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Classroom Study Material

ENVIRONMENT

JUNE 2016 – FEBRUARY 2017

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1. CLIMATE CHANGE

1.1. GLOBAL WARMING

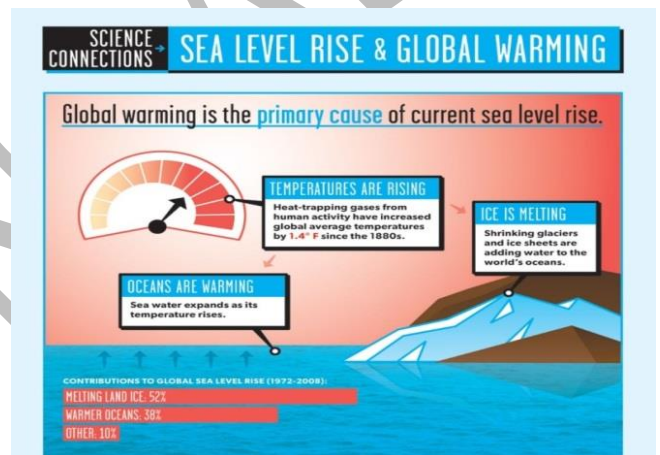
1.1.1. OCEAN WARMING AND ITS EFFECTS

Why in news?

- Recently a research report “*Explaining ocean warming: causes, scale, effects and consequences*” released by the International Union for Conservation of Nature (IUCN) – has shown the effects of ocean warming.

Concerns

- **Oceans Impacted:** World’s waters have absorbed more than 93 per cent of the enhanced heating from climate change since the 1970s, curbing the heat felt on land but drastically altering the rhythm of life in the ocean.
- **Food security**
 - ✓ Rainfall patterns affected: Increased rainfall in some mid-latitude and monsoon areas and decrease over various sub-tropical regions.
 - ✓ Yield is impacted: Correlations between wheat and maize yields with the NAO (North Atlantic Oscillation) and PDO (Pacific Decadal Oscillation), so changes in these ocean-focused atmospheric patterns have direct implications on food production.
 - ✓ Global warming is making the spread of diseases among animals and humans. This is threatening food security across the planet
- **Impacts on eco-system** Climate change is altering the hibernation periods of animals, disturbing their breeding patterns and metabolism
- **Fisheries:** At sea, warming temperatures will cause changes to the abundance and range of marine species used for food.
- Along with ocean warming, we also have increasing atmospheric temperatures. This is causing de-glaciation, and rise of sea levels. According to Danish Meteorological Institute (DMI)
- **Effect on polar bears according to a new study:** Polar bears depend on sea ice to hunt seals, their main prey. They use the ice as a platform to ambush seals at breathing holes or break through the ice to reach their dens.



1.1.2. RISING SEA COVER AROUND ANTARCTICA

- Recent observations present a contrary picture in the two poles of earth. While the sea cover around Antarctica is rising, the sea ice in Arctic sea is melting away.
- The **reason for this lies in the geology of Antarctica and the Southern Ocean**, a new NASA-led study has found.

What the study says

- **Two specific geological factors** in Antarctic region are playing a role.
 - ✓ The **topography of Antarctica** is influencing the flow of winds
 - ✓ The **depth of the ocean** around the landmass affect the circulation of ocean currents
- These two, in turn, affect the process of formation of Antarctica’s sea ice cover and its sustainability.

How does it happen?

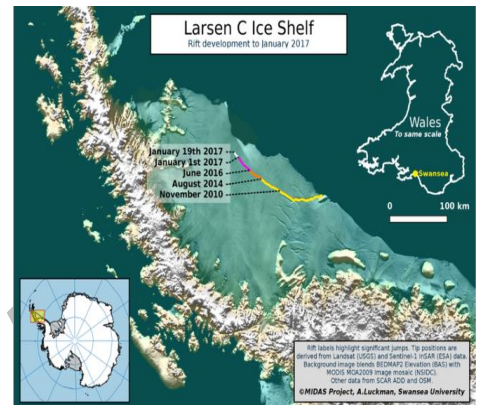
- The sea ice forms and builds up early in the sea ice growth season.
- This ice later due to winds gets pushed offshore and northward forming a protective shield of thicker, older ice that circulates around the continent.

- The persistent winds flowing down slope off the continent plays help in piling of ice up against the massive ice shield, enhancing its thickness.
- This thick band of ice protects and encapsulates the younger, thinner ice from being reduced by winds and waves.
- This ice drifts away from the continent as the sea ice cover expands creating ice factories conducive to rapid sea ice growth.

1.1.3. LARSEN C ICE SHELF POISED TO CALVE

Why in News?

- **Larsen C ice shelf**, located on Antarctic Peninsula witnessed an enormous rift, which has disproportionately grown in past few months, now extending upto 175 Km long.
- British researchers monitoring the rift as a part of **Project MIDAS** says that only 12 miles (19 km) now connect the chunk of ice to its parent iceshelf.
- If the rift fully extends, the resulting iceberg would be approximately 5000 sq km and will be one of the biggest icebergs ever recorded.
- Though there is lack of credible evidence to directly correlate calving of iceberg with global warming but it indeed show climate change has caused the thinning of the ice shelf.



Impact

- If iceberg separates, Larsen C Ice shelf will be at its **most retreated** position ever recorded, fundamentally changing the landscape of the Antarctic Peninsula.
- New configuration will be less stable than prior to the rift and might meet the same fate as its neighbours **Larsen A** (collapsed in 1995) and **Larsen B** (collapsed in 2002).
- **Land ice** that have been blocked by the breaking iceberg, will drop into the ocean and eventually would raise the sea level.

Project MIDAS is a UK-based Antarctic research project, investigating the effects of a warming climate on the Larsen C ice shelf.

Ice shelf

- It is a floating extension of **land-based glaciers** which flow into the ocean.
- As they already float in the ocean, their melting does **not directly** contribute to sea-level rise.
- The breaking of ice shelves is a **natural process** but global warming is thought to have accelerated this process.
- In recent decades many major ice shelves have disintegrated or lost substantial volume like **Prince Gustav channel, Larsen Inlet, Wordie, Muller, Jones Channel, Wilkins, Larsen A, Larsen B**, etc.

1.1.4. TANSAT SATELLITE

- China has launched this satellite to monitor CO2 levels.
- It is the third country, after US and Japan, in the world to monitor this global warming contributor.
- It is a 3 year mission which will take readings after every 16 days.

1.1.5. SCIENTISTS FIND 500 US SEABED VENTS OF METHANE

- US National Oceanic and Atmospheric Administration (NOAA's) Deepwater Exploration discovered 500 new deep-sea vents of methane all along the US's western seaboard. This brings the count to 1,000 known vents.
- Worldwide, scientists are trying to see if rising ocean temperatures cause more leaks.
- Methane naturally escapes from the sea floor in many places around the world and can stoke global warming if it reaches the atmosphere.

About

- Hydrothermal vents and cold seeps are places where chemical-rich fluids emanate from the seafloor, often providing the energy to sustain lush communities of life in some very harsh environments
- Below the photic zone many microbes have evolved chemosynthetic processes that create organic matter by using oxygen in seawater to oxidize hydrogen sulphide, methane, and other chemicals present in vent and seep fluids.
- Organisms living in such areas are often called extremophiles for the extreme nature of their living conditions.

1.1.6. GLOBAL WARMING IMPACT ON OCEAN CURRENTS

Why in news?

Scientists have used a group of elephant seals to observe changes in the circulation of the world's oceans.

About

- The research showed how "bottom water" - a dense type of water created by salt leaching out of sea water when it freezes over during the Antarctic winter - is being affected by melting ice shelves.
- **Thermohaline circulations:** are thereby affected. Also its depth is getting affected, making it shallower.

Winds drive ocean currents in the upper 100 meters of the ocean's surface. However, ocean currents also flow thousands of meters below the surface. These deep-ocean currents are driven by differences in the water's density, which is controlled by temperature (thermo) and salinity (haline). This process is known as thermohaline circulation.

1.2. OZONE LAYER

1.2.1. OZONE LAYER OVER ANTARCTIC SHOWS SIGNS OF HEALING

Why in news?

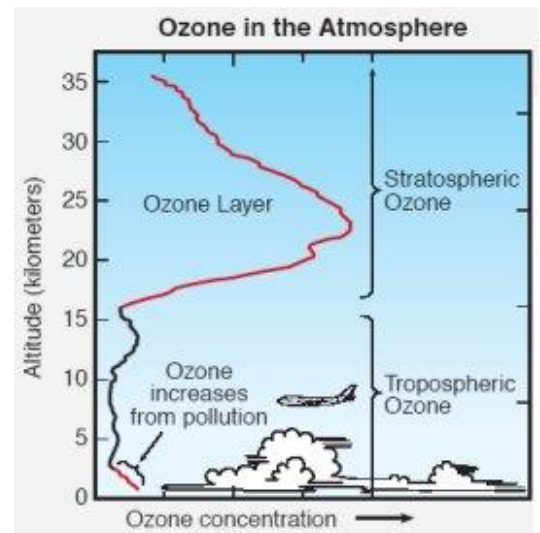
- Recent observations have showed signs of mending of this ozone hole.
- Atmospheric researchers have found that the ozone hole has shrunk by more than four million sq.kms since 2000 which is the year when ozone depletion was at its peak.

What is Ozone Hole?

- Ozone hole is a region of exceptionally depleted ozone in the stratosphere over the Antarctic that happens at the beginning of Southern Hemisphere spring (August–October).
- The thinning increasing the penetration of UV rays on the earth surface thereby increases the risks of its adverse impacts such as skin cancer.

What has caused the healing?

- The most dominating factor in the depletion of ozone layer is the release of Chlorine from CFCs molecules. The **Montreal Protocol** has led to reduction in the production and release of CFCs in the atmosphere.
- According to scientists, there are three stages in the ozone recovery process:
 - Reduced rate of decline.
 - Levelling off of the depletion.
 - Ozone increase linked to reduction of the levels of CFC
- Once the CFCs reduce to a certain level, the pace of recovery process will increase automatically.



1.2.2. HCFCs PHASE OUT MANAGEMENT PLAN

Why in News?

- India launched the second stage of its plan to phase out **Hydrochlorofluorocarbons (HCFCs)**.
- This plan is in line with its commitments made at the **Montreal Protocol to end use of Ozone Depleting Substances (ODS)**

About the Plan

- The plan is meant to effective from 2017-23. The long term target of phasing out HCFCs is by 2030.
- Under the plan, India will use \$44. 1 million to help industries to switch over to alternatives and train manpower.
- It is estimated that with the implementation of this plan, there would be direct carbon equivalent net reduction of about **8.5 million metric tonnes annually from 2023**.

1.2.3. VIENNA CONVENTION ON PROTECTION OF OZONE LAYER

- The **Vienna Convention on Protection of Ozone Layer** was adopted in 1985 and entered into force in 1988.
- The convention became the first convention of any kind to get universal ratification in 2009.
- The convention promotes research and development on the effects of human activities on the ozone layer and to adopt legislative and administrative measures against activities likely to harm the ozone layer.

1.2.4. KIGALI AGREEMENT

Why in news?

- 197 countries have struck a new landmark deal at Kigali in Rwanda to reduce the emissions of category of greenhouse gases (GHGs) which leads to hydro fluorocarbons (HFCs)
- Its reduction could prevent up to 0.5 degrees Celsius of global warming by year 2100.

Significance

- The Kigali Amendment **amends the 1987 Montreal Protocol** to now include gases responsible for global warming and will be binding on countries from 2019.
- It also has provisions for penalties for non-compliance.
- It is considered absolutely vital for reaching the Paris Agreement target of keeping global temperature rise to below 2-degree Celsius compared to pre-industrial times.
- Under it, developed countries will also provide enhanced funding support estimated at billions of dollars globally. The exact amount of additional funding from developed countries will be agreed at the next Meeting of the Parties in Montreal in 2017.

What is the Montreal Protocol on Substances?

- The treaty was originally signed in 1987 and substantially amended in 1990 and 1992 is aimed at reducing the production and consumption of ozone depleting substances in order to protect the earth's fragile ozone layer.
- This agreement was one of the few success of multilateral negotiations.

Different timelines

All signatory countries have been divided into three groups with different timelines to go about reductions of HFCs. This agreement shows a new form of grouping:

- **First group:** It includes richest countries like US and those in European Union (EU). They will freeze production and consumption of HFCs by 2018. They will reduce them to about 15% of 2012 levels by 2036.
- **Second group:** It includes countries like China, Brazil and all of Africa etc. They will freeze HFC use by 2024 and cut it to 20% of 2021 levels by 2045.
- **Third group:** It includes countries India, Pakistan, Pakistan, Iran, Saudi Arabia etc. They will be freezing HFC use by 2028 and reducing it to about 15% of 2025 levels by 2047.

1.3. INTERNATIONAL COOPERATION

1.3.1. MARRAKESH COP

- In the latest 22nd CoP of the UNFCCC held at Marrakesh, Morocco more than 190 countries negotiated to prepare the fine print for **Paris deal**. It sought to make the rules that would help in the implementation of the law i.e. Paris Agreement.
- The countries have agreed to complete the rule book by 2018 as the Agreement would come into force from 2020.

About Paris Climate deal

- The Paris Agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gases emissions mitigation, adaptation and finance starting in the year 2020.
- India is the 62nd country to ratify the agreement and accounts for 4.1 per cent of the emissions.
- The Paris Agreement entered into force on 4 November 2016, thirty days after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55 % of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depository.

1.3.2. AVIATION CLIMATE DEAL

Why in News?

- **International Civil Aviation Organisation** approved a landmark accord at its assembly session in Montreal to curb aviation pollution.

More about the Deal

- The proposal includes a mechanism for a **'carbon emission tax'** on airlines in order to offset emissions in the aviation sector.
- The agency's carbon offsetting system is expected to slow the growth of emissions from commercial flights costing the industry less than 2 percent of revenues.
- The accord requires participating countries to reduce emission by 2020 and limit it after it comes into effect from 2021.
- Participation in the deal is voluntary from 2021 to 2026. The deal becomes mandatory from 2027.
- Countries like US and China have agreed to go with the accord while Russia has refused to participate during the voluntary period.

1.3.3. KYOTO PROTOCOL

Why in News?

- Recently the Union Cabinet had approved the ratification of the second commitment period (2013-2020) of the Kyoto Protocol on containing the emission of greenhouse gases.

About Kyoto Protocol

- The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005.
- The detailed rules for **the implementation of the Protocol were adopted at COP 7 in Marrakesh, Morocco, in 2001, and are referred to as the "Marrakesh Accords."** Its first commitment period started in 2008 and ended in 2012.
- The protocol was developed under the **United Nations Framework Convention on Climate Change-UNFCCC**.
- The participating countries have ratified the Kyoto Protocol and **committed to cutting the emissions of the Green House Gases** such as Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF₆) and carbon dioxide (CO₂).

Classification of Parties to the Kyoto protocol

- **Annex I:** Parties to the UNFCCC listed in Annex I of the Convention. These are the **industrialized (developed) countries** and "economies in transition" (EITs). EITs are the former centrally-planned (Soviet) economies of Russia and Eastern Europe. The European Union-15 (EU-15) is also an Annex I Party.
- **Annex II:** Parties to the UNFCCC listed in Annex II of the Convention. Annex II Parties are made up of **members of the Organization for Economic Cooperation and Development (OECD)**. Annex II Parties are required to provide financial resources to enable developing countries in reducing their greenhouse gas emissions (climate change mitigation) and manage the impacts of climate change (climate change adaptation).
- **Annex B:** Parties listed in Annex B of the Kyoto Protocol are Annex I Parties with first or second round Kyoto greenhouse gas emissions targets.
- **Non-Annex I:** Parties to the UNFCCC not listed in Annex I of the Convention are **mostly low-income developing countries**. Developing countries may volunteer to become Annex I countries when they are sufficiently developed.
- **Least-developed countries (LDCs):** 49 Parties are LDCs, and are given special status under the treaty in view of their limited capacity to adapt to the effects of climate change.

Mechanisms to stimulate green investment

- **Emission Trading:** Emissions Trading-mechanism allows parties to the Kyoto Protocol to buy 'Kyoto units' (emission permits for greenhouse gas) from other countries to help meet their domestic emission reduction targets.
- **Clean Development Mechanism (CDM):** Countries can meet their domestic emission reduction targets by buying greenhouse gas reduction units from (projects in) non Annex I countries to the Kyoto protocol.
- **Joint Implementation:** Any Annex I country can invest in emission reduction projects (referred to as "Joint Implementation Projects") in any other Annex I country as an alternative to reducing emissions domestically.

Initiatives by India to Counter Climate Change

- **National action plan on climate change (NAPCC):** Government of India has launched **eight Missions** as part of NAPCC in specific areas which include assessment of the impact of climate change and actions needed to address climate change.
 - National Solar Mission
 - National Mission for Enhanced Energy Efficiency
 - National Mission on Sustainable Habitat
 - National Water Mission
 - National Mission for Sustaining the Himalayan Ecosystem
 - National Mission for a "Green India"
 - National Mission for Sustainable Agriculture
 - National Mission on Strategic Knowledge for Climate Change
- **National Action Programme to Combat Desertification:** It is proposed to initiate activities such as assessment and mapping of land degradation, drought monitoring and early warning system, drought preparedness plans, and on-farm research activities for development of indigenous technology etc.

1.3.4. GREEN CLIMATE FUND

- The **Green Climate Fund** was formally established by the **UNFCCC (United Nations Framework Convention on Climate Change)** in 2011 in Durban, South Africa.
- However, the idea behind Green Climate Fund was first proposed at the Copenhagen Accord in 2009.
- It was formed by 194 countries.
- The aim of the GFC is to raise \$100 billion per year by 2020 for investing in **low emission and climate resilient development projects**.

1.3.5. ADAPTATION FUND

- **Adaptation Fund** was setup in 2001 under the **Kyoto Protocol of the UNFCCC**.
- The fund is used to finance projects that help countries more prone to the harmful effects of climate change adapt to it.
- The fund is managed by **Adaptation Fund Board** which consists of 16 members and 16 alternates. The board meets twice a year.

1.3.6. MISSION INNOVATION

MI was announced on November 30, 2015 by the leaders of 20 countries that have a shared desire to accelerate global clean energy innovation during **COP 21 in Paris**.

- It aims to accelerate global clean energy innovation with the following aims
 - ✓ to make clean energy affordable
 - ✓ to address climate change
 - ✓ to create green jobs and commercial opportunities
- It includes participating countries doubling their clean energy R&D investment
- It is required to meet economic and energy security goals in timely manner
- India is Founding Member of the Steering Committee and also a Member of the two sub-groups: Joint research and Capacity Building and Private Sector Engagement.

1.3.7. CARBIFIX PROJECT

Why in news?

- Recent reports show that the project was able to solidify 95% of the injected 250 tonnes of CO₂ into calcite in 2 years, using 25 tonnes of water per tonne of CO₂.
- This is a significant achievement and offers hope for future.

What is it?

- It is a project in Iceland that aims to lock away CO₂ by reacting it with basaltic rocks.
- Carbonated water is injected into the rocks so that it reacts with Calcium, Magnesium or Silicate material present in Basaltic rocks. This is called enhanced weathering.
- Thus, the CO₂ is captured permanently without releasing any harmful by-products.

1.3.8. SUSTAINABLE DEVELOPMENT GOALS

The United Nations last year adopted global goals to **combat poverty, inequality and climate change** over the next 15 years in the most comprehensive international effort ever to tackle the world's ills.

- The SDGs are a set of **17 goals and 169** targets aimed at resolving global social, economic and environmental problems.
- To be met over the next 15 years, beginning on Jan. 1, 2016, the SDGs replace the **eight Millennium Development Goals (MDGs)** which were adopted in 2000 and expired in 2015.

1.3.9. WORLD SUSTAINABLE DEVELOPMENT SUMMIT

- It is an event conceptualized by TERI as a platform to accelerate action towards climate change.
- It is built on the legacy of **Delhi sustainable development summit**, organized first in 2005, under MoEF in collaboration with Ministry of external affairs.
- This year's broad rubric was '**Beyond 2015: People, Planet & Progress**'.

1.4. WHEAT BLAST

Why in news?

- The disease has recently entered the fields of Bangladesh. It can enter India by import, wind etc.

About Wheat Blast

- Wheat Blast is an agricultural disease that can cause more than 75 per cent yield loss in affected fields, rendering the region non-cultivable for years.
- It is caused by the '*Magnaportheoryzae*' **fungus**, which also causes Rice Blast.
- It thrives in hot and humid climates.
- It was first identified in 1985 in Brazil and has since spread to other countries of South America.

1.5. CLIMATE SMART AGRICULTURE

Why in news?

Recently the three-day Annual Forum of the Global Alliance for Climate-Smart Agriculture (GACSA) was organised at Rome by FAO.

About CSA

- Climate smart agriculture (CSA) is an integrative approach to address these interlinked challenges of food security and climate change. It basically **aims at three main objectives**:
 - ✓ sustainably increasing agricultural productivity, to support equitable increases in farm incomes, food security and development;
 - ✓ Adapting and building resilience to climate change at multiple levels; and
 - ✓ Reducing and/or removing greenhouse gas emissions, where possible.
- It is **supported by Food and Agricultural Organisation (FAO)**.

1.6. IGI IS ASIA-PACIFIC'S FIRST 'CARBON NEUTRAL' AIRPORT

Why in news?

- The Indira Gandhi International Airport in Delhi has become Asia-Pacific's only and one of the world's few airports to achieve a "**carbon neutral**" status.
- Currently, 25 airports in the world, most of them in Europe, have earned carbon neutral status.

Importance of the tag

- The Indira Gandhi International airport boasts of **green buildings, solar power plants, rainwater harvesting system** etc., which have helped reduce and offset carbon emissions.
- The airport has taken a series of measures to reduce carbon footprint, including setting up of a 7.84MW solar power plant.
- This would mean, Delhi Airport will get highest level of certification "**level 3+ neutrality**" available to airports across the world.

What is carbon neutrality?

- Carbon neutrality occurs when the net carbon emissions over an entire year are zero or when the airport absorbs or offsets the same amount of emission that was generated.
- This achievement is accredited by ACI under Airport Carbon Accreditation that monitors the efforts of airports to manage and reduce their carbon emissions.

1.7. MAJULI SET TO BECOME FIRST EVER CARBON NEUTRAL DISTRICT

Why in news?

- Assam government launched a project named, "**Sustainable Action for Climate Resilient Development (SACReD)**" in December, 2016 to make Majuli the first ever carbon neutral district in the country by 2020.

About Majuli

- Majuli is the biggest river island in the world. It is in river Brahmaputra.
- It is also first such island to be declared a district.

About SACRed

- The project has been initiated to combat climate change and greenhouse gases.
- **Mitigation through forestry and biodiversity conservation** will be the starting points in this carbon-neutral agenda.

- The project will be designed and implemented in partnership with other departments at the district level. A district level committee is to be formed.

1.8. INDIA'S FIRST 'GREEN CORRIDOR'

Why in news?

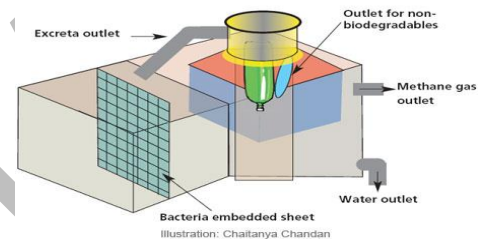
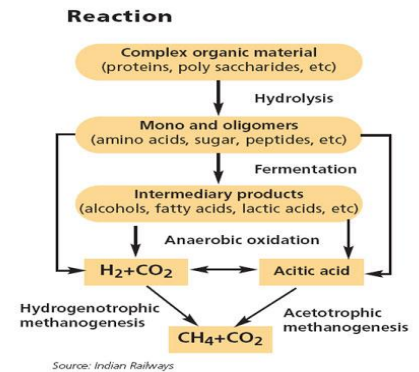
- The 114-km-long **Manamadurai–Rameswaram** stretch of Southern Railway became **India's first 'Green corridor'**.
- All the trains** in this route will have **bio-toilets** and there would be **zero discharge of human waste on tracks** in the section.
- Rameswaram** railway station had already been developed as a **'Green Station'** to handle the bio-toilets in the coaches.

About Bio toilets

- Indian Railway had developed the environment friendly **'IR-DRDO Bio-toilets'**, in association with Defence Research and Development Organisation (DRDO).
- Indian railways aims to install human waste discharge free **bio-toilets in all its coaches** and the same would be completed by **September 2019**.
- It will help in proving **cleanliness and hygiene** besides **preventing corrosion** of the tracks.
- It is **part of the Swachh Bharat Mission**.

HOW BIO-TOILETS WORK

Bio-toilets have a colony of anaerobic bacteria that converts human waste into water and small amounts of gases. The gases are released into the atmosphere and the water is discharged after chlorination on the tracks.



1.9. FOOD LEGUMES RESEARCH PLATFORM (FLRP)

Why in News?

On February 15, 2017 Union Cabinet approved the setting up of Food Legume and Research Platform in Madhya Pradesh (Amlaha, Sehore) with the **collaboration of** International Center for Agricultural Research in Dry Areas (ICARDA) and India council of agricultural Research (ICAR).

International Centre for Agriculture Research in the Dry Areas (ICARDA)

ICARDA is a non-profit agricultural research for development institute, established in 1977.

Organisation aims is to improve the livelihoods of the resource-poor across the world's dry areas.

Highlights

Department of Agricultural Research under the Ministry of Agriculture would be linchpin between ICAR and ICARDA for all the technical modification in Agreement and establishment of FLRP.

The Food Legumes Research Platform (FLRP) would be provided satellite Hubs in West Bengal (for pulses) and Central Arid Zone Research Institute (CAZRI), Rajasthan (for Natural Resource Management).

Cabinet gave the In-Principle Approval to ICARDA for setting up of FLRP.

Four Dimensional benefits of Pulses (Legume Crop)

Reducing poverty

- Pulses give 2-3 times higher market price than other cereal products.
- These are locally produced by community action, especially by women.
- Crop residue provide high protein value to livestock feed thereby cutting the cost of raising

Food Security

- It provides affordable source of protein.
- Give more food by using less land.
- Involves less risk due to its ability to withstand drought.
- Often grown in rotation as it fulfils the soil nutrients requirement (nitrogen)

Improving nutrients and health

- Contains 3-4 time higher protein content than cereals crops.
- Rich in nutrients like Calcium, Iron, Zinc and vitamin A.
- Beneficial to women and child who are the risk of anaemia.

