25%)

Andhra Pradesh (28 %)	Tamil Nadu (22%)
Gujarat including Daman and Diu (%)	Kerala (21%)
Odisha (26 %)	Gujarat including Daman and Diu (20%)
Karnataka (24 %)	Goa (14%)
Maharashtra (22 %)	Maharashtra (10%)
Goa (19 %)	Puducherry (8%)

Factors and Causes of Soil Erosion

- Human Induced factors
- Faulty farming systems
- deforestation caused by overgrazing
- clearance of land for agricultural purposes
- construction, dam construction
- diversion of the natural course of rivers
- mining activities

Rainfall Intensity and Runoff

- The impact of raindrops break up the soil and water build-up creates runoff, taking sediment with it.

Why more Erosion in eastern coast rather than western coast?

- The eastern coast underwent more erosion due to frequent cyclonic activities from Bay of Bengal in the past three decades, compared to the western coast, which remained largely stable.

National Centre for Coastal Research (NCCR)

- The NCCR, an attached office of the Ministry of Earth Sciences, monitors shoreline changes along the Indian coast.
- It has carried out a national shoreline change assessment mapping for Indian coast using 28 years of satellite data from 1990 to 2018 along nine coastal states and two Union territories (UT) to provide information for coastal management strategy, the minister added.
- The following organizations also undertake studies on shoreline changes / coastal erosion and their impact.
- The **National Centre for Sustainable Coastal Management** under the **Union Ministry of Environment, Forests and Climate Change.**
- The **Central Water Commission** under the **Union Ministry of Jal Shakti.**

15 'Renewables Integration in India 2021'

Context:

A report is released on **"Renewables Integration in India 2021"** by **NITI Aayog and IEA.**

About the 'Renewables Integration in India 2021' Report

- The report is based on the outcome of three states workshops held with the Governments of **Maharashtra, Karnataka, and Gujarat.**
- It was released to understand the specific energy transition challenges which were faced by these renewable-rich states.
- The joint report underscores IEA's commitment to providing support to India's clean energy transition agenda.
- The report uses IEA modeling results to show the effects of different flexibility options on the power system.
- The report highlights that India's power sector can efficiently integrate renewables (175 GW by 2022 and 450 GW by 2030), but it requires the identification of the resources and proper planning, regulatory, policy and institutional support, energy storage, and advance technology initiatives.
- The report suggested a wide range of flexible options by Indian states.
- Larger shares of renewables can be better managed by the shifting time of use in agriculture.
- **Time of Use (ToU) tariffs** will be an effective tool for incentivizing demand-side management and encourage flexible consumption.

Time-of-Use or TOU

- It is commonly referred to as the segregation of energy rates which are based on the time in which the energy is being consumed.
- **For example**, State has shifted 70% -80% of agriculture load to the daytime that provides incentives to the industrial consumers for consuming more electricity and increasing State share in **Green Energy Trading**.
- The report gives useful suggestions to the states to consider their integration challenge.

Renewable Energy Integration

- Renewable Energy Integration is the incorporation of renewable energy, distributed generation, thermally activated technologies, energy storage, and demand response into the electric distribution and transmission system.
- It aims to advance system design, planning, and operation of the electric grid to reduce the carbon emissions and other air pollutants through increased use of renewable energy and by other clean distributed generation.

Significance of the RE integration

- The report on renewables integration will serve as a repository of vast knowledge for stakeholders in India.
- RE integration can provide with the proper resources planning and better implementation of the technologies, such as Artificial Intelligence, base power system management, and smart grid intervention.

IEA

- The International Energy Agency is a **Paris-based autonomous intergovernmental organisation.**
- It was established in **1974 in the wake of the 1973 oil crisis.**
- IEA was formed under the framework of the **Organisation for Economic Co-operation and Development (OECD).**

- The IEA acts as a policy adviser to its member states, but also works with non-member countries, especially **China, India, and Russia.**
- The Agency's mandate has broadened to focus on the "3Es" of effectual energy policy: energy security, economic development, and environmental protection.
- IEA member countries are required to maintain total oil stock levels equivalent to at least 90 days of the previous year's net imports.
- The IEA has also been criticized for failing to create a 1.5°C scenario and place it centrally in its annual **World Energy Outlook report.**

16 Van Dhan Yojana in Tribal Clusters

Context:

Towards realizing the goal of **"SabkaSaath, SabkaVikas", TRIFED** has joined hands with NITI Aayog to implement the **Van DhanYojana** in the aspirational districts identified by NITI Aayog.

About the Van DhanYojana

- The Van Dhan Scheme is an initiative of the **Ministry of Tribal Affairs and TRIFED.**
- It was launched in **2018** and seeks to improve tribal incomes through the value addition of tribal products.
- **Central level:** The scheme will be implemented by the **Ministry of Tribal Affairs** as Nodal Department at the Central Level and **TRIFED** will be the Nodal Agency at the National Level.
- **State Level:** At the State level, the **State Nodal Agency** and the **District collectors** will be responsible for the implementation at the grassroots level.
- **Unit level:** At the unit level, aggregation of produce would be done through **SHGs** having about 30 members each forming **Van DhanVikas 'Samuh'.**
  - The SHGs would also undertake primary value addition of the Micro Forest Produce (MFPs) using equipment such as small cutting and sieving tools, decorticator, dryer, packaging tool,etc based on MFPs available in the area.
- The establishment of **"Van DhanVikas Kendra"** is to provide skill up-gradation and capacity building training and setting up of primary processing and value addition facility.
- The **Van Dhan Vikas Kendras** will be an important milestone in achieving the economic development of tribals who are involved in the collection of MFPs by helping them in optimum utilization of natural resources and providing sustainable MFP-based livelihood in MFP-rich districts.

TRIFED

- It was established in August 1987 under the **Multi-State Cooperative Societies Act, 1984.**
- This is a **National level Cooperative body** under the administrative control of **Ministry of Tribal Affairs.**
- It is mandate of bringing about socio-economic development of tribals of the country by institutionalizing the trade of **Minor Forest Produce (MFP)** & **Surplus Agricultural Produce (SAP)** collected/ cultivated by them.

17 'Making Water Sensitive Cities in Ganga Basin'

Context:

A new capacity-building initiative is launched on 'Making water sensitive cities in Ganga basin' under the **National Mission for Clean Ganga (NMCG).**

About the initiative

- The initiative is launched by **National Mission for Clean Ganga (NMCG)** in association with the Centre for Science and Environment (CSE).
- This is the first of its kind capacity-building program for river conservation.
- It is aimed at improving river health/flows.
- It is **Water Sensitive Urban Design and Planning (WSUDP) program.**
- This initiative is part of the series of ongoing efforts by NMCG which aim to ensure the convergence of the **NamamiGange Mission** with national **flagship urban missions (AMRUT, Smart Cities, Swachh Bharat Mission, HRIDAY, NULM)** and some other missions **(AtalBhujalYojana, JalJeevan Mission, Jal Shakti Abhiyan)** at state /city level across Ganga basin states.
- **The key focus areas of the program will be:**
  - Water Sensitive Urban Design and Planning
  - Urban Water Efficiency and Conservation
  - Decentralized Wastewater Treatment and Local Reuse
  - Urban Groundwater Management and Urban Waterbodies / Lake Management
- The aim of the program is capacity building and action research for promoting sustainable urban water management for improved river health in Ganga basin cities.
- Under the initiative, there will be more than 40 training programs that are supported with the development of learning material/ practitioner's guides and spread over 3 years.
- This will include residential training, field visits, online training, and webinars, etc.
- Initially, the project will be implemented in the 3-4 pilot cities in the Ganga basin.
- Technical support will be provided to the urban local bodies (ULBs).

Water Sensitive Urban Design and Planning (WSUDP)

- It is an emerging urban development paradigm that is aimed to minimize hydrological impacts of urban development on the environment.
- This includes methods of planning and designing the urban areas for optimum utilization of water, to reduce the harm caused to rivers and creeks.
- It focuses on the entire management of water systems (drinking water, storm water run-off, waterway health, sewerage treatment, and recycling).

National Mission for Clean Ganga (NMCG)

- **National Mission for Clean Ganga (NMCG)** is registered as a society under the **Societies Registration Act 1860.**
- It was established in 2011.
- It acts as implementation arm of **National Ganga River Basin Authority (NGRBA**) that was formed under the **Environment (Protection) Act (EPA), 1986.**

- **The Act envisages five tier structure as below:**
  - National Ganga Council under chairmanship Prime Minister
  - Empowered Task Force (ETF) on river Ganga under chairmanship of Jal Shakti (Department of Water Resources, River Development and Ganga Rejuvenation).
  - National Mission for Clean Ganga(NMCG)
  - State Ganga Committees and
  - District Ganga Committees

18 Energy Compact Goals towards Sustainability

Context:

- NTPC Limited has become the first energy company in the energy domain in India to declare its **Energy Compact goals as part of UN High-level Dialogue on Energy (HLDE).**
- It is India's largest power generating company under the **Ministry of Power.**

About the NTPC Energy compact goals:

- NTPC is among the few organizations globally to declare its **Energy Compact goals.**
- NTPC has set a target to install 60 GW of renewable energy capacity by 2032.
- India's largest power producer is also aiming at a 10% reduction in net energy intensity by 2032.
- NTPC has declared that it will form at least 2 international alliances/groups to facilitate clean energy research and promote sustainability in the energy value chain by 2025.
- **Measures:** NTPC has been taking various steps in increasing its green energy portfolio by adding significant capacities of Renewable Energy (RE) sources.
- The Company had earlier planned to have a minimum of 32 GW capacity through RE sources constituting nearly 25% of its overall power generation capacity by 2032.

Energy intensity

It is defined as the amount of energy used to produce a given level of output or activity. Using less energy to produce a product or provide a service results in reduced energy intensity.

UN High-level Dialogue on Energy (HLDE)

- Following the **General Assembly resolution 74/225**, a **High-level Dialogue on Energy** will be convened at a summit-level during the 76th session of the UN General Assembly in September 2021 in New York.
- It aims to accelerate SDG 7 action for the achievement of the 2030 Agenda for Sustainable Development and the Paris Agreement on climate change.
- The Dialogue represents the first inclusive global gathering on energy under the auspices of the General Assembly since the **UN Conference on New and Renewable Sources of Energy held in Nairobi in 1981.**
- It presents a historic opportunity to provide transformational action in the first years of the Decade of Action to deliver the SDGs and support the implementation of the **Paris Agreement.**

19 Saudi Green Initiative

Context:

In order to combat climate change, Saudi Arabia has launched the **'Saudi Green Initiative' and 'Middle East Green Initiative'.**

Saudi Green Initiatives

- The **Saudi Green Initiative** aims to raise the vegetation cover, reduce carbon emissions, combat pollution and land degradation, and preserve marine life.
- As part of the initiative, 10 billion trees will be planted in the Kingdom.
- It aims to reduce carbon emissions by more than 4% of global contributions, through a renewable energy programme that will generate 50% of Saudi's energy from renewables by 2030.
- With the understanding that the need of the hour is to do more than enough, Saudi Arabia is working towards raising the percentage of its protected areas to more than 30% of its total land area, representing roughly 6,00,000 sq km, exceeding the global target of 17%.

Middle East Green Initiative

- As part of the **Middle East Green initiative**, Saudi Arabia will work with the Gulf Cooperation Council countries and regional partners to plant an additional 40 billion trees in the West Asian region.
- It represents 5% of the global target of planting one trillion trees and reducing 2.5% of global carbon levels.
- Saudi Arabia has been sharing its expertise and know-how with its neighbouring countries to reduce carbon emissions resulting from hydrocarbon production in the region by 60% and globally by 10%.

20 'SUJALAM' Campaign

Context:

The **Ministry of Jal Shakti has begun (From 25th August) 'SUJALAM',** a '100 days campaign' as part of the **'Azadi Ka Amrit Mahotsav'.**

About the campaign:

- The objective is to create more and more ODF Plus villages by undertaking waste water management at village level.
- This is done particularly through creation of 1 million Soak-pits and also other Grey water management activities.

The key activities that will be organised in the villages under this campaign include:

- Organizing Community consultations, **Khuli Baithaks** and **Gram Sabha** meetings to analyze the current situation.
- Pass resolution to maintain ODF sustainability and achieve needed number of soak pits to manage the grey water.
- Develop a 100 days' plan to undertake sustainability and soak pit construction related activities.

- Construct requisite number of soak pits.
- Retrofit toilets where needed through IEC and community mobilization.
- Ensure all newly emerging Households in the village have access to toilets.

Significance:

- The campaign will not only build desired infrastructure i.e. soak pit for management of greywater in villages but will also aid in sustainable management of waterbodies.
- The campaign would boost the momentum of **Swacch Bharat Mission- Grameen phase II** activities through community participation.

21 Green Hydrogen

Context:

India hosted a two-day summit on Green Hydrogen initiatives involving the BRICS nations.

What is green hydrogen?

Hydrogen when produced by electrolysis using renewable energy is known as Green Hydrogen which has **no carbon footprint.**

Significance of Green Hydrogen:

- Green hydrogen energy is vital for India to meet its **Nationally Determined Contribution (INDC)** Targets and ensure regional and national energy security, access and availability.
- Green Hydrogen can act as an energy storage option, which would be essential to meet intermittencies (of renewable energy) in the future.
- In terms of mobility, for long distance mobilisations for either urban freight movement within cities and states or for passengers, Green Hydrogen can be used in railways, large ships, buses or trucks, etc.

Applications of green hydrogen:

- Green Chemicals like ammonia and methanol can directly be utilized in existing applications like fertilizers, mobility, power, chemicals, shipping etc.
- Green Hydrogen blending up to 10% may be adopted in CGD networks to gain widespread acceptance.

Benefits:

- It is a clean-burning molecule, which can decarbonize a range of sectors including iron and steel, chemicals, and transportation.
- Renewable energy that cannot be stored or used by the grid can be channeled to produce hydrogen.

22 Biomass-based hydrogen plant

Context:

India's first commercial-scale biomass-based hydrogen plant will be constructed in Khandwa district of Madhya Pradesh.

Key-highlights of the Plan

- Every day this plant will produce one tonne of hydrogen, from 30 tonnes of biomass feedstock.
- The plant is being put up by a joint venture of Watomo Energies Ltd and Biezel Green Energy with an investment of Rs 24 crore.
- **Bezel Green** will own 50 percent in the yet-to-be-named joint venture; the other 50 per cent will come from interested farmers.
- It will also produce biochar and methane.
- **"Thermally accelerated anaerobic digestion (TAD) reactor"** is a technology that can produce hydrogen, methane and biochar from biomass.

What is Biomass?

- **Biomass** can be described as all material that was or is a part of a living organism.
- For renewable energy applications, however, the definition of biomass is usually limited to include only materials that are plant-derived such as agricultural residues.
- Biomass is a **renewable organic resource**.
- It includes agriculture crop residues (like wheat straw or corn stover), special crops grown for energy use (like switchgrass or willow trees) forest residues, animal waste and organic municipal solid waste.
- This renewable resource can be used for producing hydrogen, and by-products.

Biomass sources for energy include

- **Wood and wood processing wastes**: firewood, wood pellets, and wood chips, lumber and furniture mill sawdust and waste, and black liquor from pulp and paper mills.
- **Agricultural crops and waste materials:** corn, soybeans, sugar cane, switchgrass, woody plants, and algae, and crop and food processing residues.
- **Biogenic materials in municipal solid waste:** paper, cotton, and wool products, and food, yard, and wood wastes.
- **Animal manure and human sewage.**

23 Serbia: Protests over Lithium Mining

Context:

The Serbian government has revoked the licenses for **lithium mining to Rio Tinto, an Anglo-Australian multinational mining organisation**, following protests for nearly two months.

About

- Serbians have been protesting against Rio Tinto's plans to mine lithium in the Jadar valley near Lozinca town in the country.
- Rio Tinto had discovered lithium deposits in the country in 2006 and had bought land in the Lozinca area in Serbia.
- While Rio Tinto has said to be fulfilling all Serbia's and European Union's environmental standards, protestors have been pointing out that lithium mining in the $2.4-billion project would irrevocably pollute the drinking water.
- Serbian capital Belgrade is surrounded by lignite mines and coal power plants powered by these mines, which only make the pollution worse.

Rio Tinto Plan

- **Rio Tinto had discovered lithium deposits in 2006**, in Serbia and had bought land in the Lozinca area.
- The company had been planning to invest USD 2.4 billion in the project.
- If completed, the project would be one of the biggest investment projects in the country.

Significance of the project

- The mine would have produced enough lithium, for operating one million electric vehicles along with sodium sulphate and boric acid.
- Once it is fully functional, mine would have created 58,000 tonnes of refined battery-grade lithium carbonate, annually.
- This would have made the mine Europe's most lithium-producing mine.

24 IREDA: Equity Infusion

Context:

The government approved the equity infusion of Rs 1,500 crore in **Indian Renewable Energy Development Agency (IREDA)** to enable it to lend Rs 12,000 crore to green energy projects.

About IREDA

- **IREDA**, a mini ratna company under the administrative control of the new and renewable energy ministry.
- It was set up in 1987 to work as a specialized non-banking finance agency for the renewable energy sector.

Benefits of the equity infusion

- The equity infusion, approved by the **Cabinet Committee on Economic Affairs**, will enable IREDA to facilitate the debt requirement of additional renewable energy generation capacity of about 3,500-4,000 Mw.
- This will help in employment generation of nearly 10,200 jobs-year and CO2 equivalent emission reduction of approximately 7.49 Million Tonnes CO2/year.
- At COP26 in Glasgow last November, Prime Minister Narendra Modi announced India's aim to achieve **net-zero emissions** by 2070 and also committed to achieving 500 GW of installed electricity capacity from non-fossil fuel sources by 2030.
- The country has installed electricity generation capacity of 392 GW, constituting 209 GW of coal and 104 GW of renewables.

25 A renewed call to halt deforestation by 2030

Context:

UK Prime Minister Boris Johnson announced that at least 110 countries had signed the pivotal **COP26 Glasgow Leaders Declaration on Forests and Land Use**, committing to halt and reverse deforestation by 2030.

About the Declaration

- **Through the Declaration, leaders promise to**
  - strengthen their shared efforts to conserve forest and other terrestrial ecosystems
  - accelerate their restoration
  - facilitate sustainable trade and development policies, internationally and domestically
  - **Empowerment of locals:** It provides for empowerment of local communities, including indigenous peoples, which are often negatively affected by the exploitation and degradation of forests.
  - **Redesigning agriculture:** It also aims to implement and redesign agricultural policies and programmes to reduce hunger and benefit the environment.
  - **Finance:** Leaders promised to facilitate the alignment of financial flows with international goals to reverse loss and degradation.

Signatories

- The declaration has over 105 signatories including the **United Kingdom, United States, Russia and China.**
- The leaders who signed the declaration represent over 85% of the world's forests.
- 12 countries have committed 12 billion dollars in public funds from 2021-25, to protect and restore forests, alongside 7.2 billion dollars of newly-mobilised private investment.
- This will include a 1.5 billion dollar fund to protect the **Congo Basin** –home to the second-largest tropical rainforest in the world.

India's stand

- **India did not sign the Declaration.**
- It objected to "trade" being interlinked to climate change and forest issues in the agreement.
- **India, Argentina, Mexico, Saudi Arabia and South Africa** are the only G20 countries that did not sign the declaration.

26 India's first-ever Euro Green Bonds

Context:

Power Finance Corporation Ltd (PFC), a financial institution under the **Ministry of Finance**, issued its maiden Euro Green Bond of £300 million (~$353 million) under the **U.S. Global Medium Term Note Program.**

About the Bond

- The bonds will have a tenor of seven years at a coupon of 1.841%.
- The Notes will be listed on the Singapore Exchange Securities Trading Limited, NSE International Exchange, and India INX.
- The settlement date is expected to be September 21, 2021.
- The principal and interest payments will be made in Euro.

- The issuance saw participation from institutional investors across Asia and Europe from 82 accounts and was oversubscribed 2.65 times.
- The net proceeds from the issuance of these Notes will be utilized per the external commercial borrowing regulations of the Reserve Bank of India.

First-ever Issuance

- This is the **first-ever Euro-denominated green bond issuance from India.**
- It is also the first-ever Euro issuance by an Indian **non-banking financial company (NBFC)** and **India's first Euro bond issuance** since 2017.
- This issuance also demonstrates our commitment for achieving India's renewable energy goals.

Green bonds

- A green bond is a type of fixed-income instrument that is specifically earmarked to raise money for climate and environmental projects.
- These bonds are typically asset-linked and backed by the issuing entity's balance sheet, so they usually carry the same credit rating as their issuers' other debt obligations.

27 Gross Environment Product (GEP)

Context:

In a latest development, the State government of Uttarakhand announced to initiate valuation of its natural resources in the form of **'Gross Environment Product' (GEP).**

Background

- The concept of valuation of the environment products or components is nothing new.
- However, it got impetus following rapid degradation of ecosystems, which led to adverse impacts on more than 60% of services derived from the ecosystems.
- In order to address these environmental issues, several attempts were made:

Ecosystem services:

- In 1981, the term "ecosystem services" was coined to attract academics towards this aspect.
- Elaborated aspects of ecosystem services: Later, Robert Costanza (American ecological economist) contributed various publications defining and elaborating aspects of ecosystem services.
- According to Costanza, ecosystem services can be defined as the benefits human populations derive, directly or indirectly, from ecosystem functions.
- However, the definition is still in the process of evolution.

Millennium Ecosystem Assessment:

- In 2000, the Millennium Ecosystem Assessment was called for by **General Kofi Annan (United Nations Secretary).**
- In 2010, **the Conference of Parties to the Convention on Biological Diversity** held in Nagoya witnessed acceptance of environmental goods part of the national accounts.
- Today, ecosystem services are well-defined field of research worldwide.

What is GEP?

- GEP is a process of simple valuation of state's ecological wealth, or to assess that what part of the GDP it contributes.
- Simply put, it is the total value of final ecosystem goods and services supplied to human well-being in a region annually.
- It can be measured in terms of biophysical value and monetary value.

Ecosystems (which can be measured) include:

- **natural ecosystems** such as forests, grassland, wetland, desert, freshwater and ocean
- **artificial systems** that are based on natural processes like farmland, pastures, aquaculture farms and urban green land, etc

28 COVID-19 has aggravated challenges to manage forests: UN Report

Context:

The novel coronavirus disease (COVID-19) pandemic has aggravated the challenges faced by countries in managing their forests, as per a recent **United Nations report 'Global Forest Goals Report 2021'.**

About the Report

- The Report provides an initial overview of progress towards achieving the six Global Forest Goals and their 26 associated targets as contained within the United Nations Strategic Plan for Forests 2030.
- The **United Nations Strategic Plan for Forests 2017-2030** was created with a mission to promote sustainable forest management and enhance the contribution of forests and trees to the **2030 Agenda for Sustainable Development.**
- The Plan recognizes that in order to create a world in which forests could provide economic, social, environmental and cultural benefits for present and future generations, they will be needed by humanity in the first place.

29 Miyawaki Technique

Context:

Japan-inspired Miyawaki forests have emerged as a popular solution to restoring degraded habitats in the country, in recent times.

About Technique

- Invented by and named after Japanese botanist Akira Miyawaki, the 'Miyawaki Method' is a unique technique to grow forests.
- Under the approach, dozens of native species are planted in the same area, close to each other, which ensures that the plants receive sunlight only from the top, and grow upwards than sideways.
- It requires very little space (a minimum of 20 square feet), plants grow ten times faster, and the forest becomes maintenance-free in three years.

This technique is a 6 step process:

- **Indentify the native species**
- **Division**- For a multi-layered process, choose different species of plants like shrub layer (6 feet), sub-tree layer (6-12 feet), tree layer (20-40 feet) and canopy layer (above 40 feet). Do not place the same species next to each other.
- **Prepare the soil**
- **Plant-** Dig a one-metre-deep pit and plant 3-5 native saplings per square metre. Maintain a distance of 60 centimetres between the saplings and level the soil around the stem of the plant.
- **Insert sticks**-To ensure that plants do not bend in the initial period, insert support sticks inside the soil.
- Monitor

Advantage of this technique

- **Faster, denser and diverse**: Mini forests grow 10 times faster and become 30 times denser and 100 times more bio-diverse than those planted through conventional methods.
- **Easy maintenance:** It is not a garden, which needs long-term maintenance, where grass needs trimming or watering is done regularly.
- **Re-generation of land:** Miyawaki forests are designed to regenerate land in far less time than the time it takes a forest to recover on its own, which is over 70 years.
- **Solving environmental problems**: The urban forests also help lower temperatures in concrete heat islands, reduce air and noise pollution, attract local birds and insects, and create carbon sinks.
- **Strengthening biodiversity:** Besides contributing to the green cover, the presence of urban forests also aids in strengthening the biodiversity in the neighbourhood.

30 System of Environmental-Economic Accounting (SEEA)

Context:

The **NCAVES India Forum 2021**, organised by the **Ministry of Statistics and Programme Implementation (MoSPI)** in a virtual format.

What is the SEEA?

- The **System of Environmental-Economic Accounting (SEEA)** is a framework that integrates economic and environmental data to provide a more comprehensive and multipurpose view of the interrelationships between the economy and the environment and the stocks and changes in stocks of environmental assets, as they bring benefits to humanity.
- SEEA is described as a satellite system to the **United Nations System of National Accounts (SNA).**
- It contains the internationally agreed standard concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics and accounts.
- The **SEEA framework** follows a similar accounting structure as the **System of National Accounts (SNA).**
- The framework uses concepts, definitions and classifications consistent with the SNA in order to facilitate the integration of environmental and economic statistics.

- The SEEA is a multi-purpose system that generates a wide range of statistics, accounts and indicators with many different potential analytical applications.
- It is a flexible system that can be adapted to countries' priorities and policy needs while at the same time providing a common framework, concepts, terms and definitions.

31 Vehicle scrappage policy

Context:

Prime Minister Narendra Modi recently unveiled the **National Automobile Scrappage Policy.**

About the Vehicle Scrappage Policy:

- Old vehicles will have to pass a fitness test before re-registration and as per the policy government commercial vehicles more than 15 years old and private vehicles which are over 20 years old will be scrapped.
- As a disincentive, increased re-registration fees would be applicable for vehicles 15 years or older from the initial date registration.
- The state governments may be advised to offer a road-tax rebate of up to 25% for personal vehicles and up to 15% for commercial vehicles to provide incentive to owners of old vehicles to scrap old and unfit vehicles.

