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1. PLACES IN NEWS

UNIT: 1

**PHYSICAL
GEOGRAPHY**

GEOMORPHOLOGY

1

'Perihelion': Earth closest to sun

CONTEXT: On *January 3, 2018*, the Earth was closest to the sun. This phenomenon is called 'Perihelion'.

About:

- The perihelion is the point in the orbit of a planet, asteroid or comet that is nearest to the sun.
- Earth comes closest to the sun every year around January 3. It is farthest from the sun every year around July 4. The difference in distance between Earth's nearest point to the sun in January and farthest point from the sun in July is 3.1 million miles (5 million kilometers).
- Earth is about 91.4 million miles (147.1 million kilometers) from the sun in early January, in contrast to about 94.5 million miles (152 million kilometers) in early July.
- When Earth is closest to the sun, it is winter in the northern hemisphere and summer in the southern hemisphere.

Significance:

- Perihelion is important from astronomy point of view. It helps in astronomical study.
- At perihelion, the earth starts to move more quickly than average velocity.

2

Nuna Supercontinent

CONTEXT: A recent study suggested that a supercontinent existed 2.5 billion years ago in the *Paleoproterozoic Era* called Nuna which comprises parts of modern day Australia, Canada, India e.t.c

About:

- It is also called **Columbia or Hudsonland supercontinent**.
- About 1.7 billion years ago, modern day Georgetown rocks were deposited into a shallow sea when the region was part of North America.
- Georgetown then broke away from North America and collided with the Mount Isa region of northern Australia around 100 million years later.
- This was a critical part of global continental reorganization when almost all continents on Earth assembled to form the supercontinent called Nuna.
- Nuna consisted of **proto-cratons** that made up the cores of the continents of Laurentia, Baltica, Ukrainian Shield, Amazonian Shield, Australia, and possibly Siberia, North China, and Kalaharia as well. India was also attached to it.

3

Mount Etna: volcano is sliding towards the sea

CONTEXT: Recently, it has been observed that the southeast flank of Mount Etna in Sicily has been sliding towards the sea at a rate of several centimeters a year.

About:

- **Mount Itna:**

- ▶ Mount Etna, or Etna, is an active stratovolcano on the east coast of Sicily, Italy, in the Metropolitan City of Catania, between the cities of Messina and Catania.
- ▶ It lies above the convergent plate margin between the African Plate and the Eurasian Plate.

- **Observations:**

- ▶ It has been observed that the southeast flank of Mount Etna in Sicily has been sliding towards the sea at a rate of several centimeters a year.
- ▶ This movement has been creating a t kind of stress inside volcano that can cause devastating landslides.
- ▶ If Etna's movement significantly increases then it could have serious consequences.
- ▶ It has been observed that the Etna's slide isn't caused by pressure from magma inside the volcano, as previously thought but it's likely caused by gravity pulling on Etna's lower underwater slopes, that lies far from the summit.
- ▶ Now, Etna is more susceptible to catastrophic collapse than ever before.
- ▶ There were no associated earthquakes during the eight-day episode, indicating that the movement wasn't caused by seismic activity.
- ▶ It must be noted that Mount Itna has been erupting since 2014 continuously.

4

Research in Third Pole Area

CONTEXT: Recently, researchers have found that 509 glaciers in 'Third Pole' disappeared in last 50 years.

About:

- **Third Pole**

- ▶ The region encompassing the Himalaya-Hindu Kush mountain range and the Tibetan Plateau in Central Asia is referred as the '**Third Pole**' because it has the largest ice storehouse after north and south poles.
- ▶ This remote polar region is expanded in 100,000 sq km with some 46,000 glaciers.

Effects of Global Warming in the region

- ▶ Recent findings suggest that **temperatures there have increased by 1.5 °C in the last 50 years** and it is more than double the global average.
- ▶ Like Arctic and Antarctic, the Third Pole is also sensitive to global warming.
- ▶ **The rate at which the glaciers are melting has almost doubled since 2005.**
- ▶ Recent, research reveals that over **509 small glaciers** disappeared in the past 50 years and even the biggest ones are shrinking rapidly.
- ▶ 226 glaciers in **China's Tiger Valley region have lost 27 sq km of ice in the past 48 years.**
- ▶ In the wider area of the Qilian Mountains, home to 2,684 glaciers, the impact has been catastrophic.
- ▶ Research shows that the **melting of glacier is happening much faster than anticipated.**

- **Causes of rapid melt of glaciers**

- ▶ One of the reasons for accelerated melting is the temperature that has been increasing at a much faster rate in the Qinghai Tibetan Plateau in China.
- ▶ Dust and pollution from car exhausts and coal burners are also triggering climate change impact.
- ▶ Black carbon particles and dust settle on the glaciers, causing it to absorb the sun and heat, unlike the white ice that reflects them away.

Significance:

- Third pole directly supports 120 million people through irrigation systems.
- About 1.3 billion (one-fifth of the world's population) people indirectly benefit through river basins in China, India, Nepal, Pakistan and Afghanistan.
- This polar region is source of 10 of Asia's largest rivers, including the **Yellow and Yangtze river (China), the Irrawaddy (Myanmar), the Ganges and the Mekong have their origin.**
- Melting of vast stores of permafrost does threaten water security in future, while currently more amount of water is flowing causing flood in different regions.
- The impact of the changes in the Third Pole can be influence global weather patterns such as monsoons and the El Nino.
- Further, it can also cause water sharing conflict in the region.

5

Earth's Inner Core is solid but softer than thought

CONTEXT: The inner core of the Earth is solid, and softer than previously thought, according to a study by Researchers at The Australian National University (ANU).

About:

- **Earth's inner core**

- ▶ According to the researchers, Inner core is indeed solid, but it was found that it's softer than previously thought.
- ▶ According to study the inner core shares some similar elastic properties with gold and platinum.
- ▶ Inner core shear waves are so tiny and feeble they can't be observed directly.
- ▶ The study shows these results can then be used to demonstrate the existence of J waves and infer the shear wave speed in the inner core.
- ▶ Some of the facts like temperature of the inner core is still unknown.

Earth's core:

- **Outer core**

- ▶ The outer core of the **Earth is a liquid layer about 2,260 kilometers thick.** It is made of iron and nickel. This is above the Earth's solid inner core and below the mantle. Its outer boundary is 2,890 km (1,800 mi) beneath the Earth's surface. The transition between the inner core and outer core is approximately 5,000 km (3,100 mi) beneath the Earth's surface.
- ▶ **The temperature of the outer core ranges from 4400 °C in the outer regions to 6100 °C near the inner core.**

- **Inner core**

- ▶ The inner core of the Earth, as detected by seismology, is a solid sphere about 1,216 km (760 mi) in radius, or about 70% that of the Moon. It is believed to be an iron-nickel alloy, and may have a temperature similar to the Sun's surface, about 5778 K

Significance:

- The study of the inner core can tell us the evolution and origin of universe.
- It can also reveal existence of some previous unknown waves such as J waves.

6

Earth's Water A Result Of Asteroid Impacts And Leftover Gas From Sun's Birth: Study

CONTEXT: A recent study on origin of water on earth has suggested that earth's water is a result of asteroid impacts and leftover gas from sun's birth.

About:

- There are many theories regarding the origin of water on earth. Most recent theory and accepted theory regarding origin of universe and water on earth is **Big Bang theory**.
- According to a recent study, asteroidal material and gas left over from the formation of the Sun could be the main reason behind formation of water on the planet. The study gives details about the development of other planets too.
- Comets, asteroids and gases left over contained water in form of ice and water vapour could be the main reason behind water contained in today's oceans.
- The study questioned the widely accepted theory of **Nebular Hypothesis** regarding origin of water.

Significance:

- There are many modern theories regarding origin of water on earth but fails to explain it fully.
- Water is one of the most important factor which dictates existence of life on earth. Hence, its knowing about its origin may give new insights into history of origin of life on earth.

7

BARNARD'S STAR B: 'Super-Earth' found orbiting Sun's nearest single star

CONTEXT: Recently, Astronomers have discovered a frozen planet with a mass over three times that of the Earth, orbiting the closest solitary star to the Sun.

ABOUT:

- According to researchers from Queen Mary University of London, the potentially rocky planet, known as Barnard's star b, is a 'super-Earth' and orbits around its host star once every 233 days.
 - ▶ The planet is a habitable zone in which liquid water, and possibly life, could exist.
 - ▶ It lies at a distant region from the star known as the 'snow line'.
 - ▶ Its surface temperature is estimated to be around -170°C but at the same time researchers have told that if the planet has a substantial atmosphere the temperature could be higher and conditions potentially more hospitable.

- **Barnard's Star**

- ▶ Barnard's Star is a very-low-mass red dwarf about 6 light-years away from Earth in the constellation of Ophiuchus.
- ▶ It is the fourth nearest known individual star to the Sun and the closest star in the Northern Celestial Hemisphere.

SIGNIFICANCE:

- Scientists have been searching planets around the universe which sustains life for a long time. This could help to resolve mystery of the origin of universe and life on earth surface.
- NASA's Exoplanet Exploration is dedicated to find planets beyond our solar system.
- Habitable planet could be crucial for space exploration and human settlements on other planets if needed in future.
- Space tourism can also be developed at such planets in future.

8

Korolev Crater

ABOUT: European Space Agency's (ESA) Mars Express mission has recently discovered an icy crater on Mars which has been named as *Korolev Crater*.

Context: Korolev Crater has been located by Mars Express Mission near the north pole of the Red Planet

It is filled with a mound of water ice 60 kilometres across and nearly 2 kilometres thick.

The water ice is a permanent feature. It has been anticipated that the crater traps a layer of cold air that prevents the ice melting even during the six-month-long northern summer on Mars, making this a year-long winter wonderland.

Mars Express mission

- Mars Express is a space exploration mission being conducted by the European Space Agency.
- The Mars Express mission is exploring the planet Mars, and is the first planetary mission attempted by the agency.
- This mission has been orbiting around Mars since 2013.

SIGNIFICANCE:

- Water on Mars has long been debated as the sign of existence of life on Mars, further existence of this huge reservoir of water will give thrust to it.
- To date, **no proof has been found of past or present life on Mars** but Cumulative evidence shows that during the ancient Noachian time period, the surface environment of Mars had liquid water and may have been habitable for microorganisms. Although, the existence of habitable conditions does not necessarily indicate the presence of life.

9

Mount Anak Krakatau

CONTEXT: Recently, Java and Sumatra Islands of Indonesia were hit by tsunami waves. Reasons attributed to it was unloading of large amount of debris material from Mount Anak Krakatau.

ABOUT:

- The deadly tsunami in Indonesia was triggered by a chunk of the Anak Krakatau volcano slipping into the ocean.
- Anak Krakatau had been spewing ash and lava for months before a 64-hectare (158-acre) section of its south-west side collapsed.
- This caused an underwater landslide and eventually caused the tsunami in Indonesia.
- The fact that the tsunami was triggered by a volcano rather than an earthquake meant no tsunami warning was triggered.
- Before this event, only earthquake was thought to be only reason for Tsunami.

SIGNIFICANCE:

- After Anak Krakatau there is emphasis on development of a new warning system which could monitor deep sea volcanoes and volcanoes on islands,
- It is for the first time that tsunami has been triggered by a volcanic eruption or collapse. This will give a new dimension for scientists to research on possibilities of Tsunami due to different reasons.

10**Scientists discover massive mountains under Earth's crust**

CONTEXT: Recently, Scientists from the Princeton University in the U.S. and the Institute of Geodesy and Geophysics in China have discovered massive mountain in the Earth's mantle.

ABOUT:

- In a study published in the journal Science, scientists used data from an enormous **earthquake in Bolivia** to find **mountains and other topography on a layer located 660 km straight down**, which separates the upper and lower mantle. Earlier, this layer was not found and there was a clear distinction between upper and lower mantle.
- The researchers have named this boundary as **"the 660-km boundary"**
- These results were out after scientists from the Princeton University in the U.S. and the Institute of Geodesy and Geophysics in China, used the most powerful waves on the planet, which are generated by massive earthquakes.
- For this study, they took the key data from waves after a magnitude 8.2 earthquake, the **second-largest deep earthquake ever recorded, that shook Bolivia in 1994.**
- They used the traditional method of using P and S waves for detecting the topographical feature from beneath the earth's crust.
- Researchers found that in this layer, the roughness was not equally distributed, just as the crust's surface has smooth ocean floors and massive mountains, the 660-km boundary has rough areas and smooth patches.

SIGNIFICANCE:

- The study will give a new dimension to geo-physics for research purpose. Hence, scientists will be able to study the earth's composition in an elaborate manner.
- Existing theories on formation of earth is closely linked to segregation of layer of the earth. A new layer will pose a challenge for the scientists to redefine these theories.

CLIMATOLOGY

1

Shrinking of Ozone layer hole

CONTEXT: Recently, NASA has confirmed that ozone layer hole has shrunk to a greater extent.

ABOUT:

- **Ozone Layer:** The ozone layer resides in the stratosphere and surrounds the entire Earth. UV-B radiation (280- to 315- nanometer (nm) wavelength) from the Sun is partially absorbed in this layer.
- As a result, the amount of UV-B reaching Earth's surface is greatly reduced. UV-A (315- to 400-nm wavelength) and other solar radiation **are not strongly absorbed** by the ozone layer.
- Human exposure to UV-B increases the risk of **skin cancer, cataracts, and a suppressed immune system**. UV-B exposure can also damage terrestrial plant life, single cell organisms, and aquatic ecosystems. Ultraviolet rays are harmful as they causes severe skin burn, diseases such as **Melanoma** and **skin cancer**.
- **Ozone Hole**
 - The ozone hole is a large region above the Antarctica which has been formed due to depletion of ozone layer.
 - Depletion of ozone layer is primarily caused by release of gases such as CFCs (Chloro Fluro carbons,) which emits chlorine free radical when acted upon by ultraviolet radiation and then reacts with ozone and destroys it.
 - Recently, NASA has confirmed that ozone hole has shrunk significantly.
 - It further explained that satellite images showed the hole had begun to close and could be **completely healed by 2060**.
- **Reasons attributed to decline in Ozone hole:**
 - **Montreal Protocol:** The Montreal Protocol, finalized in 1987, is a global agreement to protect the stratospheric ozone layer by phasing out the production and consumption of **ozone-depleting substances** (ODS).
 - The Montreal Protocol has proven to be innovative and successful, and is **the first treaty to achieve universal ratification** by all countries in the world.
 - long-term satellite observations by NASA have shown a **20% decrease in levels of chlorine in the Earth's atmosphere** since 2005, proving for the first time that the worldwide action is having a dramatic impact on the planet.

SIGNIFICANCE:

- Reduction in size of ozone hole will reduce prevalence of diseases such as Melanoma, Skin Cancer, Cataracts e.t.c

- Full implementation of the Montreal Protocol is expected to result in avoidance of more than **280 million cases of skin cancer**, approximately **1.6 million skin cancer deaths**, and more than 45 million cases of cataracts in the United States alone by the end of the century.

2 Warming imperils clouds that deter 'hothouse' conditions

CONTEXT: Recently, a research conducted by researchers at California Institute of Technology has found that Marine clouds could break up and vanish if CO₂ in the atmosphere triples.

ABOUT:

- Marine clouds that protect us from hothouse Earth conditions **by reflecting sunlight back into space** could break up and vanish in to the atmosphere.
- Researcher have argued that there were dangerous climate change thresholds were found by them of which the world was unaware.
- Stratocumulus clouds** which over about 20 percent of subtropical ocean are under mostly near western seaboard such as the coasts of California are under threat from massive global warming.
- Researchers have found that when these clouds disappear from an area then there was **increase in atmospheric temperature up to 8 degree Celsius**.
- If the same event would occur after permanent destruction of these clouds then temperature be enough to melt polar ice and raise the sea level up to ten meters.
- The last time the planet was that hot, some 50 million years ago during the **Eocene Epoch**, crocodiles roamed the Arctic.
- Even half that much warming would overwhelm humanity's capacity to adapt.

SIGNIFICANCE:

- World leaders need to take steps in similarly, the way they were able to counter the effects of HFCs which helped to recover ozone layer.
- Paris Climate Deal, 2015 which envisages to cut down global temperature up to 2% of the pre-industrial level needs to be implemented with strictly.
- There is multiplier effect of global warming. Slight change in temperature from the existing level can cause permafrost to melt which could trigger methane gas to come out and raise global temperature to multiple time.

3 Atmospheric Waves Experiment (AWE)

CONTEXT: Atmospheric Waves Experiment (AWE) has been recently launched by NASA that will help scientists understand and forecast the vast space weather system around our planet.

ABOUT:

- It comes under NASA's under **NASA's Heliophysics Explorers Program**.
- It aims to obtain global observations of an important driver of space weather in a dynamic region of Earth's upper atmosphere that can cause interference with radio and GPS communications.
- It will focus on colorful bands of light in Earth's atmosphere, called airglow, to determine what combination of forces drive space weather in the upper atmosphere.
- The Atmospheric Waves Experiment (AWE) mission will cost \$42 million and is **planned to launch in August 2022**, attached to the exterior of the Earth-orbiting International Space Station.

- Researchers aims to know the connection between effect on space weather of the Earth and of the rays coming from the sun (solar variability).
- Previously, it was thought that earth has no effect on space weather system.
- To help unravel that connection, AWE will investigate how waves in the lower atmosphere, caused by variations in the densities of different packets of air, impact the upper atmosphere.

SIGNIFICANCE:

- Solar Variability and raise coming from sun affects technology and astronauts in space and disrupts radio communications.
- Powerful solar flares can cause damage to television reception, wireless communications, radio transmissions, and dozens of other forms of electronic activity.
- Solar flares are powerful releases of energy from the sun. If their subsequent coronal mass ejections, (CMEs) which are massive bursts of charged particles and magnetic fields intersect the Earth, they can create spikes of energy in long power lines by induction.

4**Aurora Borealis**

CONTEXT: Recently, scientists predicted that there was a chance to see *Aurora Borealis* or The Northern Lights on 20th March, 2019 in some parts of Canada and USA.

ABOUT:

- This relatively rare event was tracked to March 20 when a powerful eruption of solar energy sent an unusually large stream of electrically charged particles streaming toward Earth.
- Normally, such particles simply collide with gas particles in Earth's atmosphere and put on their colorful display, much like the glow of a neon light.
- *Oxygen molecules give off a familiar, ghostly green aurora, while nitrogen produces blue or red.*

ABOUT AURORAS:

- Auroras are referred to as polar lights, northern lights (Aurora Borealis) and southern lights (Aurora Australis), is a natural light display in the Earth's sky, predominantly seen in the high-latitude regions (around the Arctic and Antarctic).

Formation of Auroras:

- Auroras are produced when the **magnetosphere is sufficiently disturbed by the solar wind** that the trajectories of charged particles in both solar wind and magnetospheric plasma, mainly in the form of electrons and protons, precipitate them into the upper atmosphere (thermosphere/exosphere) due to Earth's magnetic field, where their energy is lost.
- The resulting ionization and excitation of atmospheric constituents emits light of varying color and complexity.
- The form of the aurora, occurring within bands around both Polar Regions, is also dependent on the amount of acceleration imparted to the precipitating particles.

SIGNIFICANCE:

- Although Auroras are result of ionization by solar flares but during Auroras transmission lines, electrical equipment, radars and television sets could be damaged.

OCEANOGRAPHY

1 Migingo island

CONTEXT: Recently, Uganda and Kenya agreed for the formation of a commission to look into disputed Migingo Island.

ABOUT:

- Migingo is a small rock Island, located in Lake Victoria which is the largest lake in Africa and the largest Tropical Lake in the whole world. It is half the size of a football pitch. It is extremely densely populated.
- The island was the center of a low-level territorial dispute between Kenya and Uganda.
- In 2008–2009, the island itself was claimed by both Kenya and Uganda. However, In July 2009 a survey team found that the island is 510 metres (1,670 ft) east of the Kenya–Uganda border within the lake, a finding supported by openly available Google Earth imagery.
- Since 1926, territorial ownership of the island has been consistently shown on maps and in language on official documents as Kenyan.
- Main bone of contention is the fishing rights in Lake Victoria which is the largest lake of Africa and largest tropical lake of the world too.

2 Antarctic Circumpolar Current How does it help to keep Antarctic frozen

CONTEXT: Recently, scientists have conducted study on changing nature of the Antarctic Circumpolar Current which is changing due to changing climate.

ABOUT:

- **Antarctic Circumpolar Current (ACC):**
 - The Antarctic Circumpolar Current, or ACC, is the strongest ocean current on the Earth. It extends from the sea surface to the bottom of the ocean, and encircles Antarctica.
 - Antarctic Circumpolar Current ***maintains the boundary of Antarctic Ice cap.***
 - The ACC is created by the combined effects of strong **westerly winds** across the **Southern Ocean**, and the big change in surface temperatures between the Equator and the poles.
 - It is vital for Earth's health because it keeps Antarctica cool and frozen.
 - Global warming has led to changes in nature of this current. Hence, scientists are studying that how it might affect the world's climate.

- The ACC carries an estimated 165 million to 182 million cubic meters of water every second from west to east, more than 100 times the flow of all the rivers on Earth.
- It provides the main connection between the Indian, Pacific and Atlantic Oceans.

- **Nature of ACC:**

- In the ACC there are sharp changes in water density known as fronts. **The Sub-Antarctic Front** to the north and **Polar Front** further south are the two main fronts of the ACC.
- Both are known to split into two or three branches in some parts of the Southern Ocean, and merge together in other parts.
- The **path of the ACC is a meandering** one, because of the steering effect of the sea floor, and also because of instabilities in the current.
- The ACC also plays a part in the **meridional overturning circulation**, which brings deep waters formed in the North Atlantic southward into the Southern Ocean.

Climate Changing: Affecting Antarctic Circumpolar Current:

- The Southern Ocean has warmed and freshened in the upper 2,000 m. Rapid warming and freshening has also been found in the Antarctic Bottom Water, the deepest layer of the ocean.
- Waters south of the Polar Front are becoming fresher due to increased rainfall there, and waters to the north of the Polar Front are becoming saltier due to increased evaporation.
- These changes are caused by human activity, primarily through adding greenhouse gases to the atmosphere, and depletion of the ozone layer.
- **The ozone hole is now recovering but greenhouse gases continue to rise globally.**
- Winds have strengthened by about 40% over the Southern Ocean over the past 40 years.
- This has not translated into an increase in the strength of the ACC. Instead there has been **an increase in eddies** that move heat towards the pole, particularly in hotspots such as Drake Passage, Kerguelen Plateau, and between Tasmania and New Zealand.

Significance of Antarctic Circumpolar Current (ACC)

- It is vital for Earth's health because it keeps Antarctica cool and frozen, if there will be changes in it due to global warming, it will impact the whole earth in form of rise in sea level.
- The ACC also plays a part in the **meridional overturning circulation** if there will be changes in the pattern of flow of current then there will be changes in flow of currents. It will further impact the whole atmospheric pattern.

UNIT: 2

GEOPHYSICAL PHENOMENON

EARTHQUAKE & VOLCANOES

1

Havre world's largest deep ocean volcanic eruption

CONTEXT: Recently, geologists have confirmed that Havre which was primarily thought to be a sea-mount is essentially an under sea volcano.

ABOUT:

- Havre is located in Pacific ocean 1000 kilometers north east of the North Island near New Zealand.
- It is 400 square kilometers large and has fourteen lava flows.
- It was essentially thought to be a sea-mount which exploded later in 2002 but couldn't be identified.
- Later in 2012, a very large pumice (light volcanic rock) was observed floating in Pacific Ocean. On later investigation it turned out to be from erupted Havre.
- Investigations started in 2015 and it was found that Havre is the largest under sea volcano in present era.

SIGNIFICANCE:

- Havre can be helpful in understanding the evolution of earth.
- Basaltic lava which came out of the Havre was fluid like water. Further investigation can give deeper insights into composition of lava flow.