Sustainability for Environment

- Pulses leads to nitrogen fixation, thereby reducing the cost and environmental impact of chemical fertiliser.
- Leafy cover of pulses prevent to soil erosion.

1.10. CARBON DIOXIDE LEVELS REACH RECORD HIGH LEVELS IN 2016

Why in news?

- Carbon dioxide levels in the atmosphere reached a record high in 2016, according to the **World Meteorological Organization (WMO)** and Greenhouse Gas Bulletin.

Background

- The global average concentration of carbon dioxide achieved a milestone of 400 parts per million in 2015 for the first time since record keeping began in 1960.
- In 2016, it surpassed all previous records and created a new one.
- The rise in carbon dioxide levels has been attributed to El Nino.
- Carbon dioxide remains in the atmosphere for thousands of years and even more in case off the ocean.

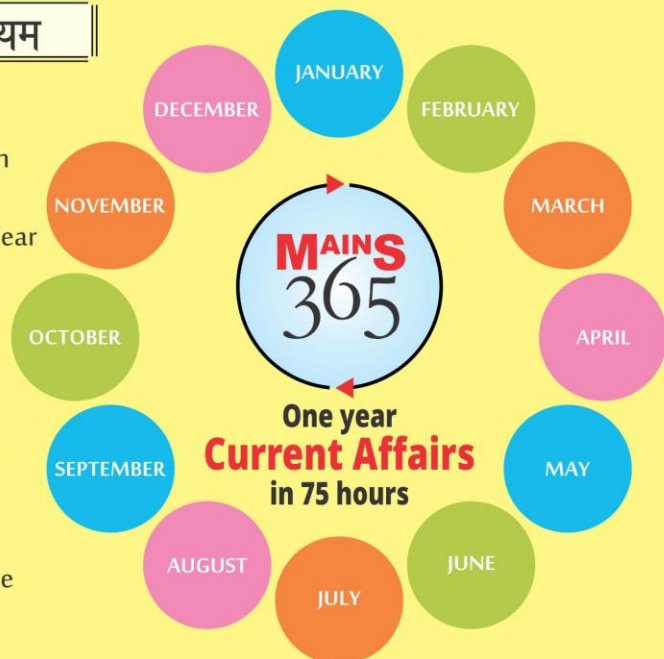
World Meteorological Organization

- WMO is a specialized agency of the UN with 191 member states.
- It came into being in 1950 and was recognized as an UN agency in 1951.
- It studies the Earth's atmosphere, its interaction with the land and oceans, weather and climate as well as the water bodies.

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2. POLLUTION

2.1. AIR POLLUTION

2.1.1. WHO STUDY ON AIR POLLUTION LEVELS

Why in news?

- A study conducted by the World Health Organisation and made public in September 2016 revealed that air pollution could have killed at least 600,000 Indians in 2012.

Method of the study

- The study findings are based on data derived from satellite measurements, air transport models and ground station monitors for more than 3000 locations, both rural and urban.
- It also relies on publicly available national data on pollutant levels.
- It is developed by WHO in collaboration with the University of Bath in UK.

Major causes of Air Pollution

- Air pollution is caused when air in the atmosphere is filled with particulate matter.
- Filters that are not changed regularly in your air conditioning units will accumulate dirt and cause the spread of pollutants in the air you breathe inside your home.
- Chemicals and toxic pollutants like sulphur dioxide, nitrogen oxides and carbon dioxide react with water molecules in the atmosphere to produce acid rain. These pollutants come from factories, automobiles and any industrial or manufacturing plants.
- Another source of air pollution is from dust and dirt that goes airborne due to every day labour in the agricultural and construction industry.
- Dust is lifted from tractors working on fields, and from land clearing and general demolition in the construction industry.
- Using household chemicals without adequate ventilation is a major source of indoor air pollution.
- Volcanoes, dust storms, and forest fires are causes of natural air pollution.

2.1.2. 'CLEAR THE AIR FOR CHILDREN': UNICEF STUDY

About

- The UNICEF recently concluded a study called 'Clear the Air for Children'.
- In the study which is based on satellite imagery it has categorized the affected areas based on the quantum of particulate matter, ranging from 10 to 60 $\mu\text{g}/\text{m}^3$.

Major findings

- Two-hundred and twenty million children in South Asia region including India, among nearly 300 million globally, currently live in areas where outdoor air pollution exceeds international guidelines by at least six times
- Many of these children are already disadvantaged by poverty and deprivation. Some are already at heightened risk from conflicts, crises and the intensifying effects of climate change.
- Globally, air pollution affects children in low-income and middle-income countries more.

2.1.3. SUPREME COURT: AIR POLLUTION IN DELHI NCR

Why in news?

The Supreme Court approved a comprehensive action plan to tackle air pollution emergencies in the capital.

Salient Features

- The court directed the centre to adopt reports submitted by the Environment Pollution Control Authority (EPCA), which list steps to be taken whenever air quality deteriorates beyond a certain level.

- EPCA's reports categorize four levels of air pollution in the National Capital Region (NCR) centred around Delhi, based on atmospheric particulate matter (PM) levels.
- The plan sets in motion a series of steps that every authority-central government, Delhi government, municipal corporations and Delhi's neighbouring states-need to take as pollution levels spike.

2.1.4. INDIA AND STATE GLOBAL AIR REPORT 2017

Background

- It is the first report on air quality by using the latest global data from 1990 to 2015.
- Report is conducted jointly by the independent research institute; 'Health Effects Institute (US-based non-profit corporation)' and The Institute of Health Metrics and Evaluation (Independent research institution-University of Washington)
- The report provides information under various titles of 'Air Pollution level and Trend', 'Global Burden of Disease' and 'Health burden due to air pollution'.
- As per the report, approximately, 90% of the world's population lives in areas with unhealthy air in 2015.

India and State Global Air Report 2017

- The report highlighted that there is a significant increase in inhalable fine particles of PM 2.5 since 1990.
- Outdoor air pollution has increased the death rate in India, surpassing the most polluted country China.
- The report highlights that the underlying reason for increasing pollution in India can be attributed to its growth, which is happening in terms of industries and its consumption of coal as the main source of energy.
- The report takes the cognisance of a **new pollutant 'ozone'**. Though the casualties in India from ozone are far less than the well-known PM 2.5. However, the rate of increase in ozone-related deaths is alarming.
- The report is significant for India in providing more comprehensive pollution monitoring road map than currently in use Air Quality Index.

About Ground level or "bad" ozone

- It is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight.
- Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NOx and VOC.
- Breathing ozone can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma.
- Ground level ozone can also have harmful effects on sensitive vegetation and ecosystems.

2.1.5. HAWA BADLO APP

Why in news?

- The "**Hawa Badlo App**" was launched by **Environmental Pollution (Prevention and Control) Authority (EPCA)**, appointed by the Supreme Court to improve the air quality in Delhi and NCR

About the App

- The app lets people report incidences of air pollution to the government. This includes reporting incidents like **leaf and garbage burning, and dust generated by construction activities**.
- Each complaint would be **geo-referenced** and will provide the time and location where the evidence of violation has been collected and submitted.
- The app has been launched with the aim of inclusive participation by the residents.
- The app also has a section for officials to resolve cases and upload evidence of the action taken.
- The app will generate weekly report which will be sent to **Centre and State Pollution Control Boards**.

2.1.6. AIR QUALITY INDEX

What is AQI?

- The minister for environment, forests & climate change launched the national air quality index (AQI) on 17 September 2014 under the Swachh Bharat Abhiyan.
- It is outlined as 'one number- one colour-one description' for the common man to judge the air quality within his vicinity.
- There are 6 AQI categories (refer fig).
- The proposed AQI will consider **eight pollutants (PM10, PM2.5, NO2, SO2, CO, O3, NH3, and Pb)** for which short-term (up to 24-hourly averaging period) National Ambient Air Quality Standards are prescribed.
- The value of the AQI, one of the experts said, is in it being comparable across cities and across pollutants in terms of health impact.

2.1.7. DELHI SMOG

- Delhi witnessed the worst smog in almost two decades, with consistently hazardous pollution levels being recorded for over a week.

About Smog

- Smog is used to describe the type of fog which has smoke or soot in it.
- Smog is a yellowish or blackish fog formed mainly by a mixture of pollutants in the atmosphere which consists of fine particles and ground level ozone.
- Smog which occurs mainly because of air pollution, can also be defined as a mixture of various gases with dust and water vapor.

2.1.8. DELHI NOT THE WORLD'S MOST POLLUTED CITY

- As per the Global Urban Ambient Air Pollution Database (update 2016) released by WHO, Delhi is no longer the most polluted city in the world.

About particulate matter

- It is the term for a mixture of solid particles and liquid droplets found in the air.
- It includes
 - ✓ **'Inhalable coarse particles'**, with diameters larger than 2.5 micrometers and smaller than 10 micrometers (PM 10); and
 - ✓ **'Fine particles'**, with diameters that are 2.5 micrometers and smaller (PM 2.5)
- They are **formed in two ways**
 - ✓ **Primary particles**; emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks or fires.
 - ✓ **Secondary particles**; formed due to complicated reactions in the atmosphere of chemicals such as sulfur dioxides and nitrogen oxides that are emitted from power plants, industries and automobiles.
- Particulate matter triggers or worsens asthma, heart attack, bronchitis and other respiratory problems. Exposure to fine particulates is linked to premature death from heart and lung disease.

2.1.9. RAJVAYU APP

Why in news?

- The Rajasthan government launched the **"RajVayu"** app for sharing information regarding **air quality index of Jaipur, Jodhpur and Udaipur**.
- Another app, **"Drishti"** used for monitoring of pollution levels in industrial areas was also launched.

NATIONAL AIR QUALITY INDEX LAUNCHED

10 cities where people can get information on actual air quality and its health implications: **Delhi, Agra, Kanpur, Lucknow, Varanasi, Faridabad, Ahmedabad, Chennai, Bangalore and Hyderabad**

- Most of the **monitoring stations** in these 10 cities **started displaying the index from Monday (April 6)**
- **Index can be accessed from websites** of Union environment ministry or respective state pollution control boards
- AQI scheme reflects **'one colour one code'** for different types of air quality (good, satisfactory, moderate, poor, very poor and severe)
- **46 other million-plus cities and 20 state capitals** will have **similar air quality index** in next one to two years
- Each of these **cities** will have **6-7 monitoring stations with AQI display boards**



AQI SCHEME		
AQI	Colour code	Likely health implications
1-50	Good	Minimal impact
51-100	Satisfactory	Minor breathing discomfort to sensitive people
101-200	Moderate	Breathing discomfort to people with lungs, asthma & heart disease
201-300	Poor	Breathing discomfort to most people on prolonged exposure
301-400	Very Poor	Respiratory illness of prolonged exposure
401-500	Severe	Effects healthy people & serious impact to those with existing diseases

About the App

- It is based on the data collected by **sophisticated air quality monitoring equipment and weather sensors**.
- The app would share details about the air quality levels through pollutants **likes Particulate Matter, SO_x, NO_x, CO, Ozone particles** with the city residents and tourists.
- It would also issue **temperature, humidity, wind speed, weather forecast and advisories**.
- It is based on the **System of Air Quality and Weather Forecasting Research (SAFAR-India)**.
- It is one of first of its kind app in the country.

2.1.10. AMMONIA DETECTED FIRST TIME IN TROPOSPHERE

- Researchers for the first time detected trace amount of Ammonia in upper troposphere.
- It was most concentrated in the upper layer of the troposphere above India and China due to high agricultural emission from livestock farming and fertilisation.

Why is this Discovery Important?

- It shows that ammonia released on Earth's surface due to agricultural processes survives all the way to the upper troposphere, and is not washed out completely by monsoon.
- It means that ammonia not only pollutes the local ecosystem but also plays a role in formation of **Aerosols**.
- The accumulation of aerosols in the troposphere is thought to have a cooling effect, as clouds reflect the sun's energy.
- It may provide an alternative way to mitigate the human-induced effects of climate change.

Aerosols

- Aerosols are tiny particles made from super-fine solid particles and liquid droplets carried in the atmosphere
- They often act as 'cloud condensation nuclei' around which cloud droplets are formed.
- Aerosols can also modify the size of existing cloud particles, and change how the clouds reflect and absorb sunlight, leading to haze and much redder sunrises and sunsets.

2.1.11. FLY ASH UTILIZATION POLICY

- The Maharashtra state cabinet has recently approved the State Thermal Power Plant Ash Utilization Policy. With this it has become the **first state to adopt this policy**.
- The policy seeks to curb transport of fly ash produced in the coal-based thermal plants and stipulates measures to utilize all coal waste at source.

About Fly Ash

- Fly ash is one of the coal combustion products and is composed of fine particles that are driven out of the boiler with flue gases. Ash that falls at the bottom of the boiler is called bottom ash.
- Fly ash includes substantial amounts of oxides of silica, aluminum and calcium. Element like Arsenic, Boron, Chromium, lead etc. are also found in trace concentrations. It, thus, poses hazards to environment and health.
- Due to the presence of these minerals it has certain unique properties. It can be used as construction material, filling old mines, building railway embankments, and reclamation of low-lying areas.

Significance

- It will help in cutting down air pollution as much of the fly ash pollutes the air while transportation.
- This would help in saving ash transportation cost, Rs. 2000 crore at present, borne by the power stations.
- This could lead to cutting the cost of power to consumers.
- This would become the source of additional revenue for the government.

2.2. GANGA RIVER

2.2.1. NATIONAL GANGA COUNCIL

Why in News?

- The Union Cabinet under the chairmanship of PM Narendra Modi has cleared the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016.
- The Order enforces an institutional structure for policy and implementation and empowers National Mission for Clean Ganga (NMCG) to discharge its functions in an independent and accountable manner.

- A mission status will be granted to the Authority with corresponding power under the Environment (Protection) Act (1986).

Major Takeaways

- The new council for River Ganga will replace the existing **National Ganga River Basin Authority (NGRBA)** for pollution prevention and rejuvenation of Ganga.
- Setting of an Empowered Task Force that will ensure the existence and implementation of an action plan under various Departments, Ministries and States.
- The NMCG will have a two tier structure with a Governing Council and an Executive Committee.
- The NMCG will comply to the decisions of the National Ganga Council.
- At the state level, State Ganga Committees would be formed for proper implementation.
- Similarly, District Ganga Committees would be formed in each Ganga Bank District and they shall be monitored by the State Committees.
- The special focus of the revamped structure would be to maintain ecological flows in Ganga with an aim to ensure water quality and environmentally sustainable development.
- An innovative model based on Hybrid Annuity has also been approved for fast track creation of sewerage and treatment infrastructure in the Ganga basin.

- **NRGBA:** established by the Central Government of India, on 20 February 2009 under Section 3 of the Environment Protection Act, 1986.
 - ✓ It declared the Ganga as the "National River" of India.
 - ✓ The chair includes the Prime Minister of India and chief ministers of states through which the Ganga flows.

Significance

- The NMCG will now have the power to issue orders and also exercise the powers under the Environment Protection Act. It can now fine polluters.
- NMCG will only take action in case of non-compliance when CPCB (Central Pollution Control Board) does not do so.
- CPCB can also take action jointly with NMCG.

2.2.2. SWACHH YUG CAMPAIGN

- As part of its efforts to make villages located along Ganga open defecation-free, Government has launched a campaign '**Swachh Yug**'.
- It is a collaborative effort of three Union Ministries, to bring about behavioural change among people staying in villages along the river.
- There are 5,169 villages located along Ganga falling under 1,651 gram panchayats in 52 districts of five states- UP, Uttarakhand, Bihar, Jharkhand and West Bengal from where the river flows.
- A nodal officer has been identified for each district to work on making area under their jurisdiction open defecation free (ODF) in a "mission mode" and clean through proper solid and liquid waste management.
- In addition to monetary incentive offered under Swachh Bharat Mission, extensive interpersonal behaviour change communication training will be given to local trainers through network of virtual classrooms.

Ministries involved in campaign

- **The Ministry of Drinking Water and Sanitation** – mission mode strategy to focus on cleanliness of village through proper solid and liquid waste management.
- **Ministry of Youth Affairs and Sports** under the coordination of the Nehru Yuva Kendra Sangathan, will enlist support of youth agencies like Bharat Scouts and Guides, Nehru Yuva Kendras and National Service Scheme.
- **Ministry of Water Resources, River Development and Ganga Rejuvenation**

2.2.3. GANGETIC DOLPHINS

Why in News?

- Scientists and wildlife conservationist feel that the development of the Ganga under the **National Waterway-1** project is threat to the survival of the **gangetic dolphins**.
- **Ganges River Dolphin** is a sub-species of **river dolphins**, found in the **Ganga and Brahmaputra** rivers.

Background

- The Centre has planned to develop a **1600-km waterway between Allahabad and Haldia for inland transportation** under a Rs. 4200-crore World Bank-aided project.
- The first phase of the project from Haldia to Varanasi (1300 km) is now underway.
- The stretch that covers that NW1 is also home to river dolphins.
- River dolphins have been classified as **“endangered”** by IUCN (International Union for Conservation of Nature) in 1966.
- These species are practically blind and rely on bio-sonar waves to move around.

2.3. SEECHEWAL MODEL TO CLEAN YAMUNA

- This model is named after noted environmental activist Balbir Singh Seechewal.
- He has played a prominent role in reviving the Kali Bein rivulet (a rivulet of Beas river) in Punjab.

The method includes cost efficient and simple methods:

- Decentralized natural treatment system - oxidation pond & settling tanks
- Processes used to remove floating materials
- Maintenance of flow of water which ensures self-purification of the river

2.4. CANCER CAUSING CHEMICALS IN PACKAGED BREAD

Highlights of Centre for Science and Environment study

- Bread manufacturers are using Potassium bromate and potassium iodate in breads that may have potential health effects.
- Effects of Potassium bromate - International agency for research on cancer (IARC) classified it as class 2B-possible carcinogenic.
- Effects of Potassium iodate - It can lead to excess intake of iodine which could affect thyroid function.

International norms

- Potassium bromate – banned in EU and China but permitted in US.
- Potassium Iodate - banned in EU, UK, Australia.

2.5. PORTABLE KIT FOR DETECTION OF CHROMIUM CONTAMINATION

Why in news?

- Bhabha Atomic Research Centre (BARC) has developed a portable kit to check chromium contamination in water.
- As per Indian standard IS10500 for drinking water, the maximum permissible concentration of Cr (VI) in drinking water is 50 microgram per litre.
- Detection of Cr (VI) at such low levels is technically challenging and involves collection of water samples from affected areas, transport to laboratory, storage and finally analysis.

About Chromium

- Chromium is widely used in various industries like leather, steel, chrome plating, paint manufacturing, wood preservation etc.
- Hexavalent Chromium Cr(VI) is toxic and the World Health Organization has classified it as carcinogenic and can cause stomach ulcers and cancers and severe damage to kidneys and liver.

2.6. EMISSIONS GAP RISING

Why in News

- A recent UN Environment Programme Report reveals that global emissions have continued to rise despite some signs of emissions from fossil fuels and industries stabilizing.

- The emissions gap for 2030 is 12 to 14 GtCO₂e (Giga tonne CO₂ equivalent) compared with 2°C scenarios, and for 1.5°C the gap is three GtCO₂e larger.

What is Emissions Gap?

- Emissions gap is the difference between the emissions levels in 2020 necessary to meet climate targets, and the levels expected that year if countries fulfill their promises to cut greenhouse gases.
- So, the emissions gap reveals how much more needs to be done by countries in order to meet the target of keeping global warming levels below the 2°C safe limit as agreed in the Paris climate accord last year.

2.7. ARSENIC CONTAMINATION

- Arsenic is highly toxic in its organic form and presence of high levels of arsenic in groundwater renders it toxic.
- Long-term exposure to arsenic from drinking-water and food can cause cancer and skin lesions. It has also been associated with **developmental effects, cardiovascular disease, neurotoxicity and diabetes.**
- The government of India has kept the maximum arsenic level in water at **50 µg/L** while WHO has kept it at **10 µg/L.**

Why causes arsenic contamination?

- Population burden is not the only cause of Arsenic contamination, low replenishment of groundwater also adds to the problem.

2.8. STOCKHOLM CONVENTION ON POPs

- It is a global treaty that aims to **protect the human health and environment from the harmful effects of persistent organic pollutants (POPs).**
- The convention entered into force in May, 2004.
- The convention has a host of measures to reduce and, where feasible, eliminate the release of POPs.
- For intentionally produced POPs, parties must prohibit or restrict their production and trade.
- For unintentionally produced POPs, the convention requires parties to develop national action plans to control them.
- The convention currently regulates **23 POPs.**

What are Persistent Organic Pollutants (POPs)?

- There are a group of chemicals that very toxic in nature and has adverse health effects.
- They are persistent in nature and can travel vast distances through air and water.

2.9. DRAFT ORDER ON BAN ON PESTICIDES

Why in News?

- The Government of India has decided to ban the use of 18 pesticides following the recommendations of the **Anupam Varma Committee.**

More on the Ban

- Complete ban of 12 pesticides would come into effect from January 1, 2018 while the rest 6 would be banned from December 31, 2020.
- The GOI has also sought objections and suggestions on this draft order from all stakeholders before taking a final decision.
- The **Central Insecticide Board and Registration Committee (CIBRC)** approves the use of pesticides in India.

Endosulfan

Endosulfan is a hazardous pesticide which is banned in 80 countries.

It was used by the **Karnataka Cashew Development Corporation** and **Kerala Government** over cashew plantation to combat tea mosquito after 1970s.

It has been found to be responsible for various mental and physical deformities among the population of the two respective states.

In 2011, Supreme Court banned Endosulfan pan-India.

Anupam Varma Committee

- This committee was constituted in July 2013 to review the use of 66 pesticides which are either banned or restricted in other countries.
- The Committee recommended banning 13 pesticides, phasing out 6 by 2020 and reviewing 27 others in 2018.
- The Committee did not review the use of Endosulfan as the matter was pending with the Supreme Court at that time.

2.10. SOLID WASTE MANAGEMENT-BUFFER ZONE

Why in News?

- **Central Pollution Control Board (CPCB)** has issued draft guidelines proposing to maintain buffer zones around landfills to minimize/prevent the impact of landfill waste disposal.
- The proposed guidelines will apply to all future treatment plants while the existing plants will have to incorporate measures such as planting trees and using odour free technology.

Current Status

- The current practice of solid waste management in India includes a host of options such as **composting, vermin-composting, biogas, refuse derived fuel (RDF), pelletization and waste-to-energy measures.**
- Disposal of garbage in landfill sites is the least preferred but a widespread option in India. It encompasses waste disposal/processing facilities.
- It affects the neighbouring environment by fostering air, water, land and noise pollution.
- Close to 62 million tonnes of solid waste is generated every year in the country. Out of this, 43 million tonnes is collected and only 12 million tonnes treated.
- The only guideline for landfills as of now is that they be at least 500 metres away from habitable zones.

Buffer Zone

- Buffer Zone refers to an area of no construction. Such an area is designated in order to segregate two regions (for environmental protection).
- The term buffer zone was first specified by the government in **Municipal Solid Waste (Management and Handling Rules), 2000.**
- The revised rules as under Solid Waste Management (SWM) Rules, 2016 made it a duty of CPCB to issue guidelines regarding buffer zones.
- According to the SWM Rules, 2016, "a buffer zone of no development shall be maintained around solid waste processing and disposal facility, exceeding five tonnes per day of installed capacity."

2.11. INDUSTRIAL WASTE RECYCLE: NANO TECH

- Traditional methods available for treating industrial dyes are expensive and do not completely break them down to non-toxic constituents but merely concentrate them.
- Scientists have developed a **photo-catalytic degradation** agent using **titanium dioxide nano-particles doped with sulphur and carbon** by treating it with red **seaweed polymer carrageenan.**
- There are several advantages of this doping as the energy required to activate the catalyst is less when it is doped, making the dye degradation faster than the traditionally available ones.
- The scientists have been able to completely degrade three industrial dyes - methyl orange, methylene blue and reactive black-5 - in the presence of sunlight.
- When a solar concentrator is used the intensity of visible light is more and this plays an important role in the degradation process
- Another advantage is that the nano-composites are thermally stable and can be reused up to six times with the degradation efficiency remaining at over 97 per cent.

2.12. TAJ MAHAL TURNS GREEN

- The historical monument is turning green due to release of faeces and dirt by insect, Geoldichironomus (Chironomuscallygraphus).
- Yamuna has become so stagnant due to pouring of waste directly into it, that fish that earlier kept insect populations in check are dying.

- This is resulting into “explosive breeding” of the insect, which is a biological indicator of water quality and localised water pollution.

2.13. MICROPLASTICS/MICROBEADS

- Microplastics or Microbeads are plastic pieces or fibre, which are very small, generally measuring less than 1mm.
- They have a variety of use, most notably being personal care products like toothpaste, body creams, clothing and industrial use.
- They have an ability to spread easily and provide silky texture and colours to the product. Thus adding visual appeal of the cosmetic products.

Issues with Microplastics

- They are non-biodegradable and flow through sewers to seas and oceans and **add to the huge chunk of “plastic soup” in the environment.**
- **They increase water pollution** and have a potential to disrupt the aquatic ecosystem.
- Once they enter water bodies **they accumulate as act as carriers for other pollutants.** They carry carcinogenic chemical compounds in the food chain.
- Due to their **small size they pass through the waste water treatment** filtration system as well.

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3. BIODIVERSITY

3.1. ASIAN WATERBIRD CENSUS DATA

Why in news

- The year 2016 marks the 50th global International Waterbird Census (IWC). With this, it has become the **world's longest running biodiversity monitoring programme**.
- The observations pertaining to wetland birds of Kerala done over a period of 27 years were released. This happens to be the **first countrywide citizen science activity on natural history**.

What is it?

- The Asian Waterbird Census (AWC) happens every **January** across Asia and Australia.
- It runs parallel to other regional programs of **International Waterbird Census (IWC)**, in Africa, Europe etc.
- In India, it is coordinated by **Bombay Natural History Society (BNHS)** along with **Wetlands International**
- It began in 1987 in Indian subcontinent

Objectives of Waterbird Census

- Obtain information of waterbird population on an annual basis **during non-breeding period of most species (January)** and use it as a basis for monitoring population and evaluate sites
- Annual monitoring of the status and condition of wetlands
- Encourage greater interest in waterbirds and wetlands amongst people and promote their conservation.