Significance:

- The vehicle scrapping policy is aimed at creating an eco-system for phasing out unfit and polluting vehicles in an environmentally friendly and safe manner.
- The initiative will promote a circular economy and make the process of economic development more sustainable and environment friendly.
- The policy will also bring in investments of around Rs 10,000 crore and create 35,000 job opportunities.

Issues with the new policy:

- Limited incentive and poor cost economics for trucks.
- Lack of addressable volumes for other segments.
- The potential benefit from scrapping a 15-year-old, entry-level small car will be ₽70,000, whereas its resale value is around ₽95,000. That makes scrapping unattractive.

32 Bharat Ratna Professor Rao receives the Eni International Award

Context:

Bharat Ratna Professor C.N.R. Rao has received the International Eni Award 2020 for research into renewable energy sources and energy storage.

About the International Eni Award

- It is also called the **Energy Frontier award**.

- This is considered to be the **Nobel Prize in Energy Research.**
- The award has become internationally recognized over the years in the field of energy and environmental research.
- **Aim:** It aims to promote better use of energy sources and encourage new generations of researchers in their work.
- It bears witness to the importance that Eni places on scientific research and innovation.
- It includes a cash prize and a specially minted gold medal.

About the Recognized work

- Professor Rao has been working on hydrogen energy as the only source of energy for the benefit of all mankind.
- The Energy Frontiers award has been conferred for his work on metal oxides, carbon nanotubes, and other materials and two-dimensional systems which includes graphene, boron-nitrogen-carbon hybrid materials, and molybdenum sulfide (Molybdenite - MoS2) for energy applications and green hydrogen production.

What is the Significance of his work?

- **It will be helpful in consatruction of-**
  - hydrogen storage systems
  - supercapacitors with high specific power and an increased number of charge-discharge cycles

What is Green Hydrogen?

- It is pure hydrogen produced using renewable energy sources such as wind or solar power.
- It could help bring the world to net-zero emissions.
- Hydrogen is get through when electrical current is passed through a tank of water splits the molecule into its two constituent elements, Hydrogen and Oxygen. This is called
- If the electricity is generated from renewable sources such as solar or wind, production of hydrogen in this way emits no greenhouse gasses.

Different shades of hydrogen:

- **Brown hydrogen** is produced by using coal where the emissions are released to the air
- **Grey hydrogen** is produced by the natural gas where the associated emissions are released to the air
- **Blue hydrogen** is produced through natural gas, where the emissions are captured using carbon capture and storage

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3 BIODIVERSITY AND ENVIRONMENTAL PROTECTION

1 Snow Leopards

Why in News?

Recently in Himachal, three snow leopards were seen on the road connecting Langcha village to Kaza.

What is a Snow leopard?

- Snow leopards live in the mountains across a vast range of Asia.
- They are insulated by thick hair—in shades of gray or creamy yellow and covered with grayish black spots—and their wide, fur-covered feet act as natural snowshoes.
- They are shy and reclusive, and rarely seen in the wild.
- International Snow Leopard Day is observed on 23rd October.
- **Aim:** To raise awareness on conservation and protection of snow leopards.
- **Background:** The day commemorates the anniversary of the Bishkek Declaration and celebrates this endangered cat and raises awareness for its conservation and protection.
- **Habitat:**
- They can be found throughout high mountain ranges, including the Himalayas and the southern Siberian mountains in Russia.
- They can also be found in the Tibetan Plateau and across a range that stretches from China to the mountains of Central Asia.
- In India, their geographical range encompasses:
- **Western Himalayas:** Jammu and Kashmir, Himachal Pradesh.
- **Eastern Himalayas:** Uttarakhand and Sikkim and Arunachal Pradesh.
- **Snow Leopard capital of the world:** Hemis, Ladakh.

Status of protection:

- The snow leopard is listed as **Vulnerable** on the IUCN- World Conservation Union's Red List of the Threatened Species.
- In addition, it is also listed **in Appendix I** of the Convention on International Trade of Endangered Species (CITES).
- It is listed **in Schedule I** of the Indian Wildlife (Protection) Act 1972.

Threats:

- Increased conflict due to expansion of human settlement & livestock grazing.
- Poaching for trade in body parts and fur.
- Climate change & shrinkage in habitat.

Conservation:

- Establishment of protected areas like sanctuaries & corridors.
- Strengthen enforcement against poaching.
- Building awareness.
- Himal Sanrakshak
- Global Snow Leopard and Ecosystem Protection (GSLEP) Programme

2 India's First Geo Park

Context:

The **Geological Survey of India (GSI)** has approved the setting up of the **country's first geo park** at Lamheta village on the banks of the **Narmada river in Jabalpur district of Madhya Pradesh.**

Key-Points

- This First geopark approval was given by the **Geological Survey of India, under the ministry of mining.**
- This Park will be constructed with an investment of Rs 35 crores, over five-acre land.
- The geological park will be built in Lamheta, because this place is among significant places in the world, from a geological point of view.
- In 1928, William Henry Sleeman had discovered Dinosaur fossils from this area.
- UNESCO has also recognised Lamheta as a geo heritage site.

What is geopark?

- Geopark is a unified area, which advances the protection and use of geological heritage in a sustainable manner.
- It also promotes the economic well-being of the people living there.

Geological Survey of India (GSI)

- The Geological Survey of India (GSI) is a **scientific agency of India.**
- The GSI is a government organisation in India, attached to the Ministry of Mines for conducting geological surveys and studies.
- It is one of the premier organisations of earth science survey and research in the world.
- The **GSI was established in 1851** and is one of the oldest of such organisations in the world and the second oldest survey institution in the country.
- It is the prime provider of basic earth science information to the government, industry and the general public, as well as the official participant in steel, coal, metals, cement, power industries and international geoscientific forums.

- Its main function is related to creation and update of national geoscientific information and mineral resource assessment.
- It is headquartered in Kolkata and has six regional offices located at **Lucknow, Jaipur, Nagpur, Hyderabad, Shillong and Kolkata.** Every state has a state unit.

3 Parasitic Plant found in Nicobar

Context:

A new genus of a **parasitic flowering plant (Septemeranthus)** has recently been discovered from the Nicobar group of islands.

What is Parasitic plant?

Parasitic plants produce root-like structures called **haustoria** which penetrate the host, connect to its vasculature and facilitate the exchange of materials such as water, nutrients, and pathogens between the host and the parasite, and between any plants simultaneously parasitized, even unrelated plant species.

Key-highlights of the discovery

- The **genus Septemeranthus** grows on the plant species **Horsfieldiaglabra (Blume) Warb.**
- The parasitic flowering plants have a modified root structure spread on the stem of the tree and are anchored inside the bark of the host tree.
- The plant was found on the periphery of the tropical forest in one of the biodiversity hotspots referred to as the **Nicobar group of islands** separated from the **Andaman group of Islands** by a **wide gap of 160 km with heavy tidal flows.**
- Septemeranthus partially depends on its host but also has leaves capable of photosynthesis.
- In addition to Septemeranthus, four other genera have also been discovered earlier from Nicobar group of islands, highlighting the ecological significance of the region on non-parasitic plants-
  - Nicobariodendron (Hippocrateaceae)
  - Pseudodiplospora (Rubiaceae)
  - Pubistylis (Rubiaceae)
  - Sphyranthera (Euphorbiaceae)

> Recently a new species in the **hemiparasitic family Loranthaceae, Dendrophthoelaljii** have also been discovered from the Nicobar group of islands.

4 World Wetlands Day

Context:

- **World Wetlands Day** is observed every year on February 2 all over the world. It is celebrated to raise global awareness about the vital role of wetlands for people and our planet.
- The year 2022 commemorates the 51th anniversary of the signing of the **Ramsar Convention** on Wetlands on **2 February 1971 in Ramsar, Iran**, celebrated annually as **World Wetlands Day.**

About Wetlands

- Wetlands are land areas that are saturated or flooded with water either permanently or seasonally.
- Inland wetlands include marshes, ponds, lakes, fens, rivers, floodplains, and swamps.
- Coastal wetlands include saltwater marshes, estuaries, mangroves, lagoons, and even coral reefs. Fishponds, rice paddies, and saltpans are human-made wetlands.
- On this day, environmentalists and community protectors come together to celebrate their love for nature.
- This is done through seminars, exhibitions, and special on-ground campaigns.

Ramsar Convention

- The Ramsar Convention is an international agreement promoting the conservation of wetlands.
- The Convention was adopted at Ramsar in Iran in 1971 and came into force in 1975. Almost 90% of the UN member states are part of the Convention.

Theme

- In 2021, the world wetlands day is celebrated under the following theme 'Wetlands and Water,' highlights the importance of wetlands as a source of freshwater and encourages action to restore them and stop their loss.
- In 2022, the World Wetlands Day is celebrated under the following theme "Wetlands action for people and nature".

Significance of wetlands

- Wetlands are a critical part of our natural environment. They mitigate floods, protect coastlines and build community resilience to disasters, absorb pollutants and improve water quality.
- The wetlands have a major role in water security.
- They provide a barrier against natural disasters such as flooding.
- They are a vital source for food, raw materials, genetic resources for medicines, and hydropower.
- They nurture complex ecosystems. They prevent soil erosion and help fight against climate change.
- The wetlands act as carbon stores. They act as one of the best sinks for greenhouse gases, especially carbon monoxide.
- 30% of land-based carbon is stored in peatland (a type of wetlands).

5 India's first Dolphin observatory

Context:

An observatory would soon be developed to allow visitors to see G**angetic dolphins in Vikramshila Gangetic Dolphin Sanctuary.** People would be able to watch aquatic activities of Dolphins in the river from an observatory tower, to be built as a part of **Sultanganj-Aguwani Ghat bridge** in Bhagalpur, Bihar

The Observatory:

- The **four-storey observatory** will be 40 feet high, with the bridge passing through its middle.

- The observatory building will be transparent, with glass from all sides to ensure people can watch the dolphins without disturbing them.
- The structural design of the observatory is such that it will promote eco-tourism. There would be no bad or adverse impact on the river's ecology as the observatory is being constructed on a bridge over the Ganga.

Features:

- **Gangetic river dolphin:** It is India's national aquatic animal found in parts of the Ganges, Meghna and Brahmaputra river systems in India, Nepal and Bangladesh.
- They are locally known as Susu which refers to the noise the dolphin is said to make when it breathes.
- **Significance:** They can be an indicator of the health of the freshwater ecosystem as they can only live in freshwater.
- **IUCN Red List:** Endangered
- **Wildlife (Protection) Act, 1972**: Schedule I
- **CITES**: Appendix I
- **Location:** It is found mainly in the Indian subcontinent, particularly in Ganga-Brahmaputra-Meghna and Karnaphuli-Sangu river systems. It is also found in the Ganga's tributaries.
- **Threats:** Declining water level, Climate Change, Poaching and increase in pollution level.

6 Eco-Sensitive Zones

Why in the news?

- Controversy occured over proposed Eco-Sensitive Zones around Wayanad wildlife sanctuary in Kerala.
- The present draft issued by the MOEFCC notifies 118.59 sq km around the WWS as ESZ.
- But, Kerala wants ESZ measuring 88.2 sq km around the WWS. The government is of the view that densely populated areas should be excluded while notifying ESZs.

Eco-Sensitive Zones:

- **Eco-Sensitive Zones (ESZs) or Ecologically Fragile Areas (EFAs)** are areas notified by the **Ministry of Environment, Forests and Climate Change (MoEFCC),** Government of India around Protected Areas, National Parks and Wildlife Sanctuaries.
- The purpose of declaring ESZs is to create some kind of "shock absorbers" to the protected areas such as National Parks and Wildlife sanctuaries by regulating and managing the activities around such areas.
- They also act as a transition zone from areas of high protection to areas involving lesser protection.
- Thus prohibition of all kinds of human activities, in those zones except agriculture is not the prime objective of eco sensitive zones.

ESZ Guidelines classify activities under three categories:

- **Prohibited:** Commercial Mining, Setting of Saw Mill, Setting of industries causing pollution, establishment of major hydroelectric projects etc.

- **Regulated:** Felling of Trees, Establishment of hotels and resorts, erection of electrical cables, drastic change of agricultural systems etc.
- **Permitted:** Ongoing agriculture and horticulture practices by local communities, rain water harvesting, organic farming etc.

7 Illegal Wildlife Trade

Why in News

- The Financial Action Task Force (FATF) has released the first global report on the Illegal Wildlife Trade namely, "Money Laundering and the Illegal Wildlife Trade".
- Financial Action Task Force (FATF) has described illegal wildlife trade as a "global threat", which also has links with other organised crimes like modern slavery, drug trafficking and arms trade.

Illegal wildlife trafficking (IWT)

It is described as any environment-related crime that involves the illegal trade, smuggling, poaching, capture or collection of endangered species, protected wildlife (including animals and plants that are subject to harvest quotas and regulated by permits), derivatives or products thereof.

Key findings of the report:

- The illegal trade is estimated to generate revenues of up to $23 billion a year.
- Criminals are frequently misusing the legitimate wildlife trade, as well as other import-export type businesses, as a front to move and hide illegal proceeds from wildlife crimes.
- They also rely regularly on corruption, complex fraud and tax evasion.
- There is a growing role of online marketplaces and mobile and social media-based payments to facilitate movement of proceeds warranting a coordinated response from government bodies, the private sector and the civil society.
- According to the 2016 UN World Wildlife Crime report, criminals are illegally trading products derived from over 7,000 species of wild animals and plants across the world.

What is the impact of the Illegal Wildlife Trade?

- Species are on the verge of extinction as a result of illegal wildlife trade demands.
- Overexploitation of wildlife resources as a result of illegal trade causes ecosystem imbalances.
- Illegal wildlife trade, as part of illegal trade syndicates, destabilizes the country's economy, resulting in social insecurity.
- The illegal trade threatens wild plants that provide genetic variation for crops (and are a natural source of many medicines).

Constitutional Provisions for wildlife protection:

- **Article 51 A (g) of the Constitution** states that it shall be the fundamental duty of every citizen to protect and improve the natural environment including forests and Wildlife.
- **Article 48 A in the Directive Principles of State policy**, mandates that the State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country.

8 Insect apocalypse

Context:

In the recent years, there is an 'insect apocalypse' underway across the world. Insects have declined by 75% in the past 50 years – and the consequences may soon be catastrophic.

What is insect?

- Any small creature with six jointed legs and a body divided into three parts namely head, thorax and abdomen is known as an 'insect'.
- They have wings, two antennae and an exoskeleton. Ants, bees and flies are insects.
- 'Entomology' is the scientific study of insects, a branch of zoology.
- There may be as many as 10 million species of insects including:
  - 3, 60,000 species of beetle
  - 1, 80,000 species of butterfly and moth
  - 1, 20,000 fly species
  - 1, 10,000 species of bees, wasps and ants
  - 82,000 true bug species (cicadas, aphids, mealy bugs, etc)
  - 20,000 species of grasshoppers
  - 5,000 dragonfly species
  - 2,000 praying mantis species

Threats causing insect apocalypse

- Habitat loss
- Climate change
- Particulate Matter
- Land-use change
- Insecticides
- Light pollution
- Invasive species
- Flowers release odour as chemicals called volatile organic compounds, which help insects locate flowers.
- Pollutants could react with and change the scents of flowers, making them harder to find.

Why insects matter?

- Insects have an essential role to play in the ecosystem.
- **Crop productivity:** They pollinate many of fruits, flowers and vegetables, contributing significantly to the productivity of at least 75 per cent of global crop species.
- **Food security**: Their services are vital for India's food security.
- **Pest control**: Insects keep pests in check. For example-
  - **Ladybird** preys on aphids that damage crops.

- Insects such as **ladybird beetles, lacewings, parasite wasps, etc**, control other insects, arthropods and vertebrates.

- **Food source:** Insects are also food sources for amphibians, reptiles, birds and mammals.
- **Economic significance:** Insects have economic importance as well. They provide honey, silk, wax and other products.

9 Sathyamangalam Tiger Reserve

Context:

- **India's Sathyamangalam Tiger Reserve** has been awarded the prestigious TX2 Awards after its tiger number doubled since 2010.
- Apart from India's Sathyamangalam Tiger Reserve, the Bardia National Park in Nepal has won this year's TX2 Award for doubling the population of wild tigers since 2010.

About Sathyamangalam Tiger Reserve:

- **Sathyamangalam Tiger Reserve in the Western Ghats** in the Erode district of Tamil Nadu, spread across 1.409 square kilometres and declared a tiger reserve in 2013, is home to about 80 tigers.

Tiger reserves in India:

- With 724 tigers, the Nilgiri biosphere landscape that Sathyamangalam Tiger Reserve is part of, is currently the home to the largest tiger population in the world.
- The adjoining areas like Erode forest division, Coimbatore forest division and Malai Mahadeshwara Wildlife Sanctuary are also emerging as important tiger habitats, creating a mosaic that allows the big cats to easily move in search of food and new territory.
- There are 52 tiger reserves in India.

The award:

- The awards are presented by the **Conservation Assured Tiger Standards (CATS), Fauna and Flora International (FFI), Global Tiger Forum (GTF), IUCN's Integrated Tiger Habitat Conservation Programme (ITHCP), Panthera, UNDP, The Lion's Share, Wildlife Conservation Society (WCS) and WWF.**
- They celebrate the 10th anniversary of all 13 Tiger Range countries, including **India, Nepal, China, Myanmar, Bangladesh,** committed to double the global population of wild tigers by 2022.

10 Living root bridges

Context:

The **Zoological Survey of India (ZSI)** has underlined some green rules for the living root bridges of **Meghalaya** to get the **UNESCO World Heritage Site tag.**

About

- A living root bridge is like a suspension bridge formed by guiding the pliable roots of the **rubber fig tree (Ficus elastica)** across a stream or river and allowing the roots to grow and strengthen over time.

- It highlights the symbiotic relationship between people and nature.
- Locally referred as Jingkieng Jri, the 'Living Root Bridges' are conserved by the communities of Meghalaya through their sacred customary practice of preserving the groves known as 'Law Kyntang'.

What is a world heritage site?

- A World Heritage Site is a landmark or area with legal protection by an international convention administered by the United Nations Educational, Scientific, and Cultural Organization (UNESCO).
- Designated by UNESCO, the tag is given for having any cultural, historical, scientific, or other forms of significance.
- **Agra Fort, Ajanta Caves, Ellora Caves, Taj Mahal** are some of the many sites from India that have been inscribed on the List of World Heritage sites.

Allocation of tag:

- Usually announced once a year, the tag is given when the nominated sites have "outstanding universal value" and meets at least one of the following:
  - Human creative genius
  - Interchange of values
  - Testimony to cultural tradition
  - Significance in human history
  - Traditional human settlement
  - Heritage associated with events of universal significance
  - Natural phenomena or beauty
  - Major stages of earth's history
  - Significant ecological and biological processes
  - Significant natural habitat for biodiversity

Benefits of living root bridges:

- These living root bridges are example of indigenous climate resilience.
- Being a stable alternative to wooden bridges, they provide connectivity.
- These bridges attract tourists and help local people earn an income.
- They also have regenerative effects on the surrounding environment.
- Apart from producing their own building material, the trees absorb the greenhouse gas carbon dioxide over their lifetimes. They help stabilise the soil and prevent landslides.
- Recently, the 4th Asia Ministerial Conference on tiger conservation was held. It was organized by Malaysia and Global Tiger Forum (GTF).

11 Scientific bird atlas

Context:

Kerala Bird Atlas (KBA), was prepared based on systematic surveys held twice over 60 days a year during the wet (July to September) and dry (January to March) seasons between 2015 and 2020.

About

- The Kerala Bird Atlas (KBA), the first-of-its-kind state-level bird atlas in India.
- It is arguably Asia's largest bird atlas in terms of geographical extent, sampling effort and species coverage derived from the aggregation of 25,000 checklists.

What has it found?

- KBA accounted for nearly three lakh records of 361 species, including
  - 94 very rare species
  - 103 rare species
  - 110 common species
  - 44 very common species
  - 10 most abundant species
- Most of the endemics were concentrated in the Western Ghats while the threatened species were mostly along the coasts.
- Among the species, White-cheeked Barbet and House Crow with 13,855 records 12,380 occurrence records topped the chart compared to 20 other species, which had just single occurrence records.
- The survey, however, ignored the very short duration passage of migrant species like Eurasian Cuckoo, Amur Falcon
- The KBA is considered to be a valuable resource for testing various ecological hypotheses and suggesting science-backed conservation measures.

12 Eastern swamp deer

Context:

The Kaziranga National Park and Tiger Reserve released the **Wetland Bird Estimation Report for 2021-2022.** And the **Eastern Swamp Deer census** has revealed a slight decrease in their numbers due to two high floods in 2019 and 2020.

About Eastern swamp deer:

- **Eastern swamp deer (Rucervus duvaucelii ranjitsinhii),** locally known as '**Dal horina'** is the rarest recognised subspecies of swamp deer in India and Nepal.
- The subspecies' scientific name **Rucervus duvaucelii ranjitsinhii** is named after **MK Ranjitsinh,** one of India's leading voices on conservation in India contribution towards the identification of it as a separate subspecies of swamp deer.
- The stronghold of the **Eastern Swamp Deer** is in Kaziranga, with a population of less than 1,000.
- The species is one of the three subspecies of swamp deer, commonly known as the barasingha.

The other two subspecies are:

- Wetland swamp deer (R.d. duvaucelii) found in Gangetic plains
- Hardground swamp deer (R.d. branderi) found in central India

Conservation Status

- **IUCN Red List:** Vulnerable

- **CITES:** Appendix I
- **Wildlife Protection Act, 1972:** Schedule I

Kaziranga National Park and Tiger Reserve

- Kaziranga National Park and Tiger Reserve, one of India's seven UNESCO world heritage sites.
- It is home to one-horned rhinos, Royal Bengal Tigers, and Asian Elephants in addition to thousands of birds of over 125 species.
- Kaziranga lies in the floodplains of the Brahmaputra, a gargantuan river that crosses the international borders of Tibet, cuts through the mighty Himalayas, enters India through Arunachal Pradesh, and then turns south to reach Bangladesh.

Key-highlights of the Report

- A total of 66,776 birds of 126 species were enumerated using the Point Count method.
- Out of this, 42,205 birds were counted in the Kaziranga National Park area while 24,571 birds were counted in Laokhowa and Burachapori Wildlife Sanctuaries.

As per the report, the ten most populous species include:

- Bar-headed Goose (16,552)
- Northern Pintail (9,493)
- Common Teal (5,631)
- Little Cormorant (3,462)
- Greylag Goose (3,453)
- Lesser Whistling Duck (3,401)
- Gadwall (2,430)
- Ferruginous Duck (2,236)
- Eurasian Coot (2133)
- Eurasian Wigeon (1,731)
- This is also the first time that Eastern Swamp Deer was estimated in the whole of the region.
- Prior to this, it was only estimated in the Kaziranga National Park.
- Eastern Swamp Deer Estimation, 2022: In 2022, a total of 868 Eastern Swamp Deer have been recorded (including 173 male, 557 female, and 138 yearlings) compared to 907 in 2018.
- A decline has been estimated in their population due to the two high floods in 2019 and 2020.

13 Increasing size of Orang National Park

Context:

The Assam government has issued a preliminary notification to make Orang National Park more than thrice its existing size for conserving Gharials.

Orang National Park:

- The **Orang National Park** also known as **Rajiv Gandhi Orang National Park** is located on the north bank of the Brahmaputra River in the Darrang and Sonitpur districts of Assam and covers an area of 78.81 square kilometers.

- It was established as a wildlife sanctuary in 1985 but was declared as a National Park in 1999.
- It is also the **49th Tiger Reserve of the country**, being notified in 2016.
- It is also known as the mini Kaziranga National Park since the two parks have a similar landscape made up of marshes, streams, and grasslands.
- The notification says for adding 200.32 sq. km to the 78.82 sq. km Orang National Park.

What are Gharials?

- Gharials are a type of Asian crocodilian distinguished by their long, thin snouts.
- Crocodilians are a group of reptiles that includes crocodiles, alligators, caimans, and more.

Quick facts:

- **State:** Assam
- **Established In:** 1985 as a sanctuary, and in 1999 as a national park
- **Total Area Covered:** 78.81 sq. kms
- Major Wildlife Attractions: One-Horned Rhinoceros, Tiger, Maljuria Elephants, Hog Deer, Wild Pig, Civet Cat, Porcupine, Rock Python, Gangetic Dolphin, and 222 species of Birds.

14 Indian Desert Cat

Context:

An Indian Desert Cat has been spotted for the first time in **Madhya Pradesh's Panna Tiger Reserve (PTR).**

About the species

- The **Indian Desert Cat (Felis silvestris ornata)** is also known as the Asiatic Wildcat or the Asian Steppe Wildcat.
- The Indian Desert Cat is said to rest in the daytime and hunt in the night when it roams nearly five to six kilometres in search of prey that include smaller animals and birds.
- Not much is known about the animal as there is not enough in-depth study done on it.

Conservation Status:

- **IUCN Red List:** Least Concern
- **CITES:** Appendix-II
- **Wildlife Protection Act:** Schedule-I

Quick facts about Panna Tiger Reserve (PTR)

- **Panna Tiger Reserve** is spread over 1,598 sq km of Madhya Pradesh's Panna and Chhatarpur districts.
- Its **core zone (critical tiger habitat)** comprises 576 sq km while the rest is the buffer zone of the reserve.
- It is located at the edge of the **Vindhyachal mountain range**, just before it opens into the Gangetic plains.

- PTR is predominantly a miscellaneous dry deciduous forest.
- Ken river flows through PTR. Ken-Betwa river interlinking project is also going to be located within this reserve.