2

Mount Merapi Volcanic Eruption

CONTEXT: Mount Merapi, an active volcano has been constantly erupting since last year.

ABOUT:

- It is located on the border between Central Java and Yogyakarta provinces, Indonesia.
- It first erupted in 1548 and has been constantly erupting from then.
- It is an active Stratovolcano.

CYCLONES

1 Bomb Cyclone

CONTEXT: A large, rapidly intensifying winter storm hit east coast of United States this winter. This type of cyclone is called Bomb Cyclone.

About:

- **Bomb Cyclone:** *Bombogenesis*, a popular term used by meteorologists, occurs when a midlatitude cyclone rapidly intensifies, dropping at least 24 millibars over 24 hours. A millibar measures atmospheric pressure.
- This can happen when a cold air mass collides with a warm air mass, such as air over warm ocean waters. The formation of this rapidly strengthening weather system is a process called bombogenesis, which creates what is known as a **bomb cyclone**.
- This event is also called "**explosive cyclogenesis**" and even "**meteorological bombs**".
- The four most active regions where extratropical explosive cyclogenesis occurs in the world are the **Northwest Pacific, the North Atlantic, the Southwest Pacific, and the South Atlantic**.

Impacts:

- As it occurs during winter in northern hemisphere, it is accompanied by snow and frost which can cause exposed skin to freeze within 30 minutes.

Temperatures usually falls as low as **-40 degrees Celsius** which causes disruption in normal lives and weather related sickness such as frostbite.

2 Mount Soputan

CONTEXT: Recently, Mount Soputan which is located in Indonesia erupted.

About:

- Mount Soputan is located in the northern part of Sulawesi Island in Indonesia. It erupted twice on 16th December, 2018.
- Soputan is one of Indonesia's more than 120 active volcanoes. It is located in Pacific Ring of Fire.
- Main reason behind a large number of volcanoes in Indonesia is due to its location at the meeting point of three major continental plates – **the Pacific, the Eurasian and the Indo-Australian plates** and the much smaller **Philippine plate**.

Pacific Ring of Fire

- The Ring of Fire is a major area in the basin of the Pacific Ocean where many earthquakes and volcanic eruptions occur.

- In a large 40,000 km horseshoe shape, it is associated with a nearly continuous series of oceanic trenches, volcanic arcs, and volcanic belts and plate movements. It has 452 volcanoes.

3

How the 2015-16 El Nino affected disease outbreaks

CONTEXT: According to a study published in the journal Nature global climatic disruptions due to the strong and extended positive phase of the ENSO conditions, or simply El Nino in 2015-16 increased the outbreak of diseases in the regions of its influence.

About:

Disease outbreak from El-Nino event:

- Major diseases like chikungunya, **dengue, malaria, Hantavirus, rift valley fever, cholera, plague and zika** are affected by the weather events induced by El Nino.
- The scientists analyzed certain disease outbreaks in the 2015-16 period and tried to **correlate them with higher temperatures and erratic rainfall patterns** characteristic of the El Nino.

Outcomes of the study:

- Researchers found that in regions like Southeast Asia, Tanzania, western United States and Brazil — which are generally affected by the El Nino — the spread of diseases came after shifts in rainfall, temperature and vegetation.
- There was either **excess of droughts or floods** in this period which created the environmental conditions that favored the growth and propagation of disease causing microorganisms and their carriers.

El-Nino Southern Oscillation (ENSO)

- **The El Niño-Southern Oscillation (ENSO)** is a recurring climate pattern involving changes in the temperature of waters in the central and eastern tropical Pacific Ocean. On periods ranging from about three to seven years, **the surface waters across a large swath of the tropical Pacific Ocean warm or cool by anywhere from 1°C to 3°C, compared to normal.**
- This oscillating warming and cooling pattern, referred to as the ENSO cycle, **directly affects rainfall distribution in the tropics and can have a strong influence on weather across the United States and other parts of the world**
- El Niño and La Niña are the extreme phases of the ENSO cycle; between these two phases is a third phase called ENSO-neutral.

El Niño:

- A warming of the ocean surface, or **above-average Sea surface temperatures (SST), in the central and eastern tropical Pacific Ocean.** Over Indonesia, rainfall tends to become reduced while rainfall increases over the central and eastern tropical Pacific Ocean.
- **The low-level surface winds, which normally blow from east to west along the equator ("easterly winds"), instead weaken** or, in some cases, start blowing the other direction (from west to east or "westerly winds"). In general, the warmer the ocean temperature anomalies, the stronger the El Niño (and vice-versa).
 - ▶ **La Niña:** A **cooling of the ocean surface, or below-average Sea surface temperatures (SST),** in the central and eastern tropical Pacific Ocean. Over Indonesia, rainfall tends to increase while rainfall decreases over the central and eastern tropical Pacific Ocean. The normal easterly winds along the equator become even stronger. In general, the cooler the ocean temperature anomalies, the stronger the La Niña (and vice-versa).
 - ▶ **Neutral:** Neither El Niño or La Niña. Often tropical Pacific SSTs are generally close to average. However, there are some instances when the ocean can look like it is in an El Niño or La Niña state, but the atmosphere is not playing along (or vice versa).

Significance:

- If correlation between El-Nino and disease outbreak is justified by further research then countries affected by would be ready after El-Nino predictions.
- Early Warning of possible changes in weather conditions after El-Nino prediction can help countries to launch awareness campaign to make their citizens cautious about negative health effects of the event.

4**Hurricane Bud**

CONTEXT: Recently, Hurricane Bud hit parts of North America especially in parts of Mexico and United States.

About:

- Hurricane Bud was a powerful **tropical cyclone** that produced heavy rainfall and flash flooding across Northwestern Mexico and the Southwestern United States.
- Bud originated from a tropical wave that departed from Africa on May 29, 2018.
- It then travelled across the Atlantic Ocean before crossing over South America and entering the Northeast Pacific Ocean late on June 6.
- Bud ultimately peaked with maximum sustained winds of 140 mph (220 km/h) and a minimum barometric pressure of 943 mbar.
- It made **landfall on Baja California Sur** as a minimal tropical storm early on June 15, 2018.

5**Cyclone Sagar**

CONTEXT: Recently, a tropical cyclone named Cyclone Sagar formed in Indian Ocean and hit eastern coast of Somalia.

About:

- Cyclonic Storm Sagar was the strongest tropical cyclone to make landfall in Somalia in recorded history of the country.
- It formed on May 16 east of the **Guardafui Channel**, Sagar intensified into a cyclonic storm the next day.
- The storm turned to the west-southwest and traversed the entirety of the Gulf of Aden, making landfall over northwestern Somalia farther west than any other storm on record in the North Indian Ocean.

Impact:

- In Somalia, Sagar dropped a years' worth of rainfall, or around 200 mm (7.9 in).
- The rains caused deadly flash flooding that washed away bridges, homes, and thousands of farm animals.
- Other countries like Yemen, Djibouti and Ethiopia also faced heavy storm followed by rainfall causing damage to life and property.

6**How is naming of cyclone done?**

CONTEXT: Recently, a number of cyclonic storms such as Ockhi, Titli, Hudhud e.t.c has hit Indian coast.

About:

- **History of naming of Cyclone**

- Traditionally cyclones were given general names such as Hurricane in the Atlantic, Typhoon in the Pacific and Cyclone in the Indian Ocean.
- If the storm's wind speed reaches or crosses 74 mph, it is then classified into a hurricane/cyclone/typhoon.

- **Naming with people's name**

- Initially, people living in the **Caribbean Islands** would name the storms after the saint of the day from the Roman Catholic liturgical calendar for the day on which the hurricane/cyclone occurred.
- In 1953, the US weather service officially adopted the idea and created a new phonetic alphabet (international) of women's names from A to W, leaving out Q, U, X, Y and Z.
- The **year's first tropical storm was given the name beginning with the letter "A"**, the **second with the letter "B"** and so on through the alphabet.
- In even-numbered years, odd-numbered storms got men's names and in odd-numbered years, odd-numbered storms got women's names.
- The process of naming cyclones involves several countries in the region and is done under the aegis of the World Meteorological Organization.

- **Naming of cyclones in Indian Ocean**

- For the Indian Ocean region, deliberations for naming cyclones began in 2000 and a formula was agreed upon in 2004.
- **Eight countries in the region - Bangladesh, India, Maldives, Myanmar, Oman, Pakistan, Sri Lanka and Thailand** - all contributed a set of names which are assigned sequentially whenever a cyclonic storm develops.
- For example, the name **Nilam** was contributed by Pakistan, Murjan was named by Oman. Similarly, Phailin was named by Thailand.

Significance:

- The naming of cyclones with local names are significant as they bear the area of their origin with them.
- It also helps in better understanding about cyclones and their study by metrologists.

7**Titli cyclone : RIMES declared it rarest of rare**

CONTEXT: The Regional Integrated Multi-Hazard Early Warning System (RIMES) for Africa and Asia, a 45-nation international organisation on disaster warning, has termed 'Titli', the severe cyclonic storm that devastated Odisha in October, 2018, as 'rarest cyclone'.

About:

- **How is Titli rarest of rare?**

- Titli cyclone is the rarest of rare in terms of its characteristics such as **recurvature** after landfall and retaining its **destructive potential** after landfall and recurvature away from the coastal areas for more than two days.
- Titli didn't follow the pre-assumed track as other cyclones follow predicted paths.
- Due to this factor it became more devastating than others and caused heavy landslides in Gajapati district of Odisha.

- Cyclone Titli after landfall had changed the path in an erratic way.

Regional Integrated Multi-Hazard Early Warning System (RIMES)

- The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) is an **international and intergovernmental institution**, owned and managed by its Member States, for the generation and application of early warning information.
- RIMES evolved from the efforts of countries in Africa and Asia, in the aftermath of the 2004 Indian Ocean tsunami, to establish a regional early warning system within a multi-hazard framework for the generation and communication of early warning information, and capacity building for preparedness and response to trans-boundary hazards.
- RIMES operates from its regional early warning center located at the campus of the Asian Institute of Technology in Pathumthani, Thailand.

Significance:

- Study of unique cyclones like 'Titli' will help to reduce the efforts of disaster mitigation and lessen the loss of life and property.
- As these cyclones have **unpredictable path** after landfall, whole area must be alerted in this type of situation.
- **58 per cent of the storms that form in the Bay of Bengal (BOB) hit the eastern coast of India.** Hence, a high level monitoring is needed to mitigate risks related to these unique type of cyclones with the help of international agencies like RIMES.

8 Cyclone Pabuk

CONTEXT: A yellow alert was initiated by Indian Metrological Department (IMD) when Cyclone Pabuk originated at Gulf of Thailand.

About:

- Cyclone Pabuk originated over Gulf of Thailand in the western part of South China Sea.
- The storm made landfall in Thailand. Rain, winds and stormy waves hit villages and popular tourist resorts on Thailand's southeastern coast.
- Further its effect were felt at Andaman and Nicobar Islands which witnessed heavy rainfall.
- **Cyclone Alert System of IMD (Indian Metrological Department)**
 - **Pre Cyclone Watch:** The cyclone warnings are issued to state government officials in four stages. The First Stage warning known as "PRE CYCLONE WATCH" issued 72 hours in advance contains early warning about the development of a cyclonic disturbance in the north Indian Ocean, its likely intensification into a tropical cyclone and the coastal belt likely to experience adverse weather.
 - **Cyclone Alert:** The Second Stage warning known as "**CYCLONE ALERT**" is issued at least 48 hrs. in advance of the expected commencement of adverse weather over the coastal areas. It contains information on the location and intensity of the storm likely direction of its movement, intensification, coastal districts likely to experience adverse weather and advice to fishermen, general public, media and disaster managers.
 - **Cyclone Warning:** The Third Stage warning known as "CYCLONE WARNING" issued at least 24 hours in advance of the expected commencement of adverse weather over the coastal areas. Landfall point is forecast at this stage. These warnings are issued by ACWCs/CWCs/ and CWD at HQ at 3 hourly interval giving the latest position of cyclone and its intensity, likely point and time of landfall, associated heavy rainfall, strong wind and storm surge along with their impact and advice to general public, media, fishermen and disaster managers.
 - **Post Landfall Outlook :** The Fourth Stage of warning known as "POST LANDFALL OUTLOOK" is issued by the concerned ACWCs/CWCs/and CWD at HQ at least 12 hours in advance of

expected time of landfall. It gives likely direction of movement of the cyclone after its landfall and adverse weather likely to be experienced in the interior areas.

Colour Coding of alerts:

Cyclone Alert	Yellow.
Cyclone Warning	Orange.
Post landfall outlook	Red



UNIT: 3

WORLD ECONOMIC GEOGRAPHIC

WORLD AGRICULTURE

1

The 10th Global Forum for Food and Agriculture (GFFA)

CONTEXT: Recently, the 10th Global Forum for Food and Agriculture (GFFA) was held at Berlin, Germany.

About:

- “Shaping the future of livestock – sustainably, responsibly, efficiently” was the theme of 10th GFFA.

Global Forum for Food and Agriculture (GFFA)

- The Global Forum for Food and Agriculture (GFFA) is an international conference that focuses on central questions concerning ***the future of the global agri-food industry and Ensure global food security to end hunger.***
- It is held during ***International Green Week (IGW)*** and will be taking place in its current shape for the eighth time.
- The forum gives representatives from the worlds of politics, business, science and civil society an opportunity to share ideas and enhance understanding on a selected topic of current agricultural policy.
- The 10th GFFA was organized by the ***Federal Ministry of Food, Agriculture and Consumer Protection (BMEL)*** in cooperation with GFFA Berlin & the Senate of Berlin and Messe Berlin.
- Union Minister of State for Agriculture & Farmers Welfare, Shri Gajendra Singh Shekhawat was leading the Indian delegation.
- Ministers adopted ***a Call for Action towards strengthening the role of livestock*** in, among others, ensuring food security, improving livelihoods, and addressing climate change.
- On the sidelines, ***ILRI (International Livestock Research Institute)*** organized an Expert Forum on opportunities to increase the efficiency of livestock production while reducing GHG emissions.
- The partnership between the UN Environment Organization and the Technical University of Denmark (UNEP-DTU) released a report titled, ***‘Low Carbon Development Strategy for the Nicaraguan Livestock Sector.’***
- The Strategy aims to support sustainable growth of livestock production in Nicaragua while achieving reductions in GHG emissions.

Significance:

- Increasing world population coupled with high demand of dairy and meat products has made livestock policy important.
- Further, generation of greenhouse gases such as methane by cattle and other livestock has made it essential to frame guidelines to develop technology for sustainable development of livestock.

- It envisaged to develop policies for paddock management, manure management, and production and use of bio-fertilizers, that could transform livestock production into a carbon sink and achieve benefits for other SDGs.

2

World's first 'speed breeding' technique to boost production of wheat

CONTEXT: A NASA technique of providing continuous light to improve crop yields has helped an Australian research team achieve three times higher reproduction in wheat.

About:

- NASA performed an experiment in space to develop wheat with a technique which involved **continuous application of light on plants** which triggered early reproduction in the plants.
- If this technique is applied on earth, it can boost production of wheat up to three times.
- By using speed breeding techniques in specially modified glasshouses **six generations of wheat, chickpea and barley plants**, and **four generations of canola plants** can be grown in a single year, as opposed to two or three generations in a regular glasshouse, or a single generation in the field.

Significance:

- This technique can be efficiently used **to tackle food insecurity** and attain sustainable development goals.
- Countries which has very short season favorable for wheat production can use this technology to grow wheat.
- It will bring prosperity to farmers as they can grow four to six generations of wheat, chick pea and barley plants in a single year.

3

Global Agriculture and Food Security Program (GAFSP)

CONTEXT: Recently, Global Agriculture and Food Security Program has funded many projects such as agricultural and aquaculture projects in Bangladesh.

About:

- **Global Agriculture and Food Security Program (GAFSP)**
 - Global Agriculture and Food Security Program (GAFSP) is a global partnership program and a multilateral financing mechanism dedicated **to fight hunger, malnutrition, and poverty by supporting resilient and sustainable agriculture in developing countries** that benefits and empowers poor and vulnerable smallholder farmers, particularly women.
 - It works primarily on three goals:
 - Reduce poverty
 - Reduce Hunger
 - Empower Small farm holders
 - GAFSP **pools development assistance resources and uses a common framework to selectively allocate them to where they are most needed**, effective and catalytic, in line with country priorities and private sector opportunities.
 - It is a platform for interaction of various stake holders such as donors, recipients, Smallholder farmers' organizations and NGOs. All come together for decision making process and share their expertise at local level.

- ▶ GAFSP projects are led by governments, private sector, and civil society organizations (CSOs).
- ▶ It also works with world's leading institutions to gain from their expertise in field of agriculture development.
- ▶ Recently, it has funded several projects in various countries of Africa.
- ▶ In Bangladesh it has funded Aquaculture in Tista River.

Significance:

- Developing and underdeveloped countries of Africa and Asia have ample of natural resources to sustain. But they lack expertise and capital to exploit them. Global Agriculture and Food Security Program aims to address their problems.
- In developing countries like India and Bangladesh small and marginal farmers lack credit. This program aims to help such farmers.
- Fighting hunger and ensuring food security which are the primary goals of this program will help to attain **Sustainable Development Goals**.

4

Girinka Programme

CONTEXT: Recently, during his visit to Rwanda Prime Minister of India gifted **200 cows to villagers at Rweru Model Village, as part of the Rwandan Government's Girinka Programme.**

About:

- The word Girinka can be translated as **'may you have a cow'** and describes **a centuries-old cultural practice in Rwanda** whereby a cow was given by one person to another, as a sign of respect and gratitude.
- The program is based on the premise that providing **a dairy cow** to poor. Girinka Programme transforms livelihoods, reconciles communities improving agricultural productivity through the use of manure as fertilizers which would lead to improving soil quality and reducing erosion through the planting of grasses and trees.
- The program also aimed at **promoting unity and reconciliation among Rwandans** based on the cultural principle that if a cow is given from one person to another, it establishes trust and respect between the giver and beneficiary. While this was not an original goal of Girinka, it has evolved to become a significant aspect of the program.
- Beneficiaries of this program are chosen on the basis of two aspects:
 - ▶ Those very poor vulnerable families that don't own a cow but do have land that can be used to grow grass for feeding the cows.
 - ▶ The beneficiary should be in position to construct an animal shed or willing to join others in community to construct a communal cow shed to be jointly used with the rest.

Significance:

- Girinka was initiated by current regime of Rwanda in response to the alarmingly high rate of **childhood malnutrition** and as a way **to accelerate poverty reduction** and integrate livestock and crop farming.
- This program shows the **importance of cow in an agricultural society** and its role in combating different types of lifestyle diseases.
- This program underlines why cow has occupied an important place in different societies worldwide.
- This type of program can be enforced in backward regions of India where people still live in primary agricultural society.

5 Wheat genome project

CONTEXT: Recently, Researchers have finally *sequenced the wheat genome*, a breakthrough that could lead to innovations like drought-resistant and vitamin-packed varieties.

About:

- Wheat's genome is so complex because genetically it's three species in one. Sometime around 500,000 years ago, two of the grassy ancestors of wheat naturally hybridized, creating wild emmer wheat.
- That means the genome has **three pairs of every chromosome**. It also means that compared to the human genome, which has 3 billion nucleotides, or genetic letters, wheat has 16 billion.
- The whole wheat genome, comprised of **21 chromosomes**, also has confusing repeating elements, which make up 85 percent of the sequence.
- Hence, It was very difficult to decode wheat genome. ***It took 200 scientists 13 years to finally figure out the complex genome of the important grain.***

Significance:

- Decoding wheat genome will lead to provide a variety of wheat crops such as drought resistant, insect resistant wheat crops e.t.c.
- Climate change has pushed scientists to adopt climate smart agriculture and dryland farming methods. Genome editing will help farmers to raise wheat in dryland areas.

6 Groundwater 'time bomb' is ticking

CONTEXT: Cardiff University's School of Earth and Ocean Sciences conducted a research on state of ground water across globe and found some unusual facts. The research has been published in journal Nature Climate Change.

Key findings of the report:

- Future generations face an **environmental "time bomb"** as the world's groundwater systems take decades to respond to the present day impact of climate change.
- Groundwater is the largest useable source of freshwater on the planet and more than two billion people rely on it to drink or irrigate crops.
- It is slowly replenished through rainfall, a process known as recharge and discharges into lakes, rivers or oceans to maintain an overall balance between water in and water out.
- Groundwater reserves are already under pressure as the **global population explodes** and crop production rises in lockstep. But the extreme weather events such as drought and record rainfall, both made worse by our heating planet, could have another long-lasting impact on how quickly reserves replenish.
- The study found that **only half of all groundwater supplies** are likely to fully replenish or re-balance within the next 100 years, potentially leading to shortages in drier areas.
- Study has termed this condition as an environmental time bomb because any climate change impacts on recharge occurring now, will only fully impact the base flow to rivers and wetlands a long time later.

Significance:

- Ground water resource has become very important from development point of view. Programmes like **Atal Bhujal Yojna** signify its importance from India's point of view.
- India has regularly framed policies to replenish ground water as it has recently legalized and made it mandatory to have a **Rainwater Harvesting System in every government building.**

- **Aquifer Mapping and Hydrological mapping of soil moisture** were done to analyze state of ground water across India.

The State of the World's Biodiversity for Food and Agriculture 2019

CONTEXT: Recently, the State of the World's Biodiversity for Food and Agriculture 2019 was released by Food and Agriculture organization.

About:

- The Food and Agriculture Organization (FAO) has flagged the growing practice of monoculture, cultivation of a single crop at a given area in food production around the world.
- Report states that of more than 6,000 plant species cultivated for food production, fewer than 200 contribute significantly to food production globally, regionally or nationally.
- Only 9 plant species account for almost two-thirds of total crop production. It further states that in many parts of the world, biodiverse agricultural landscapes have been, or are being, replaced by large areas of monoculture, farmed using large quantities of external inputs such as pesticides, mineral fertilizers and fossil fuels.
- It has given a list of drivers that has aggregated this problem, they can be listed as:
 - Population growth and urbanization
 - Over-exploitation and over-harvesting
 - Changes in land and water use and management
 - Pests, diseases and invasive alien species
 - Climate change
 - Pollution and external inputs
 - Natural disasters
 - Markets, trade and the private sector
- **Urbanization: A cause of aggregating monoculture**
 - Urbanization is the major cause of monoculture in India as when people move to cities they tend to depend on purchased food items.
 - This pressures producers to "continuously grow or keep only a limited range of species, breeds and varieties of crops, livestock, trees, fish, etc."
 - Such changes often affect the resilience of production systems and their role in biodiversity. Private food standards adopted by supermarkets and consumers have pushed farmers towards particular varieties and management procedures.
 - International markets are also particularly restrictive and impose specific requirements for market entry. They effectively debar the entry into the market of minor crops from developing countries.
 - The "emphasis on **meat-based diets** and the **use of a narrow range of major cereals (maize, wheat and rice)**" is growing. The report predicts that the demand for standardised foods can reduce the diversity of crops and animals.
- **Why is diverse agriculture practices better than monoculture?**
 - If a single variety is widely grown, a pest or disease to which it lacks resistance can lead to a dramatic fall in production. If livelihoods are heavily dependent on the species in question, the effects can be disastrous.
 - The 1840 potato blight famine in Ireland
 - The 20th century losses in cereals in the United States

- Losses of taro production in Samoa in the 1990s
- **How can problem of monoculture be dealt with?**
 - Crop diversification by intercropping by planting legumes with food crops to fix nitrogen in soil.
 - Cover cropping to maintain soil fertility.
 - Rotation and intercropping and the use of diverse forage plants in pastureland
 - Management of supply system and change in dietary habits can be other alternatives.

