

ASTRA

COMPLETE COVERAGE OF MONTHLY CURRENT AFFAIRS

OCTOBER 2023



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GEOGRAPHY & ENVIRONMENT

Ancient Kosi Superflood	4
Earthquakes In Afghanistan	4
Gangetic Dolphins	5
Coexistence of Asiatic Wild Dog & Tiger	6
2023: On Course To Be Warmest Year On Record	7
Kaziranga Sanctuary Reopens	8
Paintbrush Swift Butterfly	9
India & Green Hydrogen	9
Developed Countries to Overshoot Carbon Emissions Goal	10
A New Mushroom Species from the Western Ghats	10
'Maoists' open fire at Aralam Wildlife Sanctuary	11
Stop Taking Water for Granted	11

POLITY

State of India's Scheduled Areas	12
Dam Safety	13
Surrogacy	14
Electoral Bonds	16

GOVERNANCE & SOCIAL JUSTICE

Caravan Park in Kerala	18
Counting Deaths In India's Prisons	18
A Draft: Menstrual Hygiene Policy	20
Railways Develops Anti-Freeze Flushes and Fuel Tanks	21
Namo Bharat	21

ECONOMY

Gross GST Revenue Growth Slowed to 10.2% in Sept	22
Centre Unveils Tradeable Green Credit	23
Statistical Performance Indicators (SPI)	23
India, Japan on Semiconductor Supply Chain	24
Digital Crop Survey	25
India Skills Program	26
Periodic Labour Force Survey	27

INTERNATIONAL RELATIONS

Operation Ajay	28
Ferry to Sri Lanka	28
Indian Ocean Rim Association's (IORA) Council	28
Sri Lanka Announces Free Visas for Indians to Boost Tourism	29
India & China-Bhutan Boundary Talks	29
Qatar hands death penalty to 8 ex navy men	30

SCIENCE & TECHNOLOGY

Medicine Nobel 2023 & mRNA COVID Vaccines	31
Study about Internal Structure of Mars	31
Cloud Seeding can Produce Rainfall	32
World Reported Twice as many Cholera Cases in 2022 as in 2021	33
WHO Approves Use of Malaria Vaccine with Adjuvant Tech	34
Immuno ACT's Cell Therapy	35
Centre seeks Inclusion of Traditional Medicine on WHO's List	36
Avian Influenza Viruses Undergo Major Evolutionary Changes	36
Gaganyaan	37

DEFENCE & SECURITY

Astra BVR Air-To-Air Missile	38
Indian Air Force Unveils New Ensign on its 91st Anniversary	39
Radiation Detection Equipment	39
Phasing Out Cheetah, Chetak Helicopters From 2027	40

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Why in news?

- Geologists have found evidence of an extreme monsoon event and hyper-concentrated flows 11,000 years ago in the Kosi river, which can cause floods and avulsion.

Key Highlights

- These cores have proved crucial to geologists, who are reconstructing river floods in the Gangetic plain between 23 and 5 million years ago, in the Miocene era.
- Based on these studies, the researchers have reported that climate-change-related and seismic events ravaging the planet today could create **super-floods** that could be catastrophic for people in the Gangetic plain.
- The findings signal that we need to urgently **update India's disaster management strategy** to account for "**cascading hazards**": natural disasters that are triggered by other disasters.

Earthquakes In Afghanistan

Geography

Why in news?

- An earthquake of magnitude 6.3 struck western Afghanistan on October 15, barely a few days after multiple earthquakes of similar strength killed at least a thousand people in the Herat province.