Habitat

- The wild cat lives in desert-shrub areas, it can survive without water.
- The species is found in **'Western India'.**
- It is commonly seen in **Rajasthan, Gujarat, Maharashtra and Madhya Pradesh.**

Survival in the desert:

- Cushion toes for temperature: The toes of the species have cushion like hair which help it balance the fluctuating desert temperatures.
- **Water:** The desert cat can survive without too much water.
- **Camouflaging:** The cat is coloured such that it is camouflaged well in the desert sand, making it difficult to be spotted.
- **Ear power:** The desert cat has big ears that are very sensitive and it can pick up the slightest sound, even a kilometre away.
- The desert cats have also been seen at the **Nauradehi Wildlife Sanctuary in Madhya Pradesh** and in the forests of **Mirzapur forests in Uttar Pradesh.**

15 Askot wildlife sanctuary

Context:

Askot Wildlife Sanctuary in **Uttarakhand's Pithoragarh** has been finally declared as an **Eco-Sensitive Zone (ESZ).**

About Askot Wildlife Sanctuary

- The **Askot Musk Deer Sanctuary**, established in 1986, was established to protect the endangered Musk Deer and its habitat.
- The sanctuary area is known as **'Green Paradise on the Earth'.**
- It is located in Askot, a small hamlet in **Uttarakhand's Pithoragarh district.**
- In the sanctuary there are 2600 plants, 250 birds and 37 mammal species like **snow leopard**, **Himalayan black bear, Himalayan tahr, blue sheep, serow besides musk deer.**
- Among the fauna are species like **loong, monal, kalij pheasant and cheer pheasant**.
- The sanctuary also has rare varieties of 2,600 Himalayan herbs and 250 varieties of birds and 37 varieties of reptiles.

Area reduction

- The Sanctuary area has been reduced—a stretch of 146 square kilometers along which over 111 villages are located has been kept out of the ESZ ambit with an aim to make the flagship species habitat safe from human interference.
- The sanctuary area is now limited from original area 599.93 square kilometers to only 454.65 square km giving a comparatively little area for the fauna to move around.

Issues/Challenges

- Because of the presence of the villages, it had been witnessing:
- increased human encroachment as well as human animal conflicts
- biotic interference

Significance of the development

- The notification will help control excessive grazing, lopping, fire incidence, unscientific exploitation of land, mining and other activities associated with development in the Askot Wildlife Sanctuary".

What Are Eco-Sensitive Zones (ESZ)?

- Eco-Sensitive Zone (ESZ) is a buffer or transition zone around highly-protected areas such as National Parks and Wildlife Sanctuaries.
- The purpose of declaring ESZs is to create some kind of "shock absorbers" to the protected areas by regulating and managing the activities around such areas.

16 North Indian Rosewood

Context:

India demands removal of **North Indian Rosewood from Appendix II of CITES.**

About-

- It is a fast-growing, hardy, deciduous rosewood tree native to the Indian subcontinent and southern Iran
- Also known as **Dalbergia sissoo, or shisham**

Importance-

- The wood is prized for its unique, blood-hued lusture, intricate grain, durability and fine finish. Due to its acoustic properties, it is also sought-after for making guitars.

Concerns

- Included in Appendix II of Convention on International Trade in **Endangered Species of Wild Fauna and Flora (CITES)**
- **Appendix II** governs the trade that must be controlled to avoid utilization incompatible with their survival
- It has impacted export of products made from **North Indian Rosewood.**
- Convention on International Trade in Endangered species of Wild flora and fauna (CITES) 1973
- CITES aims to control or prevent international commercial trade in endangered species or products derived from them.
- India is a party to the convention.

17 Kyhytysuka sachicarum

Context:

Recently, an international team of researchers has discovered a new marine reptile named **Kyhytysuka sachicarum.**

About

- **Kyhytysuka means "the one that cuts with something sharp".** The word belongs to the indigenous language of central Columbia.
- The new species has been named **Kyhytysuka sachicarum** to honour the **Muisca culture of central Columbia.**
- The Muisca is also called **Chibcha.** They were conquered by the Spanish in 1537. They were mainly agrarians. They also extracted salt from the sea.
- The fossil is a stunningly preserved meter-long skull, is one of the last surviving ichthyosaurs – ancient animals that look eerily like living swordfish.

Ichthyosaur

- They are the members of an extinct group of aquatic reptiles, most of which were very similar to porpoises in appearance and habits.
- They had a very wide geographic distribution, and their fossil remains span almost the entire Mesozoic Era.
- They are first known from the Triassic Period of Asia, where they began as long-bodied, undulating swimmers without many of the specializations seen in later species.

Features of Kyhytysuka

- It was a mid – **sized ophthalmosaurian**. The **Ophthalmosaurus** belonged to the **Jurassic period.**
- It had extremely large sized eyes, dolphin – shaped body.
- The jaws had many robust teeth.
- It had several adaptations.
- It was a macro predatory vertebrate hunter, which means it hunted larger vertebrates. Vertebrates are organisms with backbone. Organisms without backbone are called invertebrates.
- The species was mostly found in shallow waters.
- The dentary is the longest bone of the species. It measures 720 mm.
- The dentition is the most unique feature of the species.
- The teeth are seated in continuous grooves. The teeth are slightly curved posteriorly. Also, an alternating wave – like pattern is observed.

The Age of Reptiles

- The Mesozoic era is also called **The Age of Reptiles**. It is subdivided into three major periods:
  - the Triassic
  - Jurassic
  - Cretaceous

- The **Jurassic Period extended from 201.3 million years to 145 million years ago**.
- The period is named after the rock strata found in the **Jura Mountains** on the border between Switzerland and France.
- This period can be called the most interesting period of the **Mesozoic era**. Many major events took place during this period.
- Some of them are the continental split, appearance of true birds, dominance of dinosaurs, and formation of new oceans.

18 Asian Waterbirds Census

Context:

Asian Waterbird Census has commenced in Andhra Pradesh under the aegis of the **Bombay Natural History Society (BNHS).**

Facts:

- **Asian Waterbird Census (AWC)** is part of the **global International Waterbird Census (IWC).**
- This citizen-science programme is supporting the conservation and management of wetlands and waterbirds worldwide.
- The AWC 2021 found **only 1,344 birds against 6,227 birds in January 2020.**
- AWC initiated in 1987 in the Indian subcontinent and since has grown rapidly to cover the major region of Asia.
- The birds which are ecologically dependent on wetlands are known as **waterbirds.**
- It encourages the citizens to learn more about **waterbirds and wetlands.**

19 New Delhi Declaration on Asian Rhinos

Context:

India will collaborate with **Bhutan, Nepal, Indonesia and Malaysia** to increase the **population of three species of Asian rhinos.**

Important Facts

- It includes the **Greater one-horned rhinoceros** found in the **Indian-sub continent.**
- The declaration was signed to conserve and review the population of the **Greater one-horned, Javan and Sumatran rhinos** every four years.
- It aims to undertake studies on Rhino health issues & potential diseases and take necessary steps for management intervention.
- To initiate proactive monitoring on potential adverse impacts of climate change on rhino health and their habitats.
- It focuses on collaborating and strengthening wildlife forensics for the purpose of investigation.

Indian rhinoceros

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

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

20 Kaiser-i-Hind Butterfly

Context:

Recently, Arunachal Pradesh has approved the large, brightly coloured **Kaiser-i-Hind as its State butterfly.**

Important facts about the species

- **Scientific Name- Teinopalpus imperialis**
  - Kaiser-i-Hind (meaning Emperor of India) is a very rare and elusive swallowtail butterfly.
    - **Swallowtail butterfly** is any of a group of butterflies in the family **Papilionidae (order Lepidoptera).**
  - The species is found at medium and higher elevations. It flies high in the canopy of broad-leaved temperate evergreen forests.
  - The temperate evergreen forests are found in the **Eastern and Western Himalayas.**
  - This butterfly with a 90-120 mm wingspan is found in **six states (West Bengal, Meghalaya, Assam, Sikkim, and Manipur)** along the **Eastern Himalayas** at elevations from 6,000-10,000 feet in well-wooded terrain.
  - Its presence indicates the existence of a good forest ecosystem and protection.

Pakke Tiger Reserve 2047 Declaration

- Arunachal Pradesh adopted the Pakke Tiger Reserve 2047 Declaration on Climate Change-Resilient and Responsive Arunachal Pradesh.
- The declaration is aimed at lowering emissions and achieving sustainable development.
- The butterfly also flutters in Nepal, Bhutan, Myanmar, Laos, Vietnam, and southern China.

Protection Status

- **International Union for Conservation of Nature (IUCN):** Near Threatened
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora(CITES):** Appendix II
- **Wildlife (Protection) Act, 1972**: Schedule II

Other butterflies in the news

- **Malabar Banded Peacock or the Buddha Mayoori** was recently declared the '**State Butterfly' of Kerala** will have a dedicated butterfly park in Kochi.
- **Tamil Nadu** has also recently declared **Tamil Yeoman (Cirrochroa Thais)** as its state butterfly to symbolize its rich natural and cultural heritage.
- **Other states to have state butterflies are**
  - Maharashtra (Blue Mormon)
  - Uttarakhand (Common peacock)
  - Karnataka (Southern birdwings)

21 What caused Earth's first mass extinction?

Context:

A recently published paper has come up with a 'new reason' behind the first mass extinction, also known as the **Late Ordovician mass extinction.**

What's the new finding?

- The article notes that the cooling climate likely changed the ocean circulation pattern.
- This caused a disruption in the flow of oxygen-rich water from the shallow seas to deeper oceans, leading to a mass extinction of marine creatures.

What is mass extinction?

- Mass extinctions are defined as any substantial increase in the amount of extinction (lineage termination) suffered by more than one geographically wide-spread higher taxon during a relatively short interval of geologic time, resulting in an at least temporary decline in their standing diversity.

Major mass extinction events in the geological history of Earth:

- **Ordovician-Silurian extinction 485 to 444 million years ago:** killed about 85% of all species.
- **Late Devonian extinction** - 383-359 million years ago: wiped out about 75% of the world's species.
- **Permian-Triassic extinction** - 252 million years ago: also known as the Great Dying caused the extinction of over 95% of all species.
- **Triassic-Jurassic extinction** - 201 million years ago: eliminated about 80% of Earth's species, including some dinosaurs.
- **Cretaceous-Paleogene extinction** - 66 million years ago

What's leading to the extinction?

- destruction and fragmentation of habitats
- direct exploitation like fishing and hunting
- chemical pollution
- invasive species
- human-caused global warming
- Uncontrolled human population
- Overexploitation of resources

22 New Cicada varieties: Nagaland

Context:

Recently, a new species of **cicada (Platyomia kohimaensis)** was discovered in **Naga Hills, Nagaland**.

About cicada species

- Cicadas are hemipteran insects known for their loud, complex and species-specific acoustic signals or songs.
- Hemipteran insects, also called true bugs, have mouthparts used for piercing and sucking and have two pairs of wings.
- The new species of cicada belong to the **Platylomia radha group** described in the Naga Hills east of the Himalayas.
- These species have been found near the village of Mitelphe in the Kohima region.
- It is a dusk singing, large-sized cicada that calls for a short window during the evening twilight hours.
- It timbalises in the form of a continuous and regular cackling.
- Timbal is a membrane that produces sound for various insects.

Habitat

- Most cicadas are canopy dwellers and are found in natural forests with large trees.
- The typical variety of cicadas in India and Bangladesh is ranked high in the world, followed by China.

Threat

- Large-scale clearing of natural forest land into human settlement and agricultural fields, along with burning of forests is behind the shrinking distribution of Cicada.
- Considered as a delicacy and fetching at a good price, its uncontrollable photography and killing during its massive emergence poses a serious threat to its survival.

23 State of Climate Services Report 2021

Context:

The **World Meteorological Organization (WMO)** releases a new 2021 State of the Climate Services report for 2021.

Key-findings

- In 2018, an estimated 3.6 million people worldwide had less than one month of water a year, expected to exceed five billion by 2050.
- Rising temperatures are causing global and regional rainfall changes, leading to changes in rainfall patterns and agricultural seasons, which have a significant impact on food security and human health and well-being.
- **Water-related disasters**: Water-related disasters have increased dramatically since 2000
- Flood-related disasters have increased by 134 percent over the past two decades.
- **Terrestrial water storage (TWS):** TWS decreased by 1 cm per year for 20 years (2002-2021).
- The biggest losses have occurred in Antarctica and Greenland.
- Over the past year, heavy rains across the continent caused severe flooding in Japan, China, Indonesia, Nepal, Pakistan and India. Millions were displaced and hundreds were killed.

Scenario in India

- India has recorded the highest losses in groundwater storage if the loss of water storage in Antarctica and Greenland is not included.
- According to the report, India has the highest loss rate for TWS.
- The northern part of India has suffered the highest losses in the country.
- The average annual water supply was reduced to 1,545 cubic meters in 2011, from 1,816 cubic meters in 2001.
- It is expected to drop further to 1,367 cubic meters by 2031.
- Five basins of 21 rivers are 'water shortages' (water supply per person less than 1,000 cubic meters) and three 'water pressures' (water supply per person below 1,700 cubic meters).

24 One-horned rhinoceros

Context:

Assam marked World Rhino Day (September 22) with a special ceremony by burning a stockpile of nearly 2,500 horns of the one-horned rhinoceros.

About Rhino

- **White, Black, Indian, Javan, and Sumatran** make up the five species of rhino in the world.
- **White and black rhinoceros** are native to Africa
- **Indian, Javan and Sumatran** can be found in India and Asia.
- Habitat: The animal is primarily found in the Himalayan foothills — India and Nepal.
- **World Rhino Day** is celebrated on September 22 to make people more aware about rhinos and promote its conservation.

Conservation Status

- The **IUCN** lists the one-horned rhino, also known as the Indian rhinoceros**, as a vulnerable.**

> **Vulnerable (VU),** a category containing those species that possess a very high risk of extinction as a result of rapid population declines of 30 to more than 50 percent over the previous 10 years (or three generations), a current population size of fewer than 1,000 individuals, or other factors.

- Rhinoceros are listed in **Schedule 1 of the Wildlife (Protection) Act, 1972, as endangered animals.**
- The **Wildlife Protection Act, 1972** allows for destruction of **wildlife parts (including rhino horn) under Section 39 (3).**
- There is an international ban on trade of rhino horns under the **Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).**

Population of Rhino

- At 71%, Assam is home to the world's largest population of one-horned rhinoceros.
- According to a 2018 census, there are nearly 2,650 rhinos in the state with around 2,400 of them in the **Kaziranga National Park.**
  - 101 in Orang National Park
  - 102 in Pobitora Wildlife Sanctuary
  - 43 in the Manas National Park

What is the purpose of the ceremony?

- The main purpose of this ceremony is aimed at "busting myths about rhino horns"
- It's a loud and clear message to the poachers and smugglers that such items have no value.
- However, in the illegal market such horns can fetch a high price.

25 Similipal Tiger Reserve's melanistic tigers

Context:

A group of researchers has discovered the genetic mutation that caused pseudomelanism in a limited number of tigers found only in the fourth largest tiger habitat in the country.

The rare Black Tiger

- The rare tigers were first officially discovered in STR in 2007. Since then it has been a mystery.
- These Odisha tigers essentially have stripes that are larger than found in other tigers.
- And, these stripes merge among one another, causing the tigers to appear as though they have black-coloured skin.
- According to the 2018 tiger census, India has an estimated 2,967 tigers. of which 8 are known to be staying within the 2,750 sq km Odisha park, whereas another 12 were using the tiger reserve.

Key-findings

- They found the black tigers are mutants and are Bengal tigers with a single base mutation in the gene **Transmembrane Aminopeptidase Q (Taqpep).**
- Different mutations in this gene are known to cause similar changes in coat colour in several other species of cats, including cheetahs.
- The drastic change in patterning and colouring of the black tiger's coat is caused by just one change in the genetic material **DNA Alphabet from C (Cytosine) to T (Thymine)** in position 1360 of the Taqpep gene sequence.
- Further genetic analyses and comparisons with a total of 395 captive and wild Indian tiger populations indicates that the mutation in Similipal tigers is very rare.

- The only other black tigers outside of Similipal in India exist at the
  - Nandankanan Biological Park, Bhubaneswar
  - Arignar Anna Zoological Park, Chennai
  - Bhagwan Birsa Biological Park, Ranchi
- Genetic tracing proved that these captive-born tigers shared a common ancestry with Similipal tigers.

Simlipal National Park

- Simlipal National Park is a national park and a tiger reserve in the Mayurbhanj district in the Indian state of Odisha
- Simplipal was designated a tiger reserve in 1956 and in May 1973 the essential part of the Project Tiger in May 1973.
- Since 2009, it has been part of the **UNESCO World Network of Biosphere Reserve.**

26 Critically-endangered Oriental white-backed vultures

Context:

Eight critically endangered Oriental white-backed vultures were released into the wild for the first time in India from the Jatayu Conservation and Breeding Centre (JCBC).

Jatayu conservation breeding centre (JCBC)

- It is the **first Vulture breeding facility in Asia.**
- JCBC was established near Pinjore in 2004. Since then, the centre has successfully released its one pair of Himalayan Griffon vultures in 2016.
- **Location:** Jatayu Conservation and Breeding Centre (JCBC) situated at the Bir Shikargah Wildlife Sanctuary in Shivalik ranges of the Himalayan foothills, Haryana's Pinjore
- **Purpose:** It was established for the breeding and conservation of Indian vultures and House sparrows.
- **Implementing Organizations:** JCBC is run by the Forests Department, Haryana and Bombay Natural History Society (BNHS) with the help of the British charity Royal Society for the Protection of Birds (RSPB).
- **Jatayu Conservation and Breeding Centre** hosts and works towards breeding four environmentally threatened species. Their respective threatened status in the IUCN red data book is as follows–
  - Indian vulture (also known as long-billed Vultures)- Critically Endangered
  - Slender-billed vultures- Critically Endangered
  - Himalayan Vultures (also known as Himalayan griffon vultures) – Near Threatened
  - Oriental white-backed vultures– Critically Endangered

About the Vulture

- The **Oriental white-backed vultures** that were released in the wild are resident birds and not migratory, so they largely stay within a radius of 50-100 km of the breeding center.
- It is an **Old World vulturein the family Accipitridae**, which also includes eagles, kites, buzzards and hawks.

- It is closely related to the European Griffon Vulture, fulvus.

Declining Vulture Population

- Once very common, vultures are on the verge of extinction in India.
- The vulture population in India was estimated at 40 million once.
- Populations of three species of vultures — the Oriental white-backed vulture, the Long-billed vulture and the Slender-billed vulture — have declined by over 97% since the 1990s, and that of the Oriental white-backed vultures by a drastic 99.9%.

Threats

- Uncontrolled veterinary usage of non-steroidal anti-inflammatory drugs (NSAID), including **Aceclofenac, Ketoprofen and Nimesulide.**
- Illegal use of the banned drug Diclofenac, are toxic to vultures if they feed on carcasses within 72 hours of the drugs' administration to such livestock.

27 River Rights highlighted at IUCN World Conservation Congress

Context:

In the ongoing International Union for the Conservation of Nature (IUCN) World Conservation Congress, in Marseille, France, the issue of 'right of rivers' was highlighted.

Universal Declaration of the Rights of Rivers

- The press conference also marked approximately one year since the formal launch of the Universal Declaration of the Rights of Rivers.
- The declaration is a civil society initiative to define the basic rights to which all rivers are entitled, according to a note by non-profit, International Rivers.

Rights of rivers

- The rights of rivers mean that the ecological causes and conditions making up the natural habitat are to be protected to maintain a river's identity and integrity.
- The concept pushes for a healthy relationship respecting the river as an ecosystem.

Recognition of rights

- In the one year since the declaration, rights have been recognised or declared for the
- Boulder Creek watershed in the United States
- the Magpie river in Canada
- waterways in Orange County in the US
- the Alpayacu river in Ecuador
- the Paraná river and its wetlands in Argentina

Recognized rivers

- The rights to recognise river as living entities rather than mere human property started in 2008. That year, Ecuador became the first country to constitutionally recognize the Rights of Nature.

- In 2017, a treaty agreement between the Whanganui Iwi (a M?ori tribe) and the New Zealand government recognised the Whanganuiriver as a legal person
- Also in 2017, a Constitutional Court decision in Colombia recognised the rights of the Atrato river.
- A court in Uttarakhand recognised the Ganga and Yamuna rivers as legal persons with rights. This was later stayed.

28 Mangroves in Bhitarkanika

Context:

German government agency, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), will conserve mangrove and biodiversity of **Odisha's Bhitarkanika National Park**, India's second-largest mangrove forest.

About the project

- The project aims to support implementation of livelihood-oriented conservation and restoration activities and train community members in alternative sustainable livelihoods.
- The given ecosystem-based sustainable livelihood measures will be adopted— such as
  - mangrove restoration
  - sustainable fisheries
  - handicraft-based activities
  - science-led horticulture
- The project is supported by International Climate Initiative (IKI) of German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

What are Mangroves?

- Mangroves are special types of trees and shrubs that are known to thrive in saline and low oxygen conditions.
- These forests are critical habitats for a variety of wildlife and aquatic creatures.
- Mangrove forests only grow at tropical and subtropical latitudes near the equator because they cannot withstand freezing temperatures.
- The roots also slow the movement of tidal waters, causing sediments to settle out of the water and build up the muddy bottom.
- Mangrove forests stabilize the coastline, reducing erosion from storm surges, currents, waves, and tides.

Major Mangroves forests in India

- Sundarbans Mangrove Forest, West Bengal
- Bhitarkanika Mangroves, Odisha
- Godavari-Krishna Mangroves, Andhra Pradesh
- Gulf of Kutch Mangroves, Gujarat
- Mangroves of Thane Creek, Maharashtra

- Pichavaram Mangroves, Tamil Nadu
- Chorao Island Mangroves, Goa
- Baratang Island Mangroves, Andaman

Bhitarkanika Indian Wildlife Sanctuary

- Spread in a vast are of 672 Kms **Bhitarkanika Indian Wildlife Sanctuary Orissa** is the **2nd largest Mangrove ecosystems of India.**
- The National park is essentially a network of creeks and canals which are inundated with waters from rivers **Brahmani, Baitarani, Dhamra and Patasala** forming a unique ecosystem.
- It is the breeding place for the endangered salt water crocodiles which are the prime attractions of the sanctuary.
- The **Gahirmatha Beach** which forms the boundary of the sanctuary in the east is the largest colony of the Olive Ridley Sea Turtles.

29 Seaweed farming units

Context:

After fisheries, coconut and tourism, the Lakshadweep administration has prioritized seaweed farming as the next major engine of economic development.

What is Seaweed farming?

- The simplest and most common cultivation method is to attach pieces of seaweed to rope lines or nets that are suspended in the sea, often near the coast.
- They hang on wooden stakes or on a floating wooden framework dug down into the seabed.

About Seaweeds

- Seaweeds are fast-growing algae.
- They utilise energy from sunlight, and take up nutrients and carbon dioxide from the seawater.
- Seaweed is consumed in several countries, especially in East Asian countries.
- It is also used in food additives, medicine, fertiliser and cosmetic goods and to combat beach erosion.

Key-highlights of the new initiative

- Launched under the guidance of premier marine research body Central Marine Fisheries Research Institute (CMFRI) headquartered in Kochi.
- The initiative is in line with a study conducted by CMFRI which found immense potential for quality seaweeds in pollution-free lagoons for high-end utilisation like pharmaceuticals, food and nutraceuticals.
- It is planning a production of about 30,000 tonnes worth Rs 7.5 million in a year.
- In line with the new plan, a farming demonstration of seaweeds was launched in nine inhabited islands.

Important species to be involved in the plan

- Indigenous red algae

- Gracilaria edulis
- Acanthophora spicifera

30 India's 1st dugong conservation reserve

Context:

The Tamil Nadu State government announced that a 500-sqkm dugong conservation reserve will soon be set up in the Palk Bay.

About India's first dugong conservation reserve

- The 500 sq.km of the biodiversity-rich waters in the Palk Bay on the southeast coast of Tamil Nadu is to become India's first dugong conservation reserve.

What are Dugongs?

- Dugongs are sea cows or sirenia. It is a species of sea cow.
- These animals are called 'sirenias', since their mammary glands and nursing habits are similar to those of humans.
- **Location:** They are found throughout the warm latitudes of the Indian and western Pacific Oceans. In India, dugongs are seen in the Gulf of Mannar, Gulf of Kutch, Palk Bay, and the Andaman and Nicobar Islands.
- **Conservation status:** Vulnerable- the IUCN Red List
- Protected in India under **Schedule I of the Wild (Life) Protection Act, 1972**
- **Diet:** The dugong is herbivorous. It primarily grazes on sea grasses and therefore spends most of its time in seagrass beds.
- Dugongs are an important part of the marine ecosystem and their depletion will have effects all the way up the food chain.

Threats for dugong

- Hunting for meat and oil.
- **By-catch:** Dugongs are often incidentally caught in nets, targeting fish and sharks. This by-catch leads to a high number of mortality because of insufficient oxygen supply.
- Habitat disturbance in a form of water pollution, which leads to destruction of seagrass beds that are the main food source for these animals.
- Human activities such as the
  - destruction and modification of habitat
  - pollution
  - rampant illegal fishing activities, vessel strikes
  - unsustainable hunting or poaching
  - unplanned tourism
- Loss of seagrass beds due to ocean floor trawling.

Steps Taken for Conservation

- The Government of India has been a signatory to the CMS since 1983.

- India has signed non-legally binding **Memorandums of Understanding (MoU)** with CMS on the conservation and management of-
  - Dugongs (2008)
  - Siberian Cranes (1998)
  - Marine Turtles (2007)
  - Raptors (2016)
- In February 2020, India hosted the **13th Conference of Parties (CoP)** of the **Convention on the Conservation of Migratory Species of Wild Animals (CMS)**, an **environmental treaty** under the aegis of the **United Nations Environment Programme (UNEP).**

31 Manda Buffalo: Odisha

Context:

The **Manda buffalo** has been recognised as the 19th unique breed of buffaloes found in India by the **National Bureau of Animal Genetic Resources (NBAGR).**

About Manda Buffalo

- **Habitat:** The buffalo are found in geographical distribution to hill ranges of Eastern Ghats and plateau of Koraput region.
- Both male and female of this breed are used for ploughing in their native habitat.
- **Characteristics:** Manda have ash grey and grey coats with copper-coloured hair.
- The lower part of the legs up to elbow is light in colour with copper-colored hair at the knee.

Speciality of the Breed

- Resistant to parasitic infections
- Less prone to diseases
- Can live, produce and reproduce at low or nil input systems

NBAGR already received a recognition of

- One breed of sheep, Kendrapada
- Two breeds of buffalo - Chilika and Kalahandi
- Four breeds of cattle - Binjharpuri, Motu, Ghumusari and Khariar

Significance of Recognition

- With the national recognition, efforts will be made by the Centre and State for conservation of the unique buffalo genetic resource.
- The conservation projects are in force for all the indigenous breeds in the State.
- **Binjharpuri cattle semen production** and its use through artificial insemination is a remarkable achievement in the country in the field of conservation.