About water birds

- Waterbirds are defined as species of birds that are ecologically dependent on wetlands.
- These birds are an **important health indicator of wetlands** of a region.

About Wetlands International

- Wetlands International is a non-profit organization established in 1937 as 'International Wildfowl Inquiry' and HQ in Netherlands.

3.2. SANGAI BROW-ANTLERED DEER

Why in News?

- The scientists of Wildlife Institute of India (WII) have been assigned with the task of providing second home to Sangai due to its depleting population in the area.

About Sangai

- The Sangai is an **endemic and rare** subspecies of brow-antlered deer found only in Manipur.
- It is also the **state animal of Manipur**
- Its habitat is restricted to the marshy wetland of **Keibul Lamjao** over the floating biomass in **Loktak Lake** which is locally called '**phumdi**'.
- While walking on the floating biomass, Sangai often balances itself which looks as if it is dancing on the green grassland and therefore popularly called as '**dancing deer**' of Manipur.
- It is classified as 'endangered' by the IUCN but is part of MoEF's 'Recovery Programme for **critically endangered** species and habitats'.

- The MoEF recently constituted a four-member team for conservation and management of the Loktak Lake.
- The team will review the implementation of various work carried out with financial assistance provided by the central and state governments so far for the conservation and management of the Lake. It will also suggest further interventions required for conserving the lake in a holistic manner.

About Loktak Lake

- Loktak Lake is the largest freshwater lake in Northeast India located in Manipur.
- It is famous for the **phumdis** which is heterogeneous mass of vegetation, soil, and organic matter at various stages of decomposition floating over it.
- **KeibulLamjao is the only floating national park** in the world. It is located near Moirang in Manipur.

- The Keibullamjao National Park is the last natural refuge of the **endangered Sangai deer**.
- Human activity has led to severe pressure on the lake ecosystem.

3.3. TIGERS

3.3.1. TRANSBOUNDARY MANAS CONSERVATION AREA (TRAMCA)

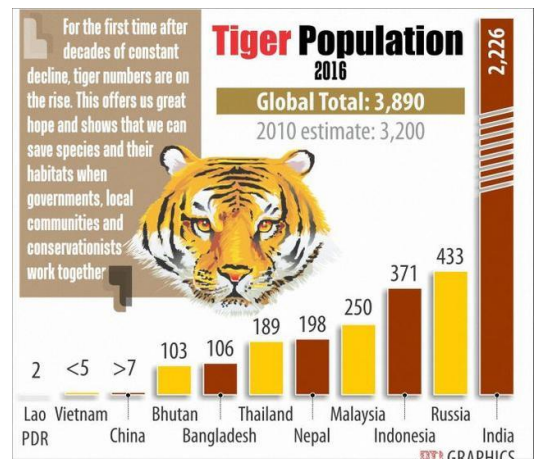
- The second monitoring of big cats across the Transboundary Manas Conservation Area (TraMCA) covering Manas National Park (MNP) in Indian side and the Royal Manas National Park (RMNP) in Bhutan has found altogether 21 individual tigers.
- The monitoring was carried out by the MNP, RMNP, National Tiger Conservation Authority (NTCA), WWF-India and conservation group Aaranyak last year, covered an area of 560 sq km across the two protected areas.
- **Transboundary Manas Conservation Area (TraMCA)** covers Manas National Park (MNP) on the Indian side and the Royal Manas National Park (RMNP) in Bhutan
- TraMCA, floated in 2008, is a joint initiative of India and Bhutan for trans-boundary biodiversity conservation.

3.3.2. COUNTRY'S FIRST TIGER REPOSITORY

- Country's first repository on tigers, under the new Tiger Cell of Wildlife Institute of India (WII)
- Working with the National Tiger Conservation Authority (NTCA) on tiger conservation and population estimation, the WII has generated a huge database of more than 23,000 images of tigers to be maintained by the tiger cell.
- The repository will help in identification of possible source of tiger skin if caught at any place, studying projects before clearances.
- The Tiger Cell will assist in population assessment of tigers, law enforcement, wildlife forensics, infrastructure development, smart patrolling and advisory role in policy formulation.

3.3.3. INCREASE IN TIGER POPULATION

- The number of wild tigers has gone up globally by 22 per cent to 3,890, from the earlier 2010 estimate of 3200, according to the World Wildlife Fund and the Global Tiger Forum (GTF).
- India leads with an estimated population of 2226, up from 1706 in 2010.
- Karnataka has the highest number of tigers followed by Uttarakhand.
- Further, the WWF TX2 goal of doubling the population to 6400 tigers by 2022 is still far.



3.3.4. INTERNATIONAL TIGER DAY

- International Tiger Day is celebrated on **July 29** with an aim of increasing awareness towards the conservation of tigers worldwide.
- This day was first started and celebrated in 2010 at the Saint Petersburg Tiger Summit and was conceptualized when experts realized that tigers were very close to extinction.

3.3.5. NATIONAL TIGER CONSERVATION AUTHORITY

- It is a statutory body in Ministry of Environment, Forest and Climate change constituted under Wildlife (protection) act, 1972.
- It strengthens tiger conservation through advisories/guidelines based on analysis of current status and recommendations of committees
- The statutory status gives legal authority to its directives regarding project tiger and also ensures accountability to parliament

- It also helps in ensuring centre-state accountability in management of tiger reserves through MoU with states regarding the same.
- Its major functions include – approving the tiger conservation plan by state governments, setting standards for various activities around tiger conservation areas such as for mining, tourism etc., enhance capacity building, take care of livelihood opportunities of local communities etc.

3.3.6. IMPACT OF KEN-BETWA LINK ON TIGER POPULATION

Background

- The Ken-Betwa River linking project aims to irrigate the drought-ravaged Bundelkhand region.
- It involves building a 288-metre **Daudhan dam**, and transfer of surplus water from the Ken river basin to the Betwa basin.
- This will submerge nearly 400 of the 4,300 hectares of the Panna tiger reserve.
- Experts suggest that the result could be drastic for the tiger population, as they have to adjust to the changes.
- Impact area will be far greater with associated activities related to construction, power houses etc.
- A team of **wildlife experts have submitted a report** on the environmental impact of the project.
- While not endorsing or disapproving the project, the Panel has advised the government to ensure two things:
 - ✓ The proposed canal should not hinder tiger movement; and
 - ✓ There should be enough habitable forest land developed to compensate for the loss of tiger reserve land.

About Panna tiger reserve

- It is located in Madhya Pradesh is most notable for its tiger conservation programme. Tigers in the reserve had plummeted from 25 in 2006 to zero in 2009. Thereafter a spate of conservation efforts including translocation has resulted in increasing the population to 18 at present.
- Designated as **Biosphere Reserve** in 2011.

3.4. HIMALAYAN BROWN BEAR SPOTTED IN KARGIL

Why in news?

- Recently a group of eight Himalayan brown bears were spotted in Ladakh's Drass Sector.
- No Himalayan bear had been spotted in the region for many years.

About Himalayan Brown Bear

- Largest mammal in the Himalayan region
- Critically endangered status under IUCN due to loss of habitat and human persecution.

Wildlife in Ladakh Region

- Tibetan Antelope and Snow Leopard are endangered species.
- Bharal (Himalayan Blue Sheep), Tibetan Wild Ass and Ibex are prominent in the region.
- There are four major wildlife regions in Ladakh- Suru, Zaskar, Drass and Kargil.

3.5. GREAT INDIAN BUSTARD (GIB)

Why in news?

- The Rajasthan government is formulating a long-term plan to save this bird from extinction in collaboration with the Wildlife Institute of India (WII).
- It will take into consideration important measures like controlling the population of stray dogs and implementing recovery actions programmes in collaboration with different stakeholders.

About GIB

- It is found in the **exclusively in north-western plains** particularly parts of Rajasthan and also Pakistan.

- It is **one of the heaviest flying birds**.
- It is **critically endangered bird**.
- The reasons are depleting habitat, i.e. grasslands especially due to development of infrastructure intrusions.
- It is the **state bird of Rajasthan**.

3.6. INDIAN WILD ORANGE

Why in news

- **Earlier it was reported only from the Garo hills of Meghalya**, where it is locally called '**Biurengthai**' and is used for medicinal and spiritual purposes by the Garo people.
- However, **recently it has been found in Manipur as well**, in a remote village called Diolong.

About

- It is a native Indian species of citrus with the scientific name '**citrus indica**'.
- It is considered to be the **most primitive citrus** likely to be **an ancestor of all citrus fruits in the world**.
- It is an **endangered species** that require a specific microclimate.
- The Nokrek Biosphere Reserve is an important site for the species
- Major threat to the specie has been habitat destruction due to slash and burn (*jhum*) activity.

3.7. HANGUL MAY GO EXTINCT

- Hangul, also known as Kashmir Deer, is an endangered species mainly concentrated at Srinagar's Dachigam National Park. The reasons for its dwindling numbers are:
- Domestic livestock grazing by Kashmir's "bakarwal" community - the nomadic tribe practicing goat herding and shepherding.
- Full-fledged government-run sheep breeding centre inside the park which causes bacterial infections that affect foetuses resulting in a low birthrate of hangul.
- Human activities - security forces, offices of fisheries, protocol, and tourism departments inside the park.

3.8. GYPS VULTURE REINTRODUCTION PROGRAMME

Why in news?

- It was launched last year by Government of Haryana by putting ten captive bred vultures in pre-release aviaries close to Jatayu Conservation Breeding Centre at Pinjore in Haryana.
- It is Asia's first Gyps Vulture Reintroduction Programme.
- Recently, two **Himalayan Griffons** were released in the wild as part of this programme.
- The programme is an ex-situ means of conservation whereby some vultures are kept at the breeding center for some time and then released into the wild.

Jatayu conservation breeding centre

It is a facility within **Bir Shikargah Wildlife Sanctuary** for the breeding and conservation of Indian vultures in Pinjore town near Chandigarh, Haryana.

Status of vulture species in India

Mainly four kinds of vultures are found in India

- **Gyps species**- also called Indian vulture, Long-billed, slender billed vulture- Critically endangered
- **Himalayan Griffon**; closely related to Indian Gyps- not endangered; only **Near Threatened**
- **Red-Headed Vulture**- Critically endangered
- **Egyptian Vulture**- Endangered as per IUCN

Why is population of vulture declining?

- Mainly due to use of **Diclofenac**, a drug which is given to cattle for inflammation and pain. The drug results in kidney failure in vultures when it enters its body through the Caracas.
- The government has banned Diclofenac since 2006 but its illegal use remains in force. People need to be made more aware of the use of alternate drug **Meloxicam**.

3.9. EURASIAN OTTER

Why in news?

- Recently Eurasian Otter were discovered from **Satpura** Tiger Reserve, Madhya Pradesh and **Kanha-Pench Corridor**.
- It was believed to be restricted to Himalayas and in some parts of the Western Ghats.

What is it?

- It is one of the **rarest Indian mammal**.
- It has wide distribution covering Europe, Africa and Asia. But it is rare in India.
- It is classified as '**Near Threatened**' under IUCN.

3.10. SMOOTH-COATED OTTER

- **Smooth-coated otter** was sighted for the **first time** in the mangrove forest adjacent to the **Krishna Wildlife Sanctuary** in Krishna district.
- Presence of the otter is a **key indicator for rise of the mangrove cover**.
- It is distributed throughout **south Asia and Southeast Asia**.
- Listed as **Vulnerable** on the IUCN Red List.

Populations reported from

- **Corbett and Dudhwa** Tiger Reserves and Katarniaghat Wildlife Sanctuary **in the north**,
- **Kaziranga** National Park in the **northeast**,
- **Sunderbans, Bhitarkanika and Coringa** in the **eastern coast**; and
- **Periyar Tiger Reserve** and the **Nagarhole National Park** in the south.

3.11. KENDRAPADA SHEEP

Why in news?

- Recently it was conferred '**rare and singular species**' tag by the Union government.
- They have some rare genetic traits which lead to multiple birth syndromes in them.

What is it?

- A threatened breed of sheep **found only** in coastal Jagatsinghpur and Kendrapara districts of **Odisha**.
- It is also known as '**Kuji Mendha**'.

3.12. HABITAT DESTRUCTION OF LAGGAR FALCON IN MADURAI

Why in news?

- The Laggar falcon, once numerous in number, now has only two birds of this species surviving on the rock cliffs of Arittapatti in Madurai.
- They are probably the only birds spotted in the entire south Indian region in the last two years.

Reasons for the decline in number

- Indiscriminate sand quarrying on the Vaigai river bed and indiscriminate granite and stone quarrying in many parts of Madurai has led to loss of habitat of these birds.
- Felling of palm trees in these areas, which is a nesting spot of many raptor species, is also one of the reasons for the disappearance of the birds.

About Laggar Falcons

Laggar Falcons are an indigenous raptor species with white and grey plumage, which can hunt and fly at speeds of up to 180 kmph. It resembles the lanner falcon but is darker overall.

3.13. GIANT PANDA NO LONGER ENDANGERED

Why in News?

- The **International Union of Conservation of Nature** has said in a report that the Panda is now classified as “**vulnerable**” instead of “**endangered**” species.

Highlights of the Report

- The IUCN (International Union for Conservation of Nature) report attributes the change in classification to the growing numbers of wild Panda.
- The Panda population jumped to 1,864 in 2014 from 1,596 in 2004, as a result of work by the Chinese agencies to enforce poaching bans and expand forest reserves.
- The report also warned that climate change is predicted to eliminate more than 35 percent of the Panda’s natural bamboo habitat in the next 80 years.

3.14. INDIAN PAINTED FROG

Why in News?

- A rare Indian painted frog was spotted for the first time in Bejjur forest in Telangana, Adilabad.
- The find had been made in an area that fell outside the mapped distribution area of the species.

Bejjur Reserve Forest

- The Bejjur Reserve Forest lies on the banks of Pranahitariver in the eastern part of Telegana district.
- The Peddavagu stream cuts across the Bejjur Reserve Forest.
- There are over 50 types of trees. There is presence of rare striped hyena, leopard almost all ungulates except the gaur.

Indian Painted Frog

- The species is found in tree holes, burrows, pollution-free wetlands and riverine areas.
- This animal is listed among species of “least concern” by the IUCN.

3.15. NEW SPECIES OF PIKA

Why in News?

- A new Pika species named “*Ochotonasikamaria*” has been discovered in the higher altitudes of Himalayas in Sikkim.
- The new species was discovered by the study based on genetic data and skull measurements.
- The study has been published in the journal, “Molecular Phylogenetics and Evolution”.

More on Sikkim Pika

- These members of the Pika family look like tailless rats.
- They are highly susceptible to climate change like increasing temperature.

3.16. KASHMIR'S RED STAG

Why in news

- IUCN (International Union for Conservation of Nature) all set to declare Kashmiri Red Stag or Hangul as a 'critically endangered' species.
- **Earlier it was considered as a subspecies of red deer.** Hence, IUCN categorized it as 'Least Concern' by clubbing with European and other 'red deer' species of the world.

Reason for decline

- Hangul has been **hunted** over centuries,
- **Fragmentation** of forested habitat,
- **Land encroachment** for grazing.

Benefit after reclassification

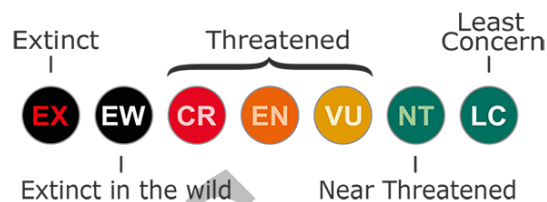
At the local scale, this would certainly attract the immediate **attention of biologists, park managers and policy makers** to invest more efforts, **time and funds to safeguard** the dwindling population of Hangul in India which has regional and international value.

About Hangul

- Kashmiri Red Stag or Hangul is known for its **giant antlers** bearing 11 to 16 points.
- Only one viable population left today in the wild is largely **confined to the Greater Dachigam Landscape** (1,000 sq.km.), encompassing the Dachigam National Park (NP) and adjoining protected areas.
- It is **one of three critically endangered species in Jammu and Kashmir**. The other two are **markhor**, the Tibetan antelope or 'chiru'. It was designated as **State Animal of Jammu & Kashmir** in 1980's.
- It is listed under **Schedule-I of the Indian Wildlife (Protection) Act, 1972** and J&K Wildlife (Protection) Act, 1978 and has also been listed **among the top 15 species of high conservation priority** by the Government of India.

About IUCN

- The International Union for Conservation of Nature (IUCN) is an international organization working in the field of nature conservation and sustainable use of natural resources.
- IUCN has a membership of over 1200 governmental and non-governmental organizations. Its headquarters are in Gland, Switzerland.
- IUCN was established in 1948. It was previously called the International Union for Protection of Nature (1948–1956) and the World Conservation Union (1990–2008).
- The **IUCN Red List** of Threatened Species (also known as Red Data List), founded in 1964, is the world's most comprehensive inventory of the global conservation status of biological species.



3.17. GIRAFFES PUT ON EXTINCTION WATCH LIST

- Scientists have put Giraffes on the official watch list of threatened and endangered species worldwide calling it "**vulnerable**".
- Giraffe population has shrunk nearly 40 percent in 30 years.

3.18. OLIVE RIDLEY

Why in News?

54 carcasses of Olive Ridley turtles were found on the Shore of **Hope Island**, off the coast of Kakinada (**Andhra Pradesh**) in last one month indicating that their breeding season has been severely affected this year.

Why there population declining?

- Rampant and irresponsible use of **mechanized fishing boat** under which turtles are stuck and crushed.
- Despite being exhorted by fisheries department, boat owners are still unwilling to use **Turtle Excluder Device (TED)** to help turtles pass through the net probably because of **lack of awareness**.
- Direct harvest of Adults and Eggs contribute to dwindling population.
- Yet another reason is **unavailability** of TED in the open market.

About Olive Ridley Turtles

- They are smallest and most abundant of all the sea turtle species. They are **Omnivores**.
- Gets their name from **olive green colouration** of its heart shaped shell.
- They are found only in **warmer waters**, including the southern Atlantic, Pacific and Indian Oceans.
- They are known for their **arribadas (synchronized mass nesting)** during which time tens of thousands of female turtles come ashore to nest in the span of a few days.
- **Gahirmatha** located in the **Bhitarkanika Wildlife Sanctuary, Odisha** houses the world largest mass nesting site of these turtles.
- Past few years, Sandy stretches of **Hope Island** of the **Coringa Wildlife Sanctuary, Andhra Pradesh** have also emerged as a breeding ground for these turtles.
- Their breeding season is from October to February where female can lays 100-150 eggs at one time.
- Despite high population, their numbers have declined significantly in past few year. They have been categorized as **Vulnerable** in **IUCN Red list** and Listed as **Schedule I** species in the Wildlife (Protection) Act, 1972, thereby being offered maximum protection.

3.19. DEER ANTLERS

Why in News?

- Kerala has sought permission from Union government to allow the use of **Antlers** of **Spotted** and **Sambhar** deer in Ayurvedic medicines by amending **Wildlife Protection Act, 1972**.
- Antlers are extension of Deer's skull and all the three species of deer found in Kerala **Spotted deer**, **Sambhar deer** and **Barking deer** shed their antlers annually which **regrow** again.
- State governments and other wildlife authorities have huge quantity of antlers in their custody as their sale and use are banned in India under **Wildlife Protection Act, 1972**.
- Though proposal only includes collection of antlers already shed, it may **trigger** the reckless hunting of deer.



Some Additional Information

- The Act of 1972, has included **antler** in the definition of **wildlife trophy** which is defined as the “whole or any part of any captive animal or wild animal”.
- **Trophy hunting** is the shooting animals for pleasure where **trophy** is the animal (or its head, skin, antler or any other body part) that the hunter keeps as a **souvenir**.
- Wildlife and wildlife trophies are considered as **owned** by the government.
- The Act prescribes imprisonment up to 3 years and fine of Rs. 25,000 for offences involving wildlife trophies.
- Antlers have **medicinal values** to invigorate spleen, strengthen bones/muscles, boost blood flow, etc.

3.20. IDUKKI WILDLIFE SANTUARY

Why in News?

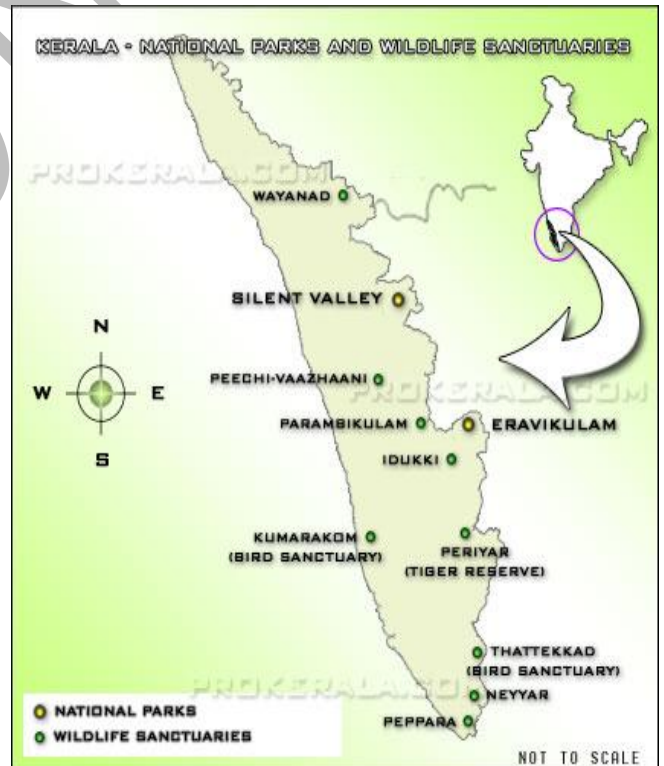
- Recently there was a **birds and butterfly survey** at the **Idukki Wildlife Sanctuary (Kerala)**.

About Idukki Wildlife Sanctuary

- **The Forest type:**
 - West Coast Tropical Evergreen forests,
 - Semi Evergreen forests,
 - Moist Deciduous Forests,
 - Hill shoals and Grass Lands.
- **Average rainfall** is 3800mm and the **highest peak is Vanjur Medu (1272m)**.
- **Biodiversity:** common animals found are - Elephant, Sambar, Barking Deer, Mouse deer, Bonnet macaque, NilgiriLangur, Malabar giant squirrel.
- **Birds:** **Osprey (fish eagle)**, listed in the **IUCN red category**, Great Indian Hornbill, Grey-headed Bulbul, etc.
- It is also notorious for illegal cultivation of marijuana – world renowned “Idukki Gold” or “Kerala Gold”

The highlights of the survey

- Newly spotted birds in the sanctuary - Scally Thrush, Booted Warbler, Paddyfield Warbler, Blue Rockhill, etc.
- The rarely sighted newly spotted butterfly species - Malabar Hedge Hopper, Malabar Tree Nymph, etc.
- It is becoming a favored **destination for migratory birds** as it is closely located to **Idukki Arc Dam**.
- The **Idukki Arch Dam** is the **Asia's biggest Arch Dam of 555 feet high**.



3.21. BAN ON IMPORT OF EXOTIC ANIMALS SKIN

Why in News?

- **Director General of Foreign Trade** has prohibited the import of skins of animals like reptiles and furs of minks, foxes and chinchillas.

Present Situation

- India's import policy allows import of raw hides, skin, leather, fur, skins of reptiles, mink, fox etc.
- But they are subjected to regulation under **Wildlife (Protection) Act, 1972** and the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**.
- **The Prevention of Cruelty to Animals Act, 1960** allows the slaughter of animals only for subsistence but this too is regulated to minimize the pain and suffering of animals.

Director General of Foreign Trade:

- It is an attached office of the Ministry of Commerce and Industry.
- It is responsible for formulating and implementing the Foreign Trade Policy with the main objective of promoting India's exports.

About CITES (Also called Washington Convention)

- Came in force in 1975, it is an international agreement between governments aiming to ensure that international trade in specimens of wild animals and plants does not threaten their survival.
- It is a **legally binding treaty** where different species are categorized into groups called Appendices.
 - ✓ **Appendix I:** Includes species threatened with extinction, trade only in exceptional situation;
 - ✓ **Appendix II:** Includes species not necessarily threatened with extinction, trade strictly regulated;
 - ✓ **Appendix III:** species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.

- China has announced to ban all ivory trade and processing activities by the end of 2017.
- The move follows a resolution at the **Convention on International Trade in Endangered Species (CITES)** in South Africa last October to close domestic ivory markets.
- China has the **biggest ivory** market in the world.

3.22. KAZIRANGA NATIONAL PARK

- Kaziranga National Park has consistently increased its **One Horned Rhino** population (**Population in 2015-2401**) because of rigorous conservation efforts in past few years.

About Kaziranga National Park (Assam)

- Situated on the bank of river **Brahmaputra** it is one of the oldest wildlife conservancy reserves of India.
- It was declared a **Wildlife Sanctuary in 1950** and later in **1974** was notified as Kaziranga National Park under the **Wildlife (Protection) Act, 1972**.
- It is popularly known as the home of the "**Big Five**"-One Horned Rhinoceroses, Tigers, Asiatic wild buffalos, **Eastern Swamp Deer**, and **Elephant**.
- It hosts **two-thirds** of the world's Great One-horned rhinoceros (68% of worldwide population).
- It has one of the **highest densities** of **Tigers** in the wild in the world and also houses almost entire population of the **Eastern Swamp Deer**.
- In **1985** it was declared as a **World Heritage Site** by **UNESCO** for its unique natural environment and **Tiger reserve** in **2006**.

Indian Rhino Vision 2020 (IRV 2020) has been launched in 2014 to achieve a wild population of at least 3,000 **Greater one-horned rhinos** in the Indian state of Assam by year 2020.

Different types of Rhinoceros

- **White Rhinoceros (square-lipped rhino):** It is a largest rhino species and has **two** subspecies namely:
- **Southern white Rhino:** IUCN status - **Near Threatened**. Can be found mostly in South Africa with smaller translocated population in Kenya, Zimbabwe and Namibia.
- **Northern white Rhino:** IUCN status - **critically endangered** (only 3 rhinos of its kind alive today).