8 UN World Food Programme

CONTEXT:

- Recently, **Japan has donated 69 million dollars** to the United Nations World Food Programme to provide vital aid to 28 countries in the Middle East, Africa, and Asia, with the biggest shares of the money earmarked for Yemen and Iraq.
- Sweden and the United Nations World Food Programme had also signed a Strategic Partnership Agreement committing an unprecedented **\$370 million dollars** to WFP over the next four years in February 2018. It was largest donation by any country till date.

About:

- **UN World Food Programme**
 - The World Food Programme (WFP) is the food-assistance branch of the United Nations and the world's largest humanitarian organization addressing hunger and promoting food security.
 - It is a member of the United Nations Development Group.
 - Headquartered in Rome (Italy), it provides food assistance to an average of 91.4 million people in 83 countries each year. It strives to eradicate hunger and malnutrition.
 - The WFP works to help people who cannot produce or obtain enough food for themselves and their families.
 - It also operates **food-for-work programmes** help promote environmental and economic stability and agricultural production.

Significance:

- As per the 2018 **Global Hunger Index (GHI)**, 2018, the level of hunger and **undernutrition worldwide fell to 20.9, down from 29.2** in the year 2000. Contribution of UN world food program can't be ignored in it
- Still, Some 795 million people in the world do not have enough food to lead a healthy active life. The vast majority of the world's hungry people live in developing countries, where **12.9 percent of the population is undernourished**. Hence, there is stringent need for organization like this to eradicate hunger and attain SDG Goal 2 of no hunger.
- WFP food aid is also directed **to fight micronutrient deficiencies, reduce child mortality, improve maternal health, and combat disease**, including HIV and AIDS. Hence, it addresses multidimensional issues.

WORLD MINERALS, INDUSTRY & INFRASTRUCTURE

1

Massive reserves of mercury hidden in permafrost

CONTEXT: Recently, researchers have discovered permafrost in the northern hemisphere stores massive amounts of natural mercury, a finding with significant implications for human health and ecosystems worldwide.

About:

- Researchers from **American Geophysical Union** have discovered permafrost in the northern hemisphere which stores massive amounts of natural mercury.
- The study revealed that **northern permafrost soils are the largest reservoir of mercury on the planet**, storing nearly twice as much mercury as all other soils, the ocean and the atmosphere combined.
- Thawing of permafrost due to global warming can release mercury into ocean and can impact ecosystem in different ways.
- Mercury accumulates in aquatic and terrestrial food chains, and has **harmful neurological and reproductive effects** on animals.

Advantages:

- If mercury reserve found in permafrost can be exploited, it can serve humanity.
- Mercury is the only metal which is in liquid state at room temperature and has high coefficient of expansion.
- Mercury is still used for the manufacture of industrial chemicals and for electrical and electronic applications.

Disadvantages:

- If the mercury is transported across waterways, it could be taken up by microorganisms and transformed into methylmercury.
- This form of mercury is a dangerous toxin that causes neurological effects in animals ranging from motor impairment to birth defects.
- This is called **Minamata disease, or Chisso-Minamata disease**, which is a neurological syndrome caused by severe mercury poisoning.

2

Hong Kong-Zhuhai bridge: World's longest sea crossing

CONTEXT: Recently, Chinese President Xi Jinping officially opened the world's longest sea crossing bridge, nine years after construction first began.

About:

- The bridge is 55km (34 miles) and connects **Hong Kong to Macau and the mainland Chinese city of Zhuhai.**
- It is designed to withstand earthquakes and typhoons.
- It was built using 400,000 tonnes of steel which is enough to build 60 Eiffel Towers.
- To allow ships through it, a 6.7km section in the middle is dipped into an undersea tunnel which runs between two artificial islands.
- It is part of China's plan to create a **Greater Bay Area**, including Hong Kong, Macau and nine other cities in southern China which is currently home to 68 million people.
- The bridge is not served by public transport, so private shuttle buses will ply the route. There is no rail link.

3**IEA Bioenergy TCP**

CONTEXT: Recently, the Union Cabinet, chaired by the Prime Minister Shri Narendra Modi, was apprised about Ministry of Petroleum & Natural Gas, Government of India joining IEA Bioenergy TCP.

About:

- **Bioenergy:**

- Bioenergy is one of many diverse resources available to help meet our demand for energy. It is a form of renewable energy that is derived from recently living organic materials known as biomass, which can be used to produce transportation fuels, heat, electricity, and products.
- International Energy Agency's Technology Collaboration Programme on Bioenergy (IEA Bioenergy TCP)
- International Energy Agency's Technology Collaboration Programme on Bioenergy (IEA Bioenergy TCP) is an international platform for co-operation among countries with the aim of improving cooperation and information exchange between countries that have national programmes in bioenergy research, development and deployment.
- IEA Bioenergy TCP works under the framework of International Energy Agency (IEA) to which India has "Association" status since 30th March, 2017.
- The primary goal of joining IEA Bioenergy TCP by Ministry of Petroleum & Natural Gas (MoP&NG) is to facilitate the market introduction of advanced biofuels with an aim to bring down emissions and reduce crude imports.
- IEA Bioenergy TCP also provides a platform for international collaboration and information exchange in bioenergy research, technology development, demonstration, and policy analysis with a focus on overcoming the environmental, institutional, technological, social, and market barriers to the near-and long-term deployment of bioenergy technologies.
- The R&D work in IEA Bioenergy TCP is carried out within well-defined 3-years programmes called "Tasks". Each year the progress of the Tasks is evaluated and scrutinized and each 3 years the content of the Tasks is reformulated and new Tasks can be initiated.
- Technical persons from Public sector Oil marketing companies will also be contributor in the Tasks participated by MoP&NG.

Significance:

- It will give a boost to India's commitment to harness 227 GW of Renewable energy by 2020 (Previously it was 175 GW).
- India has vast potential to develop bioenergy as it is 10th richest country in terms of forest cover.

- India has also largest cattle population in the world which are producers of biomass as byproducts which can be used to harness bioenergy.
- A part from it India's crop residues can be used to produce this renewable form of Energy.
- International collaboration in terms of R & D and technology transfer will also help India to grow in this sector.

GS SCORE

UNIT: 4

INDIAN GEOGRAPHY

PHYSICAL GEOGRAPHY: INDIA

PHYSIOGRAPHY

2

SC rebukes Haryana govt for throwing open for realtors, miners

CONTEXT: Recently, the Supreme Court came down heavily on the Haryana government for diluting laws protecting the Aravalli hills, according to media reports.

About:

- Haryana government had recently pushed an amendment to **Punjab Land Preservation Act (PLPA)**, despite opposition.
- It effectively strips protection under the act to areas under master plans of cities such as Gurugram, Faridabad, Nuh, Mahendragarh and Rewari.
- The apex court, however, **ordered the government to not implement the amendment** and reportedly said it was aware the move was to **"favour the builders"** and found it shocking that the government "went ahead despite our warning" It was violation of Supreme Court's order.

Aravalli range:

- The Aravalli Range is a range of mountains running approximately 692 km (430 mi) in a southwest direction, starting in North India from Delhi and passing through southern Haryana, through to Western India across the states of Rajasthan and ending in Gujarat.
- The Aravalli Range, an eroded stub of ancient mountains, is the oldest range of fold Mountains in India.
- Arabian Sea branch of Southwest monsoon runs parallel to it, hence the region around it could not get orographic rainfall.

Significance of Arravallis for the region:

- Aravallis are barriers that checks desertification and expansion of the Thar Desert.
- It also refills and recharge ground water of the region.

2

India International Cherry Blossom Festival-2018

CONTEXT: India International Cherry Blossom festival was held from November 14 to 17 in Shillong, Meghalaya.

About:

- It envisaged to celebrate the unique autumn flowering of Himalayan Cherry Blossoms with several cultural events at Shillong, Meghalaya.
- Alongside it, fashion shows, rock concerts, a beauty pageant, an amateur Golf Tournament was also organized.
- Alongside, there were stalls showcasing the region's food, wine and crafts and there are several Japanese cultural events, a Japanese Food Pavilion and a Higher Education Stall in partnership with the Embassy of Japan in India.

Significance:

- Festivals like it promote a sense of bonding of human with nature.
- It also benefits the region where it is organized by promoting eco-tourism.
- It also helps to promote local cuisines and traditional culture.

DRAINAGE/ WATER RESOURCES

3 Kaleswaram project

CONTEXT: Kaleshwaram Lift Irrigation Scheme of Telangana will be the world's biggest irrigation project after completion.

About:

- Kaleshwaram Lift Irrigation Scheme of Telangana is said to be the **world's biggest irrigation project** that is set to end water woes of the state where many regions are parched.
- Kaleshwaram Lift Irrigation Scheme is worth Rs 80,000 crore. It envisages **to irrigate 18 lakh acres** of land in 13 districts, stabilising another 17 lakh acres in another seven districts – virtually covering the entire state of Telangana.
- Kaleshwaram irrigation project will also provide **drinking water** to several towns and cities of the state, especially the most important cities of Hyderabad and Secunderabad. The irrigation project will provide water to industries in many states apart from Telangana.
- Kaleshwaram irrigation project will harness water at the confluence of three rivers with Godavari.

Composition of project:

- **Medigadda Barrage** is the starting point of the proposed Kaleshwaram Project which envisages construction of three barrages between Yellampally & Medigadda.
- From here, the water will be reverse-pumped into main Godavari and diverted into a huge and complex system of reservoirs, water tunnels, pipelines and canals.
- Kaleshwaram irrigation project is divided into **seven links and 28 packages**. This will require digging up of **20 reservoirs in 13 districts**, which will have the total capacity of holding 145 TMC water. All these reservoirs will be interconnected through a network of tunnels running through **around 330 kilometre**.
- The canal network under the project will cover 1832 kilometre, taking water as far as 500 kilometres from the source.
- The Kaleshwaram irrigation project will create a world record when **139 MW mammoth pumps will start lifting 2 thousand million cubic feet (TMC) of water daily**.
- The 2 TMC water will be pumped into two barrages – Annaram and Sundilla. From here, the water will go to Yellampalli reservoir. The distribution of water will begin from Yellampalli through gravity canals and pipelines.
- The water required for this will come from Medigadda Barrage through a **14.09 kilometre underground tunnel, which is longest irrigation tunnel in the world**.

- The cavern and surge pool, from where the pump would operate, also holds the world record with a capacity of holding **2 crore litres of water**.

Significance:

- Telangana is the state which has the **second highest number of farmers' suicides** after Vidarbha in Maharashtra often because of poor monsoon rains or lack of irrigation facilities. Kaleshwaram project will help farmers of the state to evade poor monsoon.
- **Difficult terrain of peninsular block** had ended the possibility of river interlinking. Lift water irrigation technique will help the parched region to boost agricultural productivity.
- Many tribal communities reside in Telangana plateau region. This project will provide drinking water and water for irrigation to them.

4

Natiwar Mori Hydro Electric Project

CONTEXT: Construction of Naitwar Mori Hydro Electric Project as begun in Uttarkashi district of Uttarakhand.

About:

- Naitwar Mori hydroelectricity project is being built at river Tons which is largest tributary of river Yamuna. It joins Yamuna from the west.
- A dam which is 30.5 m high is being built as part of the project.
- This project is being built in Uttarkashi district of Uttarakhand and has potential of 60 MW.
- Naitwar Mori "has the potential to generate **265.5 million units of electricity every year**.

5

Mahadayi River water sharing dispute

CONTEXT: Recently, final verdict of Mahadayi river water dispute resolution tribunal came.

About:

- Mahadayi river is also called Mandovi or Mhadei is a river flowing in three states of Karnataka, Maharashtra and Goa.
- It described as the lifeline of Goa along with river Zuari.
- It is a west flowing river which drains into Arabian Sea.
- The river has total 2,032 sq.km catchment area of which 1,580 sq. km, 375 sq. km and 77 sq. km catchment area are in Goa, Karnataka and Maharashtra respectively.
- Karnataka seeks to divert water from tributaries of the river through the **Kalasa-Bhanduri Nala project** towards the parched Malaprabha river basin. Malprabha is a tributary of River Krishna. This move has been strongly opposed by Goa.
- According to Goa, **Mahadayi basin is already water scarce** and any move to divert its water will badly affect the area.
- Apart from it there will be **huge loss to biodiversity** in water diversion process which will further affect the basin area.

Judgment:

- In February, 2018, Mahadayi river water tribunal gave its final verdict according to which **Karnataka was allocated around 13.5 thousand million cubic feet (tmcft) of water of which only 5.5 tmcft could be diverted**.
- Goa, had been allocated around 24tmcft while Maharashtra had been allocated 1.3tmcft.

Significance:

- This verdict has finally settled four decade old dispute between three states.
- Uneven pattern of Monsoon coupled with ever expanding agriculture to feed huge population has sought quick disposal of such disputes.
- Further, political mobilization on these issue creates enmity between people of different states, timely verdicts neutralizes these political motives. Ex- Cauvery Water Dispute led to violent protest against Tamils in Karnataka where buses belonging to Tamil Nadu were attacked.

6 Kishanganga project

CONTEXT: Recently, Kishanganga Hydroelectricity project was inaugurated by Prime Minister.

About:

- **Kishanganga river**
 - ▶ Kishanganga is a river in the Kashmir region of India and Pakistan occupied Kashmir (PoK).
 - ▶ It starts in the Indian city of Guraais and then merges with the Jhelum River near the city of Muzaffarabad in PoK.
 - ▶ It originates from **Krishansar Lake** in the vicinity of **Sonamarg** in Jammu and Kashmir, and runs northwards to **Tulail Valley** where it meets a tributary from the Dras side.
- **Kishanganga project**
 - ▶ It is a hydroelectric project that is designed to divert water from the Kishanganga River to a power plant in the Jhelum River basin.
 - ▶ It is located in Bandipore in Jammu and Kashmir
 - ▶ It has total capacity of 330 MW.
 - ▶ Jammu and Kashmir would get 13 percent of the power generated by the project.
- **Dispute with Pakistan over this project:**
 - ▶ According to Pakistan its Neelum Jhelum Hydropower Plant would be affected due to diversion of water by this project. Hence, it had raised its concerns with **World Bank** which is the sole negotiator according to **Indus Water Treaty**.
 - ▶ However, World Bank could not give its final decision over this issue as according to it no agreement could be made between two countries.

7 Pakal Dul Project

CONTEXT: Recently, Prime Minister laid the Foundation Stone of the Pakal Dul Power Project in Jammu & Kashmir.

About:

- Pakal Dul, with 1000 MW capacity, will be the largest Hydro Power Project in Jammu & Kashmir on completion. It is also the first storage Project in Jammu & Kashmir.
- It is located at Marusadar River, a tributary of the Chenab River, in Kishtwar district.
- The project cost of Pakal Dul is Rs. 8112.12 crore and it is supported by the Government of India as well as the Government of J&K.

- It is a storage type project that shall improve the water availability during the lean season and lead to additional Generation of 650 MU in downstream projects.

Significance:

- 3000 persons shall be employed directly/ indirectly during construction phase of the project.
- It will provide water to other projects which are located in downstream of the river during lean season.

8

Turga Pumped Storage Project

CONTEXT: Recently, West Bengal's power distribution company has roped in Japan International Cooperation Agency for a Rs 5,000 crore loan that would part finance its proposed 1000 mw Turga pumped storage project.

About:

- The project will come up in the West Bengal's Purulia district at Ayodhya hills. It will be constructed on Turga Nala, a tributary of Subarnarekha river.
- It will utilize water of catchment area of Turga Nala which is situated at Ayodhya hills.
- Project includes construction of Upper Dam across Turga Nala, and a water conductor system with an underground Power House on the downstream of Upper Dam and a Lower Dam having intermediate catchment of 4.37 sq. km.
- The construction of the Turga pump storage power plant is likely to begin by 2021.
- Japan has provided a loan of Rs 5000 crore to the Bengal government for this project.

Significance of the project:

- West Bengal is largely **not a mountainous area** as it lies in **lower and middle Ganga plain** and so there is a dearth of continuous source of running water, except for the rainy seasons when the rivers are full and swell.
- But during the winter season, when the rivers are comparatively dry, the situation is rather grave.
- So, there is a need for such pump storage power plants which can provide water 24*7.

9

Renuka dam

CONTEXT: Recently, an agreement was signed between the Central government and government of six States namely Haryana, Uttar Pradesh, Rajasthan, Uttarakhand, Delhi, Himachal Pradesh to restart construction of the Renuka multipurpose dam project which is located in the Upper Yamuna Basin.

About:

- The 148-meter-high Renukaji dam would come up in Himachal Pradesh's **Sirmour district** at a cost of Rs 4,596.76 crore. It will be constructed on **Yamuna River**.
- The central government will contribute Rs 3,892.83 crore, or 90% of the cost of the irrigation and drinking water component of the project, while the rest will come from the states.
- The project is proposed to be executed by Himachal Pradesh Power Corporation Ltd. The live storage of the Renukaji Multi-Purpose Project is 0.404 million acre-foot and it would ensure supply of 23 cubic meters per second water to the basin states.
- The project will also generate 40 MW of power and the Delhi government has agreed to fund 90% of the cost of the power plant.

Significance:

- This dam will provide electricity to Delhi as a hydropower station will be setup with investment of 90% from Delhi government.
- It will also provide adequate water for irrigation and drinking for Haryana, Uttar Pradesh, Rajasthan and the National Capital Region Delhi,
- Regular shortage of water in Haryana, Western Uttar Pradesh and NCT of Delhi during lean season will be solved after its construction.

10 Sita Rama Lift Irrigation Project

CONTEXT: Recently, Telangana government has been given the green nod for its Rs 13,384.80 crore Sita Rama Lift Irrigation Project.

About:

- Sita Rama Lift Irrigation Project aims to divert Godavari river water to irrigate 2.72 lakh hectare in three districts namely Bhadrachalam, Khammam and Mahabubabad districts of Telangana.
- The project, which is expected to be completed in three years, would lead to submergence of about 1,930 hectare area and 157 villages consisting of 9,696 families are likely to be affected.
- The objective of the project is to provide water for irrigation as well as to enroute tanks, villages, towns and supplement some of the existing/ proposed irrigation schemes.
- About 8,476.84 hectare land is required for the project, which is estimated to cost about Rs 13,384.80 crore and is expected to be completed in three years.
- There would be construction of an head regulator only at Dummugudem Anicut on Godavari river besides lined canal of about 372 km, four pump houses and delivery cisterns, laying of pumping main of about 9 km, cross drainage works across main canal and construction of tunnels, cross regulators and offtakes among others.

Significance:

- Telangana is the state which has the **second highest number of farmers' suicides** after Vidarbha in Maharashtra often because of poor monsoon rains or lack of irrigation facilities. Sita Rama Lift Irrigation Project will help farmers of the state to evade poor monsoon.
- Difficult terrain of peninsular block had ended the possibility of river interlinking. Lift water irrigation technique will help the parched region to boost agricultural productivity.

11 Lower Kalnai hydropower project

CONTEXT: Recently, Pakistan raised an objection to the design of Pakal Dul and Lower Kalnai hydro projects during the Permanent Indus Commission (PIC) meeting.

About:

- Lower Kalnai hydro project is on Lower **Kalnai Nalla, a tributary of river Chenab**.
- The total capacity of this project is 43 MW.
- As per the treaty, the 'eastern rivers' of Beas, Sutlej and Ravi are under India's control, while Pakistan controls the 'western rivers' of Indus, Chenab and Jhelum. Matter is still under consideration of Indus water Commission.

12

Mohar Reservoir Project

CONTEXT: The Chhattisgarh Water Resources Department (CWRD) had commenced the work on *Mohar Reservoir Project* in Balod district without obtaining environment and forest clearances.

About:

- According to the report by Comptroller and Auditor General, the Chhattisgarh Water Resources Department (CWRD) commenced the work on Mohar Reservoir Project in Balod district without ensuring that the land required was acquired and obtaining environment and forest clearances.
- The reservoir project was accorded administrative approval with a condition that since the project had traversed both the tribal and forest areas, the work would commence only after obtaining permission from Ministry of Environment and Forests (MoEF) and after ***paying the compensation due to the people whose private land would get affected.***

About the project:

- The Mohar reservoir project is proposed across the confluence of river Dangarh and Dalekasa with a catchment of 143 square km.
- After completion the project will have a command area of 1100 hectares.
- The proposed project is expected to irrigate 800 hectares of Kharif paddy.
- It will also supply 1000 million cubic (1 TMC) water by feeder canal to Kharkhara reservoir for 500MW power plant of NSPCL in Bhilai.

13

Arun-3 Hydro Electric Project

CONTEXT: Recently, the foundation stone was laid for the 900-MW Arun-3 hydroelectric project, on the Arun River in the Sunkhuwashabha District of Nepal by Prime Minister of India.

About:

- Arun III is run-of-the river type hydro-electric project constructed by SJVN Arun III Power Development Company Private Limited (A wholly owned subsidiary of SJVN Ltd) in Nepal at the ***Arun River***. In this project, 900 megawatts of electricity was expected to be produced.
- The Arun-III hydropower project will include the construction of a 70m-tall and 466m-long concrete gravity dam on the Arun River. The dam will have a crest level of 808m and six sluice gates. The storage capacity of the dam will be approximately 13.94 million cubic metres (Mm³).
- The output from the power plant will be transferred to the Nepal-India border through a 300km-long, 400kV DC transmission line, which will be routed along Diding (Nepal) to Dhalkebar (Nepal) towards Muzzafarpur (India).

Satluj Jal Vidyut Nigam (SJVN)

- SJVN was established in 2013 with an aim to plan, promote, organise and execute the Arun-III power plant. SJVN signed a memorandum of understanding (MoU) for the execution of the project with the Government of Nepal (GoN) in March 2008.

Arun River

- The Arun River is a ***trans-boundary river and is part of the Kosi or Sapt Koshi river system in Nepal.***
- It originates in Tibet Autonomous Region of the People's Republic of China where it is called the Phung Chu or Bum-chu.

Significance:

- The Arun-III project aims to assist the people surrounding the hydropower project by uplifting their socio-economic levels through the generation of employment for the locals, boosting the local trade and industries, and fostering entrepreneurship.
- China's increasing closeness to Nepal has worried India. The hydropower project is also expected to strengthen the bilateral ties between Nepal and India.
- The project also aims to develop the area by constructing new roads, bridges and amenities such as schools, hospitals and community centres, hence infrastructure of the area will be upgraded.

14**Par-Tapi-Narmada inter-state river link project**

CONTEXT: Gujarat government has expressed its inability to divert 434 MCM water for Maharashtra in Tapi basin as requested by Maharashtra Chief Minister Devendra Fadnavis as part of the Par-Tapi-Narmada inter-state river link project.

About:

- **Par-Tapi-Narmada inter-state river link project**

- ▶ Par Tapi Narmada Link proposes to transfer water from the water surplus regions of Western Ghats to the water deficit regions of Saurashtra and Kutch.
- ▶ The link project includes seven reservoirs proposed in north Maharashtra and south Gujarat.
- ▶ The water from the seven proposed reservoirs would be taken through a **395 km long canal** including the 33km length of the feeder canals to take over a part of the command of the **Sardar Sarovar Project**, while irrigating small enroute areas.
- ▶ This would save Sardar Sarovar water which will be used to extend irrigation in Saurashtra and Kutch region.
- ▶ The link mainly envisages **construction of seven dams, three diversion weirs, two tunnels** (5.0 km & 0.5 km of length), 395 km long canal (205 km in Par-Tapi portion including the length of feeder canals and 190 km in Tapi-Narmada portion), 6 power houses and a number of cross-drainage works.
- ▶ The seven dams proposed in the scheme are **Jheri, Mohankavchali, Paikhed, Chasmandva, Chikkar, Dabdar and Kelwan**.
- ▶ The **Jheri and Mohankavchali dams** are proposed to be constructed across **Par river**, one below the other while the **Paikhed dam** is proposed across **Nar River, a tributary of the Par**.
- ▶ Chasmandva dam is proposed across **Tan river** which is a tributary of **Auranga**, Chikkar dam is proposed across **river Ambica**, Dabdar is proposed across Kapri which is Ambica's tributary and Kelwan dam is proposed across river Purna, a tributary of Godavari.
- ▶ The project of Par-Tapi-Narmada link generally falls in the state of Gujarat **except Jheri reservoir which falls in Maharashtra state**.