National Bureau of Animal Genetic Resources (NBAGR)

- **ICAR-NBAGR, Karnal** is the **nodal agency for the registration of newly identified germplasm of livestock and poultry of the country.**

- NBAGR undertakes the responsibility of evaluating, certifying and conserving the rich and varied germplasm resources available in the country and whose genetic base is shrinking fast.

32 Odisha's Kendra Para have all three crocodile species

Context:

Odisha's Kendra Para district, has earned the distinction of being the only district in India where one can find all three species of crocodiles such as **Salt-water, gharial, Mugger.**

Key-facts

- **Odisha's Kendra Para district** has already claimed fame for its successful conservation programme for salt-water or estuarine crocodiles at the **Bhitarkanika National Park.**
- The national park, having 1,768 estuarine crocodiles, is home to 70 per cent of India's such crocodiles, the conservation of which was started way back in 1975.
- It is the second largest mangrove forest in India after Sunder bans, hosts the largest population of saltwater crocodiles, including white albino crocodiles.
- It is listed as a **Ramsar Site.**
- The crocodilian family consists of 27 different species that are subdivided into three families: True crocodiles, alligators and caimans and gharials.
- All three species of crocodilians in the river systems of Odisha:
  - Gharial (Gavialisgangeticus), listed as a Critically Endangered by IUCN.
  - Mugger crocodile (Crocodyluspalustris), listed as vulnerable by IUCN.
  - Saltwater crocodile (Crocodylusporosus), listed as least concern by IUCN.

33 Land degradation, desertification increasing: ISRO atlas

Context:

The Union Minister for Agriculture and Farmers Welfare has provided useful information about land degradation in India citing the Desertification and Land Degradation Atlas.

As per data given, land degradation year-wise

- In 2003-05, 94.53 mha (28.76 per cent of the total geographical area (TGA) underwent land degradation.
- In 2011-13, the number increased to 96.40 mha (29.32 percent of the TGA).
- Desertification and Land Degradation Atlas of India: During 2018-19, 97.85 million hectares (mha) of India's total geographical area (TGA) of 328.72 mha underwent land degradation.
- Space Applications Centre (SAC)'s Atlas (June 2021): 7 percent of the country's land in this year became degraded.
- SAC comes under ISRO.
- PM Modi claimed that India is working to restore 26 mha of degraded land by 2030 while speaking at the UN High-Level Dialogue on Desertification, Land Degradation and Drought.
- India is a **signatory to the United Nations Convention to Combat Desertification** in Paris signed on June 17, 1994.

What is Land Degradation?

- Land degradation is the deterioration or loss of the productive capacity of the soils for present and future.
- It is caused by multiple forces, including extreme weather conditions, particularly drought.
- It is also caused by human activities that pollute or degrade the quality of soils and land utility.

Land desertification

- Besides land degradation, desertification had also increased.
- Land degradation within dry land regions (arid, semi-arid and dry sub-humid regions) is termed as 'desertification'.
- Desertification is a form of land degradation by which fertile land becomes desert.
- Besides land degradation, desertification had also increased.

Causes of land desertification

- Loss of soil cover, mainly due to rainfall and surface runoff
- Water erosion
- Vegetation degradation
- Wind erosion

Various institutions for land conservation

- **Indian Institute of Soil and Water Conservation (IISWC):** Bio-engineering measures to check soil erosion due to run-off of rain water
- **Central Arid Zone Research Institute (CAZRI), Jodhpur:** Sand dune stabilization and shelter belt technology to check wind erosion
- **Council through Central Soil Salinity Research Institute, Karnal:** Reclamation technology, sub-surface drainage, bio-drainage, agro forestry interventions and salt tolerant crop varieties to improve the productivity of saline, sodic and waterlogged soils in the country.

34 Symplocos Mohananii

Context:

A new plant has been discovered in Ponmudi Hills, Kerala which is part of the Western Ghats, one of the eight hotspots of biological diversity in the world.

About the newly discovered plant species

- The plant is named as **Symplocos Mohananii.**
- It carries white flowers that usually bloom in night. The tree is very endemic in nature.
- It looks like other plants of the genus Symplocos.
- The plant was spotted from a hill which was about 3000 feet above sea level.
- Plants of this family are commonly known as sweet leaf plants locally.

Medicinal values

- Symplocos Mohananii has some medicinal properties
- Bark of a few species is also used to treat skin diseases by tribals and also for dye-making.

Western Ghats

- The Western Ghats, also called the Sahyadri, are a north-south chain of mountains or hills that mark the western edge of the Deccan plateau region.
- Rich in endemic flora and fauna, the Unesco heritage site Western Ghats stretches from Gujarat to Kerala, which plays an important role in the climatic condition of the country.
- They periodically discover new plants, frogs, reptiles and other species in western ghats.

35 Anaimalai flying frog rehabilitation efforts

Context:

Recently, Frog enthusiast in Kerala has constructed two ponds at Windermere Estate to restore the habitat for the Anaimalai flying frog.

About the Anaimalai flying frog (Racophoruspseudomalabaricus)

- It is also known as the False Malabar Gliding Frog.
- Endemic to: Southern part of the Western Ghats.
- Size:This species is usually larger than the bush frogs: the female can grow up to three inches.
- Mating period: Between June and October, during the rainy season.
  - The female creates foam nests on leaves, to lay eggs and the male fertilizes them.
  - The outer layer of foam protects the eggs from bacteria, predators, and weather changes.
  - When the eggs hatch, the nest disintegrates and tadpoles drop into the water body below.
- Threats: Population declined rapidly due to the loss of habitat due to clearing the undergrowth during cardamom plantations.
- Conservation Status: IUCN Status is Critically Endangered

Wildlife Trust of India (WTI)

- WTI is a leading Indian nature conservation organization that is committed to the service of nature established in 1998.
- Its mission is to conserve wildlife and its habitat.
- Works for the welfare of individual wild animals, in partnership with communities and governments.
- WTI works in six priority landscapes, driven by nine key strategies or Big Ideas.
- Vision: A secure natural heritage of India.
- Mission: To conserve wildlife and its habitat and to work for the welfare of individual wild animals, in partnership with communities and governments.
- Motto: In Service of Nature

36 Project BOLD

Context:

To develop green cover in the Indian deserts of Rajasthan, Khadi and Village Industries Commission (KVIC) and the Border Security Force (BSF) planted 1000 bamboo saplings at Tanot village in Jaisalmer as part of KVIC's Project BOLD (Bamboo Oasis on Lands in Drought).

About the project BOLD

- The project is the first of its kind exercise in India, launched from the tribal village NichlaMandwa in Udaipur, Rajasthan.
- Under the project, special bamboo species such as BambusaTulda and BambusaPolymorpha (specially brought from Assam) have been planted over the vacant arid Gram Panchayat land.
- KVIC has created a world record of planting the highest number of bamboo saplings on a single day at one location.
- Project BOLD seeks to create bamboo-based green patches in arid and semi-arid land zones.
- It is aligned with the efforts for reducing land degradation and preventing desertification in the country.
- The initiative has been launched as part of KVIC's "Khadi Bamboo Festival" to celebrate 75 years of independence "AzadikaAmritMahotsav".

Why Bamboo is chosen?

- Bamboos grow very fast and in about three years, they could be harvested.
- Bamboos are also known for conserving water and reducing evaporation of water from the land surface, which is an important feature in arid and drought-prone regions.

Significance of the project

- It will help in reducing the land degradation percentage of the country.
- It will support sustainable development and food security.
- The project would support self-employment in the region.
- The projects will benefit a large number of women and unemployed youths in the region by connecting them to skill development programs.

Khadi and Village Industries Commission (KVIC)

- It is a statutory body which was formed in April 1957.
- It was created under the Act of Parliament, 'Khadi and Village Industries Commission Act of 1956'.
- It is an apex organization under the Ministry of MSME.
- It aims to "plan, promote, facilitate, organize and assist in the establishment and development of khadi and village industries in the rural areas.

37 Mugger crocodile in Satkosia Gorge Sanctuary

Context:

The recent death of **Mugger crocodile (Crocodyluspalustris)** in Odisha has raised concerns regarding the threats to the species in **Satkosia Gorge Sanctury.**

About the Mugger Crocodile

- It is a medium-sized broad-snouted crocodile native to freshwater habitats.
- The species feeds on insects, fish, reptiles, birds, and mammals.

- Mugger crocodiles are covered under **Schedule I of the Indian Wildlife (Protection) Act, 1972.**
- Since 1982, the species has been marked '**vulnerable**' in the **International Union for Conservation of Nature Red List of Threatened Species.**
- India is home to three primary species of crocodile:
  - Mugger or Marsh Crocodile (Crocodyluspalustris)is found in lakes and rivers throughout the country.
  - Saltwater crocodile (porosus) is found along the eastern coast of the country and the Nicobar and Andaman Islands.
  - Gharial (Gavialisgangeticus)is found in river areas.

Satkosia Gorge Sanctuary

- Satkosia Gorge Sanctuary is spread over 795.52 square kilometers across four districts: **Angul, Budh, Cuttack, and Nayagarh in Odisha.**
- Satkosia Gorge Sanctuary owes its name to the narrow stretch of River Mahanadi.
- Mahanadi has cut across the Eastern Ghats and is known for Gharials, Mugger crocodile and rare fresh water turtles like Chitraindica and Trionyx.
- The water bodies of Satkosia are home to around 108 muggers, according to the 2021 census.

Plausible Threats to crocodiles

- Choking by fishing nets
- Blast fishing
- Illegal trade
- construction of dams, barrages, irrigation canals, siltation, changes in the river course, artificial embankments and sand-mining

Blast fishing

- Blast fishing, also known as dynamite fishing, is a highly destructive, illegal method of catching fish.
- It uses dynamite or other types of explosives to send shockwaves through the water, stunning or killing fish which are then collected and sold.
- It is one of the most destructive forms of fishing and indiscriminately kills any animal in the blast area from small fish to crocodiles and dolphins.

38 Reports of LIDAR survey of forest areas

Context:

Ministry of Environment, Forest, and Climate Change released the Detailed Project Reports (DPRs) of LiDAR-based survey of forest areas in ten states namely Assam, Bihar, Chhatisgarh, Goa, Jharkhand, Madhya Pradesh, Maharashtra, Manipur, Nagaland, and Tripura.

About the LIDAR survey of forest areas

- The project study is awarded by WAPCOS, a PSU under the aegis of the Ministry of Jal Shakti.
- The Detailed Project Reports (DPRs) were formed using the LiDAR technology.

- The DPR's were produced using LiDAR technology in which the 3-D(three-dimensional) DEM (Digital Elevation Model), imagery, and layers of the project areas are used.

Significance of study:

- **The project will help augment water and fodder in jungles areas. It will -**
  - reduce human-animal conflict
  - help in groundwater recharge
  - help local communities
  - state forest departments to use CAMPA funds
  - The project reports will help recommend the micro soil and water conservation structures consistent with site-specific geography, topography, and soil characteristics.
  - It will recommend different types of Soil & Water conservation structures such as Anicut, Gabion, Gully Plug, Mini percolation tank, Percolation Tank, Field bund, Sunken pond, Farm pond, etc.
  - These structures will help in catching the rainwater and prevent stream runoff, which will help in recharging Groundwater.

What is LiDAR technology?

- Lidar stands for Light Detection and Ranging.
- It is a remote sensing method.
- It uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.
- These light pulses—combined with other data recorded by the airborne system — generate precise, three-dimensional information about the shape of the Earth and its surface characteristics.
- Lidar systems allow scientists and mapping professionals to examine both natural and manmade environments with accuracy, precision, and flexibility.

Applications of LiDAR

- Land Surveying
- Power Line Inspection for Maintenance
- Forestry and Farming survey
- Mining Application
- Transportation Expansion

39 Genetically modified rubber planted in Kerala

Context:

Rubber Research Institute of India had developed a rubber plant tailored for the climatic conditions in the Northeast.

About the Genetically modified organism (GMO)

- A genetically modified organism (GMO) or living modified organism (LMO), is any organism whose genetic material has been modified.

- Mass production of GM technology-based human insulin, vaccines, growth hormones and other drugs has greatly facilitated the availability and access to life-saving pharmaceuticals are the results of Genetic Modification.
- Under this, the gene is incorporated into the DNA of crop plant using laboratory-based gene gun or agrobacterium approaches.

The Genetically modified rubber plant of Kerala

- This is the world's first genetically modified (GM) rubber plant tailored for the climatic conditions in the Northeast.
- The plant was developed at the Kerala-based Rubber Research Institute of India (RRII).
- This is the first time any GM crop has been developed exclusively for a particular region.
- Natural rubber is a native of warm humid Amazon forests and is not naturally suited for the colder conditions in the Northeast, which is one of the largest producers of rubber in India.
- The growth of young rubber plants remains suspended during the winter month.
- The GM rubber would tide over the severe cold conditions during winter, which impacts its growth.
- The GM rubber has additional copies of the gene MnSOD or manganese-containing superoxide dismutase.
- The MnSOD gene can protect plants from the adverse effects of severe environmental stresses such as cold and drought.

40 Dihing Patkai National Park

Context:

The State government of Assam has notified DihingPatkai as the 7th National Park (NP). It also, recently, notified Raimona National Park, as its sixth.

About Dihing Patkai National Park

- Location: It straddles eastern Assam's Dibrugarh and Tinsukia districts.
- Rivers: Short stretches of the Dirak and BuriDihing rivers passes through the park
- The park has a rich diversity of reptiles and mammals, including the tiger and clouded leopard.
- It is the only sanctuary in India with seven different species of wild cats - tiger, leopard, clouded leopard, leopard cat, golden cat, jungle cat, and marbled cat.
- Rare animals such as Chinese pangolin, flying fox, wild pig, sambar, barking deer, gaur, serow, and Malayan giant squirrels are also found here.
- Assamese macaque is on the red list of Near Threatened species.
- It has the highest concentration of the rare endangered White Winged Wood Duck.
- Flora: It is occupied by deciduous rainforest interspersed with semi-evergreen flora.

National parks in Assam

- Assam now has the third most National Parks in the country with 7 parks.
- Madhya Pradesh has 12 parks and nine in the Andaman and Nicobar Islands.

- The National Parks in the State are as follows-
  - Kaziranga
  - Manas
  - Nameri
  - Orang
  - Dibru-Saikhowa
  - Raimona National Park
  - Dihing Patkai

Raimona National Park

- Raimona adjoins the Buxa Tiger Reserve in West Bengal to its west, Phipsoo Wildlife Sanctuary in Bhutan in the north, and Manas National Park to the east.
- It forms the boundary with the Sankosh River.
- Fauna: Golden Langur is endemic to the park.
- The other major animals are Asian elephant, Royal Bengal tiger, Clouded leopard, Indian gaur, Wild water buffalo, Spotted deer, Hornbill.

41 Gharial conservation

Context:

- The Mahanandi Wildlife Division in Odisha initiated an effort of state government to conserve Gharials in Mahanadi river basin.
- The rewards will be given for rescuing gharials, a critically endangered crocodile species.

About the Gharial and its conservation

- Gharials are large and shy reptiles.
- Gharials thrive on small fish.
- Their prey base was eroding due to over-fishing by local fisherfolk.
- Gharial prefers deep fast flowing rivers.
- Sand and rock outcrops are preferred basking sites and these animals show considerable site fidelity.

Mahanadi Wildlife Division

- It was created in 1999 by the Government of Orissa.
- The whole division is a part of Satkosia Tiger Reserve.

Fauna: Tiger, Leopard, Striped hyena, Wild dog, Indian Wolf, Sloth bear, Sambar, Civet Cat, Fishing cat, Leopard cat, Chousingha, Flying Squirrel, Wild boar, Gaur migratory population of Elephants, Gharial and Mugger crocodile in the Mahanadi River, hornbills, Hill mynas, Brahamany ducks and different varieties of both resident and migratory birds.

Threats:

- Their habitat is threatened because of human encroachment and fishing activities.
- They are genetically weaker than salt water crocodiles and muggers.
- Gharials caught accidentally in fishing nets.

42 Striped hyena

Context:

Indian striped hyena raises hope that the species is re-establishing itself in the buffer zone of the Mudumalai Tiger Reserve (MTR).

About the Indian striped hyena

- **Scientific name:** Indian striped hyena (Hyaena hyaena)
- It is mammal of the Carnivora order and Hyaenidae family.
- They whoop, rumble, low, and laugh, when they are excited or on sensing danger.
- Hyenas are like wild dogs and are top predators that compete with other species.
- Striped hyenas usually lived alone and difficult to spot due to their reclusive nature.
- **Location**: They are found in India, Central Asia, North and East Africa and West Asia.
- Camera trap images from 2012 to 2020 reveal that the striped hyena population is very restricted to the North Eastern Slope (NES) and Segur forest ranges.
- The hotspots of striped hyena in the region are **Srikakulam, Parvathipuram forest area, Chodavaram and Devarapalle.**
- **Conservation Status:** The International Union for Conservation of Nature (IUCN) has categorised it as 'Near Threatened' species on a global scale.
- Reason for decline: It started declining in the Sigur plateau in the 1980s and 90s, because people reared cattle in pens. After the carnivores preyed on their cattle, the farmers would poison whatever remained of the carcasses of cattle.
- It also caused death of vultures.
- **Threats:** lack of monitoring and loss of habitat.

About Mudumalai Tiger reserve

- The **Mudumalai National Park and Wildlife Sanctuary** is declared as a tiger reserve.
- It lies in the northwestern side of the **Nilgiri Hills, Tamil Nadu.**
- It shares its boundaries with the states of Karnataka and Kerala.
- The sanctuary is divided into five ranges – **Masinagudi, Thepakadu, Mudumalai, Kargudi and Nellakota.**
- The protected area is home to several endangered and vulnerable species such as Indian elephant, Bengal tiger, gaur and Indian leopard.
- It is also a home to the critically endangered Indian white-rumped vulture and long-billed vulture.

43 Red Corals

Context:

In spite of the real threat caused by global warming, corals in the Red Sea look set to keep their vibrant color and to pass the heat test with flying color.

About the Red Coral

- It is also known as Precious coral.
- The common name given to this marine corals is Corallium.
- The scientific name given to this is Stylophora pistillata.
- It grows at depths from 10 to 300 meters below sea level.
- It is originally found in Mediterranean Sea.
- It is also found in Atlantic sites near the Strait of Gibraltar, at the Cape Verde Islands and off the coast of southern Portugal.
- Other Corallium species are native to the western Pacific, notably around Japan and Taiwan;

Global warming and coral bleaching

- The global warming is pushing ocean temperatures above the limit that the coral can withstand.
- Even under the most optimistic scenarios, most of the coral reef ecosystems on our planet in Australia, the Maldives or the Caribbean are threatened with disappearance.

Coral bleaching

- Coral is single-cell algae that live inside coral tissue for protection and, in exchange, provide corals with essential nutrients produced through photosynthesis.
- Because the algae contain a variety of pigments and therefore give coral reefs their famous colors, if they are lost the corals turn white, which is known as coral bleaching

- The corals in the Gulf of Aqaba, at the northern tip of the Red Sea, were particularly resistant to higher temperatures.
- those corals, as well as the algae and bacteria they live in symbiosis with, can withstand average temperatures some 5°C higher than what they typically experience
- Reason behind the survival: They can withstand with their molecular machinery, which means they're naturally shielded against the temperature increases.
- They show a rapid gene expression response and recovery pattern when exposed to heat stress.

44 Tiger relocation project fails

Context:

Sundari, a tigress shifted as part of India's first inter-state translocation project in 2018 from Madhya Pradesh to Odisha, returned home, signifying failure of India's first inter-state tiger relocation project.

What was the Tiger Relocation Project?

- The tiger relocation project was initiated in 2018.
- Under the plan, two big cats, a male (Mahavir) from Kanha Tiger Reserve and a female (Sundari) from Bandhavgarh from Madhya Pradesh were relocated to Satkosia Tiger Reserve in Odisha, to shore up the tiger population in the state.

- Sundari was brought to Satkosia a week after Mahavir's arrival.

Satkosia Tiger Reserve

- Encompassing an area of 963.87 sq km, the Satkosia Tiger Reserve spreads across four districts and has as its core area 523 sq km.·
- Declared as a Tiger Reserve in 2007, Satkosia had a population of 12 tigers then. The numbers reduced to two in 2018.
- The purpose of the relocation was to repopulate tigers in the reserve areas.

Purpose of the project

- **The relocation was meant to serve two purposes —**
  - to reduce tiger population in areas with excess tigers to majorly reduce territorial disputes
  - to reintroduce tigers in areas where the population has considerably reduced due to various reasons

Factors contributed to the likely failure of the project

- lack of confidence and trust building between the forest department and the villagers
- human-animal conflict
- Poor capacity for tiger monitoring
- Poor protection

45 Africa's cycads

Context:

Cycads which are the world's oldest seed-producing plants are facing extinction.

About African Cycad

- Taxa: It belongs to the most prominent taxa of Cycad.
- Genus: It comes under the genus Encephalartos.
- Endemism: Cycad is endemic to Africa.
- Global Hotspot: Africa is considered home to a variety of cycad species and South Africa is considered as a global hotspot for cycad diversity.
- Conservation Status: It is categorized under the "critically endangered" category by the International Union for Conservation of Nature.
- Threat:The biggest threat to their survival is poaching, mainly cutting of the wild old trees.
- Use: They are used in traditional medicine markets and as ornamental plants in gardens.

Why they are threatened with extinction?

- Alien Species: The wild cycads are facing threat by an invasive alien species, Aulacaspis yasumatsui that has entered South Africa.

- Aulacaspis yasumatsuiis a scale insect which is commonly known as the Cycas Aulacaspis Scale.
- It has the potential to kill cycad plants within a few months of infestation.
- Climate plays an important role in influencing the spread and establishment of invasive alien species in new habitats.

Invasive Species

- An invasive species is a living organism that is not native to an ecosystem and can causes harm.
- It can include amphibians, plants, insects, fish, fungus, bacteria, or even an organism's seeds or eggs.
- They can harm the environment, economy, or even human health.

How it is being tackled?

- CLIMEX, a bio-climatic software, is used to map the areas which have favorable climatic conditions for the establishment of the pest in Africa.
- The software uses historical climate data sets and future climate scenarios which are based on the Intergovernmental Panel on Climate Change recommendations.
- It collects information about temperature, relative humidity, phenology, and soil moisture that helps in the establishment of the Cycas Aulacaspis Scale in a novel range.
- These values are fed to the software, which subsequently predicts the potential hot spots for Cycas Aulacaspis Scale establishment.

46 Two species of seaweed discovered along India's coastline

Context:

A group of marine botanists has traced new species of native seaweed along the coasts of Kanyakumari in Tamil Nadu and Gujarat and Daman Diu.

About the new species discovered

- These species were found in the form of isolated patches in the intertidal regions of the sea.
- Species and its place of discovery
  - Hypneaindica and HypneaBullata - Kanyakumari
  - Hypneaindica– Gujarat
  - HypneaBullata- Daman and Diu.
- **Potential use:** Hypnea variants of seaweeds can have a good monetary benefit in the food industry as it contains Carrageenan which is a biomolecule commonly used in the food industry.
- It can be a potential raw material for those involved in jelly and ice cream production.

Seaweed

- Seaweed is a macro-algae that is referred to as thousands of species of macroscopic, multicellular, marine algae. The term seaweed includes some types of Rhodophyta, Phaeophyta, and Chlorophytamacroalgae also.

- Significance: Seaweed species such as kelps provide essential habitats for fisheries and other marine species.
- Some other types of seaweed such as planktonic algae play a vital role in capturing carbon and producing up to 90% of Earth's oxygen.

47 'Biodiversity heritage site'

Context:

The Maharashtra government declared an area in the Sindhudurg district in the Western Ghats as a biodiversity heritage site to protect a rare small fish Schistura.

About Schistura

- Schistura is a small and colorful fish.
- Schistura Hiranyakeshiis a rare sub-species of Schistura which is a freshwater loach.
- The fish was named after the Hiranyakeshiriver near Amboli
- It lives in water and streams with plenty of oxygen.

Why it has been declared a biodiversity heritage site?

- The decision came in the view of the protection of a freshwater species of fish, Schistura.
- It is a rare species and might face extinction due to fishing activities.

Other biodiversity heritage sites by the state government

- The glory of Allapalli in Gadchiroli district
- Landor Khori Park in Jalgaon
- Ganesh Khind in Pune
- Myristica swamp vegetation in Sindhudurg district

Biodiversity heritage sites

- Biodiversity Heritage Sites (BHS) are areas that are unique and with rich biodiversity.
- According to Section 37, of the Biological Diversity Act, the State Governments in consultation with 'local bodies' are empowered to notify areas of biodiversity importance as Biodiversity Heritage Sites.

Criteria for Identification of BHS

- Areas that contain a mosaic of natural, semi-natural, and manmade habitats
- Areas that contain significant domesticated biodiversity component and/or representative agro-ecosystems with ongoing agricultural practices that sustain this diversity
- Areas that are significant from a biodiversity point of view as also important cultural spaces such as sacred groves/trees and sites, or other large community conserved areas

- Areas including very small ones that offer refuge or corridors for threatened and endemic fauna and flora, such as community conserved areas or urban greens and wetlands
- Areas that provide habitats, aquatic or terrestrial, for seasonal migrant species for feeding and breeding
- Areas that are maintained as preservation plots by the research wing of the Forest department
- Medicinal Plant Conservation Areas

48 African elephants

Context:

The African forest elephant has been listed as critically endangered along with the African savanna elephant which is enlisted as endangered on the International Union for Conservation of Nature's Red List of Threatened Species.

About the African Forest and African Savanna Elephants

- The two species were previously considered as a single species on the Red List.
- They were earlier listed as vulnerable.
- Now they have been assessed separately due to the emergence of genetic evidence.
- Habitat: They both live in different habitats:
- African Forest elephants live in the tropical forests of Central Africa
- African Savanna elephants live in the open country in Sub-Saharan Africa, which includes grasslands and deserts

Ecological Significance

- African Forest elephants are known as the 'gardeners of the forest,'
- They help in distributing seeds
- Savanna elephants are 'keystone species in their habitat.