- **Black Rhino (hook-lipped rhino):** It is smallest of the African rhino species and occurs throughout southern and eastern Africa. It has **4 sub species**:
- **Southern Central black rhino:** IUCN status - **Critically Endangered**.
- **Eastern black rhino:** IUCN status - IUCN status: **Critically Endangered**.
- **South Western black rhino:** IUCN status - **Vulnerable**.
- **Western black rhino:** **Extinct in 2011**.
- **Javan Rhinoceros (Lesser one-horned rhino):** They are one of the rarest mammals left on earth. They are found only at Ujung Kulon national park, western java, Indonesia. IUCN status- **Critically Endangered**.
- **Sumatran Rhinoceros (Asian two-horned rhino or Hairy Rhino):** Smallest among all species of rhinoceros. They are found in southeastern part of Asia including northeast India. IUCN status- **Critically Endangered**
- **Indian Rhinoceros (Greater one-horned rhino):** They are the second largest species of rhinos. They are found in India and Nepal, and particularly in the foothills of the Himalayas. Status-**Vulnerable**.

3.23. RHINO HORN VERIFICATION COMMITTEE

Why in news?

- The **Rhino Horn Verification Committee** submitted its report to the Assam government in December 2016.

About the Committee

- The committee was constituted for the verification of rhino horns stored in various treasuries of Assam. It would help update of stock of rhino horns.
- The committee consists of 12 members which includes four wildlife experts, two representatives from media, one RTI activist, one forensic scientist and four High Officials of Assam.
- The committee visited each one of the 12 treasuries in Assam for horn verification.

3.24. SEEMAI KARUVELAM TREE

Why in news?

- The Madurai bench of the Madras high court directed the Tamil Nadu government to enact a law with prohibitory and penal clauses within two months to eradicate seemai karuvelam trees (*Prosopis juliflora*).

Features of seemai trees

- The seemai karuvelam tree sucks a lot of water.
- It has invaded into water bodies and dry lands of government and private people.
- Since such trees ultimately affect the agricultural activities, a batch of cases for their eradication was filed before the high court bench.

3.25. NEWTERMITE SPECIES NAMED CHIRAHARITAE DISCOVERED

- A new termite species, *Glyptotermes Chiraharitae*, has been discovered at Kakkayam in the **Malabar Wildlife Sanctuary**.
- The species are named 'Chiraharitae', after the tropical evergreen forests of the Western Ghats, where the termite was spotted.
- They are exclusively wood dwelling and do not require any contact with soil.
- Its relatives are known to attack mango, sal, banyan trees, Rhododendron, Artocarpus, silver oak, and jamun trees.

Malabar Wildlife Sanctuary, kozhikode

Situated within the limits of the Nilgiri Biosphere Reserve, the area of the sanctuary is an integral part of the Wayanad Elephant Reserve under Project Elephant

3.26. INVASIVE GIANT AFRICAN LAND SNAIL SIGHTED

- Giant African Land Snail (GALS), listed in the world's top 100 invasive species, is found alive, reproducing and dispersing from the Goa University campus.
- It is a cause of concern because ecologically, the species are dangerous as they reproduce faster and take over entire ecosystem which is becoming a menace to crops.

3.27. INDIAN ROLLER BIRD

- The increased poaching of Indian roller, a Schedule IV protected bird is making the species go endangered.
- This Indian Roller or Neelkanth is a state bird of various states like Karnataka, Telangana, Andhra Pradesh and Orissa. It is displayed during Dussehera festival in Telangana.
- The bird is protected under Sch. IV of WPA 1972 under which capturing and displaying of the bird is strictly illegal, attracting a penalty of Rs 25,000 or imprisonment up to three years or both.

3.28. BORNEAN ORANGUTAN DECLARED 'CRITICALLY ENDANGERED'

- The Bornean orangutan (*Pongo pygmaeus*) is now critically endangered according to the International Union for Conservation of Nature (IUCN).
- IUCN assessment finds that hunting, habitat destruction, habitat degradation and fragmentation are the biggest drivers behind the population loss.

About Bornean orangutan

- It is a species of orangutan native to the island of Borneo.
- Together with the Sumatran orangutan, it **belongs to the only genus of great apes** native to Asia.
- Like the other great apes, orangutans are highly intelligent, displaying advanced tool use and distinct cultural patterns in the wild.

3.29. OPERATION THUNDER BIRD

- Wildlife Crime Control Bureau (WCCB), Ministry of Environment, Forest and Climate Change, coordinated "**operation thunder bird**" in India which is the codename for **Interpol's** multi-national and multi-species enforcement operation.
- The operation brought about awareness among the enforcement agencies to focus on the existing trade routes and major trade hubs in the country.

Operation save Kurma

- WCCB also convened a species specific operation on turtles with code name as operation save kurma from December 15, 2016 to January 30, 2017.
- A total of 15, 739 live turtles were recovered from 45 suspects, having inter-state linkages.

About Wildlife Crime Control Bureau

- It is a statutory body created under wildlife protection act
- Its mandate is to tackle wildlife related crimes in the country such as poaching, smuggling etc.
- It would be assisted by other law enforcing agencies in investigation
- It would maintain records and analyse trends of wildlife crimes in the country

3.30. THE FISHING CAT

- The fishing cat (*Prionailurus viverrinus*) is a medium-sized wild cat of South and Southeast Asia.
- It is listed as **Vulnerable** since 2016 on IUCN Red List.
- It is threatened by destruction of wetlands as it is found in the vicinity of wetlands, along rivers, streams, oxbow lakes, in swamps and mangroves.
- West Bengal has declared it a **state animal**.

3.31. IRRAWADY DOLPHINS

- As per the 2017 census report by **Odisha** state forest department there are **55 Irrawaddy dolphins** present in water bodies of **Bhitarkanika National Park** and **Gahirmatha Marine Sanctuary**.
- In recent years **Chilka Lake** emerged as primary habitat of these dolphins with record count of 121 this year.
- Besides Irrawaddy dolphins other dolphin species that were reported are **Humpback**, **Bottlenose** and **Pantropical spotted dolphin** species.

About Irrawady Dolphins (Also commonly known as Snubfin Dolphins)

- They can be found from the northwest Bay of Bengal, in India, to the south of Indonesia.
- Major threats: incidental mortality in gillnets and other fisheries gear, Mining (ex. Sand, gravel mining, etc); Live captures for display purposes etc.
- IUCN Red list of endangered species status: **Vulnerable Species**.

3.32. NEW SPECIES OF EEL FOUND ON BAY OF BENGAL

Why in news?

- Scientists have discovered a new species of eel, a snake-like fish, from the northern Bay of Bengal along the West Bengal coast.

Details

- The species *Gymnothorax indicus* is slender-bodied, about one foot-long and edible.
- Eels are found mostly at the bottom of rivers and seas. This species was found at 35 m depth in the sea.
- With over-exploitation of fishing resources both freshwater and marine, scientists believe that these newly discovered species may contribute to food security in the future.

3.33. TWO CRITICALLY ENDANGERED BALSAMS PLANT SPECIES

- Forest officials in Munnar have spotted two critically endangered impatiens (balsams) plant species on the peripheries of the Eravikulam National Park.
- Impatiens, also called jewel weeds, is seen in pristine forests where moisture content and relative humidity are high.
- The Eravikulam National Park is surrounded by sholas.

Eravikulam National Park is located along the Western Ghats in the Idukki district of Kerala in India. It is a UNESCO World Heritage Site. It has the largest surviving population of Nilgiri tahr.

Sholas

- It is local name for patches of stunted tropical montane forest in valleys amid rolling grassland.
- **Location**-in the higher altitude hill regions of the Nilgiris, Kanyakumari district, the Western Ghats etc.

3.34. MEDICINAL PLANT FROM KERALA

Why in News?

- Scientists at the Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI) confirmed the multiple **therapeutic properties of Neurocalyxcalycinus**.

About the plant

- It is used by the Cholanaikkan tribe to treat inflammations and wounds.
- It is endemic to Western Ghats and Sri Lanka.
- In local parlance it is known as 'PachaChedi'.
- The anti-inflammatory activity of the leaves was found to be similar to the drug diclofenac sodium.
- The plant also possesses high Vitamin E content and cytoprotective activity in its cell lines, increasing its prospects as an anti-cancer drug.

Cholanaikkan Tribe

- It is a **particularly vulnerable group** of Kerala.
- They live in the **deciduous forests of Karulai and Chungathara ranges** in Nilambur in Malappuram district
- They are the **only surviving hunter gatherer tribe** in India. They do not engage in farming.
- They are the only tribal community in Asia that lives in rock-cave shelters.

Significance

- Pre-clinical trials have proved the **plant's efficacy in acting as an analgesic, anti-cancer, anti-oxidant, wound and burn healer, immune system development** etc.
- Patenting its herbal formulations would help in **protecting the traditional knowledge of India**.
- Commercial benefits of the usage of this plant can also **benefit the dwindling Chilanaikkan Tribe**.

3.35. ZINGIBER PSEUDOSQUARROSUM

Why in news?

- It is a new species of ginger recently discovered by botanists of **The Botanical Survey of India (BSI)** in the Andaman and Nicobar Islands.
- It belongs to **Genus Zingiber** and used for its medicinal values by the local Particularly Vulnerable Tribal Groups (PVTGs) of the Andamans.

3.36. NILAMBUR TEAK: GI TAG

- Kerala's **Nilambur Teak** is soon to get a **Geographical Indication (GI) Tag**.
- Nilambur is located in Malappuram district of Kerala and has **oldest** teak plantation in the world. It also hosts world's first **Teak Museum**.
- Other Kerala products with **GI Tag** includes **Pokkali rice, Vazhakulam Pineapple, Wayanadan rice** varieties **Jeerakasala** and **Gandhakasala, Tirur Betel vine, Central Travancore Jaggery, Chengalikodan Nendran**
- **Banana** etc.

3.37. POPLAR TREES IN KASHMIR

- Kashmir is known for its Pine trees. However, the pine forests have diminished significantly in last few decades due to large scale timber extraction.
- In the search for alternative, the Social Forestry Department introduced the *populous deltoids*, or Eastern Cottonwood or more popularly called Poplar.
- Introduction of the species boosted the veneer and ply-based industry in the Kashmir region while its timber, used for fruit-packing boxes, is a cost-efficient option for the horticulture industry, which forms the backbone of the state's economy.
- The financial benefits offered by growing poplars helped Kashmiri farmers look to agro-forestry as a better means of livelihood.
- In recent years, however, people have been raising concern over the increased instance of infections caused by the cotton produced by the poplars.
- As a result, the HC of J&K has ordered the felling of all Poplar trees in Kashmir valley.

3.38. WESTERN GHATS PLANTATIONS HOME TO 204 BIRD SPECIES

Why in news?

- The study, "**Producing Diversity: Agro forests Sustain Avian Richness and Abundance in India's Western Ghats**," was conducted by scientists involved with the **Wildlife Conservation Society- India**.

About Wildlife Conservation Society India Program

- WCS India Program, based in Bengaluru, has combined cutting-edge research on tigers and other wildlife, with national capacity building and, effective site-based conservation through constructive collaborations with governmental and non-governmental partners.
- WCS India Program is committed to saving wildlife and wild lands, nurturing and inspiring positive attitudes towards nature in people through its scientific and conservation endeavors.

3.39. ECO-SENSITIVE ZONE: SANJAY GANDHI NATIONAL PARK

Why in news?

- Final Notification for an Eco-Sensitive Zone (ESZ) area of 59.46 sqkms was notified by the government in Sanjay Gandhi National Park in Mumbai.

What is Eco-Sensitive Zone?

- It is created to act as a **buffer for further protection** around Protected Areas (PAs) such as National Parks and Wildlife sanctuaries.

- Activities around such areas are regulated and managed so as to protect the environment.
- ESZ is notified under Section 3 of the Environment (Protection) Act, 1986 by the Union Ministry of Environment and Forest.
- 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.
- Many states are opposed to ESZ because of presence of minerals and resources side by side.
- Local people in many areas are also opposed to ESZ for loss of livelihood due to restriction placed by it on various activities.

Sanjay Gandhi National Park

- It is part of **Western Ghat Biodiversity** complex
- Mammals found - leopard, wild boar, four-horned antelope, black-naped hare, wild cat, jackal and porcupine
- Birds- Lesser grebe, Purple Heron, Smaller Egret, Lesser Whistling Teal, Pariah Kite
- Reptiles - Indian Cobra and Viper

3.40. INDIA BIODIVERSITY AWARDS 2016

About India biodiversity awards

- It is a **joint initiative** of the Ministry of Environment, Forest and Climate Change, National Biodiversity Authority and United Nations Development programme.
- The Awards recognise the contribution of a range of stakeholders towards the conservation of biodiversity and excellence in biodiversity governance
- The **four categories** of 2016 awards are:
 - ✓ Conservation of threatened species
 - ✓ Sustainable use of biological resources
 - ✓ Successful mechanisms/models for access and benefit sharing
 - ✓ Biodiversity Management Committee

About Pakke Tiger Reserve

- It is located in the **East Kameng district** in Arunachal Pradesh
- It was earlier known as Pakhui Tiger reserve.
- It is adjacent to Nameri National Park of Assam and Sessa Orchid sanctuary and Eaglenest Wildlife Sanctuary in Arunachal Pradesh.
- It is bounded by Pakkeriver and the Bhareli/Kameng river, both tributaries of Brahmaputra.

Notable Winners of the 2016 Awards

- Nature Conservation Founder and the Ghora-Abhe society for their **Hornbill Nest Adoption Programme** introduced in **Pakke Tiger Reserve** in Arunachal Pradesh.
- Purnima Devi Burman and *Hargilla army* for protection of **Greater adjutant Bird**
- Mawkyrnot SHG for sustainable use of 52-feet long **living roots bridge** in Mawkyrnot, Meghalaya
- **Gram Mooligai Co. Ltd.** in MP for involving local communities in developing medicinal plants.
- **Dudhai Biodiversity Management Committee** in Uttarakhand for banning illegal sand mining and reviving river ecosystems

3.41. KERALA BIRD ATLAS PROJECT

- **Kerala Bird Atlas** is an ambitious citizen science project, to map the distribution and abundance of birds of an entire Indian state.
- This is the first time in India that birds in an entire state are being mapped. The only similar effort was in Mysore city few years back.
- The programme is being coordinated by the Hume Centre for Ecology and Wildlife Biology, a conservation organization in the district, in association with the Bird Count India and e-bird.
- It is envisaged as a five-year activity. By repeating the process over a period of 25 years or so, it will be possible to scientifically document changes in distribution and abundance of our birds over a period of time.

3.42. WWF'S LIVING PLANET REPORT 2016

Why in News?

- Global population of mammals, fish, amphibians and reptiles declined by 58 percent between 1970 and 2012, according to World Wide Fund for Nature (WWF) report.

Highlights

- The report is compiled with data from the Zoological Society of London (ZSL) to measure the abundance of biodiversity.
- The index tracks about 14, 200 populations of 3700 species of vertebrates.
- Biodiversity population is expected to fall 67 percent by 2020, if the current situation persists.
- Rivers and lakes are the worst hit with animal population down by 81 percent since 1970.
- The report points out we have ushered in the era of **Anthropocene – a geological period dominated by humans.**
- The report warns that increased human pressure could trigger human-nature conflicts.
- It can increase the risk of water and food insecurity and competition over natural resources.

Causes

- The report states that food production to meet the complex demands of an expanding human population is the primary factor responsible for the destruction of habitats and overexploitation of wildlife.
- Forest areas are cleared up farming and logging. As of now, only 15 percent of the Earth's land area is protected for nature.
- Poaching and exploitation for food is another major factor, due to unsustainable fishing and hunting.
- Pollution is another problem. Many sea animals are being harmed due to high levels of pollutants.
- Pollutants also travel down the food cycle and harm other animals.

3.43. REPORT ON ANIMAL AND PLANT DISCOVERIES 2015

The report is released by the Ministry of Environment and Forest with the help of the studies of scientists and experts of Botanical Survey of India (BSI) and Zoological Survey of India (ZSI).

Notable Findings of the Report

- India's biodiversity has improved with 445 new species been added to the list in 2015.
- The figure includes 262 animal species and 183 plant species.
- The list includes 4 species of reptiles, 6 species of amphibians, 26 species of fishes, etc.
- The most discoveries were made in the Eastern Himalaya region, which accounts for 19% of the total discoveries followed by the Western Ghats (18%) and Andaman and Nicobar Islands (15%).

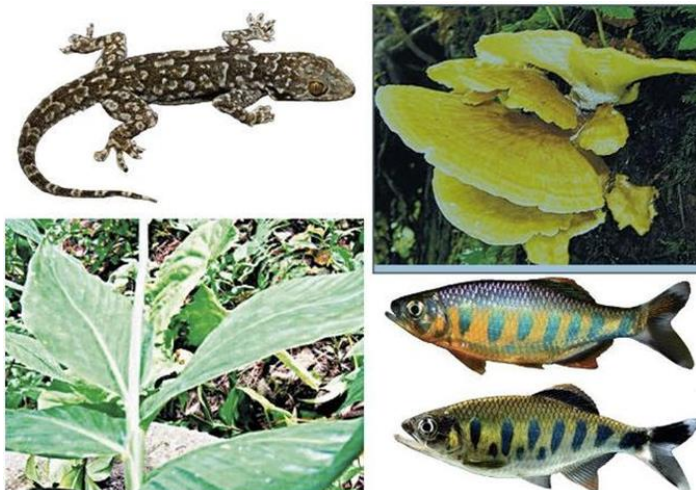
Notable Additions

Animals

- ✓ Rock gecko (*Hemidactylus yajurvedi*) found in Kanker Chhattishgarh
- ✓ New frog species (*Fejervaryagomantaki*) from the Western Ghats
- ✓ A shiny new species of fish (*Barilius ardens*), from the Western Ghats

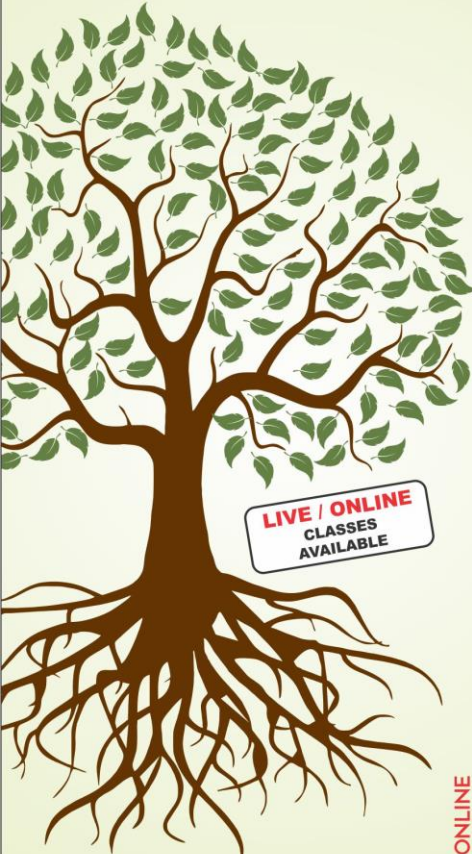
Plants

- ✓ A new species of ginger *Zingiber bipinianum* in the South Garo hills of Meghalaya
- ✓ A species of mushroom (*Bondarzewia zonata*) collected from north Sikkim at an altitude of 2,829 m.



About BSI and ZSI

- The Botanical Survey of India is an institution set up by the government of India in 1890 with the objective of identifying the plant resources of this country.
- The Zoological Survey of India was established in 1916 to survey explore and research the fauna.
- The Headquarters of both the institutions are situated at Kolkata with many regional centers.



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4. POLICIES AND INITIATIVES

4.1. NGT DECISIONS

4.1.1. DIRECTIONS ON SAMBHAR LAKE

Why in news?

- National Green Tribunal (NGT) has directed the Rajasthan government to cancel allotments of salt pans in the Sambhar Salt Lake that fall within the wetland.
- The activities were being carried out contrary to the provisions of the Wetland (Conservation and Management) Rules framed under the Environment Protection Acts of 1986 and 2010.

Final NGT order

It directed the Rajasthan government to:

- Cancel allotments of salt pans in the Sambhar Salt Lake that fall within the wetland and run contrary to the mandate of Wetland Rules, 2010.
- Not to make any further allotments or permit new salt pans within the wetland areas or in the 'no construction zone' identified for the said purpose in accordance with the Wetland Rules, 2010.
- Examine the sensitive issue in light of observations and recommendations made by the two expert committees in the year 2010 and gave six months' time to implement the recommendations which should not be later than the 2017 monsoon.

About Sambhar Lake

- Sambhar Salt Lake is India's largest inland salt lake.
- It is located in Nagaur and Jaipur districts of Rajasthan. It is surrounded on all sides by the Aravali hills.
- It has been designated as a **Ramsar site** and also an **Important Bird Area**.
- The site is important for a variety of wintering waterbirds, including large numbers of flamingos.

4.1.2. WORKING OF BIODIVERSITY ACT 2002

Why in news?

- The National Green Tribunal (NGT) had recently asked for action against top State officials who had failed to respond to an application filed before the tribunal for effective implementation of the act.
- For the first time since the enactment of the Biological Diversity Act, 2002, States have now been forced to look into its implementation.

Critical appraisal of the Act

- India's famed "**green judge**", **Justice Kuldip Singh**, had observed in **ICELA v. Union of India, 1996** case that "enacting of a law and tolerating its infringement is worse than not enacting a law at all". This is typically true for the present state of biodiversity act 2002.
- RTI responses from 15 States have revealed that out of more than **61,000 PRIs**, **only 14 per cent (less than 1,400) have PBRs (People's Biodiversity Register)**.
- The act has mostly failed in terms of implementation though the act has immense potential to safeguard India's threatened biodiversity.

4.1.3. UTTARAKHAND DISASTER: GVK FINED FOR AGGRAVATING THE IMPACT OF 2013 FLOODS

Why in News?

- The GVK Power Company also called Alaknanda Hydro Power Co. Ltd. (AHPCL) has been asked to pay Rs. 9.26 crore as fine for aggravating the impact of 2013 Uttarakhand floods.
- The judgement was carried out by National Green Tribunal (NGT).
- Along with the compensation, NGT has also directed the company to pay an amount of Rs. 1 lakh each to the applicants.
- The judgement said the even though the disaster was a result of cloudburst but the company was aware that the project was situated in a geologically sensitive area.
- This is a landmark judgement because India has a long history of companies operating with impunity.

Background

- The GVK Power Company is executing the Srinagar Hydroelectric Project in Uttarakhand.
- It was alleged that the company was largely responsible for the destruction in Garhwal, Srinagar in Uttarakhand.
- The company was dumping huge amounts of muck and silts on the hill slopes and river bed without taking adequate precautionary measures.
- The allegation has been proved to be correct by the tribunal.

4.1.4. COASTAL ZONE REGULATION

- The **National Green Tribunal (NGT)** has upheld the cancellation of CRZ clearance given by the **Ministry of Environment, Forests and Climate Change (MoEF& CC)** to Rajakkamangalam Thurai Fishing Harbour Pvt Ltd.

Coastal Regulation Zone (CRZ)

- MoEF issued a notification in 1991, under the EPA, 1986 for regulation of activities in the coastal area.
- The notification defined the “high tide line”, “coastal regulation zone” and also listed the activities restricted under this area.
- According to the notification, coastal land up to 500m from the high tide line and a stage of 100m along banks of creeks, estuaries, backwater and rivers subject to tidal fluctuations will be called CRZ.
- The CRZ was divided into four categories CRZ (1-4) as per permitted use of land.
- Last amendment to the notification was in 2011.

4.1.5. BAN ON MANJA THREADS

- **Supreme Court** has refused to lift the ban on “manja threads” imposed by NGT in 2016.
- NGT banned “manja threads” up till Feb 2016 after a petition was filed by the **People for Ethical Treatment of Animals (PETA)**.
- The ban applied to nylon, cotton and Chinese manja coated with glass.
- PETA in its petition had said that manja is a threat to environment as it harms birds, animals and humans.
- PETA had also said that minor children were engaged by the cottage industry in production of manja posing a serious threat to their health as they inhale harmful substances.
- The Delhi government also imposed a ban on the production, storage and use of Chinese manja after it became synonymous as the killer thread, killing 6 people in August 2016.

Manja threads are threads used in kite flying.

They are made sharp by coating threads with glass powder, metallic powder.

4.1.6. ABOUT NGT

- It has been established in 2010 under the National Green Tribunal Act 2010.
- It has been established for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources.
- It also includes enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith.
- It is a specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues.
- The Tribunal is not bound by the procedure laid down under the Code of Civil Procedure, 1908, and is guided by principles of natural justice.
- The Tribunal is mandated to make and endeavour for disposal of applications or appeals finally within 6 months of filing of the same.
- New Delhi is the Principal Place of Sitting of the Tribunal and Bhopal, Pune, Kolkata and Chennai shall be the other four place of sitting of the Tribunal.
- It adjudicates matters relating to following Acts-
 - ✓ Water (Prevention and Control of Pollution) Act, 1974
 - ✓ Air (Prevention and Control of Pollution) Act, 1974

- ✓ Environment (Protection) Act, 1986
- ✓ The Public Liability Insurance Act, 1991
- ✓ Forest Conservation Act
- ✓ Biological Diversity Act

4.2. NOTIFICATION OF PREVENTION OF CRUELTY TO ANIMALS (PET SHOP) RULES, 2016

- The objective of these rules is to make pet shops accountable and to prevent cruelty inflicted on animals kept in such pet shops. These rules are notified by Ministry of Environment, Forest and Climate Change.

The proposed Rules provide for:

- It will be mandatory for all pet shop owners to register themselves with the State Animal Welfare Board after inspection.
- The rules define space requirement for birds, cats, dogs etc. in the pet shops.
- It defines the basic amenities, power back-up, general care, veterinary care and other operational requirement for animals kept in pet shops.
- It is mandatory to maintain proper records of sale, purchase, death of animals in pet shop, sick animals etc.
- Every pet shop owner is required to submit yearly report to the State Board regarding animals, sold, traded, bartered, brokered, given away etc.
- Non-compliance of the proposed rules will lead to cancellation of registration of pet shop and pet animals so confiscated.