Significance:

- This link when completed will benefit water scarce Saurashtra and Kutchh regions of Gujarat.
- It will benefit the whole region from where canals will pass beside primary regions of Kutchh and Saurashtra.

15**Uranium contamination in groundwater from aquifers across 16 states in India**

CONTEXT: Recently, a study conducted by researchers from **Duke University** in the US have recorded instances of **uranium contamination in groundwater aquifers** across 16 states in India.

About:

- Bureau of Indian Standards' drinking water specification has not considered Uranium as a contaminant, while the WHO has set a provisional safe drinking water standard of 30 micrograms of uranium per litre for India, a level that is consistent with US Environmental Protection Agency standards.
- Researchers have found that while the primary source of uranium is geogenic, anthropogenic factors such as groundwater table decline and nitrate pollution may further enhance uranium mobilization.
- Due to ground water depletion concentration of natural nitrate and uranium has constantly increased.
- Nearly 33% of water tested from wells in Rajasthan were found contaminated with uranium.
- One of the main reason attributed to decline in water table is oxidation of exposed rocks due to over pumping of ground water. Oxidation leads to enrichment of uranium and thus contamination of ground water.

Significance:

- The study has thrown light on need to revise water quality assessment methodology by Bureau of Indian Standards' which does not include uranium as a contaminant.
- It has also thrown light on negligence on regular assessment of water by BIS and related health hazards caused due to it.

16**North Koel reservoir project****CONTEXT:**

- Recently, a memorandum of understanding (MoU) between Ministry of Water Resources, River Development and Ganga Rejuvenation, State of Bihar and State of Jharkhand for completion of incomplete North Koel reservoir project.
- A separate MoU was signed for Long Term Irrigation Fund (LTIF) between state government of Bihar and Jharkhand Ministry of Water Resources, River Development and Ganga Rejuvenation, NABARD and National water Development authority.
- This project has been inaugurated by Prime Minister on 6th January, 2019.

About:

- North Koel river is a tributary of Sone river which originates from Ranchi Plateau in Chhotanagpur Plateau region forming a radial drainage pattern with South Koel River.
- North Koel reservoir project was started in 1972 but was later halted in 1993 by forest department of Bihar and Jharkhand. This project is also called **Mandal Dam Project**.
- This project would benefit drought prone district of Gaya and Aurangabad of Bihar and Palamu and Garhwa of Jharkhand by irrigating 1,11,521 ha of agricultural land.
- This would also provide drinking water and water for industrial use through **Kanhar-Sone pipeline** to people of drought prone district of Garhwa and Palamu in Jharkhand.
- Apart from it various projects such as renovation and lining work of **Bater Vier Irrigation Project, renovation of Bain Banki Reservoir Project, renovation and lining work of Anjanva Reservoir Project and renovation and lining work for Brahmani irrigation project** (in Chakradharpur block of West Singhbhum district) were also considered.

Significance:

- Garhwa and Palamu districts are **drought prone area** which faces acute shortage of drinking water during drier season. Pipeline project and irrigation project will benefit this region.
- All these projects are being carried out in tribal dominated areas which are untouched of development from long time such as West Singhbhum districts of Jharkhand. These projects aim to uplift them to club with pace of development.
- Renovation and lining of reservoir will help to retain their service for longer period of time.

17 Bansagar canal project

CONTEXT: Recently, Bansagar Canal Project was inaugurated by Prime Minister in Mirzapur Uttar Pradesh.

About:

- Bansagar Canal Project aims to irrigate Mirzapur and Allahabad districts of Uttar Pradesh.
- It aims to bring water from Bansagar Multipurpose river valley project which is situated on Sone River in Madhya Pradesh. It is **171 km long**.
- Son River is the second largest right bank tributary of the Ganga after Yamuna River.
- Bansagar Multipurpose river valley project is joint venture of Uttar Pradesh, Madhya Pradesh and Bihar Government.
- Foundation stone of Bansagar project was laid in 1978, but the project was unduly delayed.
- This project was made a part of the **Pradhan Mantri KrishiSinchai Yojana**, and was completed.

Significance:

- This project will benefit the farmers of Allahabad and Mirzapur to a greater extent. It is expected to benefit more than 1 lakh 70 thousand farmers of both districts.
- Mirzapur is located in eastern Uttar Pradesh is agriculture dependent region. This project will benefit whole area significantly.

18 Himalayan springs

CONTEXT: Recently, NITI Aayog constituted group of experts moots dedicated mission to revive Himalayan springs in its report titled **"Inventory and Revival of Springs in the Himalayas for Water Security"**.

About:

- A NITI Aayog constituted group of experts has urged the government to set up a **dedicated mission to salvage and revive spring water systems in the country's Himalayan States** given their vital importance as a source of water for both drinking and irrigation for the region's inhabitants.
- The Indian Himalayan Region (IHR), spanning states across the country's north and northeast and home to about 50 million people.
- This large population has been heavily reliant on these **natural groundwater sources that** are under increasing threat from the urbanisation caused by a constant push for development and climate change.
- Almost **half of the perennial springs have already dried up** or have become seasonal and tens of thousands of villages are currently facing acute water shortage for drinking and other domestic purposes.
- Almost **60% of low-discharge springs that provided water to small habitations in the Himalayan region have reported clear decline** during the last couple of decades.

Significance:

- Recent incidents like **Shimla crisis**, which occurred due to heavy shortage of water in state capital of Himachal Pradesh along with adjoining districts has made it necessary to take consolidated step to revive Himalayan springs.
- With almost 64% of the cultivable area in the Himalayas fed by natural springs, they are often the only source of irrigation in the region. Hence, to protect rich horticulture heritage of Himalayan region corrective measures must be taken.

19 Polavaram multi-purpose project

CONTEXT: Recently, Supreme Court of India while hearing a petition filed by people affected by Polavaram project has directed the Centre to hold a public hearing in the project affected area in Odisha and Chhattisgarh.

About:

• Polavaram Project

- Polavaram Project, is a multi-purpose irrigation project on the Godavari River in the West Godavari District and East Godavari District in Andhra Pradesh.
- The project has been accorded ***national project status*** by the Union Government of India and will be the last to be accorded the status. Its reservoir spreads into parts of Chhattisgarh and Odisha States also.

• Displacement of people:

- The environmental impact assessment (EIA) of the project says 276 villages will be affected and an estimated 177,275 people live in these villages.
- The Polavaram Project Environmental Impact Appraisal Report of 1985 expected 150,697 people to be displaced in 226 villages.
- But the population of these villages according to the Census 2001 is much higher—236,834. State officials find it hard to explain the difference of 59,559 while estimating the number of people who will be displaced.
- Further, in the past 10 years, the population of these villages would have increased. If one takes into account 15,105 households (60,118 persons) that would be displaced by the two canals, then one arrives at the figure of 317,150 persons affected.

• Judgment of Supreme Court:

- The court directed the Centre to file an affidavit detailing the conduct of the public hearing, including which government agency would hold it.
- The Centre replied saying it was ready to appoint an independent agency to conduct the hearing.

Significance:

- Displacement of people and their rehabilitation due to infrastructure projects is a major issue India.
- Lakhs of people were displaced due to projects such ***Sardar Sarovar Dam*** Project and ***Tehri Dam project*** but their displacement is still questionable as they could not get their share of promised rehabilitation package.

20 Mekedatu dam project

CONTEXT: Recently, the Centre has given conditional clearance to build a reservoir across river Cauvery at Mekedatu on the border of Karnataka and Tamil Nadu.

About:

- Mekedatu project is proposed on the river Cauvery and is located in Ramanagaram district in Karnataka.
- It has been opposed by Tamil Nadu government as it violates the decisions of the Cauvery Tribunal. It has been ordered by the Supreme Court that Tamil Nadu must get its share of water during lean season of June to January.

- Construction of the two reservoirs would result in impounding of the flows in the intermediate catchment below the **Krishnaraja Sagar and Kabini reservoirs**, and Billigundulu in the common border of Karnataka and Tamil Nadu.

Significance of the project:

- Mekedatu Project is entitled solely to provide drinking water project to Bengaluru region and recharge ground water of the area.
- It aims to cover those area which has not been covered by Cauvery Tribunal settlement.

21 National Water Awards

CONTEXT: National Water Awards has been instituted by Ministry of Water Resources.

About:

- The Ground Water Augmentation Awards and National Water Award were launched in the year 2007** with an objective to encourage all stakeholder including the Non-Governmental Organizations (NGOs), Gram Panchayats, Urban Local Bodies, Water User Associations, Institutions, Corporate Sector, Individuals etc. for adopting innovative practices of ground water augmentation by rainwater harvesting and artificial recharge, promoting water use efficiency, recycling & re-use of water and creating awareness through people's participation in the targeted areas resulting into the sustainability of ground water resources development, adequate capacity building amongst the stakeholders etc.
- Considering the fact that **surface water & Ground water are integral part of the water cycle**, ministry has to institute **unified National Water Awards** with the objectives of encouraging the stakeholders to adopt holistic approach towards water resources management in the country.
- Awards will be given on the basis of 11 criteria to all stakeholders.

Significance:

- Promotion of sustainable use of water is necessary due to building pressure of population over limited water resources of the country.
- National water Awards will bring a sense of competitiveness in sustainable and optimal use of water resources.

22 Sujalam Sufalam Jal Sanchay Abhiyan

CONTEXT: The second edition of the water conservation scheme **Sujalam Sufalam Jal Sanchay Abhiyan** was recently launched by Gujarat government.

About:

- The Scheme aims to dredge the reservoirs, lakes and other water bodies for storage of water.
- It also provides maintenance to water bodies by lining canals and maintenance of river fronts.
- During first edition the target of maintenance of water bodies were over achieved as 16,616 works of deepening of ponds and lakes across the state were anticipated and 18,220 works were completed.
- It led to capacity enhancement of water bodies which increased the total capacity to of more than 11,000 lakh cubic feet rainwater.

Significance:

- Recharge of ground water and maintenance of command area are important for prosperity of a region, as it ensures availability of water for commercial and household purposes throughout the year.
- Materials obtained after desilting such as clay, mud. etc. can be further used in agricultural fields to increase soil fertility.

Disaster Management

23

National Cyclone Risk Mitigation Project (NCRMP)

CONTEXT: National Cyclone Risk Mitigation Project has been initiated by the government to check loss of life and property caused by cyclones every year.

About:

- It aims to address cyclone risks in the country. The overall objective of the Project is to undertake suitable **structural and non-structural measures to mitigate the effects of cyclones** in the coastal states and UT of India.
- **National Disaster Management Authority (NDMA)** under the aegis of **Ministry of Home Affairs(MHA)** will implement the Project in coordination with participating State Governments and the **National Institute for Disaster Management (NIDM)**.
- The Project has identified 13 cyclone prone States and Union Territories (UTs), with varying levels of vulnerability.
- It lays down structural and Nonstructural solutions for cyclone risk mitigation.

• Project Objectives :

The Project development objective of the NCRMP is to reduce vulnerability of coastal communities to cyclone and other hydro meteorological hazards through

- Improved **early warning dissemination systems**
- Enhanced capacity of local communities to respond to disasters
- Improved access to emergency shelter, evacuation, and protection against wind storms, flooding and storm surge in high area
- Strengthening DRM capacity at central, state and local levels in order to enable mainstreaming of risk mitigation measures into the overall development agenda.

National Disaster Management Authority:

- NDMA was established through the Disaster Management Act enacted by the Government of India in 30 May 2005.
- The Prime Minister is the ex-officio chairperson of NDMA.
- It works under the aegis of Ministry of Home Affairs.
- It is the apex institute to lay down the policies, plans and guidelines for Disaster Management to ensure timely and effective response to disasters..

Significance:

- Recently many tropical cyclones such as **Gaja, Titli, Sagar, Ockhi** e.t.c hit Indian coastline from Bay of Bengal and Arabian sea side of Indian peninsula, causing heavy damage to life and property. NCRMP will help to mitigate and reduce these losses.
- It also does research on various cyclone related attributes such as **history and nature of cyclones** which hit India.
- Recently, its analysis of cyclones during 1891-2000 showed that while 308 cyclones (103 being severe) affected the east coast, only 48 tropical cyclones (24 being sever) crossed the west coast.
- This project provides regional solutions for mitigation of cyclone related effects after analyzing nature and pattern of cyclone.

Ensemble Prediction Systems (EPS)

CONTEXT: Recently, the India Meteorological Department (IMD) has today launched a new Ensemble Prediction Systems (EPS) to provide probabilistic weather forecasts up to the next 10 days.

About:

- The new 10-day probabilistic forecasts will be able to provide rainfall forecasts with probabilities according to rainfall intensities.
- These new systems shall improve upon deterministic forecasts that are prone to high margins of error.
- The EPS involves generation of multiple forecasts using slightly varying initial conditions.

Significance:

- It would help in protecting life and property in case of extreme weather events, especially for cities like Mumbai, Chennai which are battered by heavy rains by giving them more time to prepare.
- It will boost block-level forecast for farmers, where current deterministic models do not help. It is due to its high resolution and precision.

Disadvantage:

- However, it would not alert about extreme weather phenomenon such as thunderstorms which usually hits north-eastern and eastern states of India.

AGRICULTURE

1 National Year of Millets

CONTEXT:

- Central government declared 2018 as National Year of Millets.
- At the same time it had requested FAO to declare 2019 as International Year of Millets. However, FAO decided to observe **2023 as International Year of Millets**.

About:

• Millets:

- Millet is a term used for a group of **small seeded grasses** that are often termed as nutri-cereals or dryland crops.
- Sorghum, Pearl Millet, Ragi, small millet, foxtail millet, Porso millet, barnyard millet a Kodo millets e.t.c are different types of millets.
- Karnataka is leader in production of millets in India.**
- India is largest producer of millets in the world.**

Rank	Country	Production (1000 MT)
1.	India	9,880
2.	Niger	3,400
3.	China	2,200
4.	Mali	1,600
5.	Nigeria	1,500

• Benefits of millets

- Millets can be grown in areas of low rainfall. Hence, it provides livelihood for millions of people in the world who are living in **drought prone areas** such as Nigeria, Niger, North-West and south west India.
- They are used in multiple forms such as food, fodder, in breweries and in formation of biofuels.
- Nutritionally millets are superior food crops owing to their **low glycemic index** and high content of minerals such as Iron and Zinc.

Significance:

- With concept of '**Superfood**' and '**Eat Smart Strategy**' forming a significant part of modern day dietary needs it has become important to focus on millets and related area.

- Being the largest producer of millets in the world, India has prime responsibility to go for **policy formulation** regarding millets in the world.
- In India, it is grown extensively at places which are separated by **100 cm isohyet**.
- African countries which are in close proximity to Great Sahara are also world leaders in its production. Initiative of FAO to declare 2023 as international year of millets will boost production of millets in these countries.
- Ever increasing demand of this Superfood in international market will boost exports of producing countries and will end up in strengthening its domestic economy.

2 Zero Budget Natural Farming

CONTEXT:

- Recently many states such as Himachal Pradesh, Andhra Pradesh and Karnataka have launched Zero Budget Natural Farming Projects.
- Apart from it, Indian Council of Agricultural Research (ICAR) under Network Project on Organic Farming (NPOF) and All India Coordinated Research Projects (AICRP) on Integrated Farming Systems, has initiated an experiment on "Evaluation of zero budget farming practices in basmati rice-wheat system" at four locations in India.

About:

- These projects have been started by Indian Council of Agricultural Research (ICAR) at **Modipuram (Uttar Pradesh), Ludhiana (Punjab), Pantnagar (Uttarakhand) and Kurukshetra (Haryana)** from rabi 2017 to study the zero budget farming practices on productivity, economics and soil health including soil organic carbon and soil fertility.
- Before it, Andhra Pradesh Became **the first state to start Zero Budget Natural Farming project. Although it evolved in state of Karnataka.**
- **Zero Budget Natural Farming (ZBNF)**
 - It is a farming practice which is done at zero input cost i.e everything which is natural is used.
 - **Subhash Palekar** is referred as father of this farming method.
 - This means that farmers need not purchase fertilizers and pesticides in order to ensure the healthy growth of crops.
 - In this method biological pesticides instead of chemical based fertilizers are used. Earthworms, cow dung, urine, plants, human excreta and such biological fertilizers are used by farmers for crop protection.
 - On the one it uses all the byproducts naturally and saves investment cost and on the other hand it preserves natural ecosystem.

The four pillars of ZBNF

- **Jivamrita/jeevamrutha :**
 - It is a fermented microbial culture. It provides nutrients, but most importantly, acts as a catalytic agent that promotes the activity of microorganisms in the soil, as well as increases earthworm activity;
 - During the 48 hour fermentation process, the aerobic and anaerobic bacteria present in the cow dung and urine multiply as they eat up organic ingredients (like pulse flour). A handful of undisturbed soil is also added to the preparation, as inoculate of native species of microbes and organisms. Jeevamrutha also helps to prevent fungal and bacterial plant diseases.
- **Bijamrita/beejamrutha**
 - It is a treatment used for seeds, seedlings or any planting material. Bijamrita is effective in protecting young roots from fungus as well as from soil-borne and seed borne diseases that

commonly affect plants after the monsoon period. It is composed of similar ingredients as Jeevamrutha - local cow dung, a powerful natural fungicide, and cow urine, a strong anti-bacterial liquid, lime, soil.

- **Acchadana (Mulching):**

- It is process of covering soil by straws, soil and other organic matter.
 - **Soil Mulch:** This protects topsoil during cultivation and does not destroy it by tilling. It promotes aeration and water retention in the soil.
 - **Straw Mulch:** Straw material usually refers to the dried biomass waste of previous crops, but as Palekar suggests, it can be composed of the dead material of any living being (plants, animals, etc). Palekar's approach to soil fertility is very simple – provide dry organic material which will decompose and form humus through the activity of the soil biota which is activated by microbial cultures.
 - **Live Mulch (symbiotic intercrops and mixed crops):** It advocates to develop multiple crop cultivation as well as livestock rearing on single field.

- **Whapasa - moisture:**

- Whapasa is the condition where there are both air molecules and water molecules present in the soil, and he encourages reducing irrigation, irrigating only at noon, in alternate furrows ZBNF farmers report a significant decline in need for irrigation in ZBNF.
- According to this concept Palekar challenges the idea that plant roots need a lot of water, thus countering the over reliance on irrigation in green revolution farming. According to him, what roots need is water vapor which is a mixture of air and water present in root hairs.

Significance:

- **Intensive mixed agriculture** is prominent in India where small land holdings are cultivated and animals are reared side by side. Promotion of ZBNF will help Indian farmers to a greater extent.
- This agriculture practice uses **sustainable method of crop cultivation** which is eco-friendly, thus helps to preserve ecosystem.

3

Krishi Vigyan Kendras

CONTEXT: Krishi Vigyan Kendras provide advanced Agriculture technical assistance to the farmers near their farms. Constantly in news due to on farm initiatives such as development of different technologies related to forage crops, dryland crops e.t.c

About:

- Krishi Vigyan Kendras (KVK) are agricultural extension center which aims to provide agricultural research in a practical and provide tailor-made solutions for localized on- farm problems.
- It undertakes following five activities:
 - Farm Advisory Service
 - Training programmes for different categories of people.
 - Training programmes for the extension functionaries.
 - Front Line Demonstration (Fill)
 - On Farm Testing (OFT)
- Government of India has envisaged to open atleast one Krishi Vigyan Kendras **in each district of the country.**
- These centers are associated with local Agricultural universities and acts as link between **Indian Council of Agricultural Research** and farmers.

- All KVKs fall under the jurisdiction of one of the **11 Agricultural Technology Application Research Institutes (ATARIs)** throughout India.
- There are more than 650 KVKs across India at present.

Significance:

- They are involved in higher level of research which includes trending areas such as **Climate Smart Agriculture** and **GMO (Genetically Modified Organisms)**. This will boost agricultural productivity in the country.
- Research on forage crops and climate resilient crops in drought prone regions were done in Tamil Nadu recently. It has successfully been implemented in drought prone areas.

3

Water Productivity Mapping of Major Indian Crops

CONTEXT: Recently, NABARD published its research on Water Productivity Mapping of Major Indian Crops.

About:

Water productivity mapping:

- Water Productivity mapping is a technique to determine productivity of water in a specific region for a specific type of crop.
- It compares the amount of water used per cubic meter of irrigation for a particular crop with same amount of irrigation's productivity in other region of a country for same crop.
- **For Example:** Punjab produces only 0.22 kg of rice for per cubic meter of irrigation while Jharkhand and Chhattisgarh on the other hand produces 0.75 kg and 0.68 kg of rice for same amount of water.

About the report:

- The report titled **"Water Productivity Mapping of Major Indian Crops"**, is part of a **research project with ICRIER**, (Indian Council for Research on International Economic Relations), mapping a water atlas for ten major crops — rice, wheat, maize, red gram or tur, chickpea or channa, sugarcane, cotton, groundnut, rapeseed-mustard and potato. These together occupy more than 60% of the country's gross cropped area.
- Report said that Indian agriculture needed to stop being "obsessed" with the land productivity and instead start thinking about water productivity.
- The report envisages to highlight overuse of water by Indian agriculture sector. It accounts for almost 80% of all the country's water resources, which is already under stress amid increasing population and massive industrialization.
- It envisages to increase the productivity of water per unit area irrigated.
- The report recommends that cropping patterns be re-aligned to water availability, using both demand and supply side interventions.

Significance:

- It envisages to achieve vision of **'Har Khet Ko Pani'** and **'Per Drop More Drop'**.
- It advocates for sustainable development of agriculture sector in India.
- Over irrigation or technique like flood irrigation causes salinity and acidity of soil. Optimum use of water will on the one hand conserve water and on the other hand protect soil's health.

4

IFFCO I-MANDI

CONTEXT: Recently IFFCO has launched e-commerce platform called IFFCO I-MANDI in partnership with Singapore based technology firm iMandi.

About:

- It aims to cater 5.5 crore farmers who are already associated with the cooperative.
- It has been launched as portal as well as in mobile application form.
- It is a 'one stop shop' for agricultural inputs and produce, FMCG, electronics, loans, insurance, etc.
- It would address all needs of the farming community and aims to cater to captive **user base of 55 million farmers**.
- Apart from buy-sell, the app has features like communication (chat and calling), entertainment and information/advisory content to keep the farmers engaged.

Indian Farmers Fertiliser Cooperative Limited (IFFCO)

- It is one of India's biggest cooperative society which is wholly owned by Indian Cooperatives.
- It was founded in 1967 with just 57 cooperatives, and at present it is an amalgamation of over 36,000 Indian Cooperatives with diversified business interests ranging from General Insurance to Rural Telecom apart from our core business of manufacturing and selling fertilizers.
- It provides fertilizers to each corner of India and reaches to farmers who live in some of the most challenging terrains and locations in the world.

Significance:

- Providing single window platform for agricultural inputs and produce, FMCG, electronics, loans, insurance etc to farmers will help them to get services at door step.
- It will provide easy access to mechanization, credit and agriculture inputs to farmers.

5**'Global Status of Commercialized Biotech/ GM Crops in 2017'**

CONTEXT: According to 'Global Status of Commercialized Biotech/ GM Crops in 2017', India has the world's fifth largest cultivated area under genetically modified (GM) crops.