Key Highlights

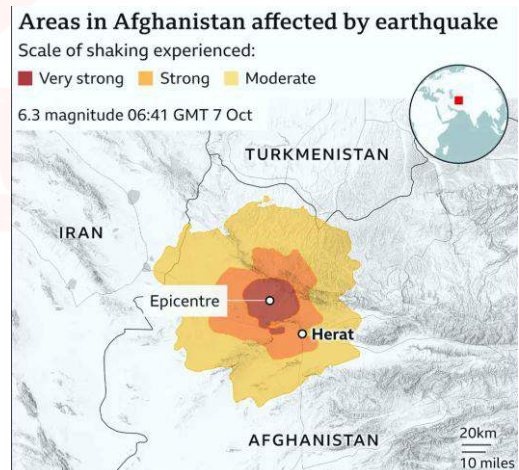
- Afghanistan has faced widespread destruction from intense earthquakes over the years.
- In June 2022, more than 1,000 people were killed when an earthquake of magnitude 6.1 struck Khost and Paktika provinces.
- In 2015, a major earthquake that struck the country's northeast killed over 200 people in Afghanistan and neighbouring northern Pakistan.
- A 6.1-magnitude earthquake in 2002 killed about 1,000 people in northern Afghanistan.
- In 1998, another earthquake and subsequent tremors in northeast Afghanistan killed at least 4,500 people.

■ The earth is made up of chunks of solid rocks called tectonic plates. Discontinuities in these rock masses, along which they have moved, are called fault lines.

■ Afghanistan is located over multiple fault lines in the region where the Indian and the Eurasian tectonic plates meet. These plates collide often, leading to significant tectonic activity.

Reasons behind frequent earthquakes in Afghanistan

- Afghanistan is located over **multiple fault lines** in the region where the **Indian and the Eurasian tectonic plates meet**.
- These plates collide often, leading to significant tectonic activity.
- Afghanistan is located on the Eurasian plate.
- Towards western Afghanistan, the Arabian plate subducts northward under Eurasia, and towards eastern Afghanistan the Indian plate does the same.
- In southern Afghanistan, the Arabian and Indian plates adjoin and both subduct northward under the Eurasian plate.



Why in news?

- A recent publication by scientists and researchers has revealed that 19 Gangetic river dolphins had been rescued from the irrigation canals of the Ganga- Ghagra basin in Uttar Pradesh between 2013 and 2020.

Key Highlights of Publication

- The publication, "**Rescuing Ganges river dolphins (*Platanista gangetica*) from irrigation canals in Uttar Pradesh**, North India, 2013-2020", not only highlights the capture and relocation methods but also describes the behavioural and demographic details of rescued animals
- and locations of the canals where the animals had been trapped.
- The paper points out that 24 rescue operations had been conducted from 2013 to 2020 and five dolphins had died.
- "There were 19 successful rescue operations and 14 dolphins were identified as female and 10 as male.
- The TBL (total body length) of these dolphins was found to be between 128 cm and 275 cm.
 - The size of male dolphins ranged from 128 cm to 195 cm, whereas the females ranged from 190 cm to 274 cm.
 - Of the five dolphins that died, three had a length over 243 cm.
- The publication said **dams and barrages had severely affected this habitat** as dolphins moved into irrigation canals where they were at a risk of injury or death from a multiple factors, such as rapidly receding waters, heat stroke and human interferences.
- The researchers also pointed out the **higher proportion of females to males**, and said larger animals and pregnant females look for an easier prey base in the canal system.
- Over 70% of entrapments were reported either post monsoon or during peak winter. This suggests straying incidents are directly related to the release of water into canals during or after the monsoon.
- "The other 30% of dolphins were rescued during peak summer when water levels fall and the minimum water flow is maintained.
- Among the rescued dolphins, females were found trapped between September and May with maximum occurrence during peak winter (December to February).
- In contrast, males were mostly recorded post monsoon and during the summer season, with least occurrence in peak winter," the paper says.
- Considering that the dolphins are found in the **Ganga-Brahmaputra-Meghna delta**, this is a huge problem to monitor this huge area and canal system.