The Prevention of Cruelty to Animals Act

- Enacted in 1960 to prevent the infliction of unnecessary pain or suffering on animals.
- As per the provisions of the law, the Animal Welfare Board of India was constituted.
- The act however makes a provision that nothing contained in this Act shall render it an offence to kill any animal in a manner required by the religion of any community

4.3. FIRST 2G ETHANOL BIO-REFINERY IN PUNJAB

Why in News?

Generations of Biofuels

First Generation Biofuel

- They are produced directly from food crops.
- Crops such as wheat and sugar are the most widely used feedstock

Second Generation Biofuel

- They are produced from marginal croplands unsuitable for food production or non-food crops such as wood, organic waste, food crop waste and specific biomass crops. For example- Jatropha
- Thus, it overcomes over food vs fuel debate in first generation biofuel.
- It is also aimed at being cost competitive in relation to existing fossil fuels and increasing Net energy gains.

Third Generation Biofuels

- It is based on improvements on the production of biomass by taking advantage of specially engineered energy crops such as algae as its energy source.
- The algae are cultured to act as a low-cost, high-energy and entirely renewable feedstock.
- Algae will have the potential to produce more energy per acre than conventional crops.

Fourth Generation Biofuels

- Fourth Generation Bio-fuels are aimed at producing sustainable energy and also capturing and storing

Ethanol Blending Programme

Cabinet Committee on Economic Affairs has made 5% ethanol blending mandatory in petrol sold after 30th June 2013

JAN 2013 GLOBAL TENDER

105 cr litre

Demand by oil marketing companies

55 cr litre

Final supply demand from domestic sugar mills

38.2 cr litre

OMCs finalised to buy

15 cr litre

Procurement till yet



JULY 2013 TENDER

Only for domestic producers

133 cr litre

Total demand

61.8 cr litre

Offer made by producers

24.7 cr litre

Quantity finalised (Letter or Intent yet to be issued)

SOURCE: ISMA & Oil Industry

carbon dioxide.

- This process differs from second and third generation production as at all stages of production the carbon dioxide is captured which can be then geo-sequestered.
- This carbon capture makes fourth generation biofuel production carbon negative rather than simply carbon neutral, as it is 'locks' away more carbon than it produces.

Benefits of Bio-ethanol Plants

- Provide additional sources of remuneration to farmers
- Reduction in CO₂ emissions from the paddy straw which currently is burnt after harvesting
- It will produce about 30,000 tonnes of bio-fertiliser per annum that can be used as soil nutrient.
- It will produce more than 1 lakh kilograms of Bio-CNG per annum which can cater to transport and clean cooking requirements.
- These Bio-refineries shall produce around 35-40 crore litres of ethanol annually, thus contributing significantly towards the EBP programme

Issues

- **1st generation**
 - ✓ One of the major drawbacks is that they come from biomass that is also a food source. This has led to increase in the volumes of crops being diverted away from the global food market and is blamed for the global increase in food prices over the last couple of years
 - ✓ Some biofuels have negative Net energy gain meaning that the energy expended to produce the biofuel is more than the energy gained from that harvest
- **2nd generation biofuels** come from non-food biomass, but still compete with food production for land use.
- **3rd generation biofuels** present the best possibility for alternative fuel because they don't compete with food. However, there are still some challenges in making them economically feasible.

4.4. DELHI DECLARATION ON AGROBIODIVERSITY MANAGEMENT

About

- The first International Agrobiodiversity Congress (IAC) held in New Delhi has adopted New Delhi Declaration on Agrobiodiversity Management.
- In the declaration, 900 participants from 60 countries have urged researchers and policy-makers to strengthen and promote complementary conservation strategies to conserve and use agrobiodiversity.

Major Highlights

- The Congress addressed seven themes:
 - ✓ agrobiodiversity for food and nutrition;
 - ✓ agrobiodiversity for adaptation to climate change;
 - ✓ intellectual property rights (IPRs) and access and benefit-sharing (ABS) and farmers' rights;
 - ✓ quarantine, biosafety and biosecurity issues;
 - ✓ conservation strategies and methodologies;
 - ✓ science-led innovation for agrobiodiversity management and sustainable use; and
 - ✓ Capacity-building and strengthening partnerships.

4.5. ENVIRONMENT AWARENESS ACTIVITIES BY MOEF

Swaccha Pakhwada Campaign

- It is a part of the Government's effort to accelerate efforts to achieve total sanitization and cleanliness by October 2, 2019 under Swacchh Bharat Mission.
- Under it, a Swacchh Bharat Fortnight is being organised theme-wise by different Ministries.
 - ✓ For e.g. in June 2016, the Corporate Affairs Ministry observed Swacchh Pakhwada and asked firms and other stakeholders to carry out activities related to cleanliness for a fortnight.
 - ✓ Similarly, the Ministry of Environment, Forest and Climate Change organised the Swacchh Bharat Pakhwada earlier this month.

- It is totally voluntary and aims at creating awareness, targeting programmes, inviting pledges, spending of CSR etc.

Eco-Clubs

- The Eco-Clubs established under the National Green Corps programme of the Ministry carried out various activities relating to Swacchhta such as SafaiAbhiyan at nearby commercial areas and cleaning of public wells, ponds and rivers of the locality.
- Other activities like tree plantation drive/greening neighbourhood, nukkad 'nataks' were performed;
- Volunteers took pledges on related themes; organised rallies and poster and slogan competitions on related themes.

National Green Corps Programme

- **National Green Corps** is a major initiative of MoEF for creating environmental awareness.
- It was launched in 2001-02 and aims at building cadres of young children working towards environmental conservation and sustainable development.
- It is operated through **Eco-clubs** which are set up in schools and registered as members of NGC.
- This programme exposes school children to in-depth field experiences, and provides opportunities to convert their ideas into creative action.
- The programme has a cascading effect as it seeks to redirect the consciousness of students towards environment friendly attitudes and actions and goes beyond schools, promoting school-society interactions to sensitize the society.

4.6. CULLING OF ANIMALS

- Environment Ministry provided a spate of clearances allowing culling of several species in different states.
- The state Boards were permitted to declare animals that were coming in conflict with humans like nilgai, rhesus monkey, wild pigs etc. as **vermin** in Bihar, HP and Uttarakhand.
- This means that those who kill these animals will, for a year, will not be subject to the jail terms and fines that hunting these animals typically invite.
- Wild animals are protected by the Wildlife (Protection) Act, 1972 under which animals and birds are classified, on the basis of threats they face, into four schedules.
- The highly endangered tiger is in the highest Schedule 1 and hares in Schedule 4.
- Each class gets different grades of protection and the law allows all, except Schedule 1 animals, to be temporarily slotted as Schedule 5 or 'vermin.'
- Nilgai, wild pig and rhesus macaque come under schedule 2 and 3.
- In response to a petition, SC refused to stay the notification that allowed for the culling.

Animal Welfare Board

- It is a statutory advisory body advising the Govt. on animal welfare laws and promotes animal welfare.
- It has questioned the "vermin" decision and called it arbitrary.
- It was established in 1960 under Prevention of Cruelty to Animals Act, 1960 and works under MoEF.

4.7. STEPS TAKEN FOR PROTECTION OF ENDANGERED SPECIES: MOEF

Why in news?

In a written reply to a question in Lok Sabha on steps taken for protection of endangered species, this information was given by Minister of Environment, Forest and Climate Change.

Details

1. **Legal protection:** has been provided to wild animals against hunting and commercial exploitation under the provisions of the Wild Life (Protection) Act, 1972. (For ex: Schedule 1 animals etc.)
2. The **Wild Life (Protection) Act, 1972 has been amended** and made more stringent.
 - The punishment for offences under the Act has been enhanced. The Act also provides for forfeiture of any equipment, vehicle or weapon that is used for committing wildlife offence(s).
3. **Protected Areas:**

- National Parks, Sanctuaries,
- Conservation Reserves and Community Reserves

Covering important wildlife habitats have been created all over the country under the provisions of the Wild Life (Protection) Act, 1972 to conserve wild animals and their habitats.

4. Financial and technical assistance by centre under:
 - 'Integrated Development of Wildlife Habitats'- Recovery programs for sixteen species have been prioritized for taking up such recovery programs which include:
 - i. Mammals: Snow Leopard, Bustards (including Floricans), Hangul, Nilgiri Tahr, Asian Wild Buffalo, Manipur Brow-antlered, Malabar civet, the great one-horned rhinoceros, Asiatic Lion, Swamp deer
 - ii. Aquatic: River Dolphin, Marine Turtles, Dugongs and coral reefs,
 - iii. Birds: Edible-nest Swiftlets, Nicobar Megapode, Vultures, and Jerdon's Courser.
 - 'Project Tiger' and 'Project Elephant' for providing better protection to wildlife, and improvement of its habitat.

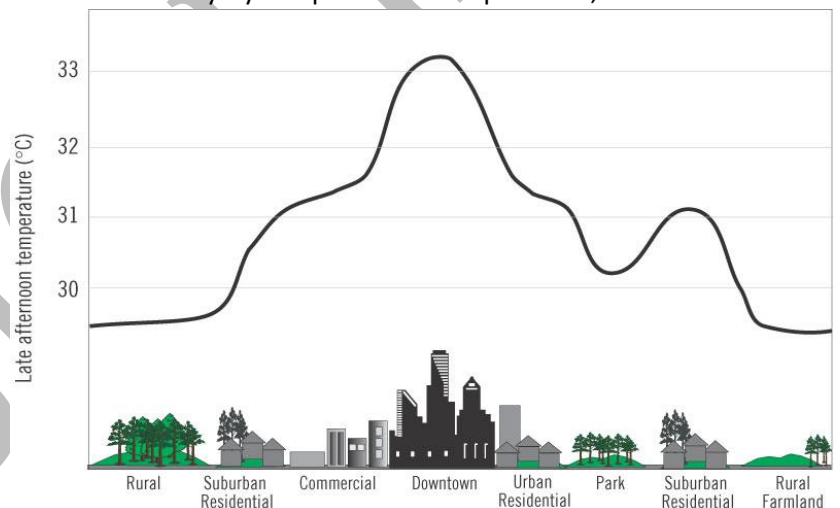
4.8. NEW MODEL TO STUDY URBAN HEAT ISLAND

Why in news?

- A new climate model to study the heat island effect in Abu Dhabi has been developed by researchers. The model, once completed, would help in tackling the effect across the globe.

About urban heat islands (UHI)

- Urbanization negatively impacts the environment mainly by the production of pollution, the modification of the physical and chemical properties of the atmosphere, and the covering of the soil surface. Considered to be a cumulative effect of all these impacts is the UHI.
- It is defined as the rise in temperature of any man-made area, resulting in a well-defined, distinct "warm island" among the "cool sea" represented by the lower temperature of the areas nearby natural landscape (figure 1).
- Though heat islands may form on any rural or urban area, and at any spatial scale, cities are favoured, since their surfaces are prone to release large quantities of heat.
- On an average the annual air temperature of a heat island in a city with 1 million people or more can be 1-3°C warmer than its surroundings which goes upto 12°C in evenings.
- Heat islands can affect communities by increasing summertime energy demands, air-conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality
- The major causes are vehicle, dark pavements, multi-storey buildings and air conditioners. Among these the use of ACs is most adverse as it creates a vicious cycle.
- The effects of a heat island can be reduced by developing efficient cooling systems, adding vegetation to buildings, cooling paved surfaces with reflective paint etc.



4.9. NEW POLICY INITIATIVES IN URBAN TRANSPORT

About

- The central government working on new policy initiatives in public transport systems like metro rail, non-motorised transport and other low carbon emitting systems in urban areas.

- The new initiatives under consideration include Green Urban Transport Scheme (GUTS), new metro rail policy, revision of metro Acts and standardisation and indigenisation of metro systems, aimed at increased private sector participation.

GUTS

- Under GUTS, provision of non-motorised transport infrastructure, increasing access to public transport, use of clean technologies, adoption of intelligent transport systems (ITS) and private sector participation in urban transport projects will be increased.

Metro Policy

- The government is also working on a new Metro Policy which would mandate preparation of comprehensive mobility plans of cities to ensure last mile connectivity with metro stations besides bringing in more innovative models of implementation.
- The present Metro Acts in Delhi and Kolkata will be integrated envisaging more delegation of powers to State Governments besides promoting PPP and private initiatives.
- State governments would also be encouraged to form Unified Metropolitan Transport Authority to facilitate coordinated planning and implementation of projects relating to urban transport and integrated management.

Non-Motorized Transport

- The policy will also promote Non-motorised transport (NMT) infrastructure for encouraging walking and cycling.
- NMT as a viable alternative mode of mobility would be effective if there is a close relationship between work and living place and this would require proper land use zoning, development control and building regulations to ensure success of public transport system in cities.
- NMT is already being encouraged under the Smart Cities and AMRUT mission.

4.10. GREEN HIGHWAYS POLICY

Why in news?

The government recently launched the initial plantation drive on 1,500 km of National Highways at a cost of about Rs 300 crore under the **National Green Highways Mission**.

What is it?

- The Union government had last year launched **Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy 2015**.
- The policy aims to take care of the ecological needs, help the environment and local communities, and generate employment by planting trees along all the highways in the country.

Key features

- **Financing:** 1% of the total project cost (TPC) of National Highways will be kept aside in a **Green Highways Fund** to be used for plantation and its maintenance.
- **Strict auditing:** Release of money to the empanelled agencies only if they have achieved a survival rate of 90% in the previous year.
- The implementation and progress of plantation will be monitored via images by **ISRO** and audit will involve modern IT tools
- Contracts will be given to NGOs, private cos. and govt. organisations with proven track record.

Benefits

- The trees can **reduce the impact of air pollution, dust as well as noise pollution** due to their quality of acting as a natural sink
- It will help in **arresting soil erosion** at the embankment slopes

4.11. STATES TO OFFER TENDER FOR GREEN CORRIDOR PROJECT

Why in news?

Recently eight states have proposed to issue tenders worth Rs 5,000 crore for the projects.

What is green corridor project?

- A project for evacuation of renewable energy from generation points to the load centres by creating intra-state and inter-state transmission infrastructure.
- The intra-state transmission component of the project is being implemented by the respective states and the Power Grid Corporation of India (PGCIL) is implementing inter-state component.
- It is being implemented in two parts
 - ✓ Power Grid is setting up the first corridor connecting states rich in renewable energy.
 - ✓ A second corridor would connect the solar parks in Andhra Pradesh, Madhya Pradesh, Karnataka, Rajasthan and Gujarat.
- The present renewable capacity of the country is 40,000 MW. The Grid can handle 30,000 MW. An additional system for 10,000 MW would be issued by September of this year.

4.12. NATIONAL ELECTRICITY MOBILITY MISSION PLAN, 2020

- The National Electricity Mobility Mission Plan 2020 was launched in 2013 to achieve national fuel security by **promoting hybrid and electric vehicles**.
- The government plans to incentives the buyers under the scheme.
- The manufacturers will reduce the price of a hybrid or electric vehicle at the time of selling it to the buyer and the amount reduced shall be borne by the government.
- Preference of customers for hybrid and electric vehicle is expected to reduce fuel consumption and thereby vehicular emission.

4.13. ENVIS (ENVIRONMENTAL INFORMATION SYSTEM)

- It is a central sector scheme under MoEF.
- It aims at information collection, storage and dissemination related to environment sector for promoting sustainable practices.
- It helps in policy formulation and decision making of government as well as environmental impact assessment by agencies.
- ENVIS centres are located in state government departments, national institutions, and non-governmental organisations.

4.14. DRAFT WIND-SOLAR HYBRID POLICY

Why in news?

- The draft National Wind-Solar Hybrid Policy aims at providing a framework to promote large grid connected wind-solar photovoltaic (PV) system for optimal and efficient utilization of transmission infrastructure is criticized for many reasons such as being restrictive and for lacking details about tariffs.

Key features of the Policy

- It proposes hybridization of existing solar PV and wind power plants apart from new projects.
- Low cost financing for hybrid projects may be made available through IREDA and other financial institutions like multilateral banks.
- For new hybrid wind-solar projects, the draft policy proposes to provide the developer with the option of using the hybrid power for captive use, third party sale or sale to state electricity distribution utilities.

Significance of the Draft Policy

- Given that critical infrastructure such as land and evacuation network for wind or solar project accounts for about 10-12% of overall project cost, hybrid projects would benefit from common infrastructure.

- The variability in generation profile is likely to be reduced to some extent, as generation from both the sources is at different intervals and in complimentary seasons.
- This would partially address the concerns of distribution utilities over the grid stability arising due to the intermittent nature of wind or solar generation.

4.15. DISASTER MANAGEMENT

4.15.1. NATIONAL DISASTER MANAGEMENT PLAN

Why in news?

- The plan was unveiled recently. It is the **first major national plan for disaster management**.
- The plan aims to make India disaster resilient and reduces loss of lives.
- It is made keeping in mind the **Sendai Framework and Sustainable Development Goals (SDGs)**.

Major highlights of the plan

- **Comprehensive definition** of disaster
 - ✓ The plan is based on the four priority themes of the "Sendai Framework," namely:
 - understanding disaster risk,
 - improving disaster risk governance,
 - investing in disaster risk reduction (through structural and non-structural measures);
 - Disaster preparedness- early warning and building back better in the aftermath of a disaster.
 - ✓ It covers all phases of disaster management: Prevention, Mitigation, Response and Recovery.
 - ✓ It covers human induced disasters like chemical, nuclear etc.;
- Planning
 - ✓ Planning for short medium and long run respectively 5, 10, and 15 years to deal with disasters.
- Integrating approach with role clarity
 - ✓ It provides for horizontal and vertical integration among all the agencies and departments of the Government.
 - ✓ The plan also spells out the roles and responsibilities of all levels of Government right up to Panchayat and Urban local body level in a matrix format.
 - ✓ Ministries are given role for specific disasters e.g. Ministry of Earth Sciences is responsible for Cyclones
 - ✓ The plan has a regional approach, which will be beneficial not only for disaster management but also for development planning.
 - ✓ It is designed in such a way that it can be implemented in a scalable manner in all phases of disaster management.
- Major activities
 - ✓ It also identifies major activities such as early warning, information dissemination, medical care, fuel, transportation, search and rescue, evacuation, etc. to serve as a checklist for agencies responding to a disaster.
 - ✓ It also provides a generalised framework for recovery and offers flexibility to assess a situation and build back better.
- Information & media regulation
 - ✓ To prepare communities to cope with disasters, it emphasises on a greater need for Information, Education and Communication activities.
 - ✓ It calls for ethical guidelines for the media for coverage of disasters as well as self-regulation. The plan wants the media to respect the dignity and privacy of affected people.
 - ✓ Also, in a move aimed to stop rumours and spread of panic, the plan directed the authorities to schedule regular media briefing (depending on the severity of the disaster) and designate a nodal officer for interacting with the media on behalf of the government
- Focus on training, capacity building and incorporating best international practices.

About Sendai framework

- The Sendai Framework is a 15-year non-binding agreement on disaster risk reduction.
- It replaced the earlier Hyogo Framework.
- It was adopted at the Third UN United Nations World Conference on Disaster Risk Reduction held at Sendai, Japan in March 2015.
- It aims for the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

4.15.2. DISASTER RISK INDEX OF THE WORLD

Why in news?

- India has been ranked 77th on the World Risk Index, topped by Island state of Vanuatu.

About the Report

- The World risk report analyses the role that infrastructure plays in shaping a country's disaster risk.
- The Index, calculated by the University of Stuttgart, ranks 171 countries according to their risk of becoming a victim of a disaster as a result of natural hazards.

Country	Ranking
Nepal	108
China	85
India	77
Pakistan	72
Sri Lanka	63
Bangladesh	05

4.15.3. WORKSHOP ON PREPARATION OF HEAT WAVE ACTION PLAN

Why in News?

- National Disaster Management Authority (NDMA)** and Government of Telengana organised a workshop on Preparation of Heat Wave Action Plan in order to mitigate the impact of the impending heat wave in 2017.

What are Heat Waves?

- Heat wave is a period of abnormally high temperatures (more than the normal maximum temperature) during summer months.
- It is predominantly prevalent in North-western parts of India during March-June. In some parts, it extends up to July.
- The **Indian Meteorological Department (IMD)** has underlined the following criteria for heat waves:
 - ✓ Heat wave is not to be considered till the temperature of a station reaches at least 40°C (for plains) and 30°C (for hilly regions).
 - ✓ When normal maximum temperature of a station is less than or equal to 40°C, then a departure of 5 to 6 degrees from the normal is to be considered heat wave while a departure of 7 degrees is to be considered severe heat wave.
 - ✓ When normal maximum temperature of a station is more than 40°C then a departure of 4 to 5 degrees from the normal is to be considered heat wave while a departure of 6 degrees is to be considered severe heat wave.
 - ✓ In case the normal temperature of station is more than 45°C then heat wave is to be declared irrespective.
- Heat waves often lead to dehydration, stress, heat exhaustion and sometimes a fatal heat stroke as well.
- NDMA** released the **Guidelines for Preparation of Action Plan – Prevention and Management of Heat Wave** in 2016.

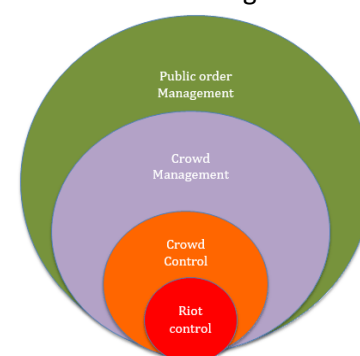
4.15.4. NDMA'S GUIDELINES ON CROWD MANAGEMENT, SAFETY PRECAUTIONS

Why in news?

Recently NDMA has released crowd management guidelines to 'Reduce risks this festive season'.

Guidelines

- Free movement:** The first step is to regulate traffic in areas surrounding the pandals and Dussehra grounds.
 - ✓ For pedestrians, route maps for reaching the venue and emergency exit route should be put up at strategic points.
 - ✓ Barricading to ensure the movement of people in a queue is key to control a burgeoning crowd.
 - ✓ Unauthorised parking and makeshift stalls eating into pedestrian space also need to be taken care of.
- Monitoring:** CCTV cameras to monitor movement and police presence to reduce the risk of snatching and other petty crimes should also be on the organisers' agenda.



- Medical emergencies can occur in claustrophobic spaces. An ambulance and health care professionals on stand-by can save lives in exigencies.
- **For participants:**
 - ✓ Familiarizing with exit routes, staying calm and following instructions will help prevent stampede-like situations.
 - ✓ In case a stampede breaks out, protect chest by placing your hands like a boxer and keep moving in the direction of the crowd.
 - ✓ Stay alert to open spaces and move sideways wherever the crowd gets thinner. Stay away from walls, barricades or bottlenecks such as doorways.
 - ✓ Stay on your feet and get up quickly if you fall. If you can't get up, use your arms to cover your head and curl up like a foetus so that your exposure area is reduced.
- **Fire related:** Unplanned and unauthorised electrical wiring at pandals, LPG cylinders at food stalls and crackers hidden in the Ravana effigies pose the danger of a fire breaking out.
 - ✓ Organisers should ensure authorised use of electricity, fire safety extinguishers and other arrangements meeting safety guidelines. A list of neighbourhood hospitals would come in handy

4.15.5. SAMUDRA PAHEREDAR

- Sri Lanka and India held joint oil spill prevention exercise onboard the Indian Coast Guard Ship "Samudra Paheredar", which is on a two-day official visit to the island country.
- As both India and Sri Lanka are located close to one of the busiest network of international shipping lanes, the readiness is of paramount importance for both countries to take remedial action against oil spills.
- Oil spills from vessels that occur as a result of sudden collisions with oil platforms and various other related reasons, had posed a significant threat on the marine environment to date.

4.15.6. CHENNAI OIL SPILL

Why in news?

- Two vessels collided off the Kamarajar Port at Ennore near Chennai resulting in oil spill in the sea.

Ecological Footprint of Oil Spill

- Damage to fish, turtles, crabs among other marine animals.
- Loss of livelihood to fisherman as venturing out into the sea was not safe.
- Consumers' reluctance to buy sea food added to woes of fisherman.
- Environmental damage to coastal areas.
- Heavy metals released along with oil will poison marine life all the way up the food chain.

Bioremediation techniques

Oilzapper

It is essentially a cocktail of five different bacterial strains that are immobilized and mixed with a carrier material (powdered orncob).

It feeds on hydrocarbon compounds present in crude oil and oily sludge and converts them into harmless CO₂ and water.

Oilivorous-S

It is a tad different from Oilzapper is an additional bacterial strain that makes the former more effective against sludge and crude oil with high-sulphur content.

Both Oilzapper and Oilivorous-S can be used in situ, thereby eliminating the need to transfer large quantities of contaminated waste from the site, a process that poses more threats to the environment.

Why Oil Spills are difficult to contain?

- When oil hits the sea, its surface is quickly dispersed by the wind, while sea currents spread the lower layers in contact with the water.
- This twin action creates a large, ever-expanding film of oil called a "slick".
- Along the shore, the oil mixes with sand and debris to form a thick viscous sludge that gradually oxidizes into a toxic brown mass that experts like to call "**chocolate mousse**".

Measures at National and International Levels to Contain Harmful Impacts of Oil Spills

- **The National Oil Spill-Disaster Contingency Plan (NOS-DCP)**, which was adopted in 1996, has routinely been updated and revised to reflect the latest in international safety and regulatory standards. But, **it completely failed in taking action on the ground.**

- A **state contingency plan has not been prepared** even after Coast Guard demanding states to formulate a local plan to fight such disasters for over 20 years now.
- The **International Convention on Civil Liability for Oil Pollution**, 1969, of which India is a signatory, provides for adequate compensation for the damages involving oil tankers and has strict liability for ship owners.
- But, the domestic liability regime for environmental damage has been weak and underdeveloped.

4.15.7. OIL DEGRADING BACTERIA TO UNDERGO FIELD TRIALS

Why in news?

- The Malabar Botanical Garden and Institute of Plant Sciences, Kozhikode, has joined hands with Bharat Petroleum Corporation Limited (BPCL) for field trials to establish the oil-degrading properties of three new strains of bacteria.
- The key hydrocarbon-degrading enzyme produced by the bacteria has been isolated and purified and laboratory tests have been successful.
- This active enzyme (**Catechol 2, 3- dioxygenase**) produced from three new strains of oil-degrading bacteria (two species of Burkholderia and one species of Pseudomonas) is going to be used in pilot plant in Kochi.

What is Bioremediation?