Reduction in number

- The number of African elephants has been decreased by more than 86% over the last 31 years.
- African savanna elephant's population has fallen by around 60% over the last 50 years.
- Threats: Poaching for ivory and loss of habitat.

Keystone species

- A keystone species is the species of the organism which help in defining an entire ecosystem.
- In the absence of its keystone species, the ecosystem would be different or cease to exist altogether.
- Examples: lion, jaguar (shown below), and gray wolf, Sea Otters and Tiger Sharks.

49 Deadly drug-resistant superbug

Context:

A deadly hospital pathogen, the Candida Auris, has for the first time been identified in the environment, off the coast of South Andaman district in the Andaman and Nicobar islands.

About the Candida Auris

- Candida Auris or C. Auris belong to Fungs and was identified in 2009 in a patient in Japan.
- It is a multidrug-resistant pathogen.
- It can pose a serious global threat to human health.
- Family: It belongs to the Candida haemulonii clade of the Metschnikowiaceae family of the order Saccharomycetales.
- Related Species:The related species of the Metschnikowiaceae family have been detected in plants, insects, and aquatic environments, as well as from human body sites.
- Closest Species: The closest known relative of C.auris is C. haemulonii, which was first discovered in 1962 from the gut of a blue-striped grunt fish, the skin of dolphins, and the seawater off the coast of Portugal.
- Habitat: This fungus is present in the environment as degraders of organic matter.
- Fungi predominately thrive in tropical and subtropical areas.
- Being an emerging pathogen, very little is known about the fungus so far.

Findings:

- Habitat: It has for the first time established that the fungus is found in tropical marshes and marine environments, outside hospital environments.
- Its ability to survive on dry environmental surfaces for prolonged periods suggests that this yeast is well adapted to survival outside human host settings as well.
- Threat: These fungi have high mortality in immune-compromised patients.
- Adaptation: TheC.auris' shows thermal and salinity tolerance, which is because of its adaptation to global warming.

What are Superbugs?

- Microorganisms: These are strains of bacteria, viruses, parasites and fungi.
- Resistance: Superbugs are resistant to most of the antibiotics and other medications commonly used to treat the infections they cause.
- Example: superbugs include resistant bacteria that can cause pneumonia, urinary tract infections and skin infections.

50 'Conservation of Fishing Cat'

Context:

The fishing cat, a lesser-known feline species, is facing several threats due to its depleting habitat. So, a worldwide campaign by the Fishing Cat Conservation Alliance to protect the feline is being started.

About Fishing Cat

- The **fishing cat (Prionailurus viverrinus)** is a medium-sized wild cat of South and Southeast Asia.
- It is very much content and survives in water.
- **Protection Status**: Since 2016, it is listed as Vulnerable on the **IUCN Red List.**
- **Threats:** Fishing cat populations have declined severely over the last decade. Some of the reasons are for the declining population is:
  - habitat loss [wetland degradation and conversion for aquaculture and other commercial projects]
  - sand mining along river banks
  - agricultural intensification resulting in loss of riverine buffer
  - targeted hunting and retaliatory killings
- **Occurrence:** They are found in Sundarbans in West Bengal and Bangladesh, Chilika lagoon, and surrounding wetlands in Odisha, Coringa, and Krishna mangroves in Andhra Pradesh.
- Fishing cats have a patchy distribution along the Eastern Ghats. They are found in
  - estuarine floodplains
  - tidal mangrove forests
  - inland freshwater habitats

Fishing Cat Conservation Alliance

- The Fishing Cat Conservation Alliance is a team of conservationists, researchers, and enthusiasts across the world.
- **Aim:** To have a world with functioning floodplains and coastal ecosystems.

51 India's leopard count

Context:

Union Environment Ministry has released a new report titled- **Status of Leopards, Co-predators and Megaherbivores-2018.** The report was released on July 29, 2021 — World Tiger Day.

As per the report:

- India's official leopard count has increased 63 per cent from 2014-2018. There were 12,852 leopards in the country in 2018 (7,910 in 2014).
- The largest number of leopards have been estimated in Madhya Pradesh (3,421) followed by Karnataka (1,783) and Maharashtra (1,690).

About Leopard:

- **Scientific Name**- Panthera pardus.
- Listed in **Schedule I of the Indian Wildlife (Protection) Act, 1972.**
- Included in **Appendix I of CITES.**
- Listed as **vulnerable on the IUCN Red List.**

- Nine subspecies of the leopard have been recognized, and they are distributed across Africa and Asia.

The government has also informed that there are 14 tiger reserves that had received the accreditation of the **Global Conservation Assured|Tiger Standards (CA|TS),** an accreditation tool agreed upon by tiger range countries. These include:

- Manas, Kaziranga and Orang in Assam.
- Satpura, Kanha and Panna in Madhya Pradesh.
- Pench in Maharashtra.
- Valmiki Tiger Reserve in Bihar.
- Dudhwa in Uttar Pradesh.
- Sunderbans in West Bengal.
- Parambikulam in Kerala.
- Bandipur Tiger Reserve of Karnataka.
- Mudumalai and Anamalai Tiger Reserve in Tamil Nadu.

What is Conservation Assured | Tiger Standards (CA|TS)?

- CA|TS has been agreed upon as an accreditation tool by the global coalition of Tiger Range Countries (TRCs) and has been developed by tiger and protected area experts.
- CA|TS is a set of criteria which allows tiger sites to check if their management will lead to successful tiger conservation.
- It was officially launched in 2013.
- The Global Tiger Forum (GTF), an international NGO working on tiger conservation, and World Wildlife Fund India are the two implementing partners of the National Tiger Conservation Authority for CATS assessment in India.

52 Deepar Beel Wildlife Sanctuary

Context:

Ministry of Environment, Forest and Climate Change has notified the eco-sensitive zone of the **Deepor Beel Wildlife Sanctuary** on the south-western edge of Guwahati. The notification specified an area "to an extent varying from 294 metres to 16.32 km" as the eco-sensitive zone, with the total area being 148.9767 sq. km.

Implications of the latest move:

- No new commercial hotels and resorts shall be permitted within 1 km of the boundary of the protected area or up to the extent of the eco-sensitive zone, whichever is nearer, except for small temporary structures for eco-tourism activities.
- Among activities prohibited in the eco-sensitive zone are hydroelectric projects, brick kilns, commercial use of firewood and discharge of untreated effluents in natural water bodies or land areas.

About Deepar Beel:

- Deepar Beel is one of the largest freshwater lakes in Assam and the State's only Ramsar site besides being an Important Bird Area.

- It is a permanent freshwater lake, in a former channel of the Brahmaputra River, to the south of the main river.

Why this wetland needs protection?

- The wetland of Deepar Beel constitutes a unique habitat for aquatic flora and avian fauna.
- About 150 species of birds have been recorded in the sanctuary, out of which two are critically endangered, one endangered, five vulnerable and four near-threatened.
- Elephants regularly visit the wetland from adjoining Rani and Garhbhanda Reserve Forest and the wetland is an integral part of the elephant habitat.
- Besides these, 12 species of reptiles, 50 species of fish, six species of amphibians along with 155 species of aquatic macro-biota have been recorded in the sanctuary.

53 "Pran Vayu Devta Pension Scheme", and Oxy Van (Oxygen Forests)

Context:

These schemes were announced by Haryana Government on the occasion of World Environment Day.

What is the Pran Vayu Devta Pension Scheme (PVDPS)?

- It is an initiative to honour all those trees which are of the age of 75 years and above and have served humanity throughout their life by producing oxygen, reducing pollution, providing shade and so on.
- Such trees will be identified throughout the state and these will be looked after by involving local people in this scheme.
- For maintenance of trees older than 75 years, a "pension amount" of Rs 2,500 would be given per year in the name of PVDPS. This 'tree pension' shall continue to increase every year, on lines similar to the Old Age Samman Pension Scheme in the state.
- The pension shall be given by the Urban Local Bodies department for the upkeep of the trees, installing plates, grilles etc.

What is an Oxy Van (Oxygen Forest)?

- Oxy Van are identified pieces of land, on which as many as 3 crore trees would be planted.
- The Oxy Vans will occupy 10 per cent of the 8 lakh hectares of land across Haryana.
- These van will house different varieties of plants and trees.

54 Caracal

Context:

The **National Board for Wildlife and Union Ministry of Environment, Forest and Climate Change** included the **caracal,** a medium-sized wildcat found in parts of Rajasthan and Gujarat, in the list of critically endangered species. The recovery programme for critically endangered species in India now includes 22 wildlife species.

About Caracal:

- Besides India, the caracal is found in several dozen countries across Africa, the Middle East, Central and South Asia.
- While it flourishes in parts of Africa, its numbers in Asia are declining.
- The wildcat has long legs, a short face, long canine teeth, and distinctive ears — long and pointy, with tufts of black hair at their tips.
- The iconic ears are what give the animal its name — caracal comes from the Turkish karakulak, meaning 'black ears'. In India, it is called siya gosh, a Persian name that translates as 'black Ear'.

Historical Evidences:

- It finds mention in Abul Fazl's Akbarnama, as a hunting animal in the time of Akbar (1556-1605).
- Descriptions and illustrations of the caracal can be found in medieval texts such as the Anvar-iSuhayli, Tutinama, Khamsa-e-Nizami, and Shahnameh.

About the Species Recovery Programme:

- It is one of the three components of the Integrated Development of Wildlife Habitats (IDWH).
- IDWH was started in 2008-09 as a Centrally sponsored Scheme. It is meant for providing support to protected areas (national parks, wildlife sanctuaries, conservation reserves and community reserves except tiger reserves), protection of wildlife outside protected areas and recovery programmes for saving critically endangered species and habitats.

55 Heritage trees

Context:

The Maharashtra government has proposed amendments to the Maharashtra (Urban Areas) Protection and Preservation of Trees Act of 1975, to introduce provisions for the protection of 'heritage trees'.

What are heritage trees?

- A tree with an estimated age of 50 years or more shall be defined as a heritage tree. It may belong to specific species, which will be notified from time to time.

Why was the concept of heritage tree introduced?

- A heritage tree will get special protection. Compensatory plantation– anyone cutting a heritage tree will need to plant trees in the same numbers as the cut tree's age.
- The organization planting the compensation trees will also have to ensure the survival of the plantation for seven years and geo-tag the trees.
- In case compensatory plantation is not possible, the tree feller has to pay compensation for the economic valuation of the trees being felled.

56 Pastoralists in Banni grasslands

Context:

The **National Green Tribunal (NGT)** ordered all encroachments to be removed from Gujarat's Banni grasslands within six months and directed a joint committee to prepare an action plan. The court also

said the **Maldharis** will continue to hold the right to conserve the community forests in the area, granted to them as per the provisions in Section 3 of Forest Rights Act, 2006.

What's the issue?

- The Maldhari community had filed a case against the rampant encroachment in the ecologically sensitive grassland in May, 2018.

Who are Maldharis?

- Maldharis are a tribal herdsmen community in Gujarat, India.
- Maldhari community breeds Banni Buffaloes, a species endemic to the region. The buffaloes are adaptive to Kutch's hot weather conditions.

About Banni Grasslands:

- Banni grassland is spread over 2,618 kilometres and accounts for almost 45 per cent of the pastures in Gujarat.
- It comprises 48 hamlets / villages organised into 19 panchayats, with a population of about 40,000.
- Two ecosystems, wetlands and grasslands, are juxtaposed in Banni.
- The area is rich in flora and fauna, with 192 species of plants, 262 species of birds, several species of mammals, reptiles and amphibians.

57 Mahendragiri Biosphere Reserve

Context:

The Odisha government has proposed a second biosphere reserve in the southern part of the state at Mahendragiri, a hill ecosystem having rich biodiversity. The 5,569-square kilometre Similipal Biosphere Reserve is Odisha's first such reserve and was notified May 20, 1996.

About the proposed Mahendragiri Biosphere Reserve:

- It is around 470,955 hectares and is spread over Gajapati and Ganjam districts in the Eastern Ghats.
- The hill ecosystem acts as a transitional zone between the flora and fauna of southern India and the Himalayas, making the region an ecological estuary of genetic diversities.
- Mahendragiri is inhabited by the Soura people, a particularly vulnerable tribal group as well as the Kandha tribe.

What are biosphere reserves?

- **Biosphere Reserve (BR)** is an international designation by **United Nations Educational, Scientific and Cultural Organization (UNESCO)** for representative parts of natural and cultural landscapes extending over large areas of terrestrial or coastal/marine ecosystems or a combination of both.
- Biosphere Reserves tries to balance economic and social development and maintenance of associated cultural values along with the preservation of nature.
- The concept of Biosphere Reserves was launched in 1971 as a, part of **United Nations Educational, Scientific and Cultural Organization (UNESCO)'s 'Man and Biosphere Programme'.**

Criteria for Designation of Biosphere Reserve:

- A site must contain a protected and minimally disturbed core area of value of nature conservation.
- Core area must be a bio-geographical unit and should be large enough to sustain a viable populations representing all trophic levels.
- The involvement of local communities and use of their knowledge in biodiversity preservation.
- Areas potential for preservation of traditional tribal or rural modes of living for harmonious use of the environment.

58 FSI Report on forest fires

Context:

The Forest Survey of India (FSI) has released a report on forest fires in the country.

Key findings:

- At least 5,291 forest fires were recorded in Odisha between February 22 and March 1, 2021 — the highest in the country for the same period.
- Collection of mahua flowers and kendu leaves, practice of shifting cultivation and grazing in forest areas are some of the reasons for forest fires in Odisha.
- Telangana recorded the second-highest fires in the country at 1,527 during the same period, followed by Madhya Pradesh (1,507) and Andhra Pradesh (1,292), according to FSI data.

Concerns:

- Forest fires have become an issue of global concern. In many countries, wildfires are burning larger areas, and fire seasons are growing longer due to global warming.
- Globally, forest fires release billions of tons of CO2 into the atmosphere, while hundreds of thousands of people are believed to die due to illnesses caused by exposure to smoke from forest fires and other landscape fires.

Causes of Forest Fire:

- Forest fires are caused by Natural causes as well as Man-made or anthropogenic causes.
- Natural causes such as lightning which set trees on fire. High atmospheric temperatures and low humidity offer favourable circumstance for a fire to start.
- Man-made causes like flame, cigarette, electric spark or any source of ignition will also cause forest fires.
- Traditionally Indian forests have been affected by fires. The problem has been aggravated with rising human and cattle population and the increase in demand for grazing, shifting cultivation and Forest products by individuals and communities.
- High temperature, wind speed and direction, level of moisture in soil and atmosphere and duration of dry spells can intensify the forest fires.

India's Initiative to Tackle Forest Fire:

- **National Action Plan on Forest Fires (NAPFF):** It was launched in 2018 to minimise forest fires by informing, enabling and empowering forest fringe communities and incentivising them to work with the State Forest Departments.

- **The Forest Fire Prevention and Management Scheme (FPM)** is the only centrally funded program specifically dedicated to assist the states in dealing with forest fires.

59 Earth holds more than 9,000 'undiscovered' tree species; and they are in danger

Context:

Over 9,200 tree species around the world are still awaiting discovery, according to estimates from a new study. The overall global tally of known and unknown tree species could be nearly 73,000.

Key-highlights of the findings

- The present study "estimated how many species are not yet known (undiscovered).
- 64,088 known tree species exist on earth, and 9,186 species of trees were awaiting discovery.
- **Distribution:** Roughly 43 per cent of all tree species can be found in South America, followed by Eurasia (22 per cent), Africa (16 per cent), North America (15 per cent) and Oceania (11 per cent).
- India is estimated to hold 2,000-2,600 species of trees and undiscovered remain unknown.

What are the threats?

About 30 per cent of tree species are threatened with extinction and at least 142 tree species have been wiped out

- Tree species are threatened due to
- deforestation
- spread of invasive pests and diseases
- climate change
- Human-inflicted pressures
- large development projects
- Large development projects in India

India is making way for a slew of such projects. For example,

- The government has proposed establishing a port, airport, township, and power plant in 16,610 hectares in Great Nicobar, a pristine tropical island in Andaman and Nicobar Islands.
- **Great Nicobar** covers 103,870 hectares of unique and threatened tropical evergreen forest ecosystems.
- Other big dams in **Arunachal Pradesh** and mining in places like **Hasdeo Arand (a forest in Chhattisgarh)** are likely to destroy these valuable forests before we even properly document their rich diversity of trees and other biodiversity.

60 Wayanad Wildlife Sanctuary

Context:

With the onset of summer, the seasonal migration of wild animals has begun from the adjacent wildlife sanctuaries in Karnataka and Tamil Nadu to the Wayanad Wildlife Sanctuary (WWS).

About Wayanad Wildlife Sanctuary

- This wildlife sanctuary is located in Wayanad, Kerala.
- Wayanad Wildlife Sanctuary (WWS) is an integral part of the Nilgiri Biosphere Reserve.
- Nilgiri Biosphere Reserve was the first from India to be included in the UNESCO designated World Network of Biosphere Reserves (designated in 2012).
- **Established in**: 1973
- It is the second largest wildlife sanctuary in Kerala.
- This wildlife sanctuary Spread over 344.44 sq km, is contiguous to the tiger reserves and is bounded by the protected area network of Nagarhole National Park and Bandipur National Park in Karnataka in the northeast, and on the southeast by Mudumalai National Park in Tamil Nadu.
- Kabini river (a tributary of the Cauvery river) flows through the sanctuary.
- It is part of the Deccan Plateau and Western Ghats.
- The forest types include South Indian Moist Deciduous forests, West coast semi-evergreen forests and plantations of teak, eucalyptus and Grewelia.
- It comes under Protect Elephant.
- Elephant, Gaur, Tiger, Panther, Sambar, Spotted deer, Wild boar, Sloth bear, Nilgiri langur, Bonnet macaque, Common langur, Malabar giant squirrel etc are the major mammals.
- This protection area is inhabited by Paniyas, Kurubas, Adiyans, Kurichiyas, Ooralis and Kattunaikkans scheduled tribes.

61 Phasi wood for Jagannath chariot

Context:

- Odisha marked the day of Basant Panchami February 5, 2022, with a prayer ceremony to consecrate the logs used in the chariot of the deity Jagannath.
- But this year, most of the Phasi (Anogeissus acuminata) wood came from private land rather than forests, according to the state forest department.

About Phasi Wood

- Phasi wood is used in chariot.
- The chariot is used in the Jagannath Yatra of Puri later in the year.
- Phasi trees are mostly found in the alluvial floodplain of the Mahanadi.
- Phasi trees take 50-60 years to mature.
- The trees for the chariot have to be pencil straight, six feet in girth and 12-14 feet in height. If the girth is less, they cannot be used.
- Around 865 logs of Phasi, Dhaura (Anogeissus latifolia), Asan (Terminalia elliptica) and Simal (Bombax ceiba), along with a few others, are the tree species majorly used for the construction of chariots of Jagannath, Balabhadra and Subhadra every year.

Reason behind decline in Phasi wood

- Excessive forest loss sans regeneration as well as climate change.

62 Golden Langur

Context:

Neighbours of a golden langur habitat in western Assam's Bongaigaon district have opposed a move by the State government to upgrade it to a wildlife sanctuary.

Background

- **Kakoijana Reserve Forest** is one of the better-known homes of the **golden langur (Trachypithecus geei)** found **only in Assam and Bhutan and a Schedule-I species under the Wildlife Protection Act of 1972.**
- It is listed as among the world's 25 most endangered primates.
- The Assam Forest Department had in January issued a preliminary notification for converting the 19.85 sq. km. patch of forest into the **Kakoijana Bamuni Hill Wildlife Sanctuary.**

About the Species

- **Gee's golden langur (Trachypithecus geei),** also known as simply the golden langur, is an Old World monkey found in a small region of Western Assam, India and in the neighboring foothills of the Black Mountains of Bhutan.
- Long considered sacred by many Himalayan people, the golden langur was first brought to the attention of the western world by the naturalist Edward Pritchard Gee in the 1950s.
- Adult males have a cream to golden coat with darker flanks while the females and juveniles are lighter.
- It has a black face and a long tail up to 50 cm (19.69 in) in length.
- It lives in high trees and has a herbivorous diet of ripe and unripe fruits, mature and young leaves, seeds, buds and flowers.
- The average group size is eight individuals, with a ratio of several females to each adult male.

63 Sanctuaries in Gujarat, Uttar Pradesh listed as Ramsar sites

Context:

- On the occasion of World Wetlands Day, Khijadiya Bird Sanctuary in Gujarat and Bakhira Wildlife Sanctuary in Uttar Pradesh have been included as Ramsar Site from India.
- With this, the total number of Ramsar sites in India goes up to 49.

About Khijadiya Bird Sanctuary

- Khijadiya sanctuary (Ramsar site No. 2464) is located in **Gujarat.** It is a freshwater wetland located near the coast of the Gulf of Kutch.
- Khijadiya has become the fourth wetland of Gujarat to get the Ramsar tag. Nalsarovar Bird Sanctuary, Thol Wildlife Sanctuary and Wadhwana wetland are the other Ramsar sites in the state.
- It was formed following the creation of a bund (dike) in 1920 by the then ruler of the erstwhile princely state of **Nawanagar** to protect farmlands from saltwater ingress.
- The sanctuary is now part of Marine National Park, Jamnagar, the first marine national park in the country.

- The sanctuary is also part of the **Central Asian Flyway.**
- The site provides habitat to endangered **Pallas's fish-eagle (Haliaeetus leucoryphus) and Indian skimmer (Rynchops albicollis), and the vulnerable common pochard (Aythya ferina).**
- The site also regularly supports more than 1% of the south and south-west Asian population of Dalmatian pelicans, more than 2% of greylag goose and more than 20% of common crane.

About Bakhira Wildlife Sanctuary

- **Bakhira Wildlife Sanctuary (site no. 2465**), a freshwater marsh in the **Sant Kabir Nagar district**, is the largest natural floodplain wetland of eastern Uttar Pradesh.
- A freshwater marsh is a non-tidal, non-forested marsh wetland that contains fresh water and is continuously or frequently flooded.
- The Sanctuary was established in 1980 and is protected under the **Wildlife Protection Act (1972).** It is declared as an "eco-sensitive zone" which extends up to a kilometer around its boundary.
- The sanctuary serves as a natural habitat for the state bird, **Sarus.**
- It also provides a wintering ground for over 25 species that migrate on the Central Asian Flyway, some of which are **endangered Egyptian vulture (Neophron percnopterus), the vulnerable greater spotted eagle (Aquila clanga) among others.**
- The sanctuary also supports 45 species of fish such as **vulnerable European carp (Cyprinus carpio) and the catfish Wallago attu, and the near-threatened Gangetic ailia (Ailia coila) and silver carp (Hypophthalmichthys molitrix).**

64 Antimicrobial resistance (AMR) in aquaculture

Context:

Given the threat posed by antibiotic use in the aquaculture sector, there is an urgent need for countermeasures.

About

- AMR is the ability of bacteria and other microbes to resist the drugs used to inhibit or kill them.
- AMR occurs naturally over time, usually through genetic changes. Antimicrobial resistant organisms are found in people, animals, food, plants and the environment (in water, soil and air).
- They can spread from person to person or between people and animals, including from food of animal origin.
- WHO has declared that AMR is one of the top 10 global public health threats facing humanity.
- Antimicrobials – including antibiotics, antivirals, antifungals and antiparasitics – are medicines used to prevent and treat infections in humans, animals and plants.

Drivers of antimicrobial resistance

- **The main drivers of antimicrobial resistance include**
  - the misuse and overuse of antimicrobials
  - lack of access to clean water, sanitation and hygiene (WASH) for both humans and animals
  - poor infection and disease prevention and control in health-care facilities and farms
  - poor access to quality, affordable medicines, vaccines and diagnostics

- lack of awareness and knowledge
- lack of enforcement of legislation

- **Reason behind increasing antimicrobials in aquaculture**
  - Sale of antimicrobials in bulk quantities to aquaculture farmers, particularly shrimp aquaculture, is a serious concern.
  - India is one of the world's largest shrimp exporters, and in addition to health risks posed by antibiotic-laden food, there have been instances of rejection of shrimp consignments from India due to antibiotic detection.

65 "Gates of Hell" to be closed

Context:

Turkmenistan's president wants to close a popular tourist attraction known as the "Gates of Hell." The site is a spectacular natural gas crater that has burned for decades.

What is the 'Gates of Hell'?

- The "Gates of Hell" is located roughly 260 kilometers (160 miles) north of the Turkmen capital, Ashgabat.
- The site is 60 meters (190 feet) wide and 20 meters (70 feet) at its depth.
- Turkmenportal, a Turkmen news site, said the "Gates of Hell" first formed in 1971 when Soviet geologists hit a natural gas cavern in the large Karakum Desert, causing it to collapse by accident.
- Soviet geologists started the fire to prevent the spread of natural gas, mistakenly believing it would be extinguished in a short period of time.
- Decades later, the "Gates of Hell" is still burning, like the inferno it is named for.

Why are there demands to close it?

- There are ecological damage and economic concerns.
- The natural gas fire "negatively affects both the environment and the health of the people living nearby."

66 Red Sanders falls back in IUCN's 'endangered' category

Context:

Red Sanders (Red Sandalwood) has fallen back into the 'endangered' category in the **International Union for Conservation of Nature's (IUCN) Red List.**

About the Species

- The species, **Red Sandalwood (Pterocarpus santalinus),** is an Indian endemic tree species, with a restricted geographical range in the Eastern Ghats.
- The species is endemic to a distinct tract of forests in **Andhra Pradesh.**
- It was classified as 'near threatened' in 2018 and has now joined the 'endangered' list once again.

- It was a moment of celebration when the species was lifted off from the endangered category for the first time since 1997.
- The latest IUCN assessment stated: "Over the last three generations, the species has experienced a population decline of 50-80 per cent. It is assessed as Endangered".

IUCN's Red List

- The IUCN maintains a list — called the Red List — of flora and fauna species and categorises them based on their conservation status.
- The status ranges from 'least concern' for the species that are abundant in numbers to 'extinct' for those that have completely disappeared from the planet.
- Species that come under 'critically endangered', 'endangered' and 'vulnerable' categories are considered threatened.

67 Biological Diversity Amendment Bill 2021

Context:

In a latest development, the Biological Diversity Amendment Bill 2021 has been tabled in the Lok Sabha.