About Ghagra River Basin

- It is a **freshwater species** and one of the few **river dolphins** found in the world.
- It inhabits the **Ganges-Brahmaputra-Meghna** and **Karnaphuli-Sangu river systems** of **Nepal, India, and Bangladesh**.
- Common Names:** Blind dolphin, Ganges dolphin, Ganges susu, hihu, side-swimming dolphin, South Asian River Dolphin
- Scientific name:** *Platanista gangetica*
- The Gangetic Dolphin has been recognized as **India's National Aquatic Animal**.
- Description:**
 - A **long thin snout, rounded belly, stocky body and large flippers** are characteristics of the Ganges River dolphin.
 - It **feeds majorly on fishes** and is usually found in counter-current systems of the main river channel.
 - Its **eyes lack lens**, and as a result, this species is also referred to as the "blind dolphin".
 - They have a **highly developed bio-sonar system** that facilitates them to hunt for fish even in murky waters.
 - Being a mammal, the Ganges River dolphin **cannot breathe in the water** and must **surface every 30-120 seconds**. Because of the **sound it produces** when breathing, the animal is **popularly referred to as the 'Susu'**.
- Conservation status:**
 - IUCN:** Endangered
 - Wildlife (Protection) Act:** Schedule-I
 - CITES:** Appendix I

Why in news?

- Overlapping prey availability or habitat suitability could dictate a positive association between dholes and tigers, facilitating coexistence or even cooperative behaviours between the two species of carnivores, a new study has found.

Key Highlights

- The **dhole or Asiatic wild dog** (*Cuon alpinus*) is the only endangered wild pack-living canid in the **tropical Indian forests** and is considered at **high risk of extinction**.
- The study through camera traps at **Manas National Park** in Assam also revealed that the **diurnal activity of the dholes had the highest temporal overlap with leopards and the lowest with clouded leopards**.

Fragmented Population

- Operating in packs of five to 10 — larger groups of more than 30 were observed in 2004 — dholes were once widespread across southern and eastern Asia.
- The global population of adult dholes, now classified as **endangered on the International Union for Conservation of Nature's Red List**, is estimated to be between 949 and 2,215.
- Factors such as **habitat loss, declining prey availability, persecution, disease, and interspecific competition** have contributed to the ongoing fragmentation of its populations.
- The hypotheses included **conflict with humans** on the periphery of protected areas as the **primary threat** to dholes, higher habitat utilisation where small-medium prey species such as rodents, hares, and rhesus macaques are found, and a **negative relationship between dhole habitat use and other large carnivores**.
- However, our study findings revealed a **surprising positive relationship between dhole habitat use and tiger**, rejecting the habitat exclusivity hypothesis.
 - This unexpected result challenges the assumption of antagonistic interactions between these two species and suggests a more complex ecological dynamic.
 - The positive association could be attributed to factors such as **overlapping prey availability or habitat suitability, which may facilitate co-existence or even cooperative behaviours** between dholes and tigers.

Manas National Park

- It is located in the foothills of Himalayas in Assam. It is contiguous with the Royal Manas National Park in Bhutan.
- It is a national park, UNESCO Natural World Heritage site, a Project Tiger reserve, an elephant reserve and a biosphere reserve.
- Flora: It contains some of the largest remaining grassland habitats in the sub-Himalayan grassland ecosystems.
- Fauna: The Park is known for its rare and endangered endemic wildlife such as the Assam roofed turtle, hispid hare, golden langur and pygmy hog.
- The name of the park originates from the Manas River, which is named after the serpent goddess Manasa.
- The Manas River is a major tributary of Brahmaputra River, which passes through the Manas National Park.