- It means the use of microorganisms to degrade environmental pollutants.
- Advantages of Bioremediation:
 - ✓ Less expensive
 - ✓ Conventional methods like mechanical removal, burial, evaporation, dispersion, and washing are expensive and can lead to incomplete decomposition, leaving residual contaminants to pollute soil and water.
 - ✓ Employed in areas that are inaccessible without excavation. For ex: spills affecting ground water.
 - ✓ Clean up petroleum pollutants from the environment conserving aquatic wildlife without negatively affecting bio-diversity.

CLEAN-UP AGENTS

- Three strains of oil-degrading bacteria identified
- Scientists isolate active enzyme
- Pilot plant to come up in Kochi
- Eco friendly method to clean up oil leaks and spills

Bioremediation related technologies

- **Bioventing** - an in situ remediation technology that uses microorganisms to biodegrade organic constituents in the groundwater system.
- **Bioleaching** - extraction of metals from their ores through the use of living organisms instead of using harmful chemical substances such as cyanide etc.,
- **Land farming** - ex-situ waste treatment process that is performed in the upper soil zone or in biotreatment cells. Contaminated soils, sediments, or sludges are transported to the Landfarming site, incorporated into the soil surface and periodically turned over (tilled) to aerate the mixture
- **Composting**- Aerobic bacteria and fungi decompose the organic matter into compost used as fertilizer.
- **Bio-augmentation** - the addition of archaea or bacterial cultures required to speed up the rate of degradation of a contaminant.
- **Bio-stimulation** - modification of the environment to stimulate existing bacteria capable of bioremediation.

4.15.8. FLOOD MANAGEMENT

Why in news?

Uttar Pradesh, Bihar and Madhya Pradesh were devastated by floods in August, this year. The main reasons were heavy rainfall in Himalayan foothill region, while U.P and Bihar at the times of floods had under normal rainfall recorded.

What is Flood?

Flood is a state of higher water level along a river channel or on coast leading to inundation of land that is not normally submerge. Flood therefore is a natural disaster which causes considerable damage to the crops, livestock and human life.

Causes of contemporary floods

- The rivers bring heavy sediment load from catchments. These, coupled with inadequate carrying capacity of rivers are responsible for causing floods.
- Drainage congestion and
- Erosion of river-banks.
- Obstruction of free-flow in rivers: Silting in deltaic areas

Flood Management

I. Minimizing flood risk

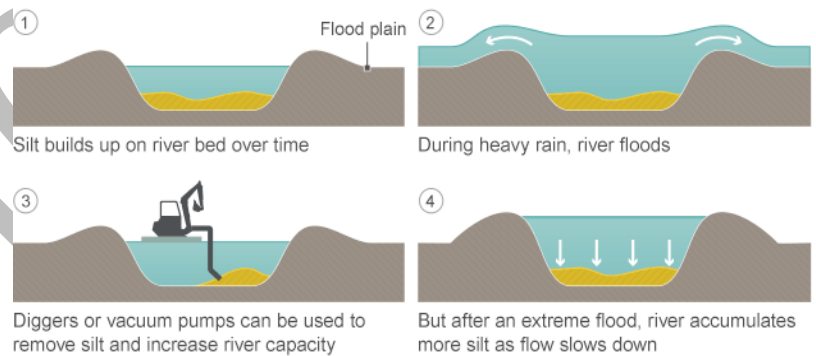
- Phase-I: These activities include identification and marking of flood prone areas on maps, preparation of close contour and flood vulnerability maps by the Central Water Commission (CWC)/ Ganga Flood Control Commission (GFCC)/Brahmaputra Board,
- Phase-II: These include implementation of the schemes for expansion and modernisation of the flood forecasting and warning network, execution of flood protection and drainage improvement schemes,
 - The efforts of the CWC, IMD, NRSA and the state governments will be integrated
- Phase-III: Implementation of activities, which include construction of dams and catchment area treatment (CAT) works in India as well as neighboring countries.

II. Hard management techniques

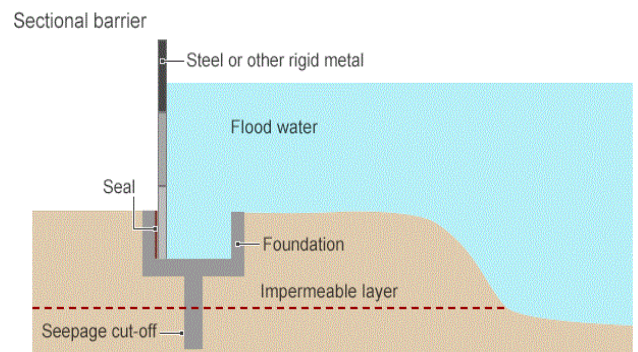
- Dams: used to trap and store water, which can be released later.
- Embankments or Artificial levees: these are raised banks which makes the river's cross section larger and so it can hold more water. They can be expensive but are effective. In the US they are called levees, somewhere breached during Hurricane Katrina and flooded large amounts of adjacent land
- Flood walls/ River defences/ Coastal defences are built around settlements to protect them from floods. They look artificial and are expensive but are effective.
- Storage areas: Where water can be pumped out of the river and stored in temporary lakes. It can then be pumped back later.
- Dredging the river basins
- Inter-basin transfers



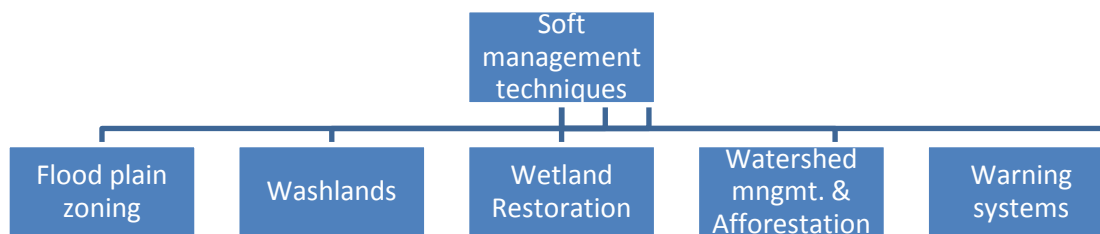
How dredging works



temporary flood barrier



III. Soft management techniques:

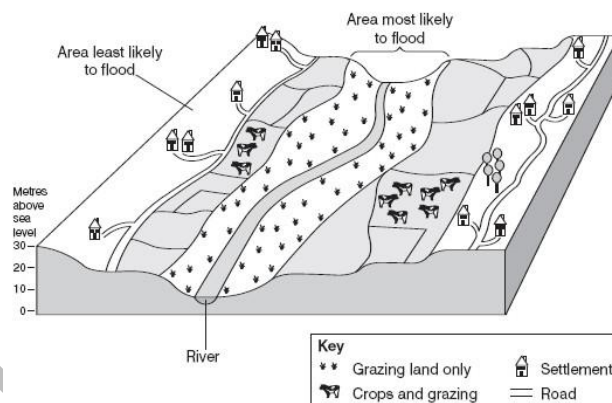


Washlands: are sections of the flood plain which are allowed to flood, therefore they are usually left as sports fields and nature parks.

Land use zoning/ flood plain zoning: is designed to prevent development in areas most prone to flooding and developments is only allowed in 'safe' areas.

Afforestation: The planting of trees in a river's catchment to increase interception, reduces soil runoff and also the uptake of water through the soil.

Warning systems: issued by flood protection agencies to enable people to react to the danger.



IV. Capacity Development and Response:

- Flood Education
- Emergency search and Rescue
- Emergency relief

4.15.9. JALRAHAT EXERCISE

- Exercise jalrahat is a **joint initiative taken by the Assam state government and Armed forces** towards the objective of **improving disaster preparedness during floods.**
- Similar exercises will be done in
 - ✓ Vishakhapatnam by Indian Navy- **Exercise Prakampana** for preparedness in case of super cyclone
 - ✓ Bhuji, Gujarat by Indian Air Force- **Exercise Sahayata** for major earthquake.

4.15.10. PRAKAMPANA-2016

- The three day long Joint Disaster Management Exercise named Prakampana ('Cyclone' in Sanskrit) was held in Visakhapatnam (Vizag) in September 2016.
- The exercise was aimed at synchronizing resources and efforts of all agencies involved in disaster management.
- It was conducted by the **Eastern Naval Command** in liaison with concerned Centre and State authorities.

4.20. COMPENSATORY AFFORESTATION FUND BILL, 2015

Why in news?

- Lok Sabha passed the Compensatory Afforestation Fund bill, 2015. It is pending in Rajya Sabha.
- The Bill establishes the **National Compensatory Afforestation Fund** under the **Public Account of India**, and a State Compensatory Afforestation Fund under the Public Account of each state.

Background

- Currently Reserved Forest or a Protected Area (PA) land may be diverted under the Forest (Conservation) Act, 1980 for non-forest developmental activities like an industrial or infrastructure project with approval of central and state government.
- To compensate for diversion of forestland, afforestation must be done on a separate piece of land called as compensatory afforestation. In addition compensation must be paid for loss of forest ecosystem and biodiversity. Valuation of this forest ecosystem is called net present value.

- Cost for both is borne by agency responsible for diversion of forestland and money is collected by the state government for afforestation and forest development.
- In 2002, Supreme Court observed that these funds were not been utilized, and for this purpose an ad-hoc authority called compensatory afforestation fund management and planning authority (CAMPA) was set up. In the absence of permanent institutional mechanism more than Rs. 40,000 crores have accumulated which are being kept in Nationalized Banks and managed by CAMPA.

What bill does?

- Provides an institutional mechanism for safety and transparency in expeditious utilization of unspent amounts with ad hoc CAMPA to mitigate impact of diversion of such forest land.
- The National CAF and State CAFs will receive payments for: **(i) compensatory afforestation (ii) net present value of forest (NPV), and (iii) other project specific payments.**
- The National Fund will receive 10% and the State Funds will receive the remaining 90%.
- Establishes the National and State Compensatory Afforestation Fund Management and Planning Authorities to manage the National and State Funds.
- These Funds will be primarily spent on afforestation to compensate for loss of forest cover, regeneration of forest ecosystem, wildlife protection and infrastructure development.

COMPENSATORY AFFORESTATION FUND BILL

PRINCIPLE OBJECTIVE

SETTING UP OF A 1 National Compensatory Afforestation Fund | 2 State Compensatory Afforestation Fund

These authorities will monitor the utilisation of funds

Any user agency which diverts forest land for non-forest purpose is required to deposit prescribed amount

90% of collected payments will go to state fund
10% of collected payments will go to national fund



(This provision may be amended as standing committee wants state fund to get 95% of the payments)

Funds will be used for

1. Increasing forest cover
2. Forest regeneration
3. Wildlife protection
4. Related activities to protect green cover

Bill is also meant for setting up

1. A national management and planning authority at the Centre
2. State-level authority in respective states

4.21. INTENSIFICATION OF FOREST MANAGEMENT SCHEME (IFMS)

- IFMS was launched with a view to **minimizing fire hazards and controlling forest fires**. Prior to 2009, it was called **Integrated Forest Protection Scheme**.
- It is a **centrally sponsored scheme**.
- The components of the scheme included forest fire control and management, survey, demarcation and preparation of working plans, strengthening of infrastructure such as roads, camp offices, watch towers, improved mobility, providing fire arms and use of modern information and communication technology etc.

4.22. GM CROPS

4.22.1. GM MUSTARD

Why in news?

- Technical sub-committee of India's genetic engineering regulator has concluded that the genetically modified variety DMH-11 (Dhara Mustard Hybrid 11) did not "raise any public health or safety concerns for human beings or animals".
- Regarding this a report was released by the regulator, Genetic Engineering Appraisal Committee (GEAC), which sought suggestions from the public over the next 30 days.

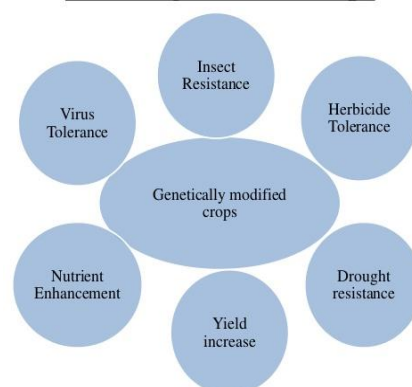
Details

- The introduced proteins i.e. Barnase and Barstar are expressed at negligible to non-detectable levels in the edible parts and have been derived from commonly occurring non-pathogenic bacteria.

Barnase and Barstar genes are used for engineering male sterility in plants. Targets the TA29 gene.

Bio informatics: is the application of computer technology to the management of biological information.

Advantages of GM Crops



- None of the three proteins has been shown to be toxic or allergenic through bioinformatics and acute toxicity studies in experimental animals

Process of approval

- Suggestions from the public will have to be evaluated by GEAC to see if evidence on bio-safety has been ignored.
- If there are no such concerns, the GEAC will have to decide whether to recommend DMH-11 for commercial cultivation.
- The GEAC's recommendation will then have to be approved by the environment minister whose decision will be final.

4.22.2. DESI GM ALTERNATIVE TO MONSANTO

Why in News?

- Indian scientists have developed two new sets of indigenous **transgenic events** in cotton cultivation that is a potential alternative to Monsanto seeds.

Highlights

- Scientists at **Delhi University's Centre for Genetic Manipulation of Crop Plants (CGMCP)** have developed two independent 'events' for insertion of the cry1Ac gene.
- **cry1Ac gene** isolated from a soil bacterium **Bacillus thuringiensis (Bt)** and is toxic for American bollworm insect.
- The other promising indigenous GM event is **whitefly-resistant cotton** developed by the **National Botanical Research Institute (NBRI), Lucknow**.
- Scientists have isolated and cloned a gene from an edible fern *Tectaria macrodonta*.
- The gene Tma12 encodes a protein toxic to whitefly.

4.22.3. ALTERNATIVE TO BT COTTON

Why in news?

- The Union government is working to develop a suite of Bt cotton genes that can be integrated into traditional varieties and be made available to farmers.
- This would be a viable alternative to the current Bt Cotton technology, which is largely sourced from foreign company Mahyco Monsanto Biotech India Ltd. (MMB).
- It would be a joint collaboration of Council of Scientific and Industrial Research (CSIR) and the Department of Biotechnology (DBT).

About Bt Cotton

- Bt Cotton is a genetically modified variety of cotton that contains insecticidal genes sourced from soil bacterium targeted at key cotton pests.
- It is the only GM crop that is legally allowed in India at present. Gm food crops such as brinjal and mustard, which are in advanced stages of regulatory clearances, are yet to become available to farmers due to stringent opposition by anti-GM activist groups.

4.23. UDAYPUR DECLARATION: BRICS

Why in news?

- A meeting of BRICS ministers on Disaster Management was held in Udaypur, Rajasthan. It ended with the adoption of Udaypur Declaration.

Major takeaways

- It laid bare the common thread of challenges on disaster issues faced by all the BRICS nations. These were:
 - ✓ mainstreaming of disaster risk reduction,
 - ✓ use of advanced technology in providing early warning,

- ✓ need for adequate funding to deal with rehabilitation and reconstruction after a disaster
- ✓ the impact of climate change on disasters
- Member nations have resolved to set up a dedicated Joint Task Force for Disaster Risk Management for regular dialogue, exchange, mutual support and collaboration.
- Agreement on a road map for implementation of the three-year Joint Action Plan on exchange of Information/ experiences on disaster management, research & technology exchange on forecasting and early warning for floods and extreme events and capacity building.

4.24. NEERDHUR

Why in news?

- Recently National Environmental and Engineering Research Institute (**Neeri**) and **CSIR** has developed 'Neerdhur', a novel **multi-fuel domestic cooking stove**.

Benefits

- Apart from wood, other fuel like **coal, cow dung and agricultural residue** can also be used in it.
- **Saves 50% fuel** and has high **thermal efficiency**.
- **Wood usage is halved** and helps save the pressure on environment
- Neerdhur has been **approved and certified** by Ministry of New and Renewable Energy (MNRE) and meets the emission **parameters of Bureau of Indian Standards (BIS)**.
- Will help in improvement of **women's health** in rural areas.

4.25. WORLD'S LARGEST MARINE PARK

Why in news

- EU and 24 countries sign long-awaited landmark deal agreement to protect 1.1m sq.km of water in Southern Ocean.

Key facts

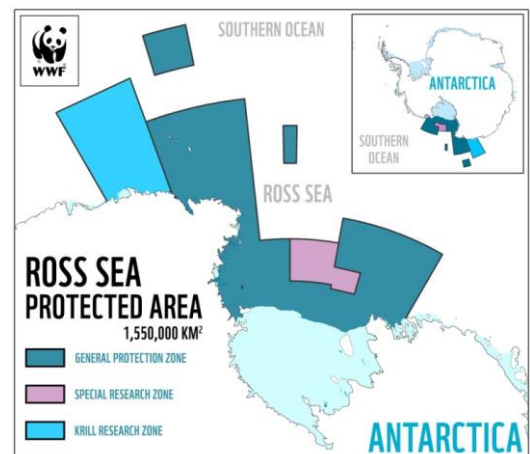
- It will be **world's largest marine park** covering more than 1.5m sq.km of the **Ross Sea around Antarctica**.
- It will be set aside as a no-take "**general protection zone**", where no fishing will be allowed.
- The protections are set to **expire in 35 years**.
- The agreement was signed at meeting of **Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)**.
- The agreement was facing **opposition from China and Russia**, which have fishing industries in the region.
- It is the **first marine park created in international waters**.

About Ross Sea

- It is sometimes called the "**Last Ocean**" because it is **largely untouched** by humans and hence the least altered marine ecosystem on Earth
- Its nutrient-rich waters are the **most productive in the Antarctic**, leading to huge plankton and krill blooms that support vast numbers of fish, seals, penguins, and whales.
- Home to **high concentrations of wildlife** and an incredible array of animals, many found nowhere else on the planet.
- Ross Sea is a **living laboratory** providing scientists with the last chance to understand how a healthy marine ecosystem functions.

Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR):

- It was established by international convention in 1982 with the objective of conserving Antarctic marine life.
- It has 25 Members, and a further 11 countries have acceded to the Convention.
- India is also a member of this commission.
- It is headquartered in Tasmania, Australia.



4.26. SEAWEED FARMING

Why in news?

Central Marine Fisheries Research Institute (CMFRI) has transferred seaweed cultivation technology to the Andaman administration.

About seaweed

- It gained prominence during **13th century**, after the **discovery of agar-agar** in Japan and **Alginic Acid** in European continent.
- It is considered as the **medicinal food of the 21st century**. Many seaweeds are **rich in vitamins and minerals** and are eaten in various parts of the world.
- **China produces over half of the world's seaweed** harvest and Indonesia 27% of world production.
- Most of that seaweed ends up in our food, though there is a growing market in seaweed-based cosmetics and drugs.

Seaweed culture in India

- In India the Gulf of **Mannar, Gulf of Kutch, Calh Bay, Hanshadweep and Bay islands** are the important areas for seaweed culture.
- Research programmes on seaweed resources and their culture were taken up by the **Central Marine Fisheries Research Institute** and **Central Salt and Marine Chemicals Research Institute**.

4.27. BACTERIA RESISTANT TO “LAST RESORT” ANTIBIOTIC

Why in News?

- Scientists at the Ohio State University have identified bacteria resistant to carbapenems in a swine farming operation.

What is it?

- Scientists have recovered 18 isolates of multiple **Enterobacteriaceae** species harbouring the beta-lactamase gene IMP-27, which confers resistance to carbapenem antibiotics.
- **This family of bacteria includes pathogens such as Escherichia Coli.**
- While plasmid-mediated carbapenem-resistant Enterobacteriaceae (CRE) have been earlier reported in European and Asian livestock, it is the first time they have been identified in US livestock.
- Carbapenems are termed “critically important” for human health by WHO.
- Carbapenems are a last line of defense against drug-resistant bacteria. It is used to treat diseases when no other antibiotics are known to work.

4.28. HAKKI HABBA

- It is a three day bird festival which was held at **Daroji Sloth Bear Sanctuary** near world famous **Hampi** in Ballari district, Karnataka.
- It was the **3rd edition** jointly organized by State's Forest Department and Eco Tourism Board in association with the local birdwatchers' association.
- The first two editions were held in **Ranganathittu Bird Sanctuary**, Mandya district and **Kali Tiger Reserves**, Uttara Kannada district.
- The objective of the festival is to create **awareness** among the people about conservation of birds.
- Birds like **Great Indian Bustard, Bar-headed geese, Partridges, Painted Sand grouses, Yellow throated bulbul, Great horned Owl, Black Storks** were sighted along the bank of River Tungabhadra in Hampi.

Sloth Bears

- Indian Sloth bears are a species of bear found **only** in **India, Nepal** and **Sri Lanka**.
- It is **nocturnal** animal, locally known as **KARADI**, lives in open scrub forests having outcrop of rocks, boulders and caves as shelter.
- They have poor vision and hearing but good sense of smell.
- Daroji sanctuary established in 1994 is biggest sloth bear sanctuary in Asia.
- Current status: **IUCN RED list – Vulnerable**, in **CITES** included in **Appendix I** and **Schedule I** of wildlife protection act, 1972.

4.29. WORLD WETLANDS DAY

Why in news?

- World Wetlands Day was celebrated at Bhoj Wetlands on February 2 to mark the Day the Convention on Wetlands was adopted in the Iranian City of Ramsar in 1971.
- The theme of World Wetlands Day for 2017 was '**Wetlands for Disaster Risk Reduction**'.

Bhojwetlands is situated in Madhya Pradesh and is **one of the 26 sites that India has designated under the Ramasar Convention.**

What are Wetlands?

- Wetlands are **areas where water is the primary factor** controlling the environment and the associated plant and animal life.
- These areas **have the soil covered by water** or are present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.
- **Wetlands, natural and manmade, freshwater or brackish, provide numerous ecological services.**
- The **density of birds in a particular area** of wetland can be **indication of the ecological health** of a wetland.

Objectives of the Scheme:-

- To lay down policy guidelines for conservation and management of wetlands in the country;
- To undertake intensive conservation measures in priority wetlands;
- To monitor implementation of the programme;
- To prepare an inventory of Indian wetlands.

Significance of Wetlands

- It helps to **maintain sedimentation and balance of soil**, helpful in water, carbon and nutrient cycles.
- It helps to **regulate the amount of water** as excess water from rainfall and floods gets absorbed and can be used in times of need.
- It is **source of livelihood** through fishing and rice farming to travel, tourism and water provision.
- Wetlands host a large variety of life, **protect our coastlines, provide natural sponges against river flooding and store carbon dioxide to regulate climate change.**
- They provide habitat for wildlife and migratory birds and help in conservation of environment.

National Wetland Conservation Programme (NWCP)

- Under the programme, which was started in 1985-86, 115 wetlands have been identified till now by the Ministry of Environment and Forest and Climate Change **which requires urgent conservation and management initiatives**

Ramsar Convention

- It is international treaty for conservation and sustainable use of wetlands.
- It is named after the **city of Ramsar in Iran**, where the convention was signed in 1971.
- There are **26 Ramsar Sites** in India designated as Wetlands of International importance.
- **Chilika Lake** (Odisha), **Point Cailmere Wildlife and Bird Sanctuary** (Tamil Nadu), **Sambhar Lake**(Rajasthan) and **Upper Ganga River**(Uttar Pradesh) are a few noted ones.
- The **2nd of February** each year is noted as the **World Wetlands Day.**

4.30. POLACHIRA WETLANDS

Why in News?

- Recently the **27th annual waterfowl** census was conducted in the **Polachira Wetlands, in Kollam, Kerala**
- This year **15 Eurasian spoonbills** were sighted at Polachira. They are **migratory birds** breeding from **the UK and Spain in the west** through to Japan in the **East**.

About Polachira Wetlands

- The wetlands are the **breeding ground for the Migratory Birds** from all around the world.
- Some of the birds sighted during the census are **Comb ducks, Black headed ibis, Painted storks, Glossy Ibis, Indian moorhen, Eurasian coot, Pheasant-tailed jacana, Grey heron, large cormorant and large egret.**

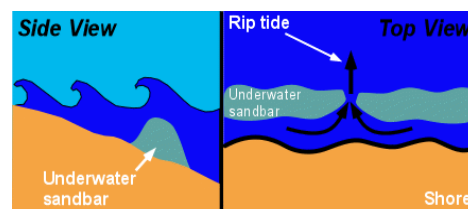
4.31. RIP TIDES

Why in News?

ISRO in collaboration with a private lifeguard agency appointed by the Goa government has conducted a study (Ripex 2017) on rip tides along the beaches of Goa.

What are Rip Tides?

- Rip tides (also known as ebb jet or tidal jet) are powerful currents running perpendicular to the shore.
- They pull the water out into the ocean.
- The term rip tide is a misnomer as tides occur due to moon's gravitational pull while rip currents are caused due to shape of the shoreline or due to formation of sandbar.
- These currents may extend 200 to 2,500 feet lengthwise and less than 30 feet in width.
- Rip tides are dangerous because they catch swimmers unaware and pull them deep into the ocean.



4.32. WORLD'S FIRST TRANSIT RATING SYSTEM

Why in news?

- The DMRC, along with the US Green Building Council (USGBC) and the Green Business Certification Inc. (GBCI), announced the world's first LEED for transit rating system.

The LEED Transit Rating System

- Developed with inputs from the DMRC, the **new LEED transit rating system** will assess the functioning of metro stations based on five categories - energy, water, waste, transportation, and human experience.
- It will allow operational transit facilities to benchmark efficiencies and demonstrate continual improvement.
- DMRC will be the first metro network in the world to pursue the pilot transit rating for its station.
- The transit rating system will help advance sustainable development agenda and to minimize carbon footprint.

About LEED (Leadership in Energy and Environmental Design)

- It is an international certification run by USGBC, which provides a framework to building owners and operators for identifying and implementing practical green building solutions.
- It concentrates its efforts on improving performance across five key areas of environmental and human health: **energy efficiency, indoor environmental quality, materials selection, sustainable site development and water savings.**

4.33. EFFICIENT AND SUSTAINABLE CITY BUS SERVICE PROJECT

Funding agreement

- India has signed a **\$9.2-million grant agreement with the World Bank for the 'Efficient and Sustainable City Bus Service Project'** aimed at improving the efficiency of the transport and reduce greenhouse gas emissions.
- The project will **be classified under Global Environment Facility (GEF) grant with IBRD as the implementing agency.**
- The total cost of the programme is \$113 million. The rest will be funded by the Centre, state and city governments for the funding of buses and ancillary infrastructure.