What is India's Biological Diversity Act (2002)?

- India's Biological Diversity Act is rooted in the Convention on Biological Diversity (CBD), an international treaty that India ratified in 1994.
- The treaty calls on its signatories to conserve their biodiversity and sustainably use their biological resources in a fair and equitable manner.
- India responded to the CBD by creating the Biological Diversity Act 2002.
- The Act aims to conserve India's biological diversity, ensure biological resources – including genetic resources and traditional ecological knowledge – are used in sustainable fashion, and that the benefits accrued from their use are shared with local communities in a fair and equitable manner.
- The last bit is formally derived from the 'Access and Benefit Sharing' model defined by the Nagoya Protocol.

Three-tier decentralised system

- Biological Diversity Act 2002 has a three-tier, decentralised system to achieve its goals:
- **Local level:** Biodiversity Management Committees (BMCs) at the level of local self-government bodies such as panchayats implement conservation activities.
  - These include developing 'Peoples' Biodiversity Registers' that document the flora, fauna and associated traditional knowledge of people in the area.
- **State level**: **State Biodiversity Boards (SBBs)** advise their respective state governments on issues related to biodiversity conservation and sustainable use.
- **National level**: The **National Biodiversity Authority (NBA)** performs "facilitative, regulatory and advisory functions" to conserve genetic resources and ensure benefits are shared fairly – including issue permits to use certain resources.

Key-highlights of the Biological Diversity (Amendment) Bill, 2021

Biological Diversity (Amendment) Bill, 2021 seeks to:

- reduce the pressure on wild medicinal plants by encouraging the cultivation of medicinal plants
- exempts Ayush practitioners from intimating biodiversity boards for accessing biological resources or knowledge
- facilitates fast-tracking of research, simplify the patent application process, decriminalises certain offences
- bring more foreign investments in biological resources, research, patent and commercial utilisation, without compromising the national interest

68 Albino Indian Flapshell Turtle

Context:

Recently, Mountaineers in Telangana have encountered a rarely found species of Albino Indian Flapshell Turtles. This Indian flapshell turtle that has been discovered several times in various parts of South Asia.

About Indian Flapshell Turtle

- Indian flapshell turtle (Lissemys punctata) is a freshwater species of turtle found in South Asia.
- The "flap-shelled" name stems from the presence of femoral flaps located on the plastron.
- These flaps of skin cover the limbs when they retract into the shell.
- They are found in Pakistan, India, Sri Lanka, Nepal, Bangladesh (Indus and Ganges drainages), and Myanmar (Irrawaddy and Salween Rivers).
- They live in the shallow, quiet, often stagnant waters of rivers, streams, marshes, ponds, lakes and irrigation canals, and tanks.
- These turtles prefer waters with sand or mud bottoms because of their tendency to burrow.
- They are also well adapted to drought conditions.
- They are known to be omnivorous.
- Its diet consists of frogs, shrimp, snails, aquatic vegetation, plant leaves, flowers, fruits, grasses and seeds.
- **IUCN Status:** Vulnerable

Reason behind different colors

The different color of the turtle may be due to albinism – a genetic disorder that causes a complete lack of pigments in the body, or a congenital disorder that is characterized by a complete or partial absence of tyrosine pigment.

69 BNHS calls for a new 'Vulture Census'

Context:

Scientists at the Bombay Natural History Society (BNHS) have recently called for a new vulture census as they believe the population of vulture has stabilized over the years.

Important facts about Vultures

- This large bird of prey with a head and neck more or less bare of feathers, is a relatively social species.

- Vultures are carnivorous and they eat carrion almost exclusively.
- A group of vultures is called a committee, volt or venue.
- In flight, a flock of vultures is a kettle.
- When the birds are feeding together at a carcass, the group is called a wake.

Vulture species in India and their status

In India, there are 9 recorded species of vultures:

- Oriental white-backed
- long-billed
- Slender-billed
- Himalayan
- red-headed
- Egyptian
- Bearded
- Cinereous
- Eurasian Griffon

Status of the population

- Between the 1990s and 2007, numbers of three presently critically-endangered species (Oriental white-backed, long-billed and slender-billed vultures) — crashed massively with 99 % of the species having been wiped out.
- The number of red-headed vultures, also critically-endangered now, declined by 91%
- Egyptian vultures, listed as 'endangered', declined by 80%.
- The Himalayan, bearded and cinereous vultures are 'near threatened'.

Cause of decline

- The cause of the decline was established as diclofenac.
- It is a veterinary nonsteroidal anti-inflammatory drug (NSAID), which is used to treat pain and inflammatory diseases such as gout in carcasses that vultures would feed off.

Why are Vultures important?

- **Nature's clean-up crew:** Vultures rid the landscape of deteriorating carcasses and thus help curb the spread of dangerous diseases and bacteria.
- Their clean-up property is due to strong enzymes present in their stomach that kill off dangerous toxins and microorganisms.

70 Illegal salt mining

Context:

Sambhar, India's largest inland salt lake is being choked by illegal salt extraction, as per a latest study.

Key highlight about the Report

- The world famous Sambhar Salt Lake in Rajasthan is constantly shrinking with the degradation of soil and water quality and a decline in the population of migratory birds,
- The lake needs a faster restoration for conservation of its wetland and salt brine worth $300 million.
- The birds foraging in the Sambhar marshlands had died due to avian botulism.
- The death of more than 20,000 birds belonging to about 10 species which migrate annually to the lake due to avian botulism, a neuromuscular illness.
- Avian botulism is a neuro-muscular illness caused by Botulinum (a natural toxin) that is produced by a bacteria — Clostridium botulinum.
- The bacteria is commonly found in the soil, rivers, and seawater.

Mining in the region

- 30% of the Sambhar Lake's area had been lost to mining and other activities, including the illegal salt pan encroachments.
- It has also threatened the livelihoods of local people who have always lived in harmony with the lake and its ecology.
- The conducted geospatial modelling for 96 years, from 1963 to 2059, at a decadal scale with the integration of ground data on birds, soil and water.
- Reduction of wetland from 30.7% to 3.4% at a constant rate with its conversion into saline soil, which increased by 9.3%, the future predictions had depicted a loss of 40% of wetland and 120% of saline soil and net increase of 30% vegetation, 40% settlement, 10% salt pan and 5% barren land.

About Sambhar lake

- Location: Sambhar lake is situated about 80 km southwest of Jaipur, in east-central Rajasthan.
- Ramsar Site: It is a wetland of 'international importance' under the Ramsar Convention, declared in 1990.
- Area Covered: The area occupied by this lake differs from season to season, so roughly it is between 190 and 230 sq km.
- Largest salt Lake: It is the largest inland salt lake in India. It represents the depression of the Aravalli Range.
- It is known for the production of brine/salt and also houses one of the largest salt manufacturing units in the country.
- Attracts migratory birds: The country's largest inland saline water body which attracts thousands of migratory birds every year.

71 Koli community's fight to save Mumbai's mangroves

Context:

Activists from the Koli community are running awareness drives as they try to save Mumbai's mangroves, a biodiversity hotspot and their source of livelihood.

What are mangroves?

- Mangroves are coastal forests situated between the ocean and land, made up of shrubs or small trees, which grow in coastal saline or brackish water.
- Mangroves are salt-tolerant vegetation that grows in intertidal regions of rivers and estuaries.
- Conservation Status: So far, none of the mangrove species has been included in the Red List of the International Union for Conservation of Nature (IUCN).
- Category: They are referred to as 'tidal forests' and belong to the category of 'tropical wetland rainforest ecosystem'.
- Coverage: Mangrove forests occupy around 2,00,000 square kilometres across the globe in tropical regions of 30 countries. India has a total mangrove cover of 4,482 sq km.
- A mangrove ecosystem is the interface between terrestrial forests and aquatic marine ecosystems.
- The ecosystem includes diversified habitats like mangrove-dominant forests, litter-laden forest floors, mudflats, coral reefs and contiguous water courses such as river estuaries, bays, inter-tidal waters, channels and backwaters

Important mangroves spices

- **Bruguiera cylindrica and Sonneratia acida (**at the verge of extinction).
- **Miswak (Salvadora Perisica),** which is used in the toothpaste

What's the Conflict?

- The mangroves by the **Kasadi river** are a microcosm of what has long been transpiring in the once rich expanse of Mumbai's coastal forests.
- As the Navi Mumbai Airport gets approvals for construction, permission to clear another 6 acres of mangroves has been granted.

Koli Community

- The Koli community, considered Bombay's original inhabitants, have had a long and complex relationship with mangroves.
- Koli, also called Kori, caste with many subgroups who inhabit the central and western mountain area of India. The largest groups of Koli live in the state of Maharashtra, especially in Mumbai, and in Gujarat state.

72 Study on the social behavior of male Asian elephants

Context:

- As human-elephant conflicts increase with time and expanding human range, understanding social behavior becomes crucial to the conservation and management of the highly social and endangered Asian elephant (Elephasmaximusindicus).
- A study is being conducted by Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous Institute of the Department of Science and Technology, Government of India.

About the Asian elephants

- **IUCN STATUS:** Endangered

- It is kept under Appendix I of the United Nations Convention on the Conservation of Migratory.
- **POPULATION**: Fewer than 50,000
- The Asian elephant is the largest land mammal on the Asian continent.
- They inhabit dry to wet forest and grassland habitats in 13 range countries spanning South and Southeast Asia.
- Asian elephants are extremely sociable, forming groups of six to seven related females that are led by the oldest female, the matriarch.
- In Asia, elephant herd sizes are significantly smaller than those of Savannah elephants in Africa.
- In India, the Asian elephant was once widely distributed throughout the country, including in states like Punjab and
- Currently, they are found in four fragmented populations, in the south, north, central and northeast India.
- Their habitat ranges from wet tropical evergreen forests to semi-arid thorn and scrub forests. However, the highest densities of the elephant population are found in tropical deciduous forests.
- Elephants are 'megaherbivores' that require vast tracts of forests, rich in food and water to survive.

73 Molecular Ecology for Wildlife Disease Management

Context:

Studies are being conducted over wildlife protection, which is threatened by urbanization, deforestation, loss of wildlife, and human-wildlife conflicts, through molecular ecology.

What is molecular ecology?

- Molecular ecology is a hybrid field that combines molecular biology techniques with ecological data to make sense of natural processes such as
  - growth or decline of populations
  - formation of new species
  - extinctions
  - invasiveness
- Genetic data from organisms are collected in the form of 'molecular markers,' which are biological molecules that may be used to distinguish between species, populations, or individuals.
- Specific DNA sequence, microsatellites, minisatellites and single nucleotide polymorphisms, as well as techniques such as DNA profiling/fingerprinting, can be applied to identify which country or population the poached animal came from.

How the molecular ecology is used in diversity management?

- **Diversity studies**: Genetic data is studied to find out the diversity and its patterns in the population.
- **Population stability**: The phenomenon of inbreeding and outbreeding is targeted to get the desired outcomes for population stabilization.
- **Genetic diversity stabilization**: The genetic make-up of a population can be rectified through the process of genetic rescues.
- Genetic rescues are carried out by introducing new individuals (which can add more genetic variation) into inbred populations to increase genetic diversity.

- **Survival analysis**: The specific gene study is beneficial for the study of the survival of species in a particular environment.
  - For example, in India, molecular ecology studies on the critically endangered gharial and blackbuckreveal that the genetic diversities in managed populations of these animals are not high, painting a grim picture for their chances of survival.
- The genome-wide data on tigers suggests that compared to the tigers from Amur, Sumatran, and Malayan populations, Indian tigers have very high genetic diversity.
- **Disease Management**: Molecular ecology has now become an important part of wildlife disease management.
- **Forensic**s: Molecular forensics using DNA barcoding has been used to identify species even from processed samples such as dried meat and powdered bones or horns.
  - For animals, sequences from the mitochondrial gene COX1 or CO1 (cytochrome oxidase 1) are usually used.

74 Saiga antelope is making a comeback

Context:

The Saiga Antelope has been a critically endangered species since 2018. But the antelope species is making a comeback.

About the Saiga antelope

- **Characteristics:** The Saiga antelope (Saiga tatarica) is a migratory ungulate of the steppes and semi-deserts of Eurasia.
- The Saiga is known for its distinctive bulbous nose.
- **Distribution:** Kazakhstan is home to a majority of the world's Saiga.
- Until the late 1980s, more than a million saigas roamed the arid regions of **Kazakhstan, Mongolia, the Russian Federation, Turkmenistan, and Uzbekistan.**
- **Increase in Population:** The population of the Saiga antelope has more than doubled in Kazakhstan since 2019.
- **Conservation Status**: The International Union for Conservation of Nature (IUCN) deems the Saiga to be among five critically endangered antelope species.
- **Threats:** Around 2,00,000 antelopes were wiped out due to a nasal bacterium that spread in unusually warm and humid conditions in 2015.
  - The threat of poaching is fuelled by the demand for the Saiga's horn in traditional Chinese medicine. Kazakhstan's leaders have pledged to intensify their crackdown on poaching.
  - Climate change and the expansion of human activity through farming and infrastructure projects are other threats to Saiga.

75 Operation Olivia

Context:

The Olive Ridleys (Lepidochelysolivacea) rescue plan is being conducted by the India's Coast Guards, at the Odisha Coast under the Operation Olivia.

About the Operation Olivia

- The operation helps to protect Olive Ridley turtles as they congregate along the Odisha coast for breeding and nesting from November to December.
- It was initiated in the early 1980s.
- It is supported through the enactment of the **Orissa Marine Fisheries Act.**

Olive Ridley Turtles

- The Olive Ridley turtles are the smallest and most abundant of all sea turtles found in the world.
- They inhabit the warm waters of the Pacific, Atlantic and Indian oceans.
- These turtles are best known for their unique mass nesting called Arribada, where thousands of females come together on the same beach to lay eggs.
- It is listed as vulnerable under the International Union for Conservation of Nature's Red list.

Conservation Status:

- It is protected under the **Schedule I of the Indian Wildlife Protection Act, 1972.**
- It is also listed in the **Appendix I of the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES).**

76 Protected Planet Reports 2020

Context:

As many as 82 percent of countries and territories increased their share of protected area and coverage of other effective **area-based conservation measures (OECM)** since 2010.

What is Protected Planet Report?

- **Publication:** Biennial landmark publications
- **Aim:** To assess the state of protected and conserved areas around the world.
- **Prepared by:** It is prepared by the United Nations Environment Programme (UNEP) World Conservation Monitoring Centre (UNEP-WCMC) and the International Union for the Conservation of Nature (IUCN) with support from the National Geographic Society, a global non-profit.

The 2020 Edition

- The 2020 edition provides the final report on the status of **Aichi Biodiversity Target 11**, and looks to the future as the world prepares to adopt a new post-2020 global biodiversity framework.

What's new in this year's report?

- The Report finds that the international community has made major progress towards the global target on protected and conserved area coverage, but has fallen far short on its commitments on the quality of these areas.
- The report finds great progress since 2010 with 22.5 million km2 (16.64%) of land and inland water ecosystems and 28.1 million km2 (7.74%) of coastal waters and the ocean within documented protected and conserved areas, an increase of over 21 million km2 (42% of the current coverage) since 2010.
- It is clear that coverage on land will considerably exceed the 17% target when data for all areas are made available, as many protected and conserved areas remain unreported.

- On an average, 62.6 per cent of key biodiversity areas (KBA) either fully or partially overlap with protected areas and OECMs. Yet a third of KBAs lack any coverage, and less than 8% of land is both protected and connected.
- The average percentage of each KBA within protected areas and OECMs is 43.2 per cent for terrestrial; 42.2 per cent for inland water and 44.2 per cent for marine (within national waters).
- There was an increase of 5 percentage points or less in each case since 2010, the greatest growth in marine and coastal areas, the report stated.
- The report also identifies crucial opportunities for further improving the protected and conserved area network under the next set of global nature targets.
- A new framework of goals is due to be agreed upon at the **United Nations Biodiversity Conference in Kunming, China**, on October 11 this year.

Aichi Biodiversity Target 11

Aichi Biodiversity Target 11 calls for the conservation of "at least 17% of terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, "through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape."

OECM

OECM are a conservation designation for areas that are achieving the effective in-situ conservation of biodiversity outside of protected areas. This report is the first in the series to include data on OECMs in addition to protected areas.

77 Biofloc method for 'Vannamei farming'

Context:

The Kerala University of Fisheries and Ocean Studies (Kufos) is opting to deploy the biofloc method for Vannamei shrimp farming.

About the initiative

- Till now, the genetically-modified farmed tilapia (GIFT) fish was grown using this technology.
- Now the species Vannamei shrimp is considering as a suitable for this type of cultivation.
- Experimental Vannamei farming was begun in the State around six years ago under an initiative by Kufos.
  - Vannamei is an exotic white leg shrimps.
  - It is native to the Eastern Pacific Ocean.
  - It is also found to be suited to the brackish water conditions in Kerala.
  - Extensive culture of Vannamei is done in Andhra Pradesh, West Bengal, Orissa, and Tamil Nadu, among other coastal States.
- The ICAR-Central Institute of Brackishwater Aquaculture in Chennai has also launched a mobile application, Vanami shrimpapp, for disseminating information on shrimp farming.

Biofloc technology

- The biofloc model is an intensive aquaculture system.
- It is considered to hold an advantage over conventional systems, as the normally harmful waste produced in conventional aquaculture can be turned into feed for fish.
- The biofloc technology had now been standardised.
- People with limited land area could take up fish culture using the technology.
- It has found acceptance among aquaculturists with the Department of Fisheries is also offering support for the programme.

78 Mukurthi National Park

Context:

The ecologically-sensitive area of Naduvattam, adjoining the Mukurthi National Park is at risk, due to the construction of buildings as well as an illegal road cutting through forest land.

About the Naduvattam area

- Naduvattam area has high diversity of endemic species, which is second only to Cispara in the Mukurthi National Park.
- The area hosts the endemic balsams in the area which are found only in this area.
- The area serves as a crucial corridor for wildlife connecting Mukurthi National Park, Mudumalai Tiger Reserve and Gudalur.

Mukurthi National Park

- Mukurthi National Park is a protected area and is located in the western corner of the Nilgiri, Western Ghats, Tamil Nadu.
- The park was formed to protect its keystone species, the Nilgiri tahr.
- The park is characterized by montane grasslands and shrublands and is interspersed with sholas.
- It is home to an array of endangered wildlife, which includes royal Bengal tiger and Asian elephant.
- The park was earlier known as Nilgiri Tahr National Park.

79 Sea Sponges movement in the Arctic Ocean Seafloor

Context:

A new study has upended the assumption that the sponges are immovable. The study has pushed and prodded the scientific thought into a new direction.

About the key findings

- **Species:** The main species in the region were identified as Geodia parva, G. hentscheli, and Stelletta rhaphidiophora.
- **Finding:** The study found the sea sponges were appeared to be crawling uphill and even on top of each other.

- The study found that sea sponges made limited movements by expanding and contracting their bodies in a laboratory setting.
- It is found for the first time that sea sponges drifted and rolled across the seafloor in the northeast Pacific Ocean.
- The larvae of the sea sponge are known to be mobile and the adults have generally been believed to be sessile, or immobile.
- They lack muscles or other specialized organs that would help them get around.

- **Reason:** No exact reason for their movement has been given yet.
- The researchers hypothesize that the sponges are moving to find food or to disperse juveniles.
- **Significance**: The study has opened the new vistas of study towards this phylum.

Sea Sponges

- These are the members of the phylum Porifera.
- They are Diplobastic means their germ layer is divided in two layers that is ectoderm and endoderm.
- They are multicellular organisms.
- There bodies are full of pores and channels allowing water to circulate through them.
- Sponges do not have nervous, digestive or circulatory systems.
- They rely on maintaining a constant water flow through their bodies to obtain food and oxygen and to remove wastes.
- All sponges are sessile aquatic animals, which means that they attach to an underwater surface and remain fixed in place.
- Many sponges have internal skeletons of spongin and/or spicules made up of calcium carbonate or silicon dioxide.
- The study of sponges is known as spongiology.

82 KVIC's Innovative Project RE-HAB (Reducing Elephant – Human Attacks Using Bees)

Context:

The Project RE-HAB has shown a huge potential and will soon be replicated in all states which are affected by elephant attacks such as West Bengal, Jharkhand, Odisha, Chhattisgarh, Assam, Tamil Nadu and Kerala.

About the Mission RE-HAB

- The Mission is an initiation of **Khadi and Village Industries Commission's (KVIC).**
- Under the project the bee boxes are used as fences to prevent elephants to enter in human habitation.
- **Location:** It was launched on the periphery of **Nagarhole National Park** in Kodagu district, Karnataka.
- **Outcomes:**
  - The innovative Project RE-HAB has significantly reduced elephants' presence in residential areas.

- The projects results are encouraging as they have prevented elephant's movement into human territories.
- It is considered to a unique and cost-effective way of preventing elephant – human conflict.
- A number of elephants are seen returning to the jungles fearing honey bee.
- Also, no destruction of crops or property by elephants has been reported in these areas since the bee boxes have been placed on the passageways of elephants.

- **Benefits:**
  - Project RE-HAB will have multi-pronged benefits such as
  - reducing human-elephant conflicts
  - increasing farmers' income through beekeeping
  - addressing climate change
  - regenerating forest cover

Khadi and Village Industries Commission (KVIC)

- It is a statutory body which was formed in **April 1957.**
- It was created under the Act of Parliament, **'Khadi and Village Industries Commission Act of 1956'.**
- It is an apex organization under the **Ministry of MSME.**
- It aims to "plan, promote, facilitate, organize and assist in the establishment and development of khadi and village industries in the rural areas.

81 Protect Great Indian Bustard

Context:

The Supreme Court swooped-in to intervene on behalf of the critically endangered Great Indian Bustards over the birds falling dead after colliding with power lines running through their dwindling natural habitats in Gujarat and Rajasthan.

About Great Indian Bustard

- The **great Indian bustard (Ardeotisnigriceps)** or Indian bustard is a bustard found on the Indian subcontinent.
- This bird is among the heaviest of the flying birds.
- The great Indian bustard is omnivorous.
- It is commonly found on the dry plains of the Indian subcontinent.
- As few as 150 individuals were estimated to survive in 2018.
- In 2011 Birdlife International up-listed it from Endangered to Critically Endangered

Habitat:

- This species was formerly widespread in India and Pakistan.
- The bird is found in Rajasthan, Karnataka, Maharashtra, Madhya Pradesh, and Gujarat states of India.

Threat:

- The main threats are hunting and habitat loss.
- The collision with the power lines is also a major concern now.

Conservation Status

- It is listed in Schedule I of the Indian Wildlife (Protection) Act, 1972.
- In the CMS Convention and Appendix I of CITES.
- Critically Endangered on the IUCN Red List and the National Wildlife Action Plan (2002-2016).
- It is protected under the Wildlife Protection Act 1972 of India.
- It has also been identified as one of the species for the recovery program under the Integrated Development of Wildlife Habitats of the Ministry of Environment and Forests, Government of India.

Important conservation sites in different states

- Desert National Park, Rajasthan
- Coastal grasslands of the Abdasa and Mandvitalukas of Kutch District of Gujarat
- Ghatigaon and Karera sanctuaries in Madhya Pradesh
- Kutch Bustard Sanctuary, Kutch,
- Great Indian Bustard Sanctuary, Maharashtra
- Rollapadu Wildlife Sanctuary, Andhra Pradesh

82 Protection of endangered pangolin

Context:

In the Eastern Ghats, a small movement, to protect the endangered pangolin, is underway which includes the awareness generation, protection from poaching and collaborating for protection.

What is the new project?

- The Eastern Ghats Wildlife Society (EGWS), in collaboration with Save Pangolins and Pangolin Crisis Fund USA initiated an immediate conservation status survey to acquire vital data on the presence/absence of the species and specific human-induced threats.
- The project area is mainly human-dominated landscapes and unprotected forest patches where Pangolins inhabit.
- The main goal of the project is to generate baseline data on the distribution of Indian pangolins in Northern Andhra Pradesh.

About Pangolin

- Pangolins are solitary and primarily nocturnal animals.
- Also known as scaly anteaters, they belong to the Mammals.
- Pangolins have large, protective keratin scales covering their skin; they are the only known mammals with this feature.
- It lives in hollow trees and burrows.

- Eight species of pangolins are found on two continents namely Africa and Asia. They range from Vulnerable to Critically Endangered.
- **Four species live in Africa:**
  - Black-bellied pangolin (Phataginus tetradactyla)
  - White-bellied pangolin (Phataginus tricuspis)
  - Giant Ground pangolin (Smutsia gigantea)
  - Temminck's Ground pangolin (Smutsia temminckii)
- **Four species found in Asia:**
  - Indian pangolin (Manis crassicaudata)
  - Philippine pangolin (Manis culionensis)
  - Sunda pangolin (Manis javanica)
  - Chinese pangolin (Manis pentadactyla)

83 WCCB wins Asia Environmental Enforcement Award-2020

Context:

- The Wildlife Crime Control Bureau (WCCB) has received the Asia Environmental Enforcement Award-2020.
- **Awarded by:** United Nations Environment Programme (UNEP).

Key takeaways

- WCCB got the award twice in three years.
- It has been awarded this year under the Innovation category.

Wildlife Crime Control Bureau (WCCB)

- It is a statutory body constituted under the WildLife (Protection) Act, 1972.
- **Ministry:** Ministry of Environment and Forests.
- **Mandate:** To combat organized wildlife crime in the country.
- **Headquarter:** New Delhi
- **Regional offices**: Delhi, Kolkata, Mumbai, Chennai and Jabalpur
- WCCB has developed an online Wildlife Crime Database Management System to get real time data to analyse trends in wildlife crimes across India.
- This system has been successfully used for carrying out operations such as Operation Save Kurma, Thunderbird, Wildnet, Lesknow, Birbil, Thunderstorm, Lesknow-II etc resulting in huge seizures of Tiger/Leopard Skin/bones, Rhino Horn, Elephant Ivory etc.

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4 ENVIRONMENTAL POLLUTION

1 Methane Emission

Why in News?

- A report titled "Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions" was released by the Climate and Clean Air Coalition (CCAC) and the United Nations Environment Programme (UNEP).
- The report of Global Methane Assessment suggests that to avoid the worst of climate change the world needs to dramatically cut methane emissions.

Why is methane is a greenhouse gas?