About Asiatic Wild Dog

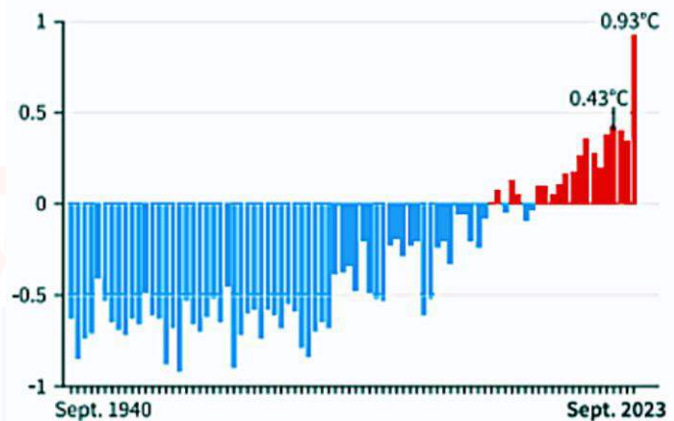
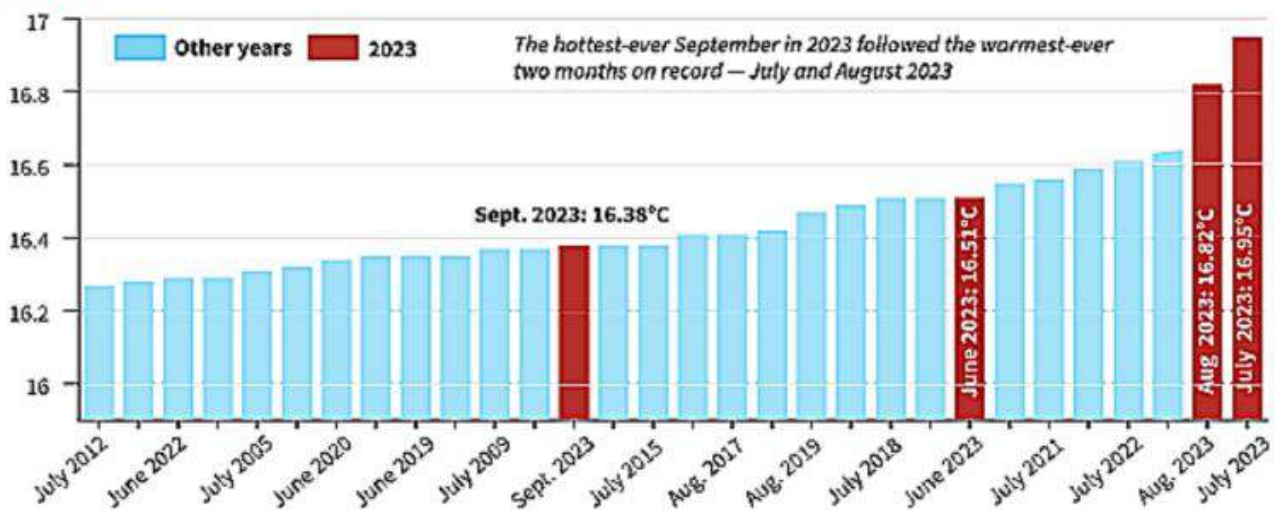
Dhole (Asiatic Wild Dog)	
About	<ul style="list-style-type: none"> Dhole (<i>Cuon alpinus</i>) is a wild carnivorous animal and is a member of the family Canidae and the class Mammalia.
Habitat	<ul style="list-style-type: none"> Dholes, historically widespread across southern Russia to southeast Asia, are now mainly found in south and southeast Asia, with northern populations in China. In India, they are clustered in the Western and Eastern Ghats, central India, and northeast India, with Karnataka, Maharashtra and Madhya Pradesh playing a crucial role in their conservation, according to a 2020 study.
Conservation	<ul style="list-style-type: none"> Wildlife Protection Act, 1972: Schedule 2. International Union for Conservation of Nature's Red List: Endangered. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): Appendix II. The creation of reserves under Project Tiger provided some protection for dhole populations sympatric with tigers. In 2014, the Indian government sanctioned its first dhole conservation breeding center at the Indira Gandhi Zoological Park (IGZP) in Visakhapatnam.

Why in news?

- 2023 recorded the **hottest-ever September**, following the warmest-ever two months on record — July and August 2023.
 - As the world gears up for COP28, there is alarming data on the horizon.
 - The year 2023 is on course to possibly becoming the warmest year in recorded history, with **temperatures nearing 1.4°C above the pre-industrial era average**.