About the project

- The project has been designed to specifically focus on identifying institutional, regulatory and fiscal constraints to operation of sustainable city bus services.
- The project will complement **Union Government's Bus Funding Scheme**, which was launched to promote public transport in cities by modernizing their bus services.

- It will introduce modern Management Information Systems and Intelligent Transport Systems for better planning and management of operations.
- It will also provide technical support to drivers and vehicles for better fuel efficiency, etc.

4.34. NEW URBAN AGENDA - HABITAT – III

Why in news?

- The New Urban Agenda was officially adopted at the UN Conference on Housing and Sustainable Urban Development (referred as “Habitat III”) held recently in Quito, Ecuador.
- The UN’s Habitat conferences are held in a bi-decennial cycle, with previous editions being held in Vancouver (1976) and Istanbul (1996).

What is New Urban Agenda?

- It is a set of 175 commitments that countries need to adhere to tackle the staggering challenges of urbanization.
- It sets the global vision of sustainable urbanization for the next 20 years.
- It is a roadmap for building cities that can serve as engines of prosperity and centres of cultural and social well-being while protecting the environment.
- It also provides guidance for achieving the Sustainable Development Goals and provides the underpinning for actions to address climate change.

4.35. SHAILESH NAYAK COMMITTEE REPORT

Why in news?

- The Report of the Committee to Review the Issues relating to the Coastal Regulation Zone, 2011, was submitted to the Ministry of Environment, Forests and Climate Change in January 2015.
- The ministry has disclosed the report after an order from the Information Commissioner last month ordering the ministry that it cannot deny the report under the Right to Information (RTI), Act.

Highlights of the report

- The committee found that the 2011 regulations, especially with regard to construction, have affected the housing, slum redevelopment, redevelopment of dilapidated structures and other dangerous buildings.
- Since January 2015, several dilutions appear to be taken from this report, such as
 - ✓ Allowing construction of monuments/memorials (Sardar Patel statue in Gujarat) in CRZ VI zones;
 - ✓ Proposal to allow high-rise buildings (Chennai) in CRZ II zones within 500 metre of the high-tide line;
 - ✓ Proposal to allow reclamation of land from sea (Mumbai) for facilities such as ports, roads, quays, harbours and others.
- The report proposes the devolution of powers to state and union territory governments along with local authorities as sought by several states.
- The report even suggests that both CRZ II and III zones (500 metres from the high-tide line that are developed and relatively undisturbed, respectively) should not fall under the environment departments of the State or Central Ministry, and instead be guided by the rules of State town and planning departments.
- It further proposes to reduce the “no development zone” to just 50 metres from existing 200 metres for “densely populated” areas.

About Coastal Regulation Zone

- The coastal land up to 500m from the High Tide Line (HTL) and a stage of 100m along banks of creeks, estuaries, backwater and rivers subject to tidal fluctuations, is called the Coastal Regulation Zone (CRZ).
- It seeks to ensure livelihood security to the coastal communities, to conserve and protect coastal stretches and marine areas and promote sustainable development on scientific principles taking into account the dangers of natural hazards in the coastal areas and sea level rise.

4.36. FOREST FIRE

- Parliamentary Standing Committee on Science and Technology submitted its report on forest fires.
- It said that the frequency of forest fires across Central Indian forests and the Himalayan Pine forest have increased by 55% in 2016.
- The States of Odisha, Chhattisgarh, and Madhya Pradesh accounted for 1/3rd of the forest fires.
- The committee observed that Chir pine needles, which are highly inflammable due to its high resin content, are a prominent factor in occurring and spreading of forest fires. In comparison, incidents of fire in broad leaves forests were found to be minimal.
- The Committee suggested that a national policy on managing forest fires should be prepared.

4.37. GLOBAL GREEN AWARD

Why in news?

The steering committee of the International Union for Conservation of Nature and Natural Resources (IUCN) informed **Dr. Dhrubajyoti Ghosh**, the **first Indian environmental activist** to receive the **Luc Hoffman award**.

Details

- He mapped the area of East Kolkata wetland which is a swathe of water bodies spanning over 100 sq. km.
- This is fast shrinking due to **illegal filling of fishponds**.
- He innovatively calculated the economic value of its loss and presented it in Net Present Value which could be easily used in GDP and other mathematical calculations.
- For this he was presented **Luc Hoffman award**.
- He also studied about what happens to the city sewage, after it reaches wetlands.
- East Kolkata Wetlands is "**wetland of international importance**" under the Ramsar Convention.



4.38. MINING ACCIDENTS

Why in News?

- In December 2016, 23 workers got trapped under debris at the **Lalmatia open-cast coal mine** in Jharkhand's Godda district.

Government initiatives on mining safety

- Mines Act 1952 covers protection of health and safety of workers in mines.
- Major incidents are investigated by the **Oil Industry Safety Directorate** and a committee set-up by the Ministry of Petroleum and Natural Gas.
- Root Cause Analysis (RCA) and lessons learnt report is shared with oil companies to prevent similar incidents.
- Ministry of Mines has recently started **Anti-collision system for dumpers, electronic telemonitoring system, slope stability system and gas monitoring system** in some areas.

4.39. SAFETY MEASURES IN COAL MINES

Why in news?

- An open cast coal mine collapsed in Lalmatia in Jharkhand killing at least 13 miners.
- A solid floor of 300 metres length and 110 metres width of the overburden dump area slid down by about 35 metres involving around 9.5 million cubic metres of earth material.
- It the worst such disaster in over a decade.

Open Cast Coal Mines

- This is mining of minerals at the surface by excavating large strips of land as shown in the adjoining figure, without making subsurface tunnels as is done in underground mines.
- Retaining walls are made along steeper slopes to prevent collapse of pit benches.
- Its **benefits** include lower cost and higher safety level.
- It causes **ground water contamination** and high chances of exposure to radioactive substances.

4.40. HERITAGE HEROES AWARD

Why in news?

- Assam-based ecologist and conservation activist **Bibhuti Lahkar** has become the first Asian to be awarded the prestigious Heritage Heroes Award by the International Union for Conservation of Nature (IUCN).
- He received the award at the IUCN's World Conservation Congress.

Work of Mr. Lahkar

- He has been working to save the grasslands, flora and fauna of Manas National Park area for the past two decades.
- He currently engaged as Manas Landscape Administrator for Aaranyak, an NGO working for biodiversity conservation in Northeast India.
- He was instrumental in connecting **Manas Wildlife Sanctuary** with the **Royal Manas National Park in Bhutan**.
- He had also conducted a GIS survey of the Manas area and his research findings were highly beneficial in the Manas Tiger Conservation.

What is Heritage Heroes Award?

The Heritage Heroes award is given by IUCN. It aims to recognise the outstanding efforts of a few brave people, around the four corners of the world, who relentlessly invest efforts to make a difference in the way natural World Heritage sites are conserved, sometimes despite life-threatening situations.

The objective of this initiative is to inspire people to value the importance of natural World Heritage sites and recognise the need to collectively invest in their conservation.

PHILOSOPHY/ दर्शनशास्त्र
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ANOOP KUMAR SINGH

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5. PHYSICAL GEOGRAPHY

5.1. CYCLONE VARDHAH

Why in News?

- Cyclone Vardah made a landfall on Chennai on December 10, 2016 uprooting trees, causing heavy rainfall and bringing the metropolitan to a standstill.

About Cyclone Vardah

- Cyclone Vardah is a tropical storm that originated in the Bay of Bengal.
- It slammed Chennai and adjacent parts of Andhra Pradesh coast.

What are tropical cyclones?

- They are intense depressions with very low central pressure.
- It has a warm central core or eye, largely cloudless. Around the eye is a great cylinder of clouds, torrential rain and violent winds.
- In 'eye wall' and 'rain-band' region, latent heat of the warm seawater is released. This acts as energy source to drive the system. Therefore they become less intense once cut off from the sea and eventually die.
- They are variously known as hurricanes (Caribbean), Cyclones (Indian Ocean), Typhoons (China Sea), Willy-Willies (Australia).

Where are tropical cyclones formed?

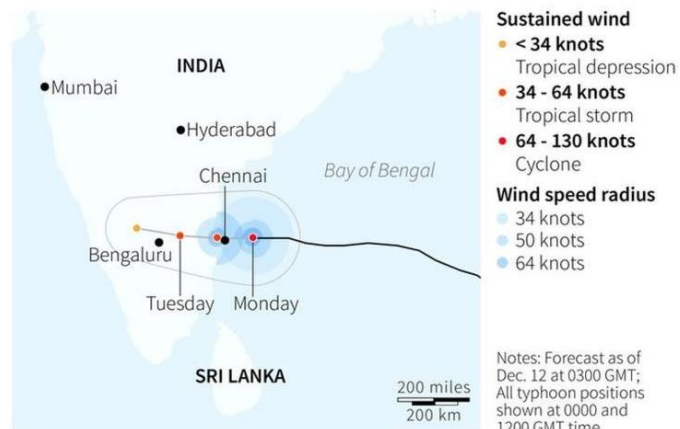
- They occur in tropical areas, where seawater is warm enough (>27 C) to feed the cyclone with latent energy.
- They don't occur close to the equator, even when seawater is warm. This is because of the low Coriolis force in equatorial areas. Coriolis force makes the winds have to turn into central low pressure.
- They form closer to the Equatorial trough and therefore in Indian Ocean we have 2 peak seasons of cyclone occurrence: May and September.

How are they measured?

- The wind speeds are maximum at 15-20 kms from the central 'eye'.
- These wind speeds are used as a measure of intensity. For ex: cyclonic storm has a velocity of 62-88 kmph acc. to IMD scale.

Cyclone Vardah

A severe cyclone storm is due to strike the southeast coast of India, including Chennai, one of the most populous Indian cities.



5.2. WINTER FOG EXPERIMENT

Why in news?

- Ministry of Earth Sciences (MoES) has launched Winter Fog Experiment (**WIFEX 2016-17**) to achieve better understanding of fog life cycle at Indira Gandhi International Airport (IGIA), Delhi.
- The main scientific objective of this project is to study the characteristics and variability of fog events and associated dynamics, thermodynamics and fog microphysics.

About Fog

- Fog is a visible mass consisting of cloud water droplets suspended in the air or near the Earth's surface.
- Maximum fog occurrence over the Northwest India is about 48 days (visibility < 1000m) per year, and occurs mostly during the December-February time period.
- Land use changes and increasing pollution in the region are responsible for growing Fog occurrence.

5.3. ANTHROPOCENE EPOCH – HUMAN-INFLUENCED AGE

Why in news?

An expert group at the World Geological Congress in Cape Town recommended that the new Anthropocene epoch, start from the mid-20th century, be officially declared. The approval process is likely to take at least two years and requires ratification by three other academic bodies.

What is Anthropocene?

- The Anthropocene, coined in 2000 by the Nobel prize-winning scientist Paul Crutzen, is a proposed epoch that begins when human activities started to have a significant global impact on Earth's geology and ecosystems.
- Neither the International Commission on Stratigraphy nor the International Union of Geological Sciences has yet officially approved the term as a recognized subdivision of geological time
- An epoch is a subdivision of the geologic timescale that is longer than an age and shorter than a period.
- Epochs are most commonly used for the younger Cenozoic Era, where a greater collection of fossils has been found and paleontologists have more detailed knowledge of the events that occurred during those times.
- We are currently living in the Holocene Epoch of the Quaternary Period
- The **Holocene epoch began** 12,000 years ago at the end of the last ice age. All human civilisations have developed during this climatically and geologically stable period.

Evidences of the Anthropocene

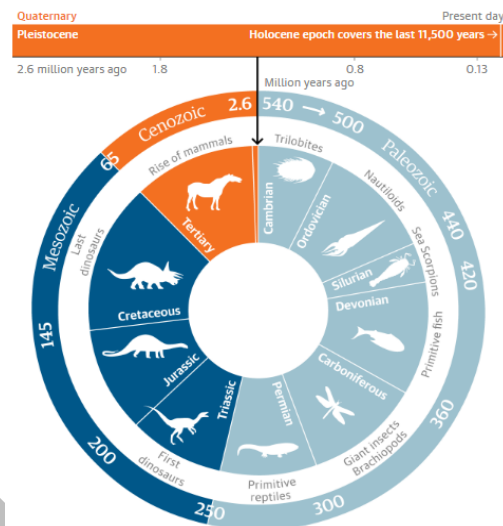
- Since the 1950s, human beings have begun to alter the earth's surface and atmosphere in unalterable ways. Human activity has:
- Pushed extinction rates: The Earth is on course to see 75% of species become extinct in the next few centuries if current trends continue.
- Doubled the nitrogen and phosphorous in our soils in the past century with fertiliser use. This is likely to be the largest impact on the nitrogen cycle in 2.5bn years.
- Left a permanent layer of airborne particulates in sediment and glacial ice such as black carbon from fossil fuel burning.

5.4. REPORT ON PALAEO CHANNEL OF NORTH WEST INDIA

- Recently Union Minister of Water Resources, River Development and Ganga Rejuvenation released a Report on Palaeo Channel of North West India: Review & Assessment by **Expert Committee headed by Prof. K. S. Valdiya**, eminent Geologist.
- The committee studied piles of **sediments, their shapes and features** which appeared to have been brought by a "big river" and are reminiscent to ones found in present-day Ghaggar, Ganga and Yamuna.
- The report is an assertion of the assumption that River Saraswati **originated from Adibadri in Himalaya to culminate in the Arabian Sea** through the Runn of Kutch.
- It is based on the **study of the land texture** of states of North-West India And has also taken account of the **geological changes** that had occurred in the past
- The river had **two branches**:
 - ✓ **Western branch** - present-day **Ghaggar-Patialwali** rivulets
 - ✓ **Eastern branch** -**Markanda and Sarsuti** (also known as Tons-Yamuna)
 - ✓ The confluence of the **branches** was near **Shatrana**, 25 km south of **Patiala**.

Geological periods

Division of geological periods from 540m years ago to the present



5.4.1. PALAEOCHANNEL

Why in news?

- **Central Ground Water Board (CGWB)** under Ministry of Water Resources, River Development and Ganga Rejuvenation has been putting great emphasis on studying the various aspects of Palaeochannels in India so that its ground water potential can be optimally utilized. Recently it organized a workshop on this issue.

Paleo-channels are deposits of unconsolidated sediments or semi-consolidated sedimentary rocks deposited in ancient, currently inactive river and stream channel systems.

About Palaeochannel

- A palaeochannel is a **remnant of an inactive river or stream channel** that has been either filled or buried by younger sediment.
- A palaeochannel is distinct from the overbank deposits of currently Active River channels because its river bed is filled with sedimentary deposits which are unrelated to the normal bed load of the current drainage pattern.
- Palaeochannel forms when river channels aggrade, depositing sediment on their bed. For these channel deposits to be preserved, the flow must not re-occupy and re-erode them. For example, when the channel is in a net-depositional environment, or in a subsiding sedimentary basin.

Importance of Palaeochannel

- **Geological importance**
 - ✓ Understanding movement of faults
 - ✓ Preserving sediments and fossils useful for understanding past rainfall, temperature and climate- this could aid in understanding global warming and climate change as well
 - ✓ Preserving evidences of older Erosional surfaces and levels
- **Economic importance**
 - ✓ The old sediments contain deposits of minerals like Uranium, lignite and precious metals like gold and platinum
- **Ground water source**
 - ✓ Because of better flushing mechanism in the **ground water system of palaeochannels due to coarser nature of sediments and fast recharge**, the quality of ground water is often better than the surrounding environment.

5.4.2. EVIDENCE OF LOST CHANDRABHAGA RIVER FOUND

- Scientists have found evidence of the mythical Chandrabhaga River near the UNESCO world heritage site of Konark Sun Temple in Odisha.
- This river figures prominently in ancient literature, although at present no river exists in the proximity of the Konark Sun Temple.
- An aerial examination of the area through satellite imagery depicts the trail of a lost river which is otherwise difficult to identify in the field
- The existence of a palaeochannel at some locations is further corroborated through shallow surface geophysics using ground penetrating radar.
- The geological map shows that the study area is covered with alluvium, a deposit characteristic of rivers.

5.5. NEW CONTINENT: ZEALANDIA

- A study published by the Geological Society of America, found that New Zealand and New Caledonia are part of a huge 4.9 million sq. km single slab of continental crust that is separate from Australia.
- The study says that Zealandia should be considered a geological continent, rather than the previously-held theory that it was a collection of continental islands and fragments.



- Currently there are 7 continents. In descending order of size they are: **Asia>Africa>North America>South America>Antarctica>Europe >Australia.**

About Zealandia

- Zealandia is about half the size of Australia, but only 7 percent of it is above sea level. Most of that terrestrial land makes up the two large islands of the country of New Zealand the North Island and the South Island.
- Zealandia is a very tectonically active region. Part of it is on the Australian plate, while the other part is on the Pacific plate.
- Stewart Island, just south of the South Island, and many smaller islets are also a part of Zealandia.
- New Caledonia, a collection of islands governed by France, makes up the northern tip of Zealandia.
- The submerged part of Zealandia is rich in mineral deposits.
- Zealandia's submerged fossils provide valuable clues to life during those time periods.

Criteria for continents:

- Elevation above surrounding area
- Distinctive Geology
- Well defined area
- Crust much thicker than that found on ocean floor

5.6. ECOLOGICAL EXPERIMENTAL ZONES

Why in news?

- China will set up several national ecological experimental zones to carry out reforms in the “ecological civilization” in a bid to improve the environment damaged by fast-paced development in the past three decades.

Aim

- The aim is to incorporate certain ecological friendly practices in these zones which are also aligned with the development needs.
- Consequently, these zones can be projected as ‘ecological civilizations’
- Targets were set in the plan, including the water quality of over 90 per cent of water systems in the province will reach optimal level, 23 cities will enjoy good air quality on over 90 per cent of days, and forest coverage will pass 66 per cent by 2020.

5.7. ANTARCTIC CIRCUMPOLAR EXPEDITION

Why in news?

More than 50 researchers from 30 countries are to carry out the first scientific full circumnavigation of Antarctica in an attempt to measure pollution and climate change.

What is it?

ACE is the first project of the newly-created Swiss Polar Institute (SPI) to "**enhance international relations and collaboration between countries, as well as to spark the interest of a new generation of young scientists in polar research.**"

Significance

- The Antarctic Circumpolar Expedition (ACE) will be the first scientific mission to study all the major islands in the Antarctic ocean, as well as the Antarctic land mass.
 - ✓ Antarctica acts as global thermometer for any ecological change.
 - ✓ A better understanding of Antarctica is critical, not just for its preservation, but for the whole planet.
- Global collaboration – More than 50 researchers from 30 countries have collaborated for the expedition.
- Pollution and biodiversity: ACE will help to make strategies to reduce pollution in Antarctic region which is important for entire world.
 - ✓ Help to map the effect of pollutants on whales, penguins and albatrosses in the Southern Ocean. information on whales is important for the conservation and management of the Antarctic marine environment

- ✓ Investigate the extent to which micro plastics have reached the Southern Ocean ecosystem and whether they have entered the food web.
- **Biodiversity:** the rise in sea water will affect the aquatic habitants of the Antarctic sea and impact on beaches and places near the sea where humans live will be impacted too.
- **Climatology:** Scientists will also take ice core samples and study biodiversity on the continent in an attempt to reveal conditions before the onset of the Industrial Revolution.
 - ✓ Our understanding of Monsoon, ENSO, Madden-Julien oscillation etc. will be enhanced

5.8. INTERNAL CARBON PRICE

Why in news

- Mahindra & Mahindra became first Indian firm to announce an internal Carbon Price of \$10 per ton of carbon emitted.

What is internal carbon price?

- It is an internationally recognised business tool that enables companies to create resources which are invested in low carbon technologies, which help reduce future emissions and lower operating costs.

Significance

- Help accelerate innovation and drive our investments in energy efficient and renewable technologies.
- Taking advantage of low-carbon investment opportunities while managing carbon risk.
- Some of the global companies that have announced carbon pricing are Unilever, Microsoft, Google.
- Mahindra partnered with the World Bank and IFC led Carbon Pricing Leadership Coalition along with the World Resources Institute, India to enhance its understanding of the Carbon price mechanism.

A carbon price is a cost applied to carbon pollution to encourage polluters to reduce the amount of greenhouse gas they emit into the atmosphere.

There are two main types of carbon pricing:

- ✓ emissions trading systems (ETS)
- ✓ Carbon taxes.

An **ETS** – sometimes referred to as a cap-and-trade system – caps the total level of greenhouse gas emissions and allows those industries with low emissions to sell their extra allowances to larger emitters.

A **carbon tax** directly sets a price on carbon by defining a tax rate on greenhouse gas emissions or – more commonly – on the carbon content of fossil fuels.

5.9. ATMOSPHERIC MOISTURE AFFECTING RAINFALL AND DROUGHT

Why in News?

- According to a study, atmospheric rivers (AR) and low level jets (LLJ) play a major role in the occurrence of extreme rainfall events, and their absence leads to droughts.
- The study was published in **Annual Review of Environment and Resources**.

What is it?

- Atmospheric rivers are 1-2.km high and 300-500 km wide wind systems which carry huge amounts of water vapour. They stretch over a distance of 2000kms.
- When Atmospheric Rivers make a landfall, they often release water vapour in the form of rain or snow. These events can turn extreme as well.
- Atmospheric rivers carry 90 percent of ocean moisture transported to the mid-latitudes.
- Similarly most of the moisture transported from ocean to land in the tropics is via low level jets.
- While Atmospheric Rivers is an extra-tropical phenomenon, low level jets occur in both tropical and extra-tropical region.
- Atmospheric rivers are essential as they provide rain and snow that is crucial to water supply.
- Rainfall from low level jets occurs only in summer while that from Atmospheric Rivers could occurs in winter as well.

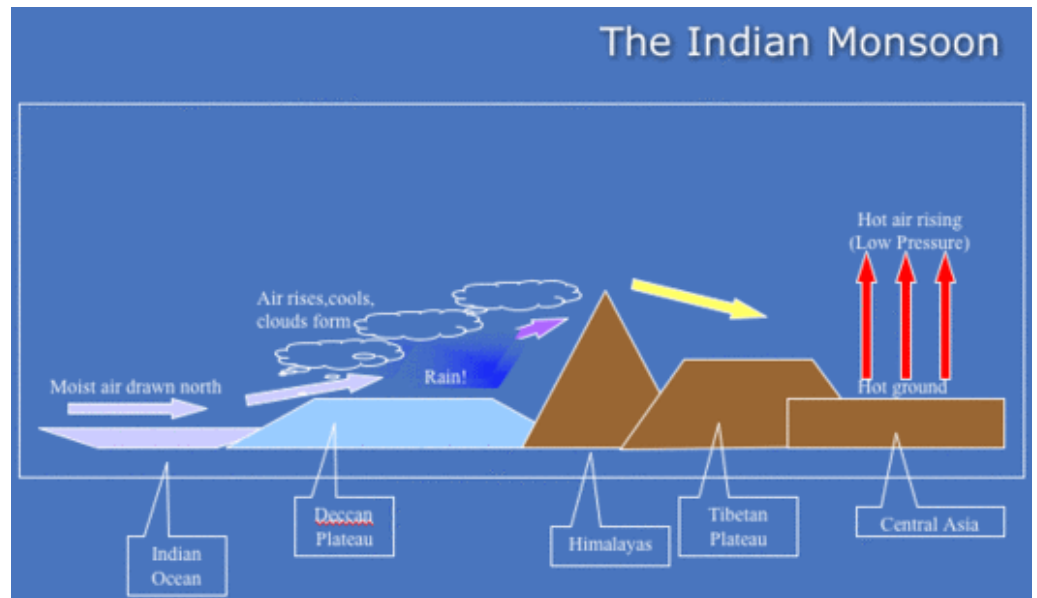
5.10. CLOUDS, POLLUTION AND MONSOON

Why in news?

Researchers have found that the high pollution in Northern and Central India, can affect the monsoonal systems. This happens due to change in formation of clouds.

How?

- The Indian summer monsoon season begins when the land surface becomes hot enough to drive a powerful rising motion of air in the atmosphere, producing heavy precipitation.
- Cooler, humid air over the Arabian Sea flows inland to compensate for the rising air.
- Air in this compensating



- circulation encounters the surface heating and also rises, perpetuating the cycle.
- At the smallest scales, an increase in tiny particles in the atmosphere can shade the land surface while absorbing sunlight aloft, causing a reduction in the heat that reaches the surface.
- Clouds that do form in these polluted environments are less likely to rain and more likely to persist because the droplets are smaller. These longer-lived clouds further cool the surface and weaken the circulation.
- In this way more air pollution can mean weakening of monsoonal systems.

5.11. EASTERN HIMALAYAN SYNTAXIS IS MOVING NORTHWARDS

- **Optically Stimulated Luminescence (OSL) thermochronometry** is a new technique being used to study the northward movement of the Himalayan syntaxis (convergence of mountain ranges, or geological folds), a gorge along the Parlung river in Tibet.
- The eastern Himalayan syntaxis is an ideal location to study the effects of erosion on tectonics — very tall mountains over 7,000 metres high and powerful rivers.
- As rocks rise to the surface from the earth's crust, they start cooling down.
- At specific temperatures, the minerals such as quartz contained in the rocks start capturing electrons while continuing to rise, and they cool correspondingly.
- In this new technique, by observing the history of concentrations of electrons, the researchers estimate the temperature profile against the time and then translate this into knowledge of the depth as a function of time.
- This gives them an understanding of the rate at which the rocks rose to the surface.
- The new data showed that the rate of erosion had increased in the last 1 million years, to rates which could not be explained simply by river incision but the help of tectonic uplift was essential to explain it.
- Previous studies on the wider geological context, also indicated continued northward migration of the dome, which are consistent with the new data.

5.12. INDIA'S ONLY ACTIVE VOLCANO

Why in News?

- Barren Island is the **only active Volcano** along the volcanic chain from Sumatra to Myanmar. Moreover, it is the **only active volcano** in India.
- The Volcano erupted on January 23, 2017. The first Record of Volcanic eruption on significant scale was in 1787. Since 1991, the volcano has been showing sporadic activity and erupted in 2005.