- Methane accounts for about a fifth of global greenhouse gas (GHG) emissions and is about 25 times as potent as carbon dioxide in trapping heat in the atmosphere.
- In the last two centuries, methane concentrations in the atmosphere have more than doubled, mainly due to human-related activities.
- Methane is short-lived, compared with carbon dioxide.
- Methane is emitted from a variety of anthropogenic (human-influenced) and natural sources.
- The human sources include landfills, oil and natural gas systems, agricultural activities as well as livestock rearing, coal mining, stationary and mobile combustion, wastewater treatment, and certain industrial processes.
- Sources of methane can be harnessed for energy and in principle reduce dependence on energy sources that emit high carbon dioxide.

Related Indian Initiatives

- **Seaweed-Based Animal Feed-** In collaboration with the country's three leading institutes the Central Salt & Marine Chemical Research Institute (CSMCRI) developed a seaweed-based animal feed additive formulation that aims to reduce methane emissions from cattle and also boost immunity of cattle and poultry.
- **India Greenhouse Gas Program-** The India GHG Program builds comprehensive measurement and management strategies to reduce emissions and drive more profitable, competitive and sustainable businesses and organizations in India. The program is led by WRI India (non-profit organization), Confederation of Indian Industry (CII) and The Energy and Resources Institute (TERI) an industry-led voluntary framework to measure and manage greenhouse gas emissions.

- **National Action Plan on Climate Change-** Launched in 2008 NAPCC aims at creating awareness on the threat posed by climate change and the steps to counter it among the representatives of the public, different agencies of the government, scientists, industry and the communities.
- **Bharat Stage-VI Norms-** India shifted from BS-IV to BS-VI emission norms. With the implementation of the new norms, pollution levels are expected to reduce to a large extent as the particulate matter (PM) concentration should decrease.

2 Pet Coke

Why in news?

- The Directorate General of Foreign Trade banned the use of imported petcoke as fuel.
- Use of Petcoke is allowed only for cement, lime kiln, calcium carbide and gasification industries when used as the feedstock or in the manufacturing process on actual user condition.

About Petcoke:

- Petcoke is an exceptionally polluting form of carbon which is banned in several countries due to its severe toxicity.
- Petroleum coke or petcoke, is a final carbon-rich solid material that derives from oil refining.
- It is categorized as a "bottom of the barrel" fuel as it is essentially residual waste material which is obtained after refining coal to extract lighter fuels like petrol.
- Petcoke is abundantly used in India in several manufacturing industries such as cement, steel and textile and it is generated in vast quantities by refineries as it is significantly cheaper that coal, has high calorific value and is easier to transport and store.

Composition:

- Petcoke is over 90 percent carbon and emits 5 to 10 percent more carbon dioxide. (CO_2) than coal on a per-unit-of-energy basis when it is burned.
- Petcoke has a higher energy content therefore it emits between 30 and 80 percent more CO_2than coal per unit of weight.

Hazards of Pet Coke:

- Petcoke is much more potent pollutant than coal and causes greater harm to the environment and health.
- It contains whopping 74,000 PPM of sulphur content which is released into atmosphere as emissions which is much higher than vehicular emissions.
- It is also a source of fine dust, which can get through filtering process of human airway and lodge in lungs which can cause serious health problems.
- Apart from sulphur, petcoke also releases cocktail of other toxic gases after burning such as nitrous oxide, mercury, arsenic, chromium, nickel, hydrogen chloride and greenhouse gases (GHG) which contribute to global warming.

3 Fly Ash

Context:

Maharashtra became the first state in the country to adopt the **Fly Ash Utilization Policy**. The policy paves way for prosperity by generating wealth from waste and environment protection.

What is fly ash?

Fly ash is a fine, glass powder by-product recovered from gases of burning coal in thermal power plants during production of electricity.

- Fly ash is a byproduct of burning pulverized coal in thermal power plants.
- During combustion, mineral impurities in the coal (clay, feldspar, quartz, and shale) fuse in suspension and float out of the combustion chamber with the exhaust gases.
- As the fused material rises, it cools and solidifies into spherical glassy particles called fly ash.
- The low-grade coal used in thermal power generation carries 30-45% ash content. The high-grade imported coal has a low ash content of 10-15%.
- Since most of the coal used in thermal plants is low-grade, it generates a large quantity of ash which requires a large area as landfill or ponds for disposal.
- All fly ashes exhibit cementitious properties to varying degrees depending on the chemical and physical properties of both the fly ash and cement.

What are environmental concerns?

The Fly ash causes air pollution. It can also contaminate water and soil systems. The wet disposal of Fly ash results in leaching of toxic heavy metals in ground water system.

- **Usage**
  - It is an excellent material for making construction materials such as bricks, mosaic tiles and hollow blocks.
  - Bricks made of fly ash can help conserve soil to a great extent.
  - There are several eco-friendly ways to utilise fly ash so that it does not pollute air and water.
  - It includes the use of fly ash in the manufacturing of cement, ready-mix concrete; constructing roads, dams and embankment, and filling of low-lying areas and mines.
- **Issues**
  - Fly ash contains toxic and heavy metals.
  - The ponds where fly ash is usually dumped are poorly managed. Fly ash becomes dry as temperature increases and gets airborne.
  - Thus, it becomes one of the major sources of air and water pollution.
  - Air in areas around coal-fired power plants is polluted with fly ash.
  - Apart from causing various diseases, it also leads to reduction in the recharging of groundwater.

Fly Ash Utilization Policy

- Maharashtra became the first state in the country to adopt the **Fly Ash Utilization Policy**. The policy paves way for prosperity by generating wealth from waste and environment protection.

- The policy seeks 100% use of fly ash generated from thermal power plants and biogas plants for construction activities.
- Facilitates use of fly ash to make bricks, blocks, tiles, wall panels, cement and other construction materials.
- The policy extends use of fly ash to 300 kms radius of power plant from earlier 100 kms radius of power plant.
- It will help in environment protection and save soil excavation. It also will make available raw material for construction at low cost to help 'Housing for All' projects.
- It will also help create new employment opportunities in the power plant sector and pave way for prosperity by generating Wealth from Waste

4 Proposal to tighten limits for POPs

Context:

The **European Commission** has recently proposed to tighten limits for a range of **persistent organic pollutants (POPs)** to tackle contamination in recycled products, health and environment.

What are POPs?

- **Persistent Organic Pollutants (POPs)** are **organic chemical substances**, that is, they are carbon-based.
- They possess a particular combination of physical and chemical properties such that, once released into the environment, they:
- remain intact for exceptionally long periods of time (many years)
- become widely distributed throughout the environment as a result of natural processes involving soil, water and, most notably, air
- accumulate in the living organisms including humans, and are found at higher concentrations at higher levels in the food chain are toxic to both humans and wildlife

Stockholm Convention on POPs:

The **Stockholm Convention on Persistent Organic Pollutants** is a **global treaty** to **protect human health and the environment** from chemicals that:

- remain intact in the environment for long periods
- become widely distributed geographically
- accumulate in the fatty tissue of humans and wildlife
- have harmful impacts on human health or on the environment
- It sets up a system for tackling additional chemicals identified as unacceptably hazardous.
- The Global Environmental Facility (GEF) is the designated interim financial mechanism for the Stockholm Convention.

Aim: The Stockholm Convention is perhaps best understood as having five essential aims:

- Eliminate dangerous POPs, starting with the 12 worst
- Support the transition to safer alternatives

- Target additional POPs for action
- Cleanup old stockpiles and equipment containing POPs
- Work together for a POPs-free future

Other important Convention:

- The Basel Convention on Control of Trans-boundary Movements of Hazardous Wastes and their Disposal was adopted in 1989 and entered into force in 1992.
- The Rotterdam Convention on the Prior Informed Consent Procedure (PIC) for Certain Hazardous Chemicals and Pesticides in International Trade was adopted in 1998 and entered into force in 2004.

5 Himachal: First LPG-enabled and smoke-free state

Context:

Himachal Pradesh has become the first LPG enabled and smoke free-state in the country due to the Ujjwala scheme of the Central Government and housewives welfare scheme of the State Government.

Pradhan Mantri Ujjwala Yojana (PMUY):

- PMUY is a programme launched by the government on May 1, 2016.
- The implementation of the scheme is under the Ministry of Petroleum and Natural Gas through its Oil Marketing Companies.
- The primary purpose of the scheme is to distribute LPG (liquefied petroleum gas) connections to the women of low households in India.
- The programme was initially launched with a budget of Rs. 80 billion.
- Initially, five crores BPL (below poverty line) households were targeted through PMUY; the target was achieved by March 31, 2019.
- An additional allocation of Rs 4,800 crore was done, and the target was expanded to benefit 80 million low-income families through the scheme.
- Under this scheme, towards an initiative for the loss by Covid-19 outbreak, the Finance Minister of India, announced to provide cylinders free of cost to the BPL families from March 26, 2020, for three months.

Liquified petroleum gas (LPG):

- Liquified petroleum gas (LPG) is a fuel used in many household appliances for cooking, heating, and hot water.
- It is called liquefied gas because it is easily transformed into a liquid.
- LPG composition is primarily propane, butane, isobutane, butylenes, propylene and mixtures of these gases.
- LPG is composed of liquid or gas (vapor), depending on pressure and LPG gas temperature.
- LPG needs only low pressure or refrigeration to change it into liquid from its gaseous state.

About Mukhyamantri Grihini Suvidha Yojana

- The Mukhya Mantri Grihini Suvidha Yojana was launched on May 26, 2018.

- With the concerted efforts of the Central and state governments, the women of the state had become free from indoor pollution.
- Besides, to conserve the environment, a free LPG connection was given to families with no gas connection.

The progress

- Under the Ujjwala scheme, 1.36 lakh free domestic kitchen connections were given by the central government at a cost of Rs 21.81 crore while 3.23 lakh housewives were given Rs 120 crore under the Mukhyamantri Grihini Suvidha Yojana.

Need of the Scheme

- The objective of launching the scheme was to provide free gas connections to those families which were not covered under the Centre's Ujjwala scheme.
- These schemes have reduced the dependence on wood for fuel.
- The adverse effect of smoke on women's health has also been relieved. Due to these schemes, the standard of living of women has also improved.

Indoor air pollution:

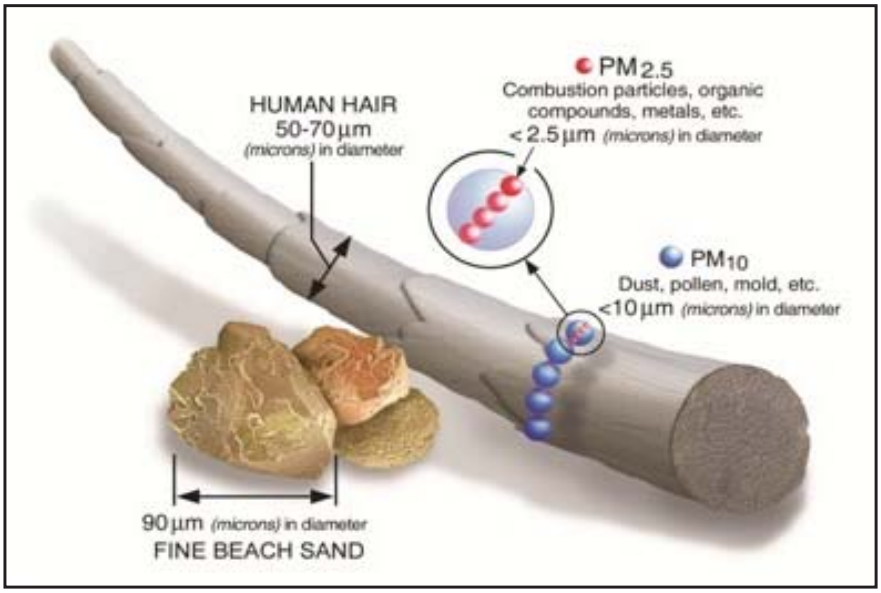
- It refers to the physical, chemical, and biological characteristics of air in the indoor environment within a home, building, or an institution or commercial facility.
- A number of air pollutants have been recognised to exist indoors, including NOx, SO2, ozone (O3), CO, volatile and semi-volatile organic compounds (VOCs), PM, radon and microorganisms.

6 Deaths linked to PM2.5 2nd highest in India

Context:

India recorded 867,000 deaths in 2017 due to exposure to fine particulate matter (PM2.5) — the second-highest in the world, according to a new report.

Particulate Matter (PM):



- **Airborne particulate matter (PM)** is not a single pollutant, but rather is a mixture of many chemical species.
- Particles are defined by their diameter for air quality regulatory purposes.
- **Particulate matter 2.5 (PM2.5),** refers to tiny particles or droplets in the air that are two and one half microns or less in width.
- The widths of the larger particles in the PM2.5 size range would be about thirty times smaller than that of a human hair.
- The smaller particles are so small that several thousand of them could fit on the period at the end of this sentence.

Key-highlights of the Study:

- China topped the list with 1,387,000 deaths.
- Indonesia came third, recording 94,000 deaths, followed by Egypt 88,000, Pakistan 86,000, Russian Federation 68,000, Bangladesh 64,000, Nigeria 51,000 and the United States 47,000.
- In India, the top four of the 200 areas with the highest PM2.5 concentrations — Singrauli, Kanpur, Sitapur and Ahmedabad — all experienced increase in population-weighted mean (PWM) for PM2.5 mass between 1970 and 2017 (the study period).
- The PWM for these places were 14-16 times the annual average advocated in World Health Organization guidelines.

The Study:

- The study Global Burden of Disease from Major Air Pollution Sources: A Global Approach by Health Effects Institute (HEI), an independent, non-profit research institute was published December 15, 2021.
- It analyzed data on air pollution and mortality from 1970-2017.

7 COP to Basel, Rotterdam and Stockholm Conventions

Context:

The 15th meeting of the COP to the Basel Convention, the tenth meeting of the COP to the Rotterdam Convention and the tenth meeting of the COP to the Stockholm Convention will convene in a virtual format in 2021 and as an in-person event in 2022.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal-

- It regulates the transboundary movements of hazardous wastes and other wastes and obliges its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.
- Parties also have an obligation to minimize the quantities that are transported, to treat and dispose of wastes as close as possible to their place of generation and to prevent or minimize the generation of wastes at source.
- The member nations to the convention are required to have domestic legislation for both prevention and the punishment of the illegal trafficking of such hazardous waste
- It was adopted in 1989 and it came into force in 1992

- Location- Basel, Switzerland
- India is a party to the convention

Rotterdam Convention

- It creates legally binding obligations for the implementation of the Prior Informed Consent (PIC) procedure for certain hazardous chemicals and pesticides thathave been banned or severely restricted for health or environmental reasons.
- Location – Rotterdam, Netherlands
- India is a party to the convention

Stockholm Convention

- It aims to restrict and eliminate the production and use of persistent organic pollutants (POPs).
- POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms
- It has five essential aims:
- Eliminate dangerous POPs, starting with the 12 worst (later increased)
- Support the transition to safer alternatives
- Target additional POPs for action
- Clean-up old stockpiles and equipment containing POPs
- Work together for a POPs-free future
- It was signed in 2001 and entered into force in May 2004.
- Location- Stockholm, Sweden
- India is a party to the convention

8 Plastics in soil- A threat to food security, health, and environment

Context:

Plastic pollution has become pervasive in agricultural soils, according to a new report released by the UN agriculture agency, posing a threat to food security, people's health, and the environment.

Understanding the structure of soil

- The soil is the mixture of organic matter, minerals, gases, water and air, and other organism and also the attribute of the earth's outermost layer crust.
- The parent material of soil called as a rock, that goes under several transformations due to the influence of number factors such as climate, wind and other chemical activity.

About plastics

Plastics are a group of materials, either synthetic or naturally occurring, that may be shaped when soft and then hardened to retain the given shape.

They are polymers

- A polymer is a substance made of many repeating units.

- A polymer can be thought of as a chain in which each link is the "mer," or monomer (single unit).
- The chain is made by joining, or polymerizing, at least 1,000 links together.
- Polymerization can be demonstrated by making a chain using paper clips or by linking many strips of paper together to form a paper garland.

Properties

- Capability of being molded or shaped, usually by the application of heat and pressure.
- Low density, low electrical conductivity, transparency, and toughness, allows plastics to be made into a great variety of products.

Negative side

- Non-biodegradable
- Microplastics
- Contamination of soil and water
- Contamination of food chain

Positive side

- **Cleanliness**: Plastics help to protect the environment by reducing waste, lowering greenhouse gas emissions, and saving energy.
- **Construction**: Plastics enable sustainable, durable, long-lasting design and construction in homes, buildings, and infrastructure like bridges.
- **Automotive**: Plastics contributes to a multitude of innovations in safety, performance, and fuel efficiency.
- **Safe and sustainable packaging**: Plastic packaging helps protect and preserve goods while reducing weight in transportation, which saves fuel and reduces greenhouse gas emissions.
- **Electronics**: Computers and cell phones to televisions and microwaves, durable, lightweight, and affordable plastics have helped revolutionize electronics.

Why plastic is becoming a challenge?

- **Impact on soil:** Microplastics can interact with soil fauna, affecting their health and soil functions.
- **Harmful chemical affecting ecosystem:** Chlorinated plastic can release harmful chemicals into the surrounding soil, which can then seep into water sources affecting the ecosystem.
- **Polluting emission:** Plastics film have been shown to release potentially carcinogenic phthalate acid esters into the soil, which can be taken up in vegetables and so, risk to human health
- **Toxic for Human health:** These toxic chemicals are now being found in our bloodstream and the latest research has found them to disrupt the Endocrine system which can cause cancer, infertility, birth defects, impaired immunity, and many other ailments.

Steps taken by various stakeholders

- India aims to eliminate single-use plastic by 2022.
- Indian Railways and Air India banned the use of single-use plastic, which cannot be recycled.
- GloLitter Partnerships Project
- World Environment Day

- The Plastic Waste Management Regulations, 2016
- Plastic Waste Management Regulations (Amendments), 2018
- 'Plastic Hackathon 2021' campaign

9 Radioactive pollution in water

Context:

Radioactive pollution of water is newly emerging but is of grave concern for water pollution and human health.

Understanding Radioactivity

- Radioactivity is the phenomenon of spontaneous emission of particles or waves from the unstable nuclei of some elements.
- There are three types of radioactive emissions:
  - Alpha
  - Beta
  - Gamma
- Alpha particles are positively charged He atoms, beta particles are negatively charged electrons and gamma rays are neutral electromagnetic radiations.
- Radioactive elements are naturally found in the earth's crust.

Radioactive communication:

- Radioactive contamination is more prevalent in groundwater as compared to surface water since it is much exposed to radioactive elements found in the rocks.
- Sometimes, magma also releases radioactive gases into the environment.
- The deposition of these radioactive gases in waterbodies also cause radioactive contamination.
- Atmospheric deposition (both dry and wet) of cosmogenic radionuclides also add radioactive nuclei in the surface water.
- A number of radionuclides are found in surface and subsurface waters, among which 3H, 14C, 40K, 210Pb, 210Po, 222Rn, 226Ra, 228Ra, 232Th and 234,235,238U are common. Uranium, thorium and actinium are three NORM series that contaminate water resources.
- Radium, a descendant of the NORM series, is one of the decidedly radiotoxic elements found in aquatic systems and can be penetrated into groundwater via (i) aquifer rock dissolution (ii) decaying of 238U and 232Th, or (iii) desorption processes.

Source of radionuclides discharge:

- Nuclear reactors and nuclear warhead experiments are the key sources of human-induced radionuclides discharge.
- Nuclear reactors produce radioisotopes (Cobalt-60, Iridium-192, etc) that hand out as sources of gamma radiation in radiotherapy and numerous industrial appliances.

10 National Clean Air Programme

Context:

The National Green Tribunal has slammed the **Ministry of Environment and Forests (MoEF)** over its report on the **National Clean Air Programme (NCAP)** which proposes 20-30% reduction of air pollution by 2024.

Important facts

- The approach for NCAP includes collaborative, multi-scale and cross-sectoral coordination between the relevant central ministries, state governments and local bodies.
- The city specific action plans have been prepared which, inter-alia, include measures for strengthening the monitoring network.
- Air quality of cities is monitored by State Pollution Control Boards which publishes their results from time to time.
- NCAP proposes a framework to achieve a national-level target of 20-30 per cent reduction of PM2.5 and PM10 concentration by between 2017 and 2024.

National Green Tribunal

- It is a specialised body set up under the National Green Tribunal Act, 2010
- It draws inspiration from India's constitutional provision of Article 21, which assures the citizens of India the right to a healthy environment.
- It follows principles of **Natural Justice**.
- NGT is mandated to make disposal of applications or appeals finally within 6 months of filing the same.

11 Biojet Fuel

Context:

CSIR-IIP Dehradun's home-grown technology to produce bio-jet fuel has beenformally approved for use on military aircraft of the Indian Air Force (IAF).

What is Biojet fuel?

- Biojet fuel is prepared from "non-edible tree borne oil" and is procured from various tribal areas of India.
- This fuel is made from Jatropha oil sourced from Chattisgarh Biodiesel Development Authority (CBDA) and then processed at CSIR-IIP, Dehradun.
- Generally, it is made from vegetable oils, sugars, animal fats and even waste biomass.

Points to Remember

- The AN-32 aircraft of Indian Air Force powered with 10% blend of bio-jet fuel took off and landed successfully in Leh airport.

- Leh is at an altitude of 10,682 ft above mean sea level and is among the world's highest and most difficult operational airfields.

International Air Transport Association (IATA)

- The IATA is the trade association for the world's airlines, representing some 290 airlines or 82% of total air traffic.
- IATA support many areas of aviation activity and help formulate industry policy on critical aviation issues.
- Headquarter: Montreal, Canada.

12 Corporate Average Fuel Efficiency (CAFE) Regulation

Context:

Carmakers from the Society of India Automobile Manufacturers (SIAM) recently requested Ministry for Road Transport to postpone implementation of BS VI CAFÉ Phase II regulations since the industry is still recovering from the impact of COVID.

PT Facts:

- It aims at lowering fuel consumption of vehicles.
- It is achieved by lowering carbon dioxide (CO2) emissions.
- Corporate Average refers to sales-volume weighted average for every auto manufacturer.
- The norms are applicable for petrol, diesel, LPG and CNG passenger vehicles.
- **Significance:** Global automakers are attracted to make investments in India as vehicle penetration is still low.
- Also, pollution on road is worsening the air quality in many cities.
- Upgrading to stricter fuel standards is one way to tackle air pollution.
- CAFE norms assume importance in the light of their ability to reduce the carbon footprint.
- Stricter CAFE targets can also lead to manufacturers moving to electric or strong hybrid.

13 WHO slashes guideline limits on air pollution from fossil fuels

Context:

The World Health Organization has cut its recommended limits for air pollution, for the first time since 2005.

Key highlights

- The new recommendations targeting pollutants including particulate matter and nitrogen dioxide, both of which are found in fossil fuel emissions.
- **NO2:** The new limit for nitrogen dioxide (NO2), mainly produced by diesel engines, is now 75% lower.

- **PM 2.5:** Under the new guidelines, the WHO halved the recommended limit for average annual PM2.5 level from 10 micrograms per cubic meter to 5.
- **PM 10:** It also lowered the recommended limit for PM10 from 20 micrograms to 15.
- These guidelines not legally-binding.

WHO's 2005 guideline

- The 2005 WHO Air quality guidelines offer global guidance on thresholds and limits for key air pollutants that pose health risks.
- The Guidelines indicate that by reducing particulate matter (PM10) pollution from 70 to 20 micrograms per cubic metre (μg/m), we can cut air pollution-related deaths by around 15%.

Air pollution, the greatest environmental threat

- Air pollution kills at least 7 million people prematurely each year.
- In 2019, a full 90% of the global population was breathing air considered unhealthy by the 2005 guidelines.
- India, still have national standards that are looser than those 2005 recommendations.

NAAQS

India last revised its National Ambient Air Quality Standards in 2009 —setting annual averages for

- PM2.5 (40 ug/m3)
- PM10 (60 ug/m3)
- NO2 (40 us/m3)

WHO

- Founded in 1948, WHO is the United Nations agency.
- It connects nations, partners and people to promote health, keep the world safe and serve the vulnerable – so that everyone, everywhere can attain the highest level of health.
- Headquarters: Geneva, Switzerland
- India is a member state of the South East Asia Region at the WHO.

14 Global Methane Pledge

Context:

The US and the EU made a joint pledge to cut global methane emissions by almost a third in the next decade.

Key-highlights of the Pact

- The pact between the US and the EU sets a target of cutting at least 30% from global methane emissions, based on 2020 levels, by 2030.

- If adopted around the world, this would reduce global heating by 0.2C by the 2040s, compared with likely temperature rises by then.
- The world is now about 1.2C hotter now than in pre-industrial times.

Steps taken by India to reduce emissions

- India has announced a renewable energy capacity goal of 450 GW by 2030.
- Indian Railways has committed to achieving 'net zero' emissions by that year.
- However, India as a whole has not committed to a time frame for reaching that target.
- Some 130 countries are considering a net zero emissions target by 2050.

About Methane

- Methane is a potent greenhouse gas.
- It is about 80 times more effective at trapping heat in the atmosphere than carbon dioxide.
- Natural gas production and fracking, meat production and other forms of agriculture are among the chief sources.

15 River Bhogdoi

Context:

The rampant coal mining in Nagaland, coupled with waste discharge from tea estates and encroachment have been sounding death knells for River Bhogdoi in Assam.

About the river

- **River Bhogdoi** is one of **the south bank tributaries of the mighty river Brahmaputra.**
- It originates from **Mokokchung in Nagaland** where it is also known as **Tsujenyong nullah.**
- The total catchment area of the inter-state river (flowing between Assam and Nagaland) is 1,545 square kilometres and travels 160 kilometres before joining Dhansiri river near its confluence with Brahmaputra.
- In 2019, the **Union Ministry of Environment, Forest and Climate Change declared Bhogdoi as one of the most polluted rivers in Assam** and 351st among the polluted rivers in the country.

Reasons behind the situation

- Massive encroachments along the river bank
- Laxity of administration in keeping a check on encroachments
- Disposing of human excreta and cremating dead bodies
- Water pollution
- **Biological Oxygen Demand (BOD)**
  - Biochemical oxygen demand is the amount of oxygen consumed by bacteria and other microorganisms while they decompose organic matter under aerobic conditions.
  - The high BOD (Biological Oxygen Demand) indicates low water quality and less oxygen for aquatic life.