About:

- 'Global Status of Commercialized Biotech/ GM Crops in 2017' was published by **International Service for the Acquisition of Agri-Biotech Applications** (ISAAA).
- According to it, India has the world's fifth largest cultivated area under genetically modified (GM) crops, at 11.4 million hectares (mh) in 2017.
- But unlike other big growers, its **entire GM crop area is under a single crop, i.e cotton**, incorporating genes from the **Bacillus Thuringiensis** or Bt soil bacterium coding for resistance against heliothis bollworm insect pests.
- The country with the highest area under transgenic crops, at 75 mh, is the United States.
- The report by the global crop biotech advocacy organisation has estimated the highest share in the world's total 189.8 mh GM crop area for 2017 to be of **soyabean (94.1 mh)**, followed by maize (59.7 mh), cotton (24.1 mh), canola (10.2 mh), alfalfa (1.2 mh) and sugar-beet (0.50 mh).
- In India, GM crops are regulated by **Genetic Engineering Appraisal committee**.
- Only **Bt/insect-resistant cotton** which includes glyphosate-tolerant cotton has been commercialized in India.
- GM Mustard is the new GM crop in the block that is doing the rounds of constant speculation and has been cleared by the Genetic Engineering Approval Committee (GEAC), the biotech regulator in India under the Ministry of environment and forests with no such biosafety or public health concerns.
- However, it is yet to be commercialized.

Threat from GM crops:

- Some researchers have concerns about the effect of Bt crops on human health.
- There is evidence that GM crops will impact directly on human health through damage to the ileum, the final portion of the small intestine, which joins it to the large intestine.
- With virtually all GM seed, farmers may soon be unable to save seed from their crops. Hence, there will be monopoly of GM suppliers in market which are few in number.
- GM varieties can pollute neighboring crops in "**pollen trespass.**" GM corn has **polluted traditional varieties in Mexico**, threatening traditional culture and genetic diversity.

Advantages of GM crops

- India spends roughly around **\$12 billion annually on vegetable oil imports**. GM mustard has been considered by agri-experts as a solution for the country's edible oil deficit because it has yields up to 30% higher than the normal varieties.
- The variety –named as **Dhara Mustard Hybrid-11 or DMH-11** has been developed by a team of scientists from Delhi University.
- Increasing agricultural productivity is the only solution to India's increasing population and increasing pressure on land. Introducing GM crop can be one of the solutions to increase agricultural productivity.

6**Millet Village Scheme**

CONTEXT: Recently, Satisfied with its trial run in the Millet Village scheme at Attappady in Palakkad district in Kerala, the State Agriculture Department of Kerala earmarked farm space in more districts for growing nutrient-rich millets.

About:

- State Agriculture Department of Kerala was planning to expand cultivation of millets to Idukki, Wayanad and other parts of Palakkad, including more tribal villages at Attappady.
- The department had sought Central support under the **national-level mission for promoting millets**.
- Under the Millet Village scheme, the department had harvested ragi (finger millet), thina (foxtail millet), cholam (sorghum) and kuthiravaali (barnyard millet) in 1,200 acres.

• Millets:

- Millet is a term used for a group of **small seeded grasses** that are often termed as nutri-cereals or dryland crops.
- Sorghum, Pearl Millet, Ragi, small millet, foxtail millet, Porso millet, barnyard millet a Kodo millets e.t.c are different types of millets.
- Karnataka is leader in production of millets in India.**
- India is largest producer of millets in the world.**

• Benefits of millets

- Millets can be grown in areas of low rainfall. Hence, it provides livelihood for millions of people in the world who are living in **drought prone areas** such as Nigeria, Niger, North-West and south west India.
- They are used in multiple forms such as food, fodder, in breweries and in formation of biofuels.
- Nutritionally millets are superior food crops owing to their **low glycemic index** and high content of minerals such as Iron and Zinc.

Significance:

- With concept of '**Superfood**' and '**Eat Smart Strategy**' forming a significant part of modern day dietary needs it has become important to focus on millets and related area.

- Being the largest producer of millets in the world, India has prime responsibility to go for **policy formulation** regarding millets in the world.
- In India, it is grown extensively at places which are separated by **100 cm isohyet**. They are climate resilient crops which can be grown in drier areas as well as semi-Arid to arid regions.
- African countries which are in close proximity to Great Sahara are also world leaders in its production. Initiative of FAO to declare 2023 as international year of millets will boost production of millets in these countries.

7

Policy bias against rainfed agriculture

CONTEXT: Recently, Revitalizing Rainfed Agriculture (RRA) Network released a rainfed agriculture atlas.

About:

- **Agriculture Atlas highlights:**

- The new agricultural Atlas maps the agro biodiversity, socio-economic conditions prevailing in such areas and also documents the policy biases that are making farming unviable for many in these areas.
- **Percentage of farmers using rainfed irrigation:** Three out of five farmers (60%) in India grow their crops using rainwater, instead of irrigation.
- **Investment by government:** *Per hectare government investment into their lands may be 20 times lower*, government procurement of their crops is a fraction of major irrigated land crops, and many of the government's flagship agriculture schemes are not tailored to benefit them.
- **Investment in mode of irrigation:** Lands irrigated through big dams and canal networks get a per hectare investment of ₹5 lakh. Watershed management spending in rainfed lands is only ₹18,000-25,000.
- **Income of Farmers:** Farmers in rainfed areas are receiving 40% less of their income from agriculture in comparison to those in irrigated areas.
- **Procurement:** When it comes to procurement, over the decade between 2001-02 and 2011-12, the government spent ₹5.4 lakh crore on wheat and rice. Coarse cereals, which are grown in rainfed areas, only had ₹3,200 crore worth of procurement in the same period.

Revitalizing Rainfed Agriculture (RRA) Network

- Revitalising Rainfed Agriculture (RRA) Network, formed in 2010 is a **pan India network of more than 600 members**, including eminent academics, policy makers, farmer and civil society organisations that work to influence public systems, policy and investments for productive, prosperous and resilient rainfed agriculture.
- RRA Network was and has since been evolving operational processes for planning and convergence to facilitate the revival of rainfed agriculture.
- During the 12th Five Year Plan, the Natural Resource Management (NRM) and Rainfed Farming subgroup constituted by Ministry of Agriculture (MoA) has come up with a strategic framework to improve growth in rainfed agriculture.

Conclusion:

- There must be a **separate policy for agriculture in rainfed areas** which has been neglected for a long time as flagship government schemes, such as seed and fertilizer subsidies and soil health cards, are designed for irrigated areas and simply extended to rainfed farmers without taking their needs into consideration.

- Secondly, many hybrid seeds notified by the government scheme need plenty of water, fertilizer and pesticides to give high yields and are thus not useful to most rainfed farmers.
- A more balanced approach was needed, to give rainfed farmers the same research and technology focus, and production support that their counterparts in irrigation areas have received over the last few decades.
- According to experts, cash incentives and income support like the PM-KISAN scheme will help farmers in a better way as they can invest according to their needs.

8 Possibilities in Jute Sector in India

Context:

- Recently, ban on plastic bags in different states of India has provided opportunity to jute sector to revive.
- This has led to massive procurement of Jute bales by Jute Corporation of India.

About:

- A total of **3.46 lakh bales** worth Rs. 190 crores have been procured by Jute Corporation of India (JCI) during the last two years benefitting around 39,000 farmers. Rs.100 crores have been approved for 2018-19 and 2019-20 for procurement operations by JCI.
- Whenever the market price of raw jute falls below a certain level, the JCI procures raw jute at Minimum Support Price (MSP), fixed on the basis of recommendation of the commission for Agricultural Cost and Prices (CACP) from jute growers to safeguard their interest.
- To protect the interest of farmers, the Government imposed Definitive **Anti-Dumping Duty** in January, 2017 on jute goods originating from Bangladesh and Nepal.
- By promoting Jute cultivation, government envisages to reopen closed jute mills in different states of India.

Jute:

- Almost 85% of the world's jute cultivation is concentrated in the Ganges Delta.
 - The suitable climate for growing jute is a warm and wet climate, which is offered by the monsoon climate.
 - Temperatures ranging from 25-30 °C and relative humidity of 70%-90% are favorable for successful cultivation.
 - Jute requires 160-200 cm of rainfall weekly with extra needed during the sowing period.
 - River basins or alluvial or loamy soils are best for jute cultivation.
 - Jute cultivation in red soils may require high dose of manure and pH range between 4.8-5.8 is best for its cultivation. Plain land or gentle slope or low land is ideal for jute cultivation.
- India is the largest producer of jute in the world according for 56 % of the world jute production.
 - West Bengal is largest producer of Jute in India.

Significance:

- Increasing use of biodegradable and eco-friendly products in carry bag segment will help to revive jute sector in India.
- Providing skill training for production of value added products such as Carpets, canvases e.t.c will boost prospects of Jute Sector in India.
- Despite being largest producer of Jute in the world India imports jute significantly. There is need to incentivize jute sector for better production so that import dependency could be reduced.

9

All India Rural Financial Inclusion Survey (2016-17)

CONTEXT: Recently, NABARD has released its report titled “All India Rural Financial Inclusion Survey (2016-17)”

About:

- According to the National Bank for Agriculture & Rural Development's (NABARD) All India Rural Financial Inclusion Survey 2016-17, Agriculture Generates **not even a quarter of rural household incomes in India**.
- Even for so-called agricultural households, just over **43 per cent of their average income comes from cultivation of crops and rearing of animals**.
- The NABARD survey estimates **the total number of rural households in India for 2016-17 at 21.17 crore**.
- Out of the **21.17 crore rural households**, 10.07 crore, or under **48 per cent, are “agricultural”**, those with at least one member self-employed in farming and reporting annual value of produce at more than Rs 5,000. The remaining **11.10 crore households** or **52 per cent are “non-agricultural”**.

Net Monthly Income:

- According to the survey, the average net monthly income of Indian rural households after deducting expenses incurred in the course of economic activity was Rs 8,059.
- The highest share of this (Rs 3,504) was accounted for by wage labour (both farm and non-farm), which was followed by government or private service jobs (Rs 1,906).
- Agriculture i.e. income from crop cultivation and livestock rearing contributed only Rs 1,832.

Significance:

- This type of survey will be helpful in understanding the rural economy in a better way and thus will lead to effective implementation of schemes.
- Findings also highlight the need to strengthen the agriculture sector to increase income from farm activities.
- It highlighted the importance of wage labour in monthly income of an agricultural household and thus defined the importance of schemes like MGNREGA.

10

International Conference on Recent Advances in Food Processing Technology (iCRAFPT)

CONTEXT: Recently, International Conference on Recent Advances in Food Processing Technology (iCRAFPT) was held in at Indian Institute of Food Processing Technology, Thanjavur in Tamilnadu.

About:

- This conference provided an important platform for exchange ideas related to **food research** by bringing international speakers together at a single platform.
- It discussed a range of issues from food processing to areas of advances in food engineering and its industrial applications, **food product development, food biotechnology, nano foods** e.t.c
- During conference speakers highlighted that the bumper production and diversification of agriculture had brought in new challenges for everybody in view of the **large scale food wastage** on one hand and **seasonal & regional demand & there supply issues** of many commodities.
- At the same time, importance of food processing sector was also discussed to a larger extent as it can balance the both problems highlighted above.

Importance of food processing sector in India

- The percentage share of the organised/registered food processors are hardly 1.5 percent of the total food processors, which should be increased.
- Our nation's export basket of food produces contains **75% of the fresh F&V and unprocessed item and only 25% of processed products.**
- This has lowered the expected revenue which could be earned from agricultural product's export.
- India's agricultural sector is growing at a rate 4.9% per year, whereas the food processing sector has grown at 8% which clearly establishes the importance of the food processing sector in India.
- Food Processing sector has an ability to **prevent large scale food wastage on the hand and add value to the processed food on the other.** It will also help government to achieve its aim to **double the farmer's income by 2022.**

11

Krishi Kumbh-2018

CONTEXT: Recently, the government of Uttar Pradesh in association with the Government of India organized a mega Agriculture Expo called "Krishi Kumbh-2018" from 26-28 October 2018 at Indian Institute of Sugarcane Research Lucknow.

About:

- "Krishi Kumbh-2018" was planned to project the state's agriculture potential on one hand and provide a platform for interaction among stakeholders on the other hand.
- The primary objective of Krishi Kumbh 2018 was to provide a common platform to farmers, farmers group, technical experts and entrepreneurs for seamless exchange of knowledge regarding agriculture production food processing and marketing, agriculture mechanization, agro-food processing, high value crops, input and technology management in agriculture, PHT, e-NAM, ICT and innovative models in extension, animal husbandries, horticulture, poultry, fishery and many more.
- This mega event witnessed participation of over one lakh farmers beside several ministers, senior Government officials and other Policy makers, international organizations, heads of banks and development institutions and captains of industries working in this vast area.
- Krishi Kumbh-2018 comprised of the National level exhibition, technical sessions around the **theme of doubling farmers income**, Business Meet, and host of other engaging activities.

Significance:

- As Uttar Pradesh is the state with the largest number of farm holdings and largest numbers of farmers, this event offered a great opportunity for showcasing their works to the stakeholders in this field, especially the large number of farmers who visited this mega event.
- Increasing application of technology in field of agriculture will boost agricultural productivity to a greater extent but at the same time a platform like it was needed to increase investment in field of agriculture and a platform for scientist- farmer interconnection.

12

National Mission on Government e-Market (GeM) portal

CONTEXT: The National Mission on GeM (NMG) was launched on 5th September 2018 till 17th October 2018.

About:

- The objective of the Mission was **to accelerate the adoption and use of Procurement by Major Central Ministries, States and UTs and their agencies** (including CPSUs/PSUs, Local Bodies) on the GeM platform. The objectives of the NMG were to:
 - Promote inclusiveness by catapulting **various categories of sellers and service providers**

- Highlight and communicate 'value add' by way of transparency and efficiency in public procurement, including corruption free governance.
- Achieve cashless, contactless and paperless transaction, in line with Digital India objectives.
- Increase overall efficiency leading to significant cost saving on government expenditure in Procurement.
- Maximizing ease in availability of all types of products and services bought by Government buyers.

Significance:

- The main aim of GeM is to bring transparency, efficiency, and inclusiveness in public procurement.
- At the same time, it has reduced the time of procurements, reduced the process and enabled ease of doing business for both buyers and vendors.
- There is huge savings in the cost of procurement, ranging from a minimum of 10% to 45% in different categories after the use of GeM.
- The average saving based on the MRP/Listed price is about 28%.
- Overall, GeM has saved government revenues to a great extent and at the same time it has brought down corruption in procurement process.
- These steps by government has improved India's ranking on a global corruption index in 2018. **India rose by three points to 78** in the list of 180 countries in the world.

13

Technology Initiatives for Coffee Stakeholders

CONTEXT: Recently, Minister for Commerce & Industry in a bid to promote *Coffee industry* in India launched *Coffee Connect - India coffee field force app* and *Coffee Krishi Tharanga* - digital mobile extension services for coffee stakeholders.

About:

- **The mobile app Coffee Connect** has been developed to ease the work of field functionaries and to improve the work efficiency.
- This application provides solution by harnessing the power of mobility comprising the latest technology in easing the whole process of the field activities like digitization of Coffee Growers & **Estates with Geo Tagging**, collecting the Plantation details.
- It will also help in transparency in the activities of the extension officers and officials, transparency in subsidy disbursement and real time report generation.
- **The Coffee KrishiTharanga services** are aimed at providing **customized information and services** to increase productivity, profitability, and environmental sustainability.
- The customised services are two ways, 24 X 7 service supports. The "Coffee KrishiTharanga" is pilot tested in the Chikmagalur and Hassan districts of Karnataka State covering 30,000 farmers during the first year and will be extended to remaining growers in a phased manner.
- NABARD has partly funded the Pilot project. The solution will help in to reach maximum growers in limited period, efficient, timely, customised advisory, improve the efficiency through digitisation and leverage existing mobile reach for wider delivery of improved technology.
- Pilot projects on data analytics, artificial intelligence, IOTS and blockchain & smart contract Coffee Board has also identified technological solutions to address some of the perennial coffee production and coffee farming issues and challenges such as rainfall, pests and diseases.

Coffee production in India

- Coffee is cultivated in India in about 4.54 lakh hectares by 3.66 lakh coffee farmers and 98% of them are small farmers.
- Its cultivation is mainly confined to Karnataka (54%), Kerala (19%) and Tamil Nadu (8%) which form traditional coffee tracts. Coffee is also grown in non-traditional areas like Andhra Pradesh & Odisha (17.2%) and North Eastern states (1.8%), with main emphasis on tribal development and afforestation.

Significance:

- Coffee is a cash crop which has huge demand across world. Production of coffee with innovative technologies will help farmers, distributors and other stakeholders.
- This initiative will help to tackle local problems in coffee cultivation and will help to improve its prospects in coming years.

14**ENSURE – National Livestock Mission-EDEG**

CONTEXT: Recently, a portal named ENSURE- National Livestock Mission-EDEG which has been developed by NABARD and operated under the Department of Animal Husbandry, Dairying & Fisheries was launched.

About:

- NABARD has developed an online portal “ENSURE” in order to provide information related to beneficiary of National Livestock Mission and application related to enrollment under it.
- EDGE is a mission component under National Livestock Mission in which subsidy payment for activities related to poultry, small ruminants, pigs etc. goes directly to the beneficiary’s account through Direct Benefit Transfer (DBT).
- Online portal “ENSURE” has been launched in order to make it better, simpler and transparent.

Significance:

- The subsidy will be approved within 30 days from the date of sanction of loan.
- Earlier, even after the loan approval, subsidy took a long time to reach the beneficiary’s account.
- Through this process, the flow of information/funds will also be quicker and more accountable.
- The burden of extra interest due to delay in the disbursement of the subsidy would now be reduced after the launch of the portal.

15**Sach GOURAV**

CONTEXT: ‘Sach-Gourav became the *first cloned Assamese buffalo* produced by ICAR-Central Institute for Research on Buffaloes (CIRB) at Hisar in Haryana.

About:

- It is the first cloned Assamese buffalo born in India at **CIRB (Central Institute for Research on Buffaloes), Hisar in Haryana**. The calf was born to a **Murrah buffalo**.
- The genotype of the calf was confirmed by **microsatellite analysis** (parentage verification) and **chromosome analysis**.

Other Achievements of India in field of cloning

- The first cloning was done at the **National Dairy Research Institute**, Karnal in 2010. The cloned Buffalo was named “Samrupa” and it was the first cloned Buffalo in the world.
- Hisar Gourav is a **Murrah buffalo calf** produced from the cell taken from the ventral side of the tail of a buffalo bull.
- With this achievement CIRB (Central Institute for Research on Buffaloes) had become world’s third and India’s second institute to produce cloned buffalo.
- This achievement had been made under the project entitled, Cloning for conservation and multiplication of superior buffalo germplasm.

Central Institute for Research on Buffaloes (CIRB)

- Central Institute for Research on Buffaloes (CIRB) was established in the year 1985. It is located at Hisar in Haryana.
- The institute carries out research on various aspects of buffalo improvement including conservation, improvement and propagation of germplasm, development of optimum rations and feeding systems for different categories of buffaloes, enhancement of reproductive efficiency, health management practices for augmenting milk, meat and draught performance of the species.

Significance:

- India accounts for **58% the world's buffaloes** and **35% of India's cattle are buffaloes**.
- Buffalo milk contributes **70% of the total milk yield in India** and Buffalo meat makes up 86% of India's total meat exports.
- Strengthening of Research and Development in this field will help to consolidate India's top position in milk production in the world.
- India is also the world's largest consumer of milk. Increasing demand of milk products could be countered by High Yielding Variety of milch animals.
- Cross breeding and genetic modifications of non-drought animals will help them to sustain in drought conditions and adapt in changing climate.

16

Zearalenone in cereals

CONTEXT: Recently, a study conducted by Journal of Food Science detected zearalenone in wheat, rice, corn and oats from markets in Uttar Pradesh.

About:

• Zearalenone:

- Zearalenone is a **fungus toxin** infesting cereals such as wheat, maize and barley. It attacks crops while they are growing, but can also develop when cereals are stored without being dried fully.
- A study published by **Journal of Food Science** detected Zearalenone in wheat, rice, corn and oats from markets in Uttar Pradesh.
- This study was conducted by researchers from Lucknow's Indian Institute of Toxicology Research (IITR), found the substance in 70 of the 117 samples tested.
- The **Food Safety and Standards Authority of India does not impose maximum limits for Zearalenone**, though the European Union (EU) does.
- Twenty-four of the U.P. samples exceeded the EU regulatory limits of 100-200 mcg/kg of cereals.

• Other Fungal toxins and regulations in India

- Fungal toxins are commonly found in food, and can be a public health concern. India regulates the levels of some of these, including **aflatoxin, deoxynivalenol, ergot and patulin**.
- The first three infest cereals, while patulin is found in apples. Each of these toxins has been associated with disease outbreaks.

• Negative impacts of fungal toxins:

- In 1974, a hepatitis outbreak in Rajasthan and Gujarat, which made 398 people sick and killed 106, was linked to aflatoxin in maize.
- Chronic aflatoxin consumption has been shown to cause **liver cancer**. The **International Agency for Research on Cancer (IARC)** classifies aflatoxin as a Group 1 carcinogen, meaning there is enough evidence for its carcinogenicity.

- However, in Zearalenone's case, there is no strong evidence of toxicity in humans so far, but there may be potential impacts on it.

Significance:

- This research is significant after Monosodium Glutamate which was found in noodles samples in Uttar Pradesh. Food safety is directly related to public health concerns which must be regulated according to international standards.
- India's **Agriculture Export Policy** has included a provision of maintaining international standards of safety for food product to be exported. **Agricultural & Processed Food Products Export Development Authority (APEDA)** is nodal authority to deal with it.
- If India wants to **double its agricultural export** basket as envisaged by its Agricultural Export Policy then it must regulate its internal food market and food processing industries with international standards.

17 Soil moisture map

CONTEXT: Recently, India has got its first soil moisture map developed using hydrological model.

About:

• What is soil moisture map?

- Soil moisture is of paramount importance in various applications e.g. hydrology, agriculture and meteorology.
- Mapping of different areas and different types of soil to analyze soil moisture is called soil moisture map.

• Soil moisture map of India

- It has been prepared by IIT Gandhinagar and the India Meteorological Department (IMD).
- It has taken into consideration soil, vegetation, land use and land cover among other parameters apart from rainfall data.
- It suggests that deficit soil moisture conditions are likely during the winter sowing season in Gujarat, Bihar, Jharkhand, Tamil Nadu and southern Andhra Pradesh.
- It predicts that in western Uttar Pradesh, Bundelkhand, and Chhattisgarh soil moisture is likely to be normal or surplus in the Rabi season.

Significance:

Some of the applications where soil moisture is useful are:

- Advanced knowledge about soil moisture is crucial for farmers to plan their crops and the required irrigation in the field.
- Optimal irrigation in farms
- Identify areas being over-irrigated
- Improved flood risk estimation
- Monitor agricultural drought in near real time
- Improved weather forecast
- Analyse the impact of an irrigation project
- Identify the irrigated area by an irrigation source
- Automatic billing of farm based on the actual irrigation
- Estimation of actual evapotranspiration taking place
- Estimation of area getting degraded

18 Categorisation of Farmers in India

CONTEXT: Recently, PM- KISAN was launched in order to provide Direct Benefit Transfer (DBT) to marginal and small farmers. Following is the list of division of farmers according to their land holdings.

Sr. no.	Types of farmers	Size of land holding
1	Marginal	Below 1.00 hectare
2	Small	1.00-2.00 hectare.
3	Semi- Medium	2.00-4.00 hectare
4	Medium	4.00-10.00 hectare
5	Large	10.00 hectare and above

18 India's First Aqua Mega Food Park

CONTEXT: Recently, India's first Aqua Mega Food Park was inaugurated in Madhya Pradesh. It has been named as Godavari Mega Aqua Food Park Pvt Ltd.