Barren Volcanic Island

- The Island is situated in Andaman Sea, of the north-eastern part of Port Blair (Andaman and Nicobar Islands).
- It is a **Submarine emergent Volcano**, which lies above the subduction zone of India and Burmese plate.
- The Island is uninhabited and devoid of any significant vegetation and wild life.

Other volcanoes in India

- Doshi Hill is an extinct volcano in north-west part of Aravalli range of Mahendergarh (Haryana).
- Dhinodhar Hills is an extinct volcano in Kutch district of Gujarat.
- Narcondam Island in Andaman and Nicobar is a volcanic island and classified as dormant volcano by Geological Survey of India. The island is listed under UNESCO World Heritage Sites and famous for its **endemic** Narcondam Hornbill.
- Baratang Island in Andaman is famous for **Mud volcanoes**.

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6. MISCELLANEOUS

6.1. FIRST MAMMAL TO GO EXTINCT

- **Melomysrubicola**, a small rat-like animal, may be the first mammal lost to the phenomenon of climate change.
- It is an endemic species found only in the Great Barrier Reef of Australia.
- It is also called Bramble cay melomys because it is found in the Bramble cay, north most point of land of Australia.
- A **Cay** is a small, low-elevation, sandy island on the surface of a coral reef.
- Researchers say that the key factor behind the extinction was most likely ocean inundation of the low-lying cay, likely on several occasions, over the last decade, which resulted in dramatic habitat loss.

6.2. KARNALA BIRD SANCTUARY

- The National Highways Authority of India (NHAI) is setting aside about Rs 58 crore for a plan to mitigate the impact of a road project on the Karnala Bird Sanctuary (KBS).
- The Karnala Bird Sanctuary is located in Panvel Taluka of Raigad District, outside Mumbai near Matheran and Karjat.
- The sanctuary is home to over 150 species of resident and 37 species of migratory birds which visit the sanctuary during winter.
- Three rare birds, the **ashy minivet**, **toed kingfisher** and **Malabar trogon** have been sighted here.

6.3. GREENLAND SHARK

- Scientists have estimated that Greenland shark is the Earth's oldest living animal with a backbone.
- For the age estimates, a complex and indirect system combining chemical tracking, mathematical modelling and growth measurements focusing on the shark eye lens was used.
- The shark eye lens form while the shark is still developing inside the mother's uterus and measures of carbon in them won't change after birth.
- As per the estimates, the female gray shark or the Greenland shark, was born in the icy waters roughly between 272 to 400 years ago, and died only recently.
- Until now, that record holder was a bowhead whale that hit 211 years old.

6.4. SIKKIM TOPS COVERAGE IN SWACHH BHARAT

- Close to two years after the launch of the Swachh Bharat Abhiyan in October 2014, Sikkim has emerged on top, while Bihar has been placed at the bottom among States in the rankings for coverage of Swachh Bharat (Rural).
- The rankings of the selected 75 selected districts were released by the Rural Development Ministry.
- Other top performing States are Himachal Pradesh (97.11 per cent coverage) and Kerala (96.35 per cent), while
- Odisha (32.79 per cent), Jammu & Kashmir (33.35 per cent) and Jharkhand (40.52 per cent) are the poor performers.

How clean are our villages?

Ranking of States based on coverage data as per Integrated Management Information System, as on September 8, 2016:

Top five		Bottom five	
Sikkim	99.90%	Bihar	25.16%
Himachal	97.11%	Odisha	32.79%
Kerala	96.35%	J&K	33.35%
Haryana	87.33%	Jharkhand	40.52%
Uttarakhand	86.42%	Telangana	42.13%

6.5. T.N. TOPS LIST OF ENDEMIC FLOWERING PLANTS

- Almost one of every four species of flowering plants found in India is endemic to the country, a recent publication by the Botanical Survey of India (BSI) has revealed.
- Tamil Nadu accounts for the highest number of flowering plants species with 410, followed by Kerala with 357 and Maharashtra with 278.
- Of the 18,259 flowering plants reported in the country, 4,303 (**over 23 per cent**) are endemic to India.

- **Western Ghats tops the list** with about 2,116 species, followed by the Eastern Himalayas with 466 species.
- Among the **most widely exploited endemic plants** in country is **red sandal wood**, which is found only in the **southern parts of the Eastern Ghats**. This plant is classified as **critically endangered** under International Union for Conservation of Nature (IUCN).

6.6. ENVIRONMENT TAX IN CHINA

- China passed a new law to tax polluters especially heavy industries and it will enter into force on 1st January, 2018.
- Carbon dioxide, one of the major contributors to global warming, is not included in the levying list.
- The law followed nearly week-long red alert due to heavy smog over Beijing and 23 other cities
- China is the world's largest emitter of greenhouse gases, due to its heavy reliance on coal to provide electricity to its population of 1.37 billion.

6.7. PREDATOR FOUND FOR DENGUE CAUSING MOSQUITO

- Dengue affects more than 390 million people each year. In 2016, more than 1 lakh confirmed cases of dengue were reported in India (WHO Estimate).
- Researchers at the Calcutta University recently found that the **Lutziafuscana larvae** demonstrated a preference for feeding on *Aedesaegypti* larvae (the dengue-causing mosquito)
- "Lutziafuscana" mosquito is a natural predator of *Aedesaegypti*.
- Thus, *Lutzia* larvae, being a potential biological control method, can be the better solution than using dangerous chemicals to kill Dengue mosquito.
- Since 1928 India has been using **Gambusia affinis** or mosquito fish as a biological control agent against mosquito larvae. It is an exotic species and has been distributed throughout the warmer and some temperate parts of the world.

6.8. ARCTIC VAULT RECEIVES NEW SEED DEPOSITS

Why in news?

- Some 50,000 new samples from seed collections around the world, including India, have been deposited in the Svalbard Global Seed Vault

About Svalbard Global Seed Vault

- It is owned and administered by the Ministry of Agriculture and Food on behalf of the Kingdom of Norway.
- It is a gene bank built underground on the isolated island in a permafrost zone some 1,000 kilometers from the North Pole.
- It was opened in 2008 as a master backup to the world's other seed banks, in case their deposits are lost.
- It is the world's largest repository built to safeguard against wars or natural disasters wiping out global food crops.

6.9. ORGANISATIONS/INSTITUTION IN NEWS

6.9.1. NATIONAL INSTITUTE OF ANIMAL WELFARE

- It is a subordinate office under MoEF.
- It is one of its kind institute which provides professional education in this field.
- Its major aim is to promote awareness, disseminate information and impart education about animal welfare and its discipline in a professional manner.
- It also aims at poverty alleviation through use of animals for generation of wealth and employment opportunities.
- It also strives for creation of enabling environment to fulfil provisions under prevention of cruelty to animals act, 1960.

6.9.2. CENTRAL ZOO AUTHORITY

- It is an autonomous statutory authority in MOEFCC, constituted under wildlife protection act, 1972
- Every zoo in India needs to obtain recognition from CZA which it provides on the basis of parameters given under Recognition of zoo rules, 1992.
- It regulates the exchange of animals of endangered category listed under Schedule-I and II of the Wildlife (Protection Act) among zoos.
- Its approval, under EXIM policy and CITES, is required for exchange of animals between national and foreign zoo
- IT also coordinates conservation breeding program of endangered species

6.9.3. BIRDLIFE INTERNATIONAL

- It is world's largest conservation partnerships for conservation of birds and their habitats. It build a global partnership of national conservation organisations.
- It also published important bird areas (IBA) inventory
- It was earlier known as international committee for bird preservation.
- Its global office is in UK with 6 regional offices - Africa, the Americas, Asia, Europe and Central Asia, the Middle East and the Pacific.

6.9.4. ICRISAT

- International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT) is an international non-profit organization, hosted in India, which aims at prosperous, food-secure and resilient dryland tropics
- It aims at reducing poverty, hunger, malnutrition and environmental degradation in these areas.
- It focuses on research for development. Thus, the institute have extra specialization in crops that can survive in these harsh conditions.
- It builds expertise in whole value chain from farm management to agribusiness.

6.9.5. WORLD METEOROLOGICAL ORGANIZATION (WMO)

- It is a specialised agency of UN with mandate of international cooperation for the development of meteorology and operational hydrology
- It was established to facilitate the exchange of weather information among countries
- It plays a pioneering role in monitoring and protecting the environment.

6.9.6. NATIONAL MUSEUM OF NATURAL HISTORY (NMNH)

- It was established under ministry of environment and forests, in 1972 with aim of depicting India's flora, fauna, mineral wealth to the public.
- It provides an out of school facility for education of children and promotes awareness in masses.

6.9.7. INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION

- It is an autonomous organization under MoEF.
- It is an apex body in research and education in forestry sector.
- It focuses on solution based research for emerging issues such as reducing diversity, desertification, and climate change.

6.9.8. NATIONAL BIODIVERSITY CONGRESS

- It is one of the significant biodiversity mega events in the country, hosted this year by Kerala state biodiversity board.
- The theme for this year is **"Mainstreaming Biodiversity for Sustainable Development"** with four sub-themes.

6.9.9. NATIONAL BUREAU OF ANIMAL GENETIC RESOURCES

- This institute in Karnal was formed by merger of two institutes National Bureau of Animal Genetic Resources and National Institute of Animal Genetics
- It aims at identification, evaluation, characterization, conservation and utilization of livestock and poultry genetic resources of the country
- It also conducts training program for management of genetic resources

6.10. SALT TOLERANT GARDEN IN TAMIL NADU

Why in news?

- Recently, Mauritius President inaugurated a, probably first in the world, genetic garden of naturally occurring salt-tolerant plants (**halophytes**) in Vedaranyam, TN.

Importance of halophytes

- Importance due to climate change - Salinity is increasing.
- Contain 30% high oil and 35% high protein like soya beans.

6.11. BIRDS OF BANNI GRASSLANDS BOOK

Why in news?

- PM released a book titled "Birds of Banni Grasslands book", compilation of research work of Gujarat institute of desert ecology.

About Banni grassland

- It is arid grassland ecosystem in Kutch region of Gujarat.
- It is known for its wildlife and biodiversity protected under reserved forest category.
- It is believed to be the last known habitat of cheetah in India.

6.12. NORWAY BECOMES FIRST COUNTRY TO BAN DEFORESTATION

- This would have huge impact on global deforestation.
- Norway has also committed to find alternatives to palm oil, soy, beef and wood products which contributes to a little less than half of total tropical deforestation.

6.13. ENERGY EFFICIENCY IMPLEMENTATION READINESS

- It is calculated by **World Bank** on which AP has topped followed by Rajasthan and Karnataka.
- These rankings were included in report of the World Bank titled: '**India's State Level Energy Efficiency Implementation Readiness**'.

6.14. URBAN FORESTS IN 200 CITIES

- The Environment Ministry announced that urban forest would be created across 200 cities/towns across the country.
- The Environment Ministry also launched the "**Urban Forestry Scheme**" in Pune where 6,000 saplings will be planted to create an urban jungle on about 80 acres of land.
- This will help in combat deforestation and as well as increase green cover in the country.

6.15. INTERNATIONAL SOLAR ALLIANCE

Upendra Tripathy, a former secretary of the renewable energy ministry, has been appointed interim director general of the International Solar Alliance (ISA)

About International Solar Alliance

- It is an alliance of more than 120 countries, most of them being **sunshine countries**, which come either completely or partly between the **Tropic of Cancer and the Tropic of Capricorn**.
- The ISA framework agreement was opened for signing up at the Conference of the Parties (COP 22) at Marrakesh in November last year and 25 countries have joined it. The assembly will meet after 15 of these signatories ratify the ISA.
- ISA will have an assembly, a council and a secretariat. The Indian government will support the secretariat for five years, after which would have to generate its own resources. The secretariat has been set up at the **National Institute of Solar Energy in Gurgaon**.
- ISA will also collaborate with other multilateral bodies such as the IEA, International Renewable Energy Agency and the United Nations.

6.16. HYDROPONICS

Hydroponics' means the technique of growing plants without soil or solid growing medium, but using water or nutrient-rich solution only, for a short duration. Kerala Dairy Development Department (KDDD) has recently introduced a scheme to produce hydroponic green fodder. Hydroponic fodder cannot substitute green fodder and hay completely, as it lacks in fibre content.

6.17. PHOTOCATALYST TO COMPLETELY DEGRADE INDUSTRIAL DYES

- Central Salt & Marine Chemicals Research Institute (CSMCRI) scientists have been able to degrade 3 industrial dyes (methyl orange, methylene blue and reactive black-5) using sunshine
- Photocatalyst used for the reaction is titanium dioxide nanoparticles doped with sulphur and carbon by treating it with red seaweed polymer carrageenan

Advantages over current degrading methods:

- Cheaper, faster and less energy required
- Completely breakdown dye molecules to non-toxic substances

6.18. IMPORTANT INTERNATIONAL DAYS

6.18.1. WORLD MOUNTAIN DAY

Why in News?

- **World Mountain Day** which is celebrated every year on **December 11** recognises the mountain culture as a unique blend of livelihoods and physical conditions.

Why is it Important to Conserve the Mountain Culture?

- The mountain culture is closely linked to its livelihood and therefore it must be protected against the onset of globalisation.
- Isolation created by uneven topography has helped to maintain the unique mountain culture.
- This culture is now degrading due to migration as well as climate change.

6.18.2. WATER DAY

Why in news?

- The central government has decided to observe April 14 every year as "water day".

Background

- Water is increasingly becoming a scarce resource with per capital availability of water going down to 1545 cubic meters as per the 2011 census as compared to 1816 cubic meter as per 2001 census.
- The importance of economic use and better management of water arises as most of the water is not available for use and secondly it is characterized by its highly uneven spatial distribution.

- The Water Day is being observed **to raise the awareness** among people about conservation of water, minimizing wastage and need for more equitable distribution both across and within states.

6.18.3. WORLD FOOD DAY

- It is a day of action against hunger in commemoration of establishment of FAO in Canada on 16th October 1945.
- This year's global message for this day was "Climate is changing. Food and agriculture must too."

6.18.4. EARTH HOUR

- It is a people's movement inspiring individuals to take stand against climate change.
- It was organized by WWF with an aim to enable harmonious existence of human and wildlife.
- It aims at encouraging people to turn off their non-essential equipments.

6.18.5. WORLD ENVIRONMENT DAY

- It is conceptualized by UN as a platform for raising awareness and action regarding environment.
- It is celebrated on 5th June every year, hosted this year by angola.
- Slogan for 2016- "Go wild for life".
- Theme of 2016 - "zero tolerance for the illegal trade in wildlife."

6.18.6. WORLD WILDLIFE DAY

- It is celebrated on 3rd march in commemoration of signing of CITES.
- Theme 2017 - "listen to the young voices".
- In general, engagement of youth is high on agenda and in this regard CoP in September 2016 adopted very first CITES resolution on "youth engagement".

6.18.7. WORLD'S FIRST TSUNAMI AWARENESS DAY

- It was celebrated on 5th November 2016 in collaboration with the United Nations Office for Disaster Risk Reduction (UNISDR).
- The date is important as on this date, first instance of tsunami early warning was documented when a villager in Japan burned rice sheaves on the hill top to make people from village to come on hill top to put off fire and thereby, saving them from tsunami.
- This day is also known as day of "Inamura no hi".
- The theme of 2016 was "effective education and evacuation drills".

6.18.8. INTERNATIONAL DAY FOR PRESERVATION OF OZONE LAYER

- It is celebrated on 16th September in commemoration of signing of montreal protocol.
- The theme of 2016 was "Ozone and climate: Restored by a world united" to recognize collective efforts under Vienna convention and montreal protocol.

6.18.9. WORLD DAY TO COMBAT DESERTIFICATION

- It is observed on 17 June to promote public awareness regarding desertification and drought.
- Its slogan is, "Protect Earth. Restore Land. Engage People"
- This year's theme was "Inclusive cooperation for achieving Land Degradation Neutrality"

6.18.10. WORLD HYDROGRAPHY DAY

- World Hydrography Day is celebrated on 21st June as adopted by the International Hydrographic Organization as an annual celebration to publicise the work of hydrographers and the importance of hydrography.
- The International Hydrographic Organization (IHO) is the inter-governmental organisation representing hydrography. The IHO enjoys observer status at the United Nations.

6.18.11. WORLD OCEANS DAY

- World Oceans Day is celebrated every June 8.
- It was celebrated unofficially since its original proposal in 1992 by Canada at the Earth Summit in Rio de Janeiro, Brazil.
- It was officially recognized by the United Nations in late 2008.

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7. PREVIOUS YEAR PRELIMS QUESTIONS

- Which one of the following is not a Biosphere Reserve?
(a) Agasthyamalai (b) Nallamalai
(c) Nilgiri (d) Panchmarhi
- Where is Bundala Biosphere Reserve which has been recently added to the UNESCO's Man and Biosphere (MAB) network, located?
(a) Russia (b) India
(c) Sri Lanka (d) Bangladesh
- "Other than resistance to pests, what are the prospects for which genetically engineered plants have been created?
1. To enable them to withstand drought.
2. To increase the nutritive value of the produce.
3. To enable them to grow and do photosynthesis in spaceships and space stations.
4. To increase their shelf life.
Select the correct answer using the codes given below:
(a) 1 and 2 only (b) 3 and 4 only
(c) 1, 2 and 4 only (d) 1, 2, 3 and 4"
- In a particular region in India, the local people train the roots of living tree into robust bridges across the streams. As the time passes these bridges become stronger. These unique 'Living Root Bridges' are found in:
(a) Meghalaya (b) Himachal Pradesh
(c) Jharkhand (d) Tamil Nadu
- Recently Uttar Pradesh and Madhya Pradesh governments signed a Memorandum of Understanding for the linking of two rivers as a link project. Which are these two rivers?
(a) Betwa and Chambal (b) Betwa and Ken
(c) Chambal and Son (d) Ken and Narmada
- Consider the following kinds of organisms:
1. Bat
2. Bee
3. Bird
Which of the above is/are pollinating agent/agents?
(a) 1 and 2 only (b) 2 only
(c) 1 and 3 only (d) 1, 2 and 3
- Which of the following National Parks is unique in being a swamp with floating vegetation that supports a rich biodiversity?
(a) Bhitarkanika National Park (b) Keibul Lamjao National Park
(c) Keoladeo Ghana National park (d) Sultanpur National park
- Consider the following pairs:
National Park River flowing through the Park
1. Corbett National Park Ganga
2. Kaziranga National Park Manas
3. Silent Valley National Park Kaveri
Which of the above pairs is/are correctly matched?
(a) 1 and 2 (b) 3 only
(c) 1 and 3 (d) none

9. Which one of the following groups of animals belongs to the category of endangered species?
- Great Indian Bustard, Musk Deer, Red Panda and Asiatic Wild Ass.
 - Kashmir Stag, Cheetal, Blue Bull and Great Indian Bustard.
 - Snow Leopard, Swamp Deer, Rhesus Monkey and Saras (Crane).
 - Lion-tailed Macaque, Blue Bull, Hanuman Langur and Cheetal.
10. What is the difference between a CFL and an LED lamp?
- To produce light, a CFL uses mercury vapour and phosphor while an LED lamp uses semi-conductor material.
 - The average life span of a CFL is much longer than that of an LED lamp
 - A CFL is less energy-efficient as compared to an LED lamp.
- Which of the statements given above is/are correct?
- 1 only
 - 2 and 3 only
 - 1 and 3 only
 - 1, 2 and 3
11. Consider the following agricultural practices:
- Contour bunding
 - Relay cropping
 - Zero tillage
- In the context of global climate change, which of the above helps/help in carbon sequestration/storage in the soil?
- 1 and 2 only
 - 3 only
 - 1, 2 and 3
 - None of them
12. Consider the following pairs:
- | Terms sometimes seen in the news | Their origin |
|---|---------------------|
| 1. Annex-I Countries : | Cartagena Protocol |
| 2. Certified Emissions Reductions : | Nagoya Protocol |
| 3. Clean Development Mechanisms : | Kyoto Protocol |
- Which of the pairs given above is/are correctly matched?
- 1 and 2 only
 - 2 and 3 only
 - 3 only
 - 1, 2 and 3
13. With reference to an initiative called 'The Economics of Ecosystems and Biodiversity (TEEB)', which of the following statements is/are correct?
- It is an initiative hosted by UNEP, IMF and World Economic Forum.
 - It is a global initiative that focuses on drawing attention to the economic benefits of biodiversity.
 - It presents an approach that can help decision makers recognize, demonstrate and capture the value of ecosystems and biodiversity.
- Select the correct answer using the code given below.
- 1 and 2 only
 - 3 only
 - 2 and 3 only
 - 1, 2 and 3
14. Which of the following statements is/are correct?
- Proper design and effective implementation of UNREDD+ Programme can significantly contribute to
- protection of biodiversity
 - resilience of forest ecosystems
 - poverty reduction
- Select the correct answer using the code given below.
- 1 and 2 only
 - 3 only
 - 2 and 3 only
 - 1, 2 and 3

- 15. What is 'Greenhouse Gas Protocol'?**
- It is an international accounting tool for government and business leaders to understand, quantify and manage greenhouse gas emissions.
 - It is an initiative of the United Nations to offer financial incentives to developing countries to reduce greenhouse gas emissions and to adopt ecofriendly technologies
 - It is an intergovernmental agreement ratified by all the member countries of the United Nations to reduce greenhouse gas emissions to specified levels by the year 2022
 - It is one of the multilateral REDD+ initiatives hosted by the World Bank
- 16. With reference to 'Agenda 21', sometimes seen in the news, consider the following statements:**
- It is a global action plan for sustainable development.
 - It originated in the World Summit on Sustainable Development held in Johannesburg in 2002.
- Which of the statements given above is/are correct?
- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2
- 17. Consider the following statements:**
- The International Solar Alliance was launched at the United Nations Climate Change Conference in 2015.
 - The Alliance includes all the member countries of the United Nations.
- Which of the statements given above is/are correct?
- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2
- 18. With reference to the Agreement at the UNFCCC Meeting in Paris in 2015, which of the following statements is/are correct?**
- The Agreement was signed by all the member countries of the UN and it will go into effect in 2017.
 - The Agreement aims to limit the greenhouse gas emissions so that the rise in average global temperature by the end of this century does not exceed 2o C or even 1.50 C above pre-industrial levels.
 - Developed countries acknowledged their historical responsibility in global warming and committed to donate \$ 1000 billion a year from 2020 to help developing countries to cope with climate change.
- Select the correct answer using the code given below.
- 1 and 3 only
 - 2 only
 - 2 and 3 only
 - 1, 2 and 3
- 19. Consider the following statements:**
- The Sustainable Development Goals were first proposed in 1972 by a global think tank called the 'Club of Rome'.
 - The Sustainable Development Goals have to be achieved by 2030.
- Which of the statements given above is/are correct?
- 1 only
 - 2 only
 - Both 1 and 2
 - Neither 1 nor 2
- 20. The term 'Intended Nationally Determined Contributions' is sometimes seen in the news in the context of**
- Pledges made by the European countries to rehabilitate refugees from the war-affected Middle East
 - Plan of action outlined by the countries of the world to combat climate change
 - Capital contributed by the member countries in the establishment of Asian Infrastructure Investment Bank
 - Plan of action outlined by the countries of the world regarding Sustainable Development Goals
- 21. What is/are the importance of the 'United Convention to Combat Desertification'?**
- It aims to promote effective action through innovative national programmes and supportive international partnerships
 - It has a special/particular focus on South Asia and North Africa regions, and its Secretariat facilitates the allocation of major portion of financial resources to these regions.

3. It is committed to bottom up approach, encouraging the participation of local people in combating the desertification.

Select the correct answer using the code given below.

- (a) 1 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

22. Which of the following best describes/ describe the aim of 'Green India Mission' of the Government of India?

1. Incorporating environmental benefits and costs into the Union and State Budgets thereby implementing the 'green accounting'.
2. Launching the second green revolution to enhance agricultural output so as to ensure food security to one and all in the future
3. Restoring and enhancing forest cover and responding to climate change by a combination of adaptation and mitigation measures.

Select the correct answer using the code given below.

- (a) 1 only (b) 2 and 3 only
(c) 3 only (d) 1, 2 and 3

23. In the cities of our country, which among the following atmospheric gases are normally considered in calculating the value of Air Quality Index?

1. Carbon dioxide
2. Carbon monoxide
3. Nitrogen dioxide
4. Sulfur dioxide
5. Methane

Select the correct answer using the code given below.

- (a) 1, 2 and 3 only (b) 2, 3 and 4 only
(c) 1, 4 and 5 only (d) 1, 2, 3, 4 and 5

24. Which of the following are the key features of 'National Ganga River Basin Authority (NGRBA)?

1. River basin is the unit of planning and management.
2. It spearheads the river conservation efforts at the national level.
3. One of the Chief Ministers of the States through which the Ganga flows becomes the Chairman of NGRBA on rotation basis.

Select the correct answer using the code given below.

- (a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

25. 'Gadgil Committee Report' and 'Kasturirangan Committee Report', sometimes seen in the news, are related to

- (a) Constitutional reforms (b) Ganga Action Plan
(c) Linking of rivers (d) Protection of Western Ghats

26. What is/are unique about 'Kharai camel', a breed found in India?

1. It is capable of swimming up to three kilometres in seawater.
2. It survives by grazing on mangroves.
3. It lives in the wild and cannot be domesticated.

Select the correct answer using the code given below.

- (a) 1 and 2 only (b) 3 only
(c) 1 and 3 only (d) 1, 2 and 3

27. Recently, our scientists have discovered a new and distinct species of banana plant which attains a height of about 11 metres and has orange-coloured fruit pulp. In which part of India has it been discovered?

- (a) Andaman Islands (b) Anaimalai Forests
(c) Maikala Hills (d) Tropical rain forests of northeast

28. With reference to 'Red Sanders', sometimes seen in the news, consider the following statements:

1. It is a tree species found in a part of South India.
2. It is one of the most important trees in the tropical rain forest areas of South India.

Which of the statements given above is/are correct?

- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

29. Recently, for the first time in our country, which of the following States has declared a particular butterfly as 'State Butterfly'?

- (a) Arunachal Pradesh (b) Himachal Pradesh
(c) Karnataka (d) Maharashtra

30. In which of the following regions of India are you most likely to come across the 'Great Indian Hornbill' in its natural habitat?

- (a) Sand deserts of northwest India
(b) Higher Himalayas of Jammu and Kashmir
(c) Salt marshes of western Gujarat
(d) Western Ghats

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