16 Commission for Air Quality Management in the NCR and Adjoining Areas Bill, 2021

Context:

The **Commission for Air Quality Management in National Capital Region and Adjoining Areas Bill, 2021** is set to be tabled in parliament to replace earlier promulgated ordinance with some changes.

About

- The C**ommission for Air Quality Management in National Capital Region and Adjoining Areas Bill, 2021** aims to replace earlier promulgated ordinance with same changes.
- The changes have been devised following several rounds of negotiations with farmers of the region.
- The farmers had raised concerns of stiff penalties and possible jail terms for stubble burning.
- Decriminalized Stubble Burning: The bill has decriminalized the act of stubble burning and withdrawn the clause for possible jail time.
- Environment Compensation fees: The bill has provided for an environment compensation fee to be levied by on those who are found to be engaged in stubble burning, including farmers.
- New commission for environment regulation: The bill will replace the Environment Pollution (Prevention and Control) Authority or EPCA with a commission having more powers.

Functions of the newly proposed commission:

The bill has defined functions of commission as:

- **Coordination with state governments:** The commission will coordinate with concerned state governments of Delhi, Haryana, Punjab, Rajasthan, and Uttar Pradesh as per provisions of the bill for taking actions taken by them.
- **Pollution control:** It includes planning and executing plans to prevent and control air pollution in the NCR.
- It will also provide a framework for identification of air pollutants.
- **Collecting Environment Compensation fees:** The collection of such fees will be exclusively done by the commission.
- **Identification of Violators:** The commission will be in charge of identifying violators, monitoring factories and industries and any other polluting unit in the region.
- Further, it will have the powers to shut down such units.
- **Overruling directives of state government:** The Commission will also have the powers to overrule directives issued by the state governments in the region that may be in violation of pollution norms.
- **R&D on air pollution in NCR:** The commission is mandated with conducting research and development through networking with technical institution.
- **Preventive Measures:** The commission has been mandated to take preventive measures such as increasing plantation and addressing stubble burning.
- It will have authority to issue directions on matters including inspections, or regulation which will be binding on the concerned person or authority.

Significance of the Bill

- **Eases penalties norms:** In contrast with penalties and jail terms as proposed in original ordinance, the bill has decriminalizes the act of stubble burning but kept alive the penalties in form of Environment Compensation fees.
- **Ensuring uniform regulations across NCR:** The power of the commission to overrule directives issued by the state governments in the region that may be in violation of pollution norms will ensure uniform application of law throughout National Capital Region across five states.

17 Black carbon

Context:

According to a study by the Department of Science and Technology (DST) that tracked mortality rates, Black Carbon was most associated with premature mortality.

About the Key findings of the study

- It has serious health impacts in terms of mortality due to BC aerosol exposure that have never been evaluated in India.
- The Indo-Gangetic plain has a high burden of black carbon with serious implications for regional climate and human health.
- Several cities in this belt routinely find themselves at the top of the list of the most polluted cities in India as well as the world.
- A 10-point increase in air pollution from black carbon led to an average 5% increase in mortality whereas a similar rise in PM 2.5 led to an average 1% increase in mortality.
- Nitrogen dioxide (NO2) and Sulphur Dioxide (SO2) were both associated with a 2.3% and 1.3% increase in mortality.
- The detrimental effect of pollutants was higher for males, age group 5-44 years and, in winter.
- The adverse effect of air pollutants was not limited to the current day of exposure but could extend to as late as five days after exposure.

What is Black Carbon?

- **Black carbon (BC)** is a component of **fine particulate matter (PM ⩽ 2.5 μm).**
- Black carbon consists of pure carbon in several linked forms. It is formed through the incomplete combustion of fossil fuels, biofuel, and biomass.
- It is one of the main types of particle in both anthropogenic and naturally occurring soot.
- Black carbon results from the incomplete burning of fossil fuel.
- It's a relatively short-lived pollutant in the atmosphere but influences cloud formation and atmospheric heat absorption processes.

18 Invisible particles in air

Context:

The smallest, invisible particles matter the most when it comes to dealing with air pollution, researchers have found in two recent studies, published in journals Faraday Discussion and Nature NPJ climate and atmospheric science.

Key-takeaways from the study

- **Ultrafine particles** — which have almost negligible weight and surface area and are hence are not considered a threat to the air we breathe — do have an effect on haze formation, visibility and air pollution.
- The smallest particles are formed from gaseous sulfuric acid and ammonia or amines, which are ubiquitous.
- The particles grow via condensation of organics and nitrate which are equally available throughout the city.
- The new particle formation and growth were equally important in contribution to haze formation as traffic and other anthropogenic activities.

A slow killer

- Atmospheric air pollution kills more than 10,000 people every day.
- Some 1.7 million Indians died due to air pollution in 2019, according to a report by interdisciplinary journal Lancet Planetary Health published December 2020.
- Uttar Pradesh, Maharashtra, Bihar, West Bengal and Rajasthan account for over 50 per cent deaths attributed to air pollution in India, according to the same report.
- An old study in China claimed that Particulate Matter (PM) 1 contributed to 80 per cent of PM2.5. Evidence for health effects of PM1 is very limited, because it is not routinely monitored internationally.
- So far, the standards for PM1 have not been proposed by the World Health Organization or any other government agencies.
- While PM2.5 can reach lungs, PM1 can enter bloodstream.

19 Plastic Waste Management Amendment Rules, 2021

Context:

The Environment Ministry has notified the Plastic Waste Management Amendment Rules, 2021, which prohibit specific single-use plastic items which have "low utility and high littering potential" by 2022.

The New Rules:

- **What is banned?** The manufacture, import, stocking, distribution, sale and use of the identified single-use plastic will be prohibited with effect from the 1st July, 2022.
- The ban will not apply to commodities made of compostable plastic.
- For banning other plastic commodities in the future, other than those that have been listed in this notification, the government has given industry ten years from the date of notification for compliance.
- The permitted thickness of the plastic bags, currently 50 microns, will be increased to 75 microns from 30th September, 2021, and to 120 microns from the 31st December, 2022.
- The **Central Pollution Control Board**, along with state pollution bodies, will monitor the ban, identify violations, and impose penalties already prescribed under the **Environmental Protection Act, 1986.**

- The plastic packaging waste, which is not covered under the phase out of identified single use plastic items, shall be collected and managed in an environmentally sustainable way through the **Extended Producer Responsibility (EPR) of the Producer, importer and Brand owner (PIBO),** as per **Plastic Waste Management Rules, 2016**.

What is single-use plastic?

It is a form of plastic that is disposable, which is only used once and then has to be thrown away or recycled like water bottles, straw, cups etc.

Few notable facts:

- India's per capita consumption of plastic at 11 kilograms (kg) per year is still among the lowest in the world against global average is 28 kg per year.
- Close to 26,000 tons of plastic waste is generated across India every day and 10,000 tons uncollected.

India's efforts:

- India has won global acclaim for its "Beat Plastic Pollution" resolve declared on World Environment Day last year, under which it pledged to eliminate single-use plastic by 2022. At the fourth United Nations Environment Assembly in 2019, India piloted a resolution on addressing pollution caused by single-use plastic products.

20 Smog tower

Context:

The smog towers are being installed in Delhi on the lines of China. The Delhi government will study the impact of smog towers on pollution and could add more such structures across the national capital.

What is a smog tower?

- Smog towers are structures designed to work as large-scale air purifiers. They are fitted with multiple layers of air filters and fans at the base to suck the air.
- After the polluted air enters the smog tower, it is purified by the multiple layers before being re-circulated into the atmosphere.

21 Carbon Watch

Context:

Chandigarh became the first state or Union Territory in India to launch Carbon Watch.

What is Carbon Watch?

- It is a mobile application to assess the carbon footprint of an individual.

What is Carbon Footprint?

- Carbon footprint is the amount of greenhouse gases-especially carbon dioxide-released into the atmosphere by a particular human activity.

How does the app Carbon Watch work?

- As a person downloads the application, they will need to fill details in four parts- Water, Energy, Waste Generation and Transport (Vehicular movement). In each category, they will be required to inform about their respective consumptions and waste generations.
- With the mentioned information, the mobile application will automatically calculate the carbon footprint of the individual.
- The application will also provide information such as the national and world average of the emission, and the individual's level of emission generation.

Solutions:

- The mobile application will suggest methods to reduce the carbon footprints. The application will suggest ways as per the information furnished by the individuals.

22 Oil Spill

Context:

Singapore-registered MV X-Press Pearl, carrying chemicals and plastic, has been in news since a fire incident on May 20, 2021 and subsequent explosion aboard, following which tonnes of plastic pellet deposits were found deposited along Sri Lanka's beaches.

What is an oil spill?

- OECD defines an oil spill as oil, discharged accidentally or intentionally, that floats on the surface of water bodies as a discrete mass and is carried by the wind, currents and tides.
- Oil spills can pollute land, air, or water, though it is mostly used for oceanic oil spills.

Effects of oil spills:

- **Ecosystem Destruction:** Oil spills can have a major impact on the temporary animal and fish loss of habitat. Heavy oils may affect several organism functions like respiration, feeding, and thermo-regulation.
- It can affect living beings in case of direct contact with the environment polluted with spilled oil components (some of which may persist a long time), such as drinking polluted water or breathing polluted dust particles.
- **Effects on flora**: If the oil washes into coastal marshes, mangrove forests, or other wetlands, fibrous plants and grasses absorb oil, which can damage plants and make the area unsuitable as wildlife habitat.
- **On Marine Organisms**: Oil spills frequently kill marine mammals such as whales, dolphins, seals, and sea otters.
- **On Birds:** Oil spills also damage nesting grounds, potentially causing serious long-term effects on entire species.

Effects of oil spills on economy:

- If beaches and populated shorelines are fouled, tourism and commerce may be severely affected.
- The power plants and other utilities that depend on drawing or discharging sea water are severely affected by oil spills.

- Major oil spills are frequently followed by the immediate suspension of commercial fishing.

Methods through which oil spill can be cleaned:

- **Containment Booms:** Floating barriers, called booms are used to restrict the spread of oil and to allow for its recovery, removal, or dispersal.
- **Skimmers:** are devices used for physically separating spilled oil from the water's surface.
- **Sorbents:** Various sorbents (e.g., straw, volcanic ash, and shavings of polyester-derived plastic) that absorb the oil from the water are used.
- **Dispersing agents:** These are chemicals that contain surfactants, or compounds that act to break liquid substances such as oil into small droplets. They accelerate its natural dispersion into the sea.

23 High levels of uranium in groundwater

Context:

- A chemical analysis of groundwater in 73 villages of Karnataka has found high levels of uranium concentration in groundwater of at least 57 villages.
- The uranium concentration in these villages was at least 30 micrograms per litre (µg / l). In 48 of these villages, the levels exceeded 60 µg / l.

About Uranium

- Uranium is a naturally occurring radioactive element that occurs in low concentrations in nature.
- It powers nuclear reactors and atomic bombs. It is as common in the Earth's crust as tin, tungsten and molybdenum.
- **Found in:** This heavy metal is present in natural form in certain types of soils and rocks, especially granites and meta-sedimentary rocks, as well as younger sedimentary deposits.
- Uranium occurs in seawater, and can be recovered from the oceans.
- Uranium was **discovered in 1789 by Martin Klaproth**, a German chemist, in the mineral called pitchblende.
- This naturally radioactive element, powers nuclear reactors and atomic bombs.

Reason for uranium contamination

Uranium can also be introduced in drinking water sources due to human induced activities such as:

- mill tailings
- emissions from the nuclear industry
- due to burning of coal and other fuels

Impact of Uranium in drinking water

- Uranium in drinking water raises concerns because of its chemical toxicity. Uranium (U) has no known essential biological functions.
- Chronic exposureto low-level U isotopes (radionuclides) may be interlinked with cancer etiology and at high exposure levels, also kidney disease.

24 Mass Fish Death reported in Kameng River

Context:

Recent landslides caused by an earthquake of 3.4 magnitude close to the border with China has led to mass fish death in the Kameng river in Arunachal Pradesh.

What led to the deaths?

- There is high content of Total Dissolved Substances (TDS) causing low visibility and breathing problems for aquatic species resulting in the death of thousands of fish.
- The landslides dumped several tonnes of mud and rocks into the river, substantially reducing the flow of water.

Effects of Low dissolved oxygen

- Low dissolved oxygen concentrations can arise through natural phenomena that include seasonality, changes in river flow, and both saline and thermal stratification of the water column.
- Low dissolved oxygen levels can also indicate an excessive demand on the oxygen in the system.

Kameng River

- Kameng river originates in **Tawang district in Arunachal Pradesh**, from the glacial lake below snow-capped **Gori Chen mountain on the India-Tibet border.**
- It flows through **Bhalukpong circle of West Kameng District, Arunachal Pradesh and Sonitpur District of Assam.**
- It is one of the major tributaries of the **Brahmaputra River**. It joins Brahmaputra river at Tezpur, just east of the **Kolia Bhomora Setu bridge, Assam.**
- The **Dafla Hills are east and the Aka Hills are located west of the Kameng River.**
- Important tributaries: **Tippi, Tenga, Bichom and Dirang Chu.**

25 Draft EPR Notification: Plastic Packaging Waste

Context:

Recently, the Union Environment Ministry has come out with a draft notification for regulation of **Extended Producer Responsibility (EPR)** under **Plastic Waste Management rules 2016.**

Key-highlights of the notification

- **Manufacturers' Authority:** It authorizes manufacturers of plastic packaging materials to assemble all their products by 2024 and ensure that a small percentage of it is recycled and used in the next supply.
- Producers of plastic will be obliged to declare to the government, via a centralised website, how much plastic they produce annually.
- **EPR certificates:** It also clarified a system in which manufacturers and users of plastic packaging can collect certificates - called EPR certificates - and trade them.

- EPR refers to a manufacturer's responsibility to properly treat a product (plastic packaging) until the end of its life.
- Certificates will help organizations address their shortcomings in other organizations that have used recycled content in addition to their obligation.

End-of-Life Disposal

- Only a piece of recyclable plastic - such as multi-purpose plastic - is suitable for end-of-life exposure such as road construction, electric waste, electric waste and cement.
- Only measures set by the Central Pollution Control Board (CPCB) will be approved for disposal.

Classification of Plastic Packaging

- **Rigid Plastic**: They are plastic products that do not give easily when pressed. There are lots of big, big things like grass chairs, buckets, small toys etc.
- **Flexible Plastic:** Includes single or multilayer layer inserts (more than one layer with various types of plastic), plastic sheets and covers made of plastic paper, carry bags (including containers made of containers containing plastic), plastic bag or bags.
- **Multi-Layered Plastic Packaging**: It is plastic with at least one layer of plastic and at least one layer of material other than plastic.

Targets

Companies will need to collect at least:

- 35% of the target for 2021-22
- 70% of the target for 2022-23
- 100% target by 2024
- By 2024, at least 50% of their solid plastic will need to be reused as it will make up 30% of their 2nd and 3rd grade plastic.
- Each year you will see progressive goals and after 2026-27, 80% of their category 1 and 60% of the other two categories will need to be redesigned.
- There are similar, slightly different, objectives for companies that use packaging and importing materials.

26 'Toxic 3 Os' used in sunscreen

Context:

Recently, a petition has been filed to the Food and Drug Administration (FDA) to reclassify three chemicals used in sunscreen.

What are the Toxic 3 O?

- Oxybenzone (OBZ)
- Octinoxate (OMC)
- Octocrylene (OCR)
- These three chemicals are active ingredients present in more than two-thirds of all sunscreens.
- These UV filters are known to widely contaminate the environment through a variety of anthropogenic sources, including sewage discharge.

Key-points made in the petition

- The above mentioned chemicals to be shifted to "Not Generally Recognized as Safe & Effective" (GRASE Category II)".
- Removal of products that contained these chemicals from the marketplace.
- Oxybenzone, octinoxate and octocrylene, along with 11 other Soluble Organic UV Filters, were removed from the GRASE Category I (generally recognized as safe & effective) list in February 2019.

Reason behind the demand

- **Threat to all:** These chemicals pose a threat to public health, marine life and coral reefs.
- **Damage to reproductive organs:** Octocrylene in sun protection products degrades into benzophenone, a carcinogen that can also interfere with key hormones and reproductive organs.
- **Leading to various diseases:** They cause human cell damage that has been linked to cancer, disrupt hormones, have been found in breast milk, blood and urine and are known allergens.
- **Threat to corals:** Oxybenzone is particularly toxic to corals at concentrations as low as a few parts per trillion — the equivalent of three drops in an Olympic-size swimming pool may be enough to severely damage or kill coral.
- **Ill-effects on human health and overall economy:** The 'Toxic 3 Os' are also detrimental when there is fishing in contaminated waters, impacting human health and the economy.

27 Era of leaded petrol over: UNEP

Context:

The use of leaded petrol has been eradicated from the globe, as per the UN Environment Programme (UNEP).

Background

- Concerns were raised as early as 1924, when dozens of workers were hospitalised and five declared dead after suffering convulsions at a refinery run by US giant Standard Oil.
- Nevertheless, until the 1970s almost all the gasoline sold across the globe contained lead.
- When UNEP launched its campaign in 2002, many major powers had already stopped using the fuel, including the United States, China and India.
- By 2016, after North Korea, Myanmar and Afghanistan stopped selling leaded petrol.
- Only a handful of countries were still operating service stations providing the fuel.
- Algeria is the last country to use the fuel.

UNEP on polluting transport sector

- The transport sector is responsible for nearly a quarter of energy-related global greenhouse gas emissions and is set to grow to one third by 2050.
- 1.2 billion new vehicles would hit the streets in the coming decades.
- This includes millions of poor-quality used vehicles exported from Europe, the United States and Japan, to mid- and low-income countries.
- This contributes to planet warming and air polluting traffic.

Important facts on lead

- Lead is a naturally occurring toxic metal found in the Earth's crust.
- Its widespread use has resulted in extensive environmental contamination, human exposure and significant public health problems in many parts of the world.
- Lead is a cumulative toxicant that affects multiple body systems and is particularly harmful to young children.
- Lead in the body is distributed to the brain, liver, kidney and bones. It is stored in the teeth and bones, where it accumulates over time.
- Human exposure is usually assessed through the measurement of lead in blood.
- Lead in bone is released into blood during pregnancy and becomes a source of exposure to the developing fetus.

Significance of the development

- It will prevent more than 1.2 million premature deaths and save world economies over $2.4 trillion annually.
- The development also offers an opportunity for restoring ecosystems, especially in urban environments, which have been particularly degraded by this toxic pollutant.

28 Light pollution

Context:

Skyglow forces dung beetles to abandon the Milky Way as their compass. The era of electric lighting, which began in the late 19th Century, allowed humanity to extend days into the night with the flick of a switch. As technology has progressed, it has only become simpler and cheaper to light up the world more brightly.

How does the Nature's clock work?

- The Sun is basically like a clock.
- The reliable rhythm of night and day gives plants and animals signals for natural cycles of feeding, mating, migrating and navigating.
- Humans are altering this natural rhythm by flooding the world with artificial light.

Light Pollution

- Light pollution, also known as photopollution or luminous pollution, is the excessive, misdirected or invasive use of artificial outdoor lighting.
- Mismanaged lighting alters the color and contrast of the nighttime sky, eclipses natural starlight, and disrupts circadian rhythms (the 24-hour processes of most organisms), which affects the environment, energy resources, wildlife, humans and astronomy research.
- 'skyglow' is an omnipresent sheet of light across the night sky in and around cities that can block all but the very brightest stars from view.

About the Study

- In the journal Current Biology, the researchers show that South African dung beetles (Scarabaeus satyrus) are unable to use their star compass under light-polluted skies.

- Researchers tested how dung beetles responded to two types of artificial light:
- a single bright beacon
- the dull glow a nearby city might produce
- Both kinds disoriented the dung beetles, throwing them off their usual path.
- When exposed to the bright light, the beetles headed toward that, and when exposed to the ambient light, they went in circles.
- In the study, researchers compared the dung-rolling performance of beetles in a rural part of Limpopo province with that of beetles at the University of Witwatersrand in inner city Johannesburg, both in South Africa.

29 Nitrous oxide is on the rise from ocean dead zones

Context:

The researchers are conducting studies on the global N2O emission from the dead zones of the oceans.

About the dead Zones

- When organisms die, they sink through the water column, consuming oxygen in the sub-surface ocean as they decompose.
- This leads to bands of oxygen-depleted water called oxygen minimum zones, or "dead zones."
- These harsh environments are uninhabitable for most organisms.
- Although they occur naturally in some areas, dead zones often appear after fertiliser and sewage wash downstream into coastal areas, sparking algal blooms, which then die off and decompose.

Nitrous oxide

- It is more commonly known as "laughing gas".
- It is a potent greenhouse gas, 300 times more powerful than carbon dioxide.
- Global emissions of N2O are increasing as a result of human activities that stimulate its production.
- Aside from its effects as a greenhouse gas, N2O is also the predominant ozone-depleting substance emitted to the atmosphere.

N2O hotspots

- The oceans currently account for around 25 per cent of global N2O emissions, and scientists are working to improve estimates of marine contributions.
- Most research has focused on oxygen minimum zones, which are known as hotspots of N2O emissions.

Impact of climate change

- Warming of the ocean due to climate change is driving the expansion of marine oxygen minimum zones globally.
- This has led to speculation that N2O emissions from the oceans will continue to increase and further accelerate climate change.
- Results indicate that even more N2O production may be expected where these low-oxygen waters are in contact with the seafloor.

- The United Nations has declared 2021 as the start of a Decade of Ocean Science for Sustainable Development. Detailing the vital link between oceans and climate change has never been more timely than now.

30 Black carbon over the Himalaya

Context:

Scientists at the Aryabhatta Research Institute of Observational Sciences (ARIES), in collaboration with scientists from the University of Delhi, IIT Kanpur and Space Physics Laboratory, ISRO have made extensive observations of black carbon and elemental carbon and estimated monthly and wavelength-dependent values of MAC over the central Himalayan region for the first time.

What is black carbon?

- Black carbon, or soot, is part of fine particulate air pollution (5) and contributes to climate change.
- It is formed by the incomplete combustion of fossil fuels, wood and other fuels.
- Complete combustion turns all carbon in the fuel into carbon dioxide (CO2), but combustion is never complete and CO2, carbon monoxide, volatile organic compounds, and organic carbon and black carbon particles are all formed in the process.
- The complex mixture of particulate matter resulting from incomplete combustion is often referred to as soot.
- Black carbon is a short-lived climate pollutant with a lifetime of only days to weeks after release in the atmosphere.
- During this short period of time, black carbon can have significant direct and indirect impacts on the climate, the cryosphere (snow and ice), agriculture and human health.
- Black Carbon (BC) has recently emerged as a major contributor to global climate change, possibly second only to CO2 as the main driver of change. BC particles strongly absorb sunlight and give soot its black color.

Key findings

- The calculated annual mean value of MAC has been found it to be significantly lower than the constant used earlier.
- These lower values are a result of transport of processed (not fresh) air pollution emissions at this otherwise clean site.
- The study also revealed that these estimated MAC values show significant seasonal variation.
- It is found that these changes are caused by the seasonal variability of biomass burning, air mass variation, and meteorological parameters.

Need for the study

- The accurate estimation of Black carbon will now be possible using optical instruments in the Himalayan region using mass absorption cross-section (MAC).
- The precise knowledge on BC at various wavelengths will help in source apportionment studies done to constrain the sources of BC emissions, an important information to form the mitigation policies.
- It will also improve the performance of numerical weather prediction and climate models.

MAC

- The **mass absorption cross-section (MAC)** of BC defines the characteristic link between its atmospheric concentrations and climate impacts.
- MAC is a spectral quantity relating the absorptive efficiency of a particle per unit mass.
- When multiplied by the path-integrated mass concentration of a particle, MAC yields the observed absorption at a specific wavelength of light.

About ARIES

- **ARIES (Aryabhatta Research Institute of Observational Sciences)** is one of the leading research Institutes which specializes in observational Astronomy & Astrophysics and Atmospheric Sciences.
- It is an autonomous institute under the **Department of Science & Technology (DST).**
- The main research interests of Astronomy & Astrophysics division are in solar, planetary, stellar, galactic and extra-galactic astronomy including stellar variabilities, X-ray binaries, star clusters, nearby galaxies, quasars, and inherently transient events like supernovae and highly energetic Gamma Ray Bursts.
- Research focus in Atmospheric Sciences division is mainly in the lower part of the atmosphere and covers the studies on aerosols and trace gases.

31 "Global Electric Vehicles Outlook 2021" released by IEA

What is the News?

- International Energy Agency (IEA) has released a report titled "Global Electric Vehicle Outlook Report, 2021".
- The **Global EV Outlook (GEVO)** is an annual report published by IEA. The report looks at the latest EV trends. Apart from that, it also looks at the drivers for road transport sector electrification.

Key Findings of Global Electric Vehicles Outlook 2021 related to India:

- More than 30% of the new vehicle sales in India will be electric by 2030.
- Electric Vehicles(EV) deployment in India will mainly be achieved through the electrification of two/three-wheelers. The report mentions that electric two/three-wheeler sales will reach a sales share of almost 50% by 2030.
- However, the lack of government spending under the FAME II Scheme has delayed EV deployment in India.
- Further, EV deployment was also delayed due to pressure on domestic automakers to focus on BS-VI innovation instead of EVs.

International findings of Global Electric Vehicles Outlook 2021:

- Firstly, three million new electric cars were registered in 2020. This was 41% higher than those registered in 2019.
- Secondly, the rise in electric car sales in 2020 came even as the worldwide automobile market contracted by 16% due to the Covid-19 pandemic.
- Thirdly, apart from that, the number of electric cars, buses, vans and heavy trucks on roads is expected to hit 145 million by 2030.

- Fourthly, if the governments improve their efforts to meet international climate goals, then the number of global electric vehicles will increase to 230 million by 2030.

About International Energy Agency(IEA):

- It was established in 1974 as an autonomous intergovernmental organization under the OECD framework.
- **Objective:** To ensure reliable, affordable, and clean energy for its member countries and beyond.
- **Members:** It has 30 member countries and eight association countries. India became an associate member in 2017.
- **Secretariat:** Paris, France.

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