About:

- Godavari Mega Aqua Food Park Pvt Ltd (GMAFP) is set up at **Bhimavaram of West Godavari District, Andhra Pradesh**.
- Conceptualized as a **Hub & Spoke Model**, the Mega Food Park is constructed with its Core Processing Center (CPC) at Tundurru Village in Bhimavaram region.
- Acting as the Hub and the Spoke comprises of Two Primary Processing Centers (PPC) at Amalapuram in East Godavari District (PPC1) and Karlapalem in Guntur District (PPC2) along with the 9 Collection Centers (CC), one each in the 9 coastal districts of the state of Andhra Pradesh.
- The Mega Food Park being developed in 55.65 Acres offers **Preprocessing, Processing, and Packaging & Storage** along with transportation facilities providing world class infrastructure and technology to the enterprises.
- Both farmers and processors engaged in the aqua food processing industry.
- Godavari Mega Aqua Food Park will provide a platform and establish **backward and forward linkages** covering the entire aqua food processing value chain, quality assurance, food safety and implementation of best practices in post-harvest management.
- The Godavari Mega Aqua Food Park shall make available the latest food processing technologies to Fish & Shrimp farmers, Companies, Exporters and Marketers through international tie-ups.
- Located in heart of the **most aqua-rich areas of India, the facility is foreseen as the destination for sourcing food products** for domestic and international markets in future.
- This Mega Food Park is supported and approved by Ministry of Food Processing, Government of India under **Mega Food Parks Scheme** to provide all infrastructural facilities under one roof.
- The Food Park upon completion will be certified with **"USFDA" (United States Food & Drug Administration), "EU" (European Union), "BAP" (Best Aquaculture Practices), "BRC" (British Retail Consortium) ISO standards**.

Significance:

- India is among the largest producers of the fish in the world. It is second largest producer of fish in the world.
- Providing forward and backward linkages will help India to become leader in fish production.
- Mega Food Park will add value addition and certification from USFDA and BAP will help to match export standard of the world.

INDUSTRY

1 Delhi Mumbai Industrial Corridor (DMIC)

CONTEXT: The Delhi-Mumbai Industrial Corridor Project (DMIC) is one of the world's largest infrastructure projects with an estimated investment of US\$90 billion and is planned as a high-tech industrial zone spread across six states.

About:

- Delhi-Mumbai Industrial Corridor is a **mega infra-structure project of USD 90 billion** with the financial & technical aids from Japan, covering an overall length of 1483 KMs between the political capital and the business capital of India, i.e. Delhi and Mumbai.
- It envisages to build **Multi-modal High Axle Load Dedicated Freight Corridor (DFC)** between Delhi and Mumbai, covering an overall length of 1483 km and passing through the six States - **U.P, NCR of Delhi, Haryana, Rajasthan, Gujarat and Maharashtra**, with end terminals at Dadri in the National Capital Region of Delhi and Jawaharlal Nehru Port near Mumbai.
- **Composition of DMIC:**
 - It includes **24 industrial regions, eight smart cities, two international airports, five power projects, two mass rapid transit systems, and two logistical hubs.**
 - The eight investment regions proposed to be developed in Phase I of DMIC are following:
 - Dadri-Noida-Ghaziabad (UP),
 - Manesar-Bawal (in Haryana),
 - Khushkhhera-Bhiwadi-Neemrana
 - Jodhpur-Pali-Marwar (Rajasthan),
 - Pithampur-Dhar-Mhow (MP),
 - Ahmedabad-Dholera Special Investment Region (SIR) (Gujarat)
 - Shendra-Bidkin Industrial Park, and
 - Dighi Port Industrial Area in Maharashtra.
- **Investment:**
 - Initially a project development fund with an initial size of ₹1,000 crore (US\$139.1 million) has been set up with equal contribution from Japanese and Indian government.
 - Project initially aims for US\$100 billion direct investment in this scheme. Japan will be a major investor for this project.
 - Apart from it, many countries such as Canada, the U.S., Singapore and Taiwan are also willing to invest.

Significance:

- Industrial development along this corridor will boost Foreign Direct Investment in India and GDP growth of India.
- It will also create job opportunities at the time when joblessness is all time high.
- This corridor passes through agricultural heartland of Haryana and Western Uttar Pradesh. Development of infrastructure and road connectivity will provide forward linkages to farmers.
- Western Dedicated Freight Corridor will provide an alternative option for logistics industry to operate between Delhi and Mumbai in shortest time interval.
- It will provide impetus to **Make in India, supported by Startup India and Standup India**, a total of **24 special investment nodes** are conceived to be created by the government, that would support manufacturing, as any kind of industry can be setup along this corridor.

2 India to build Railway link to Nepal

CONTEXT: India has envisaged to build railway link from Raxaul in Bihar to Kathmandu in Nepal.

About:

- Raxaul-Kathmandu rail line is **113 km long** railway line project which will be running from Raxaul in Bihar to Kathmandu in Nepal.
- The objective of the Raxaul-Kathmandu rail line was to expand “connectivity” between the two neighbors and “enhance people-to-people linkages and promote economic growth and development”.

Significance:

- This will strengthen India-Nepal bilateral ties and trade.
- India exports a huge bulk of goods and services to Nepal. This rail link will boost ties in trade and commerce.
- China has proposed to build a railway line between **Lhasa in the Tibet Autonomous Region (TAR) and Kathmandu** by 2022, under its ambitious **trans-Himalayan economic corridor** with an apparent aim of reducing Kathmandu’s dependence on India. This would definitely hurt India’s trade interest in Nepal.
- Raxaul-Kathmandu rail line will help India to counter China’s trans-Himalayan economic corridor.

3 India to build Railway link to Nepal

CONTEXT: Department of Commerce of the Ministry of Commerce & Industry has notified a scheme for Transport and Marketing Assistance (TMA) for Specified Agriculture Products.

About:

- The “Transport and Marketing Assistance” (TMA) for specified agriculture products scheme aims to provide assistance for the international component of freight and marketing of agricultural produce which is likely to mitigate disadvantage of higher cost of transportation of export of specified agriculture products due to trans-shipment and to promote brand recognition for Indian agricultural products in the specified overseas markets.
- The scheme would be suitably included in the **Foreign Trade Policy (2015-20)**.

Eligibility:

- All exporters, duly registered with relevant Export Promotion Council as per Foreign Trade Policy, of eligible agriculture products shall be covered under this scheme.

- The assistance, at notified rates, will be available for export of eligible agriculture products to the permissible countries, as specified from time to time.

Mode of assistance:

- Assistance under TMA would be provided in cash through direct bank transfer as part reimbursement of freight paid. FOB supplies where no freight is paid by Indian exporters are not covered under this scheme.

Significance of the scheme:

- This scheme will help India to achieve its goal to double the export of agricultural products under its **Agriculture Export Policy**.
- This scheme will also help Indian agricultural produce to reach international market.
- It will also help government to achieve its goal of **doubling the farmer's income by 2022**.

4 Ratnagiri Mega Refinery

CONTEXT: Recently, Saudi Arabian oil and Gas giant Aramco signed a MoU with a consortium of Indian Oil Companies IOCL, BPCL and HPCL to establish **world's largest integrated refinery cum petrochemicals complex at Ratnagiri**.

About:

- Project will be 50:50 joint partnership with an Indian consortium of IOC, BPCL, HPCL and Aramco.
- This project is estimated to be built at an expense of 3 lakh crore rupees.
- The refinery will be capable of processing 1.2 million barrels of crude oil per day.
- The refinery will also provide feedstock for the **integrated petrochemicals complex**, which will be capable of producing approximately 18 million tonnes per annum of petrochemical
- It will produce a range of refined petroleum products, including petrol and diesel meeting **BS-VI fuel efficiency norms**.

Significance:

- India is the **third largest consumer of oil in the world**. To feed domestic consumption, a large infrastructure project like Ratnagiri refinery was needed.
- Collaboration with an oil giant like Aramco will transfer technical expertise and technology to India which will help growth of Oil and Gas sector which is one of the eight core sectors of economy.
- This Maha project will bring a huge positive change to Ratnagiri and Sindhudurg Districts and the state of Maharashtra through the overall economic development of the region.

5 Trans Regional Maritime Network (T-RMN)

CONTEXT: Recently, India signed an accession pact to the 30-member Trans Regional Maritime Network that would give it an access to the information on ships passing through the Indian Ocean Region.

About:

• Trans Regional Maritime Network (T-RMN)

- It is aimed at exchange of information on the movement of commercial traffic on the high seas.

- ▶ There are 30 member states in this network which is headed by Italy.
- ▶ The information is available primarily through the Automatic Identification System (AIS) fitted on merchant ships with more than 300 Gross Registered Tonnage, as mandated by the **International Maritime Organization**.
- ▶ The AIS information, comprising the name, MMSI number, position, course, speed, last port of call and destination, can be picked up through AIS sensors.
- ▶ India already has bilateral White Shipping Agreements with 36 countries.

International Maritime Organization

- IMO is the **global standard-setting authority for the safety, security and environmental performance of international shipping**.
- Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented.
- It is a specialized agency of the United Nations.
- Its role is to create a level playing-field so that ship operators cannot address their financial issues by simply cutting corners and compromising on safety, security and environmental performance.

Significance:

- Joining Trans Regional Maritime Network (T-RMN) will help India to identify different types of vehicles passing through its maritime water.
- It will help it to identify and neutralize illegal drug traffickers and terrorists easily.
- It will also strengthen India's coast guard and navy to secure its maritime borders and let go commercial vehicles.

INFRASTRUCTURE

1 Zoji La tunnel project

CONTEXT: Recently, Zoji La tunnel project was sanctioned by government.

About:

- **Zoji La pass:**

- ▶ Zoji la Pass is a high mountain pass in the Indian state of Jammu and Kashmir, located on National Highway 1 between Srinagar and Leh in the western section of the Himalayan mountain range. It separates Kashmir Valley to its west from Dras Valley to its northeast.
- ▶ It was captured by Pakistan during Kargil conflict but was recaptured under **operation Bison**.
- ▶ It is situated at an altitude of 3,528 m (11,575 ft).
- ▶ Zoji La Tunnel is a 14.2 km long road tunnel under Zoji La pass on the Himalayas between **Sonmarg and Dras town of Kargil district** of the Indian state of Jammu and Kashmir, currently under construction.
- ▶ Zozila tunnel aims to reduce the distance travelled in 3 hrs to 15 minutes only.
- ▶ After Construction it will ensure year-long road connectivity between Srinagar and Leh which currently remains closed for about seven months due to heavy snowfall on the Zoji La pass which is situated on **Srinagar-Kargil-Leh highway**.
- ▶ The Zoji La tunnel will be **the longest bi-directional road tunnel in Asia**. Its construction period will be five years because of a very difficult terrain where in some areas the temperature drops to minus 45 degree Celsius.

Significance:

- It takes more than 3 hours to cross the pass but the tunnel will reduce the time to only 15 minutes.
- This tunnel is a strategic requirement of the army and the Ladakhi people as the pass is close to LOC and vulnerable to hostile actions by terrorists.

2 Integrated Automatic Aviation Meteorological Systems (IAAMS)

CONTEXT: Recently, Integrated Automatic Aviation Meteorological System (IAAMS) was inaugurated by Indian Navy at INS Garuda.

About:

- IAAMS envisages to **conduct automatic and continuous recording of standard weather parameters** that are vital for accurate weather forecasting.

- It is equipped with the state of the art Meteorological Sensors viz., Radar Vertical Wind Profiler, Transmissometer, Ceilometer and Automatic Weather Observation System.
- It alerts the duty staff about any abnormal change of weather parameters that may affect safe flying operations.
- It disseminates routine weather reports automatically from one air station to other Air Stations and to ATC (Air Traffic Control) tower without any human intervention, as per **World Meteorological Organization (WMO) standards**.
- It is overall fourth air station installed with this integrated system.

Significance:

- It aims to modernize the Meteorological infrastructure of the nine Naval Air Stations.
- It will give a major fillip to aviation safety through automation of weather monitoring process.

3

Sela pass tunnel

CONTEXT: Recently, Government announced to build a tunnel through the Sela Pass which is located at altitude of more than 13000 ft.

About:

• Sela Pass:

- The Sela Pass is a high-altitude mountain pass located on the border between the Tawang and West Kameng Districts of Arunachal Pradesh state in India.
- It has an elevation of 4170 m (13,700 ft) and connects the Tibetan Buddhist town of Tawang to Dirang and Guwahati.
- The pass carries the National Highway 13 (previously NH 229), connecting Tawang with the rest of India.
- While Sela Pass gets heavy snowfall in winters, it is usually open throughout the year but landslides or snow requires the pass to be shut down temporarily.
- **Sela Tunnel will ensure yearlong connectivity through Sela pass.**
- The project is being constructed by the Border Roads Organisation (BRO) and would be completed in the next three years.

Significance:

- Sela pass is located close to **101 lakes which are considered sacred in Buddhism**. Tunnel will provide yearlong connectivity and will boost tourism in the area.
- It will also reduce the travelling time from Tezpur to Tawang significantly.
- It is important from strategic point of view as it is located in border area. China has repeatedly claimed territorial rights over Tawang citing it was part of former theocracy of Tibet.

4

Shakti Sthala

CONTEXT: Recently, Karnataka government has inaugurated the first phase of world's largest solar power park named "**Shakti Sthala**".

About:

- The **world's largest solar park**, Shakti Sthala, has a capacity of 2,000 MW and has set up at an investment of Rs16, 500 crore at **Pavagada in Karnataka's Tumakuru district**.
- When it will run in its full capacity, it will generate electricity of about 2,000 megawatts (MW). First phase will deliver only 600 MW of power as proposed.

- The solar project, touted as the largest in the world, is spread over 13,000 acres and five villages.
- It is part of the **"Karnataka Solar Policy 2014-2021"** which aims to decrease dependence on traditional power sources and move to environmentally friendly ones to meet the growing power needs of the state.
- The park ties in with the centre's scheme to generate 100 gigawatts (GW) of solar power by 2020 which has now been revised to 227 GW with contribution of solar energy at 113.49 GW.

Significance:

- It will give a boost to India's commitment to harness 227 GW of Renewable energy by 2020 (Previously it was 175 GW).
- It will create employment in drought prone district of Tumakuru in Karnataka and will utilize parched land.

5 India's largest dry dock at cochin shipyard

CONTEXT: Recently, Shipping Ministry announced that India's largest dry dock will be built at Cochin Shipyard.

About:

• Dry-dock:

- The dry dock is a structured area wherein construction, repairs and maintenance of merchant vessels and boats are carried out.
- The unique construction allows the water to be filled up in an area, also known as a lock so that vessels can be maneuvered in and out of the area.
- Once the vessel enters the dry dock, the gates are closed and the seawater is drained out so that hull and other areas of the ship which have been exposed to seawater for a long time are available for carrying out maintenance and repair works.

• Dry Dock at cochin shipyard

- The dry dock will give an impetus to **'Make in India'** initiative under **Sagarmala** (Programme for building and modernizing ports) and raise **India's share in global shipbuilding to 2%. India currently occupies 0.66%** share in global shipbuilding market.
- The dock will be able to build specialised and technologically advanced large vessels like LNG Carriers, drill-ships, jack-up rigs, large dredgers, aircraft carriers for the Indian Navy and high-end research vessels.
- India's commercial shipbuilding industry is worth Rs 3,200 crore and focuses primarily on small-medium sized off-shore vessels and cargo/bulk carriers. The new dock is being constructed at a cost of Rs 1,799 crore.

Significance:

- Around **95 per cent of India's trading by volume and 70 per cent by value** is done through maritime transport. Developing this sector will help India's economy in multidimensional way.
- India is the **sixteenth largest maritime country** in the world, with a **coastline of about 7,517 km**. Development of ship maintenance sector will help its fisheries sector which will ultimately help local industries to build up.

6 India's longest elevated road

Context: Expressway connecting Raj Nagar Extension in Ghaziabad to UP Gate is longest elevated road in India was inaugurated in Uttar Pradesh.

About:

- The **Hindon Elevated Road** will be connecting Raj Nagar Extension in Ghaziabad to UP Gate, shortening an hour-long journey to just 18 minutes.
- The expressway is a 10.3 km long elevated road, making it the longest elevated road in the country.
- The entire stretch of the Hindon Elevated Road is built on 228 single-pier pillars.
- The Hindon Elevated Road is constructed on **Transit-oriented development (TOD) basis**, a kind of urban planning that aims at public transportation made easily accessible to residential, business and leisure space.

7**Eastern Peripheral Expressway**

CONTEXT: Eastern Peripheral Expressway connecting Kundil and Palwal in Haryana was recently inaugurated by Prime Minister.

About:

- It connects Kundil and Palwal in Haryana and passes through Sonapat, Baghpat, Ghaziabad, Noida, Faridabad and Palwal.
- It is 135- km expressway which connects National Highway 1 and 2 from the eastern side of Delhi and aims to decongest and de- pollute the national capital by diverting traffic.
- This expressway will entirely be lit by solar power and will pass through 36 national monuments and 40 fountains located at a distance of 500m.
- Trees have been planted on both sides of highway with provision of drip water irrigation to irrigate the.
- It will be equipped with modern technologies for automated challan for overspeeding which will be detected by Speed cameras.

Significance:

- Rapid Urbanization and immigration has increased the population of NCT of Delhi which has led to traffic congestion. Eastern Peripheral highway will help to decongest it to a greater extent by providing an alternative way.
- It will provide new areas connected to NCT and will allow it to expand and develop new satellite towns in its vicinity.

8**Banihal-Qazigund tunnel**

CONTEXT: Recently, National Highway Authority of India (NHAI) announced that Banihal-Qazigund tunnel will be commissioned soon.

About:

- Banihal Qazigund Road Tunnel is an **8.5 km road tunnel at elevation of 1,790 m in the Pir Panjal range** in the Indian state of Jammu and Kashmir connecting Banihal and Qazigund.
- It is a **double tube tunnel** consisting of **two parallel tunnels** - one for each direction of travel. Each tunnel is 7 m wide and has two lanes of road.
- The two tunnels are interconnected by a passage every 500 m for maintenance and emergency evacuation.
- The tunnel will have forced ventilation for extracting smoke and stale air and infusing fresh air. It will have **state of the art monitoring and control systems** for security.

Significance:

- It will replace existing dependence on Jawahar Tunnel which is prone to avalanches and is closed time to time.

- The new Banihal-Qazigund tunnel's elevation is 1,790 metres (5,870 feet), 400 metres below the Jawahar tunnel. This makes it less prone to avalanches.

9 Water aerodrome in Chilika Lake

CONTEXT: Recently, the Airports Authority of India has proposed to set up a water aerodrome in Chilika Lake for starting amphibious aircraft operations in Odisha.

About:

- This airport will be setup as a green field project under UDAN regional connectivity scheme.
- However, there are some chances that this project may face regulatory hurdle.
- As For six months between October and March, Chilika turns into a temporary habitat for lakhs of migratory and residential birds.
- If an aircraft flies at low height, there is every chance of the birds getting hit.
- While the bird population will be in danger, safety of passengers of amphibious aircraft will also be jeopardized.
- As aerodrome may boost tourism at a **Ramasar convention site** which is also **largest brackish water lake of Asia** but at the same time it may cause threat to migratory birds and safety of passengers.

10 Western Dedicated Freight Corridor

CONTEXT: Recently, the railways has completed the 306-km section between Madar (Ajmer) in Rajasthan and Kishangarh (Rewari) in Haryana in the western segment.

About:

- Equipped for heavy-haul train operation with 25 tonne axle loads for the first time in the country, the section contains 15 major bridges and 271 minor bridges and 177 **Road Under Bridges** (RUB).
- The 306-km route has six newly-built freight stations - Dabla, Bhagega, Sri Madhopur, Pachar Malikpur, Sakhun and Kishangarh and three junctions - Rewari, Ateli and Phulera.
- Freight trains on Dedicated Freight Corridor Corporation Limited (DFCCIL) will be capable for attaining speeds of 100 kmph as against the current maximum speed of 75 km/h on Indian Railway network.

Western Dedicated Freight Corridor

- The Western Dedicated Freight Corridor or Western DFC is a broad gauge freight corridor under construction in India by Indian Railways.
- It will connect India's capital, Delhi, and its economic hub, Mumbai. This corridor will cover a distance of 1483 km and would be electrified with double line operation.
- This will run parallel to existing Delhi - Mathura main line.
- Route from Rewari to Dadri will be entirely new line and Dadri will further be connected to Khurja junction which will connect this corridor to Eastern Dedicated Freight Corridor.

Significance:

- It will provide transportation of raw materials along **Delhi - Mumbai Industrial Corridor**.

11**Bogibeel Bridge: India's longest river bridge**

CONTEXT: Recently, Bogibeel bridge which is India's longest river bridge was inaugurated.

About:

- Bogibeel Bridge is a **combined road and rail bridge** over the Brahmaputra river in the north eastern Indian state of Assam between Dhemaji district and Dibrugarh district.
- Bogibeel river bridge is the longest rail-cum-road bridge in India **measuring 4.94 kilometers** over the Brahmaputra river.
- The bridge has a **double rail line on the lower deck and a 2 lane road on the upper deck**.
- It is **Asia's 2nd longest rail-cum-road bridge** and has a serviceable period of around 120 years.
- It is India's first bridge **to have fully welded steel-concrete support beams** that can withstand **earthquakes of magnitudes up to 7 on the Richter scale**.

Significance:

- The bridge, fourth over the Brahmaputra, will be of strategic importance, for it will boost India's ability to transport troops and supplies to its border with China in Arunachal.
- Nearly 75 per cent of the 4000-km long border which India shares with China is in Arunachal and the bridge will help in logistical support for the Indian Army deployed to guard the border.
- It will benefit people in several districts of Arunachal Pradesh and Assam, as the rail distance between Dibrugarh and Itanagar has got reduced by over 700 km.

12**City Gas Distribution (CGD) Projects**

CONTEXT: Recently, Prime Minister Shri Narendra Modi today laid the Foundation Stones of City Gas Distribution (CGD) Projects in 65 Geographical Areas (GAs) in 129 Districts under the 9th CGD Bidding Round.

About:

- City gas Distribution project was launched in 1990s to provide Piped Natural Gas (PNG) to households in different cities of India.
- Pilot projects were launched in the early 1990s in two metros **Delhi and Mumbai** through joint venture companies Indraprastha Gas Limited (IGL) and Mahanagar Gas Limited (MGL) leading to the start of commercial operation of city gas projects.
- It envisages to promote the usage of environment friendly clean fuel i.e. natural gas as a **fuel/feedstock across the country to move towards a gas based economy**.
- Till September 2018, 96 cities/Districts in different parts of the country were covered for development of CGD networks. About **46.5 lakh households and 32 lakh CNG vehicles** are availing the benefit of clean fuel through existing CGD networks.
- 2 crore PNG (Domestic) connections and **4600 CNG stations are expected to be installed in next 8 years across the country**.
- PNGRB has also initiated the process of 10th CGD bidding round for additional 50 new GAs covering 124 districts in 14 States to increase the potential coverage to about 53% of the country's area covering 70% of country's population.

Significance:

- Its main aim is to provide pollution free fuel to Indian cities which are already choked due to pollution from different anthropogenic sources such as construction activities, unplanned urbanization and vehicular pollution.
- Secondly, India aims to build a gas-based economy and increase its share in India's energy sector from 6% to 15%.

- Initiatives like **Urja Ganga Project** and **Pradhan Mantri Ujjawala Yojna** aims to increase consumer base in this sector.

13 Kaiga power station-1 creates a world record yet again

CONTEXT: Recently, Karnataka's Kaiga created a world record for the longest uninterrupted operation for 941 days, thereby breaking the earlier record of 940 days by the United Kingdom's Heysham-2 Unit-8.

About:

- Heysham-2 Unit-8 of the U.K. had held the earlier record of the longest uninterrupted operation (940 days) among all nuclear power reactors (of all technologies) in the world.
- Kaiga Generating Station (KGS-1) broke this world record by uninterrupted operation for about 941 days continuously
- While KGS-1 is a Pressurised Heavy Water Reactor (PHWR), Heysham-2 Unit-8 is an Advanced Gas Cooled Reactor (AGR).

Kaiga Nuclear power station

- Kaiga Generating Station is a nuclear power generating station situated at Kaiga in Uttara Kannada district of **Karnataka**.
- The plant has been in operation since March 2000 and is operated by the **Nuclear Power Corporation of India**.
- It has four units of 220 MW each,

14 Noney Bridge: World's Tallest Railway Bridge

CONTEXT: Northeast Frontier Railway (NFR) has managed to construct 100 metres tall pier in the world's tallest railway bridge being built in Manipur.

About:

- India is all set to get world's tallest railway bridge. The bridge is expected to be about twice the height of Qutub Minar which is the tallest Minaret in the world made of bricks.
- On completion, the bridge is expected to be over **142 meters tall**.
- It has been named as **the Noney Bridge**. The total length of the bridge will be 703 meters.
- Standing tall at 139 meters, Mala-Rijeka viaduct, Europe currently holds the tallest railway bridge record.**
- The project will have 45 tunnels in total, the longest being 10.280 Km long.
- The bridge is part of the new 111-km long **Jiribam-Tupul-Imphal broad gauge line project** and it will connect Manipur with the rest of the country.

Significance:

- Building new infrastructure projects in North east is a prime importance for government under its **Act East policy to connect with East Asian Countries**.
- North Eastern Regions are long being neglected by successive regime but its **strategic location due to proximity to Chinese border** and East Asian countries can't be neglected. Now, it is being seen as gateway to East Asian countries and Indo-Malayan region.
- Along with it and infrastructure project like Bogibeel bridge, India is strengthening its position in alongside Myanmar and Chinese border.

15

"The Future of Rail" Report

CONTEXT: Recently, Minister of Railways launched the report "The Future of Rail" of International Energy Agency (IEA).

About:

- "The Future of Rail" the first-of-a-kind report analyses the current and future importance of rail around the world through the perspective of its energy and environmental implications.
- This report has been published by **International Energy Agency**.
- The report reviews the impact of existing plans and regulations on the future of rail, and explores the key policies that could help to realise an enhanced future rail.
- This first ever global report has a focus on India, elaborating on the unique social and economic role of rail in India, together with its great enduring potential, to show how India can extend and update its networks to harness rail at a scope and scale that is unparalleled.

Findings of future of Rail Report:

- **Energy Efficient:** Rail is among the most energy efficient modes of transport for freight and passengers, while the rail sector carries 8% of the world's passengers and 7% of global freight transport, it represents only 2% of total transport energy demand.
- **Railways Electrification:** Three-quarters of passenger rail transport activity takes place on electric trains, which is an increase from 60% in 2000, the rail sector is the only mode of transport that is widely electrified today. This reliance on electricity means that the rail sector is the most energy diverse mode of transport. It has also made it pollution free as compared to diesel locomotives. Passenger rail is significantly more electrified than freight in almost all regions, and regions with higher reliance on urban rail and high-speed rail are those with the largest share of passenger-kilometers served by electricity.
- **Railway traffic around the world:** The regions with the highest share of electric train activity are Europe, Japan and Russia, while North and South America still rely heavily on diesel.
- Most conventional rail networks today are located in North America, Europe, China, Russia, India, and Japan. These regions make up about **90% of global passenger movements** on conventional rail with India leading at 39%, followed by China at 27%.
- **High Speed Railways and Metros:** In contrast, significant investments have been made in high-speed rail and metros. High-speed rail provides an important alternative to aviation while urban rail provides a solution to cities impacted by congestion and air pollution. **Growth has been most notable in China, which has overtaken all other countries in terms of network length of both types within a single decade.**

India: "The Future of Rail" Report

- India's railway system has played a fundamental role in the country's development, transporting people and goods throughout its vast territory, integrating markets and connecting communities. Following are the key findings of the report about Indian railways:
 - **Rail Passenger Traffic:** Rail passenger traffic in India has increased by almost 200% since 2000 and freight traffic by 150%, yet latent demand for mobility in India remains huge. In fact, rail activity in India is set to grow more than any other country.
 - **Length of Railway lines:** The conventional rail system in India comprises a total route length of almost 68000 km. Metro systems exist in 10 Indian cities. A further 600 km of metro lines are planned for the next few years.
 - **Proposal of High Speed Railways:** India does not have any high-speed rail. However, in 2015 India and Japan signed an agreement to develop a high-speed rail line connecting the cities of Ahmedabad and Mumbai, to come into operation in 2023. **Seven other high-speed lines** are currently under consideration. Once completed, they would connect the four cities that constitute the **Golden Quadrilateral** (Delhi, Mumbai, Kolkata and Chennai) plus other intermediate cities.

Significance:

- Future of Rail reports provided a glimpse of comparative study of world's major railways network. This would enable India to align with those countries who excelled in different sectors of Railways and bring home their technical expertise and experience.
- India can learn from China's massive leap forward in railways infrastructure and can thus provide a thrust to growth prospects in this sector.

16**Gas Trading Hub**

CONTEXT: Recently, Ministry of Petroleum & Natural Gas has given its nod to set up the gas trading hub(s)/exchange(s) in the country wherein the natural gas can be freely traded and supplied through a market mechanism.

About:

- It has been agreed to establish the gas trading hub(s)/exchange(s) in the country wherein the natural gas can be freely traded and supplied through a market mechanism.
- Draft National Energy Policy of NITI Aayog advocates for investment of US \$ 150 billion in energy sector on an annual basis until 2040 to strengthen this sector for a better developmental pace.

- **What is a gas Trading/ Exchange hub?**

- Natural gas hubs tend to be at the heart of gas infrastructure networks such as pipelines and liquefied natural gas (LNG) terminals.
- The hub is used as a central pricing point for the network's natural gas. In some cases, a financial derivative contract is priced off gas delivered at this point as well.

- **Significance of a gas trading Hub:**

- Establishing a gas trading hub takes time, investment and political will **to let prices develop without regulatory intervention.**
- Gas hubs require pipeline networks and storage sites that allow supplies to be traded and moved about at short notice.
- Diverse sources of gas supply, including from domestic output, pipeline imports and overseas LNG shipments, are seen as favorable to **avoiding domination by a few producers.**
- A strong consumer base, with **competing buying interests** - for example, from household, power and industrial consumers - is also seen as crucial to developing a diverse market place.
- **Regulation allowing domestic and foreign participants to trade and access pipelines and storage facilities is also seen as essential to establishing a gas hub.** Participants also need to know they can trust a government not to intervene when prices go against local interests.
- An oversupply of gas is also seen as necessary in the early stages of developing a trading hub to allow the commodity to be exchanged in significant volumes.

- **Major gas trading Hubs of the world:**

- The world's biggest natural gas hub is the Henry Hub in the U.S. state of Louisiana.
- Britain's National Balancing Point (NBP) and the Dutch Title Transfer Facility (TTF) have emerged as the main natural gas hubs, in Europe.
- Japan, China, India and Singapore in Asia are trying to establish gas trading hubs.

17

Byorung Bridge: India's longest 300-metre single lane steel cable suspension bridge

CONTEXT: Recently, India's longest 300-metre single lane steel cable suspension bridge was inaugurated in Arunachal Pradesh.

About:

- Byorung Bridge, built at a cost of ₹48.43-crore provided by the DONER (Department for Development of North Eastern Region) Ministry, will reduce the distance from Yinkiong to Tuting by almost 40 km.
- It is situated on Siang River in Arunachal Pradesh's Upper Siang district, bordering China.
- The bridge is expected to benefit 20,000 people on either banks of the river, besides bolstering the defence preparedness.

Significance:

- It will boost India's ability to transport troops and supplies to its border with China.
- Nearly 75 per cent of the 4000-km long border which India shares with China is in Arunachal and the bridge will help in logistical support for the Indian Army deployed to guard the border.
- It is also part of India's Act East Policy to strengthen its border infrastructure with East Asian Countries and China for bilateral trade and commerce.

18

Ganga Expressway

Context: Recently, Uttar Pradesh Government has envisaged to construct what is being touted as the world's longest highway, the Ganga Expressway between Meerut and Prayagraj.

About:

- The 600-km Expressway will be built at a cost of Rs 36,000 crore on a stretch of 6,556 hectares of land.
- The proposed Phase-1 of Ganga Expressway will weave through Meerut-Amroha-Bulandshahr-Budaun-Shahjahanpur-Kannauj-Unnao-Rae Bareli-Pratapgarh and end at Malawan Khurd village on Jhusi Sahson road in Prayagraj District.
- Phase-2 will comprise of two sections, one 110 km long section connecting Tigrī (near Garhmukteshwar) to Uttar Pradesh Uttarakhand Border near Haridwar and second 314 km connecting Prayagraj to Ballia. Total length of both the phases will come to 1020 km.
- The expressway will connect major cities in the state of Uttar Pradesh, passing through Varanasi, Mirzapur, Allahabad, Pratapgarh, Rae Bareli, Unnao, Kanpur, Kannauj, Hardoi, Farrukhabad, Shahjahanpur, Badaun, Bulandshahr.

Significance:

- Kumbh Mela is in UNESCO's intangible heritage list and is the largest gathering of human in the world. Connecting major cities with it will help people from across country to visit it.
- Apart from it, there are large number of pilgrimage sites along proposed highway such as Varanasi (2nd phase). Connecting all pilgrimage sites together will help to boost tourism of the region.
- Apart from it, Deprived Poorvanchal region will get a dedicated highway from Ballia to Merrut, near National Capital territory of Delhi which has been envisaged to be built in second phase.

18

Kerala to get country's 2nd longest rail tunnel for Vizhinjam port connectivity

CONTEXT: Recently, A 10.7-km railway line, including a 9.02-km tunnel, has been proposed to connect the upcoming Vizhinjam International Multipurpose Deepwater Seaport to the railway network, by Konkan Railway Corporation Ltd (KRCL).

About:

- The **9.02-km tunnel**, mooted by Konkan Railway Corporation Ltd (KRCL) from near the **Balaramapuram station on the Kanyakumari-Thiruvananthapuram railway line**, will be the second longest railway tunnel of the country on completion.
- It will be part of 10.7 Km railway line which has been proposed to connect the upcoming **Vizhinjam International Multipurpose Deepwater Seaport** to the railway network.
- The proposed railway line from Balaramapuram to Vizhinjam will be a single line and will be sufficient for the movement of 9 to 10 rakes daily through the corridor for the next 20 years.
- The cost of providing the rail connectivity, including land acquisition, has been put at ₹1,069 crore.

Significance:

- According to the Ministry of Shipping, around 95 per cent of India's trading by volume and 70 per cent by value is done through maritime transport. Hence, it is important to link ports with railways and road networks to provide logistic support.
- Under the National Perspective Plan for **Sagarmala**, six new mega ports will be developed in the country. Connectivity of these ports are provided under **Bharatmala Pariyojna**.

19

Purvanchal Expressway

CONTEXT: Recently, Prime minister laid the foundation of Purvanchal Expressway at Azamgarh.

About:

- Poorvanchal Expressway is a 354-km, 8-lane project, linking Lucknow to Ghazipur.
- Originally a six-lane expressway, but **expandable to 8-lane** later, the Purvanchal Expressway is to link Lucknow with Ghazipur.
- The 354 km- expressway is set to reduce the travel time between Lucknow to Ghazipur to 4.30 to 5 hours.
- It will be passing through eight districts of the state and would be linked to Varanasi through a separate link road.

Significance:

- Poorvanchal or eastern Uttar Pradesh is considered as one of the most deprived area of the country. Linking it with major infrastructure project will benefit the whole region.
- It will lead to industrial development in the region and will provide farmers access to market.

UNIT: 5

**HUMAN
GEOGRAPHY**

POPULATION WORLD PATTERNS

1 India's population grew twice as fast as China's: UN report

CONTEXT: Recently, a report by United Nations Population Fund (UNFPA) has stated that India's Population has grown more than twice as fast as China.

About:

World Population Report, 2018

- It has been released by United Nations Population Fund (UNFPA).
- World's population growth has been estimated at 1.1% while India's growth has been estimated at 1.2% which is 0.1% higher than world's average growth.
- ***The world's population rose to 7.715 billion in 2019, up from 7.633 billion the year before, with the average life expectancy remaining 72 years.***
- The least developed countries recorded the highest population growth, with countries in Africa registering an average of 2.7% a year.
- Much of the overall increase in global population till 2050 is projected to occur in high fertility countries, mostly in Africa, or in countries with large populations, such as India and Nigeria.

India's Population Scenario:

- It noted that ***India's population grew at 1.2% a year between 2010 and 2019, marginally higher than the global average of 1.1%*** a year in this period, but more than double China's 0.5% a year.
- Around half India's population in 24 states have achieved so-called replacement fertility rates of 2.1 children per women, which is the desired family size when the population stops growing, but the country's large youth bulge will continue to fuel population growth even as the size of the ageing population increases.
- According to the report the poorest 20% households have the largest unmet need for contraception and reproductive health services, with adolescents, disabled, unmarried young people, and the socially marginalized being the most deprived.
- The report remarked that India had made some groundbreaking shifts at the policy level and moved from a target approach to family planning services and methods to a rights-based approach, but it has still not fully moved away from sterilization incentives and disincentives.

Steps taken by government to control population growth rate since Independence:

- In 1951, ***India became the first country in the developing world to create a state-sponsored family planning program, the National Family Planning Program.***
- The program's primary objectives were to lower fertility rates and slow population growth as a means to propel economic development.

- The program was tied to a series of five year plans aimed at economic growth and restructuring which were carried out over 28 years, from 1951 to 1979.
- In the early 1970s, government of India had implemented **a forced sterilization programme**, but failed.
- Officially, men with two children or more had to submit to sterilization, but many unmarried young men, political opponents and ignorant, poor men were also believed to have been sterilized.

Results of India's family planning measures:

- Family planning in India resulted in a **19.9% decrease in birth rate** where it has since stagnated at 35 births per 1000 persons.
- By 1996, the program had been estimated to have **averted 16.8 crore births**.
- However, **maternal and infant morbidity and mortality rates remain high along with the number of unsafe abortions**, and little is known about the prevalence of sexually transmitted diseases.

Recent policies and schemes for family planning in India:

- **Mission Parivar Vikas:** It was launched in 2017 by Ministry of health and family welfare. The key strategic focus of this initiative is **on improving access to contraceptives** through delivering assured services, ensuring commodity security and accelerating access to high quality family planning services. Its overall goal is **to reduce India's overall fertility rate to 2.1** by the year 2025.

Steps need to be taken:

- **Minimum age of Marriage:** Minimum age for marriage must be raised from current age 18 years for women and 21 years for men.
- **Raising the Status of Women:** Women are child bearer and hence raising their status will reflect in maternal health and their understanding of family planning.
- **Social Security:** More and more people should be covered under-social security schemes. So that they do not depend upon others in the event of old age, sickness, unemployment etc. with these facilities they will have no desire for more children.
- **Employment Generation:** India must cater its demographic dividend by creating employment for youths. It will accelerate its pace of development.

MIGRATION

1

India and the Global Compact for Migration

CONTEXT: The Global Compact for Safe, Orderly and Regular Migration, a non-binding agreement for the better management of migration, was adopted by the United Nations member countries in December 2018.

About:

- The major goal of the Global Compact for Migration is **to assist nation states to frame well-managed migration policies.**
- **India is not a signatory to the UN Refugee Convention of 1951 or the 1967 Protocol, which protects refugee rights.**
- Hence, signing of global compact of migration is a better step by India as it is one of the worst hit country by illegal migration and is also the world's largest contributor of migrant workforce.

Global Compact for Migration

- It is a **non-binding agreement**, which aims for Safe, Orderly and Regular Migration (GCM) aims to better manage migration at local, national, regional, and global levels, including reducing the risks and vulnerabilities that migrants or refugees face at different stages of their journey.
- Despite its non-binding nature, the adoption of the compact has led to a wide range of discussions within and outside parliaments, especially in receiving states.
- **Out of the 193-member states, 164 countries have adopted the compact.**

Implications on India of migration treaties:

- Among the emigrant countries, **India receives the highest amount of remittance** per year. The World Bank classifies India as one of **the top emigrating countries** in the world, and the Indian diaspora is identified as the largest in the world.
- Simultaneously, India has witnessed immigration to the country over the years, especially from neighboring countries.
- Another stream is the **internal migration** within India. But, the Indian state's approach towards all three streams of migration is not explicit in nature and the **management of migration is ill-developed** as compared to other major sending and receiving countries.
- There is no balanced migration policy in the country which has led India to face criticism over the migration issue.

Significance:

- By signing global compact for migration, India will ensure its emigrants safety and will draft a migration policy with the help of GCM (Global Compact for Migration).
- India has a long history of immigration from Tibet, Bangladesh, Sri Lanka, Pakistan, Afghanistan and recently Myanmar.
- India has also internal migration from eastern and North-eastern states to western and North-western states. Hence, India needs a migration policy to counter these problems.
- India's limited natural resources has been overburdened by its population explosion and regular illegal immigration. A migration policy will help to manage migration issues in a better way.

HUMAN DEVELOPMENT

1

2019 UNDP Human Development Report on Inequality

CONTEXT: Recently, United Nation Development Program (UNDP) has told that it will release its 2019 Human Development Report (HDR), with its focus on inequality, this year's last quarter.

About:

- The report will provide a comprehensive picture of the many forms of inequality that are shaping the 21st century.
- According to UNDP, the life and prospects faced by a newborn in a poor country or in a poor household are radically different from those of wealthier children.
- In all societies, long-standing forms of inequality persist while gaps are opening in new aspects of life.
- The report intends to use a framework that looks beyond income (considering inequalities in health, education, tech and exposure to economic and climate-related shocks) and beyond averages (painting a more accurate and timely picture of the state of inequality).
- It will also seek to look beyond today by taking a long-term view of inequality and by identifying trends and making projections.
- It intends mainly to assess impact of inequalities on life and development of individuals.

Significance:

- In India economic inequality is very high. According to a study published by Oxfam, **82% of all of the wealth generated between the second quarter of 2016 and the corresponding period last year went to the top 1%.**
- While global inequality pattern is different from Indian scenario where the bottom **50% of the global population bagged less than 1% of total wealth in 2016-2017, India's 1% held 58% of the country's total wealth.**
- Government has taken many steps for financial inclusion by providing credit, banking services at doorsteps, insurance and social security but these steps are in preliminary stage.
- **Pradhan Mantri Swasthya Bima Yojna** and **Pradhan Mantri Jan Dhan** Account has been successful in implementation.
- Apart from financial insurance, government has also provided health insurance by providing 5 lakhs per family per year under Pradhan Mantri Jan Arogya Yojana (PMJAY).

URBANIZATION

1

Why the world should be watching India's fast-growing cities: How has India intended to solve problems of unsustainable urban growth

CONTEXT: Recently, problems of unplanned urbanization and unsustainable urban growth in India was discussed in world Economic Forum.

About:

- The UN Department of Economic and Social Affairs (UN DESA) predicts that future increases in the world's urban population will be concentrated in just a few countries.
- **India, China and Nigeria are together expected to account for 35% of the projected growth in the world's urban population until 2050;** of these three, the absolute growth in urban population is projected to be the highest in India.
- In terms of sheer numbers, the largest urban transformation of the 21st century is thus happening in India, and the Indian real estate and infrastructure industry is a key contributor to this growth.
- **Future development scenario in India**
 - India's real estate sector is expected to contribute 13% to the country's GDP by 2025 and reach a market size of \$1 trillion by 2030.
 - However, the environmental footprint of the Indian real estate industry is also mounting. Buildings in India account for 40% energy use, 30% raw material use, 20% water use and 20% land use; they also generate 30% of solid waste and 20% of water effluents.
 - **The sector is responsible for 24% of India's annual CO2 emissions, contributing to global warming and poor air quality.** It is therefore critical that India adopts a holistic and sustainable approach to real estate development.
- **India's urbanization scenario**
 - Many of India's metropolises and cities contend with unsustainable levels of stress on infrastructure, resources and public services.
 - To achieve sustainable growth, these cities will have to become more livable and safe with clean air; adequate infrastructure; reliable utilities; and opportunities for learning and employment.
 - The solution lies in inclusive urbanization processes that prioritize quality of life for all, focusing especially on the needs of vulnerable urban groups for employment, housing, sanitation, healthcare and education.
 - Most importantly, planning must incorporate long-term resource sensitivity and community involvement at every step, while benchmarking smart and measurable outcomes for all stakeholders.

- **India intends to set benchmark for urban development**

- India is currently at a unique tipping point in its journey of urban development, with **300 million new urban residents** projected by the same year.
- A plurality of cultures, languages, climate zones and landscapes, combined with the Indian government's efforts towards citizen-focused urban development, means that **India is poised to establish unique global benchmarks in sustainable urbanization**, which can be used for reference in future.

- **India's policy formulation and its commitment for development along with achieving SDGs (Sustainable Development goals)**

- **Renewable energy:** India registered a growth of approximately ~67% in wind power production in the last four years and also recorded its biggest ever solar power capacity addition of 5525.98 MW in 2017-18.
- **Policy-driven urban rejuvenation:** India has aimed to solve its urban problems with visionary schemes such as **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)**, **100 Smart Cities Mission**, **Housing for All (PMAY)** and **Swachh Bharat Mission**. These initiatives seek to ensure that urban progress is accessible to all and quality of life is enhanced.
- **Urban Transport:** At the national level, policies such as the **National Urban Transport Policy & the National Electric Mobility Mission Plan 2020** seek to provide safe, affordable, quick and sustainable access; and achieve fuel security and leadership in electric mobility.

PATTERNS OF DEVELOPMENT

1 Diversification of Rural Workforce in India

CONTEXT: Recent trend of growing *inter-sector migration* (migration from farm sector to other sectors of economy) and *rural-urban migration* due to stress on rural workforce caused by low growth rate of agriculture sector is a key concern. Further, it is a big challenge before government which aims double the farmer's income by 2022.

About:

- The Government of India has committed to doubling farmers' income by 2022 and has taken steps in this direction.
- However, a large chunk of the rural workforce constitutes daily wage earners, who comes under informal sector and are not covered under schemes enforced by government.
- The rate of transformation of farm sector has been slow in last few decades as compared to other sectors of Indian economy.
- The farm sector continues to provide employment to about 70 per cent of the rural workers of which 47 per cent are agricultural labourers.
- Agricultural wages, therefore, determine the livelihood of the largest segment of rural population.

• Causes of migration from farm sector:

- Labour absorption in non-farm sector has been mainly in construction, trade, hospitality, transport, storage and communication with construction being the dominant sector of all.
- **Economic opportunities in the non-farm sector have expanded in India**, both in urban and rural areas.
- The lopsided nature of growth of the non-farm sector is leading to **rural-urban migration**. The small base of the rural non-farm sector located within the large rural population is indicative of the employment potential in the rural non-farm sector.
- Growth of non-farm wages is decisive in leading to rural diversification and thereby relieving rural distress

• Trend of rural employment

- Employment pattern in the last three decades clearly indicates the dominance of the farm sector in providing employment to the rural population.
- Structural transformation has taken place and is evident from the continuous **decline in the percentage share of farm sector employment**. The reduction in dependency on farm sector was higher for male workers (8 per cent) than female workers (3 per cent) indicating higher dependency of women workers on farm employment.
- In 2011-12, **the farm sector provided employment to about 60 per cent of male workers and about 80 per cent of female workers**.

- **Migration pattern of rural workforce:**

- But due to boost in manufacturing sector and construction sector after 1990s has sucked up the rural workforce.
- Transport, storage and communication services sector is gradually growing and the share of total male employment almost doubled during the study period from 2 per cent to 4 per cent against a near insignificant gain in female employment.
- ***The transition from farm to non-farm employment is expected as the economy grows.***

- **Expected structural changes due to development:**

- The most significant increase has been that of the construction Technological developments and mechanization in farm sector is expected to force movement from farm to non-farm sector.
- Further, enhanced capital investment, skill building and infrastructural developments are likely to attract more labour in the non-farm sector.
- These factors lead to rural diversification and development.
- There are other compelling factors that can lead to shift in employment from farm to non-farm sector. This could be ***abundance in farm sector resulting in low profitability, growing risk in farm sector due to climate change, depletion in water levels etc***
- Increasing population has also led to structural changes in agricultural households.
- ***Self-employed in agriculture decreased by about 10 per cent since 1990s***, while there has been increase in marginal and small formers.

- **Steps need to be taken:**

- Schemes like Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and Pradhan Mantri Gram Sadak Yojana (PMGSY) provide rural workforce employment at their door step.
- These schemes provide part time jobs apart from jobs in farm sector during seasonal unemployment days to them.
- Apart from it these schemes develop rural infrastructure providing forward linkages to farm sector.
- Government must envisage implementation of such schemes to stop interstate and rural-urban migration.

UNIT: 6

**PLACES
IN NEWS**

PLACES IN NEWS

- **Modipuram, Ludhiana, Pantnagar and Kurukshetra:** Indian Council of Agricultural Research (ICAR) under Network Project on Organic Farming (NPOF) and All India Coordinated Research Projects (AICRP) on Integrated Farming Systems, has initiated an experiment on "Evaluation of zero budget farming practices in basmati rice-wheat system" at Modipuram (Uttar Pradesh), Ludhiana (Punjab), Pantnagar (Uttarakhand) and Kurukshetra (Haryana).
- **Varanasi:** Multi modal terminal was inaugurated in Varanasi. This is the **first of the four multi-modal terminals** being constructed on the National Waterway-1 (river Ganga) as part of the World Bank-aided Jal Marg Vikas project of the Inland Waterways Authority of India.
- **Pakyong:** It is situated in Sikkim. Here the first airport of Sikkim was inaugurated. It is the fifth highest airport in India. **Kushok Bakula Rimpochee Airport** in Leh is the highest airport in India.
- **Leh-Manali-Bilaspur Railway line:** This railway line is the first railway line in the country to have a station within a tunnel. **The Keylong station** will be constructed at a height of 3,000m, on the Bilaspur-Manali-Leh line which is near the Sino-India border. Keylong, located at a distance of 120km from the Indo-Tibetan border and 26 km north of Manali, is the center of administration of Lahaul and Spiti district in Himachal Pradesh.
- **Amravati:** Amravati is proposed capital city for the state of Andhra Pradesh. It will host the **World's first thermal battery plant** to be manufactured by **the Bharat Energy Storage Technology Private Limited (BEST)**, the first-of-its-kind cell is aimed at boosting up renewable sources of energy production, instead of non-renewable fossil fuel-based energy generation.
- **Baulsingha:** Baulsingha is a village in Odisha's Bargarh district. It will host India's first Second Generation (2G) Ethanol Bio-Refinery and also first in the country to produce ethanol from rice straw. This refinery will be set up by **Bharat Petroleum Corporation Limited (BPCL)** at an estimated cost of Rs1000 crore, the bio-refinery will produce **three crore litre of fuel-grade ethanol annually using rice straw** as feedstock.
- **Sadhubet island:** It is a **riverine island located in downstream of Narmada river**. **Statue of Unity** which was inaugurated can be located here. Standing at 182 meters tall, the Statue of Unity is built near **the Sardar Sarovar Dam** in the Narmada district of Gujarat. It is a colossal statue of Indian statesman and independence activist Sardar Vallabhbhai Patel who was the first Home minister of independent India.
- **Rajkot:** Rajkot was in news due to **"Eye-Way Project"**. Under this project 973 CCTVs cameras were installed across the city of Rajkot in Gujrat. This project got Rajkot the **safest city award**.
- **Farakka:** India has redesigned a **navigation lock** at Farakka barrage over the Ganges **to ensure smooth and safe migration of the Hilsa shoal during the three mating seasons**. It will ensure Hilsas' journey up to Allahabad after a gap of over 40 years down the Ganga this monsoon. A navigational lock is a device used for raising and lowering ships/vessels between stretches of water of different levels on river and canal waterways. Previously these locks were creating obstruction to Hilsa fishes.
- **Gorakhpur (Uttar Pradesh):** Hindustan Urvarak and Rasayan Limited (HURL) has signed a Rupee Term Loan agreement for the Gorakhpur fertilizer plant. HURL is currently implementing 3 urea projects at **Gorakhpur, Sindri and Barauni** in the eastern part of the country.

- **Gorakhpur (Haryana):** There is a Proposal for **nuclear plant in Gorakhpur in Haryana**. India's Atomic Energy Regulatory Board (AERB) has approved the start of excavation work at Gorakhpur for **the construction of two 700 MW pressurized heavy water reactors (PHWRs)**. Construction will start on the first unit in 2019.
- **Latur (Marathawada, Maharashtra) :** A new rail coach factory has been established in Marathawada region of Maharashtra in Latur. This will be operational in current year 2019-2020.
- **Rewa (Madhya Pradesh): Rewa Ultra Mega Solar** is a proposed solar power plant in the Rewa district of Madhya Pradesh, with a total solar installed capacity of 750 MW. Once completed in 2018, it would become one of the largest single-site solar power plant in India and the world.
- **Mandsaur (Madhya Pradesh):** A solar park was recently inaugurated at Suwasra, in Mandsaur district of Madhya Pradesh. It has been set up by NTPC at an investment of approx. Rs 1500 Cr mainly on non-agricultural land and Generation of Electricity have been achieved without affecting the natural eco-system with zero carbon emission. It has an installed capacity of 250 MW.
- **Udhampur:** Recently, the Environment Ministry has sanctioned a project for abatement of pollution in **Devika** and **Tawi** rivers at Udhampur town in Jammu and Kashmir, which is scheduled for completion by March 2021. Under this project, full sewerage system will be laid in the town and its entire sewage will be treated, the project will improve the aesthetics and sanitation conditions in Udhampur and support the Swachh Bharat Abhiyan towards ensuring cleanliness in the town.
- **Vishakapatnam:** Here, headquarters of dredging corporation of India is located. Government has decided for the strategic sale of **Dredging Corporation of India** to a consortium of four ports Vishakhapatnam Port Trust, Paradeep Port Trust, and Jawaharlal Nehru Port Trust & Deendayal Port Trust. **Dredging** is the process of removing material from one part of the river or oceans and relocating it to another
- **Delhi-Meerut RRTS corridor:** Recently, Delhi-Merrut RRTS (Regional Rapid Transport System) corridor was approved. It aims to lay high speed railway tracks in order to operate trains with speed up to 160 km/h. This 82 km stretch with 22 stations between Delhi, Ghaziabad and Meerut. The distance will be covered in less than 60 minutes by high-speed, high-frequency, safe, reliable, comfortable and green public transit.
- **Delhi-Alwar Regional Rapid Transit System:** This RRTS will connect Delhi to Alwar It is a proposed 164 km long, semi-high speed rail corridor connecting Delhi, Gurgaon, Rewari and Alwar.
- **Delhi-Sonipat-Panipat Regional Rapid Transit System:** Delhi-Panipat Regional Rapid Transit System (Delhi-Panipat RRTS) is a proposed, 103 km (64 mi) long, semi-high speed rail corridor connecting Delhi, Sonipat and Panipat in the National Capital.
- **Kurnool:** It is in Andhra Pradesh. It is in news because of innovative agricultural practices. Microsoft, ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) and Andhra Pradesh government had joined hands to develop Artificial Intelligence based agriculture information system. It includes metrological information and information such as time of sowing seeds e.t.c
- **Jawahar Lal Nehru Port (Maharashtra) and Karwar Port (Karnataka):** Both ports have been selected under Coastal Berth Scheme recently. The Coastal Berth Scheme provides financial assistance to Major/ Non-Major Ports/ State Maritime Board/ State Governments for creation of infrastructure to promote movement of cargo/passengers by Sea/National Waterways.
- **Mumbai:** Recently, **International Cruise Terminal** was opened in Mumbai. It will be completed by June 2019, and will be able to hold 500 passengers at a time.
- **Barmer:** Rajasthan's first oil refinery was inaugurated in Barmer in January, 2018. It is being developed by a joint venture (JV) between Hindustan Petroleum Corporation Limited (HPCL, 74%) and the Government of Rajasthan (26%), known as HPCL Rajasthan Refinery Limited (HRRL). It will have a total processing capacity of nine million metric tonnes per annum (Mmtpa).
- **Kundrodi (Gujrat):** It is located in Kutch in Gujrat. Cold and hot steel rolling plant has been established here.
- **Amritsar (Punjab):** India's largest roof top solar power plant has come up in Amritsar. A 19 MW system installed on an 82-acre campus of the RSSB Educational and Environmental Society in Amritsar, Punjab, is currently the world's largest too.

- **Vadodara:** India has got its first Railway University, the National Rail and Transport University, NRTU which is located in Vadodara. The institute will provide human resources training and build the capability of Indian Railways. It will be beneficial for the research and modernization of the country's archaic railway system.
- **Thally:** Thally is located in Krishnagiri district of Tamil Nadu. It will host the first agro-technology development center to be set up with Israel's assistance for development of floriculture.
- **Dindigul:** Another agro-technology development centre which specializes in vegetables is to be established in Dindigul. It is a district located in Tamil Nadu.
- **Antarvedi (East Godavari District, Andhra Pradesh):** Here, Dredging Corporation of India (DCI) will open its repair, skill development and maintenance yard for dredgers.
- **Kacheguda: Kacheguda Railway Station** under the South Central Railway (SCR) has earned the unique distinction of being the **first Energy Efficient 'A1 Category' Railway Station on Indian Railways**. It is located in Hyderabad. The station has achieved 100% energy efficiency by replacing 1,312 conventional lights with light-emitting diode (LED) lighting and 370 ceiling fans with energy efficient Brushless DC Electrical (BLDC) motors fans.
- **Dharoi Dam:** Dharoi Dam in the northern Gujarat was in news as it hosted Sea plane ride by Prime Minister while travelling from the Sabarmati river in Ahmedabad. It is one of the 6 water aerodrome proposed to be developed. Other are **the Sabarmati river fronts, Shatrunjay Dam**, and Statue of Unity (**Sardar Sarovar Dam**) in Gujarat, **Nagarjuna Sagar** in Telangana and **Umrangso Reservoir** and Guwahati in Assam.
- **Rajkot, Gujarat:** A new greenfield airport at Rajkot, Gujarat was approved by cabinet recently. The greenfield airport is situated in Hirasar district of Gujarat which will be 28 kilometres from Rajkot. It will be developed through a special purpose vehicle (SPV).
- **Jaintia hills:** 15 miners who were involved in rat hole mining were trapped on December 13 last year in an illegal coal mine at Ksan in **East Jaintia Hills district of Meghalaya** about 3.7 km deep inside a forest, when water from the nearby **Lytein river** gushed into it. National Green Tribunal (NGT) has banned this mining practice after the incident.
- **Araku valley:** Araku Valley Coffee bagged the gold medal for the best coffee pod in the Prix Epicures OR 2018 Award in Paris. This area is known for coffee production. It is located in Visakhapatnam district of Andhra Pradesh.
- **Kuttanad, Kerala:** Kuttanad is a delta region of about 900 sq. km situated in the west coast of Kerala State, India. The area is a larger mosaic of fragmented landscape patches and varied ecosystems such as coastal backwaters, rivers, vast stretches of paddy fields, marshes, ponds, garden lands, edges, corridors and remarkably networked water ways. **The Kuttanad Below Sea-level Farming System (KBSFS) is unique**, as it is the only system in India that practices rice cultivation below sea level. The major land use structure of KBSFS is flat stretches of rice fields in about 50,000 ha of mostly reclaimed delta swamps.
- **Numalligarh, Assam:** India's **first bio-fuel refinery** has been set up in Numalligarh, Assam. Further, this will be the first-of-its-kind bio-refinery in the northeastern region which will be entirely powered by renewable source of energy. The refinery will primarily use **bamboo biomass** as the fixed stock in production of ethanol. The bio-fuel refinery will be bamboo based and it will also be **the largest bio-fuel refinery** in the country.
- **Kalliyoore, Thiruvananthapuram, Kerala: National Banana Festival (NBF) 2018** was organized from 17 to 21 February at Kalliyoore, Thiruvananthapuram, Kerala. The festival was organised by Centre for Innovation in Science and Social action (CISSA) in partnership with Kalliyoore Grama Panchayat and a host of National and State organizations.
- **Palghar, Maharashtra:** Recently, Maharashtra government has offered 157 acres of land in Palghar district near to a private company to produce its indigenously designed 20-seater commercial aircraft. The aircraft will be designed and developed by Thrust Aircraft Pvt Ltd.
- **Palem, Telangana :** A Regional Agricultural Research Station has been established in Telangana which is entirely dedicated **dryland crops**.

- **Pottipuram, Tamil Nadu:** Pottipuram village is located in Theni district, near the Tamil Nadu-Kerala border in Tamil Nadu where India-based Neutrino Observatory project is to be built at an investment of Rs 1,500 crore. It is the latest in a series of neutrino detectors, neutrino factories and experiments being set up worldwide to promote research in particle physics.
- **Loktak Lake, Manipur :** Loktak Lake is the largest freshwater lake in India's north-east, and it is now home to a floating laboratory that patrols its waters analyzing pollution load to help conserve this biome. The 15-metre-long boat that can accommodate 10 people is a full-fledged laboratory made at cost of Rs. 5 lakh. It cruises on the vast waters of the Loktak Lake analysing the water quality.
- **Bhikampura:** Bhikampura village is located at Karauli in Rajasthan. Swajal pilot project was launched here to ensure the availability of clean drinking water to every household round the year. Swajal is a community owned drinking water programme for sustained drinking water supply. It was the 2nd Swajal project after first was launched in Uttarkashi.
- **Jewar, Noida, UP:** It is **greenfield project site for international airport**. The Jewar Airport is a proposed airport to be constructed in Jewar (56 kilometers (35 mi) from Noida) in Gautam Budh Nagar district of Uttar Pradesh. It will connect to the Yamuna Expressway, allowing domestic and international tourists to reach Agra, Mathura and Vrindavan.
- **Naitwar Mori:** Recently, 60-MW Naitwar Mori hydro project on the Tons River in Mori, Uttarkashi district of Uttarakhand was proposed. Naitwar Mori "has the potential to generate 265.5 million units of electricity every year. This project is expected to be completed in 48 months period.
- **Vijaypur:** This is the largest solar power plant which has been established in Uttar Pradesh. Built at a cost of around Rs. 528 crores, the 75 MW solar plant at Vijaypur village in Mirzapur, will generate 13 crore units of electricity per annum.
- **Hisar, Haryana:** India's first cloned Assamese buffalo male calf named Sach-Gaurav was born in the Central Institute for Research on Buffaloes (CIRB) at Hisar in Haryana. It was born to Murrah buffalo.
- **Anantpur, Andhra Pradesh:** It is set to host **India's first Wind Solar Hybrid Power project**, an integrated project of both solar and wind energy. The project, to come up in a strong wind zone of Ramagiri in Anantapur, will have 120 MW of solar, 40 MW of wind and a battery back-up facility of 40 MW.
- **Thootkundi, Tamilnadu:** It was in news recently due to protest against the **Sterlite Copper factory** which causes environmental pollution. It led to protests and death of many protesters due to clashes with police. Later, the National Environmental Research Institute (NEERI) and the TNPCB found evidence that Sterlite contaminated the groundwater, air and soil with its effluents and also violated standards of operation.
- **Kondapavuluru, Andhra Pradesh :** Southern Campus of National Institute of Disaster Management (NIDM) established at Kondapavuluru Village, Gannavaram Mandal, Krishna District of Andhra Pradesh was recently inaugurated by vice president of India.
- **Palampur, Himachal Pradesh:** **Zero-budget natural farming** was started in the Palampur agriculture university in Himachal Pradesh. Under the project, the university has dedicated 25-acre land to practise the zero-budget farming model. It is first such initiative to promote this farming practice.
- **Ahmedabad/Nagpur/Kochi:** "Mobilise your city" which envisages to cut green house gas emission in cities have been launched as pilot projects. Mobilise Your City (MYC) is part of an international initiative which is supported by the French and the German Governments and was launched at 21st Conference of Parties (COP21) meeting in December, 2015. Based on a proposal made by AFD in 2015, the European Union has agreed to provide funds of Euro 3.5 million through the AFD to contribute to specific investments and technical assistance components within the Mobilise Your City (MYC) programme in India.
- **Poonamallee and Avadi:** These are the centers of micro-composting. They are located in Tamil Nadu.
- **Sitamarhi (Bihar):** It has been declared plastic free district of Bihar.
- **Bogibeel, Assam:** Recently India's longest rail road bridge was inaugurated in Bogibeel in Dibrugarh district of Assam. It is located on Brahmaputra River and is 4.94 kilometres long. The bridge has a double rail line on the lower deck and a 2 lane road on the upper deck.

- **Bandipore (Jammu and Kashmir)** : Recently, Kishanganga Hydroelectricity project was inaugurated by Prime Minister at Bandipore. It has total capacity of 330 MW.
- **Kishtwar (Jammu and Kashmir)** : Recently, Prime Minister laid the Foundation Stone of the Pakal Dul Power Project in Kishtwar. It is a storage type hydroelectricity project which will generate 1000 MW of electricity. It is located at Marusadar River, a tributary of the Chenab River.
- **Ghaziabad (Uttar Pradesh)**; Recently Hindo Expressway which is longest elevated expressway of the country was inaugurated here. It will connect UP gate to rajnagar extension in Ghaziabad.
- **Ratnagiri**: Recently, a MoU was signed between Saudi Oil Giant Aramco and a consortium Indian oil giants IOCL, BPCL and HPCL to build an integrated refinery cum petrochemicals complex at Ratnagiri. It will be **world's largest refinery** cum integrated petrochemical complex after completion.
- **Kundli/Palwal (Haryana)**: Recently, Eastern Peripheral Expressway connecting Kundli and Palwal in Haryana was inaugurated by Prime Minister. It passes through Sonapat, Baghpat, Ghaziabad, Noida, Faridabad and Palwal. This 135- km expressway connects National Highway 1 and 2 from the eastern side of Delhi and aims to decongest and de- pollute the national capital by diverting traffic.
- **Yogyakarta** : It is a province located in Indonesia. Mount Merapi which is one of the most active volcanoes of the world is located in this province.
- **Somalia**: It is a country in eastern Africa was recently hit by Cyclone Sagar. It was the strongest tropical cyclone which ever hit Somalia.
- **Banihal-Qazigund (Jammu and Kashmir)**: Banihal Qazigund Road Tunnel is an 8.5 km road tunnel at elevation of 1,790 m in the Pir Panjal range in the Indian state of Jammu and Kashmir connecting Banihal and Qazigund. It is expected to be operationalized in current year.
- **Rawanda**: Recently, during his visit to Rwanda Prime Minister of India gifted 200 cows to villagers at Rweru Model Village, as part of the Rwandan Government's Girinka Programme. The program is based on the premise that providing a dairy cow to poor. Girinka Programme transforms livelihoods, reconciles communities improving agricultural productivity through the use of manure as fertilizers which would lead to improving soil quality and reducing erosion through the planting of grasses and trees.
- **Lucknow /Ghazipur (Uttar Pradesh)**: Both districts of Uttar Pradesh will be linked through eastern expressway or Poorvanchal expressway. Poorvanchal Expressway is a 354-km, 8-lane project, linking Lucknow to Ghazipur.
- **Mirzapur (Uttar Pradesh)**: Prime Minister Narendra Modi recently inaugurated the Bansagar canal project in Mirzapur in Uttar Pradesh. Bansagar Dam is a multipurpose river Valley Project on Son River situated in the Ganges Basin in Madhya Pradesh. The project aims to provide irrigation in the region and will benefit farmers of Mirzapur and Allahabad districts of Uttar Pradesh.
- **Dhemaji/Dibrugarh**: Recently, Bogibeel Bridge which connects Dhemaji district and Dibrugarh district of Assam was inaugurated. It is a road and rail bridge over the Brahmaputra river and is 4.94 kilometers long.
- **Sicily (Italy)**: It was observed that the southeast flank of Mount Etna in Sicily has been sliding towards the sea at a rate of several centimeters a year. , Mount Etna is a stratovolcano which is located in Sicily.
- **Migingo island**: Migingo is a small rock Island, located in Lake Victoria which is the largest lake in Africa and the largest Tropical Lake in the whole world. It is half the size of a football pitch.
- **Cochin**: Recently, government has envisaged to build largest dry dock at Cochin Shipyard. The dry dock will give an impetus to 'Make in India' initiative under Sagarmala (Programme for building and modernizing ports) and raise India's share in global shipbuilding to 2%. India currently occupies 0.66% share in global shipbuilding market.
- **Gajapati District, Odisha**: Recently, one of the most severe and unpredictable cyclone termed as Titli struck the Gajapati district of Odisha. The Regional Integrated Multi-Hazard Early Warning System (RIMES) for Africa and Asia, a 45-nation international organisation on disaster warning, has termed 'Titli', the severe cyclonic storm that devastated Odisha in October, 2018, as '**rarest cyclone**'.

- **Purulia district, West Bengal:** Turga Pumped Storage Project will come up in the West Bengal's Purulia district at Ayodhya hills. It will be constructed on Turga Nala, a tributary of Subarnarekha River.
- **Shillong, Meghalaya:** India International Cherry Blossom festival was held from November 14 to 17 in Shillong, Meghalaya. It envisaged to celebrate the unique autumn flowering of Himalayan Cherry Blossoms with several cultural events at Shillong, Meghalaya.
- **Sulawesi Island, Indonesia:** Recently, Mount Soputan which is located in the northern part of Sulawesi Island in Indonesia erupted. Soputan is one of Indonesia's more than 120 active volcanoes. It is located in Pacific Ring of Fire.
- **Ramanagaram district, Karnataka:** Mekedatu project is proposed on the river Cauvery and is located in Ramanagaram district in Karnataka. Recently, the Centre has given conditional clearance to build a reservoir across river Cauvery at Mekedatu on the border of Karnataka and Tamil Nadu.
- **Kaiga, Uttara Kannada district, Karnataka:** Recently, Karnataka's Kaiga created a world record for the longest uninterrupted operation for 941 days, thereby breaking the earlier record of 940 days by the United Kingdom's Nuclear reactor Heysham-2 Unit-8.
- **Manipur:** Northeast Frontier Railway (NFR) has managed to construct 100 meters tall pier in the world's tallest railway bridge being built in Manipur. India is all set to get world's tallest railway bridge. On completion, the bridge is expected to be over 142 meters tall. It has been named as the **Noney Bridge**. The bridge is expected to be about twice the height of Qutub Minar which is the tallest Minaret in the world made of bricks.
- **Sirmour district, Himachal Pradesh:** Recently, an agreement was signed between the Central government and government of six States namely Haryana, Uttar Pradesh, Rajasthan, Uttarakhand, Delhi, Himachal Pradesh to restart construction of the Renuka multipurpose dam project which is located in the Upper Yamuna Basin, in Himachal Pradesh's Sirmour district.
- **Balod, Chhattisgarh:** The Chhattisgarh Water Resources Department (CWRD) commenced the work on Mohar Reservoir Project in Balod district without ensuring the land required was acquired and obtaining environment and forest clearances.
- **Sankhuwasabha District, Nepal:** The Arun-III hydropower plant will be developed on the Arun River in Sankhuwasabha District of Province 1, East Nepal. It is an export-oriented project with a power generation capacity of 900MW. It is being developed on a build-own-operate and transfer (BOOT) basis by Satluj Jal Vidyut Nigam (SJVN) Arun 3 Power Development Company (SAPDC), a joint venture of the Government of India and the Government of Himachal Pradesh.