Key Highlights

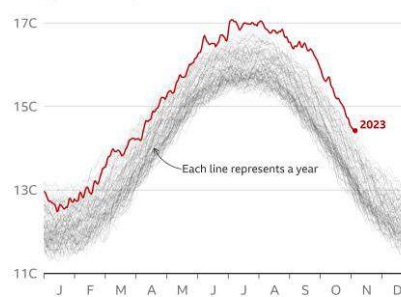
- In September 2023, global temperatures reached a record high.
- The average surface air temperature was 16.38°C, which is 0.93°C higher than the September average between 1991 and 2020.
- Moreover, it was 0.5°C warmer than the earlier record set in September 2020.
- Chart 1** shows the globally averaged surface air temperature anomalies relative to 1991–2020 for each September from 1940 to 2023.
- The month of September 2023 was approximately 1.75°C above the average temperature of September during the 1850-1900 span, which is considered the pre-industrial benchmark.
- From January to September 2023, the global surface air temperature was 0.52°C above the 1991-2020 average and 0.05°C higher than the same period in 2016, the warmest year.
- During this time frame in 2023, the world's average temperature was 1.40°C higher than the baseline period of 1850-1900.
- According to the Copernicus Climate Bulletin, in September 2023, the majority of **Europe experienced temperatures significantly higher than the average from 1991 to 2020**.
 - A region stretching from France to Finland and extending to north-western Russia reported its hottest September ever.
 - Notably, both Belgium and the U.K. faced unparalleled heatwave conditions at the start of the month.
- Chart 2** shows the average global surface air temperatures for the 30 warmest months between 1940 and 2023, arranged in ascending order.

Chart 1 Globally averaged surface air temperature anomalies relative to 1991–2020 for each September from 1940 to 2023**Chart 2** Average global surface air temperatures (°C) for the 30 warmest months between 1940 and 2023

- The global mean temperature reached monthly records of 16.95°C and 16.82, in July and Aug 2023 respectively.
- The notable increase in these two months, especially compared to the July 2019 record of 16.63°C, is evident in Chart 2.
- Moreover, September 2023 is the sole September represented in this chart. The warmest September before 2023 recorded an average surface air temperature 15.88°C, which is not high enough to be included in chart 2.
- **Chart 3** shows the global daily surface air temperature (°C) from January 1, 1940 to September 30, 2023, plotted as a time series for each year.

Global temperatures remain at record levels

Daily global average air temperature, 1940-2023



Kaziranga Sanctuary Reopens

Environment

Why in news?

- The Kaziranga National Park and Tiger Reserve reopened with a literary tribute to a British-era forest officer who rid its name of any hunting connotations.

Key Highlights

- The 1,300-sq.km reserve, the world's safest address for the one- horned rhinoceros, opens annually for tourists in October.
- The plan for a nature and wildlife- specific library at the Centenary Convention Centre in the Kohora area of Kaziranga, could not materialise in 2020 because of COVID outbreak.
- Named after Patrick D. Stracey, the library was.
 - Stracey, who was born in Andhra Pradesh's Kakinada, served as an Indian Forest Service officer in Assam.
 - He played a key role in renaming the Kaziranga Game Sanctuary as a wildlife sanctuary in 1950.
 - He also established the Assam Forest School, a training institute catering to the northeastern region.
- "The PD Stracey Library offers readers books and magazines on the world of nature apart from merchandise to take memories of Kaziranga home. The initiative is a tribute to a legendary forest officer.



Kaziranga Wildlife Sanctuary	
Location	<ul style="list-style-type: none"> • It is located in the State of Assam and covers 42,996 Hectare (ha). • It is the single largest undisturbed and representative area in the Brahmaputra Valley floodplain.
Legal Status	<ul style="list-style-type: none"> • It was declared as a National Park in 1974. • It has been declared a tiger reserve since 2007. <ul style="list-style-type: none"> • It has a total tiger reserve area of 1,030 sq km with a core area of 430 sq. km.
International Status	<ul style="list-style-type: none"> • It was declared a UNESCO World Heritage Site in 1985. • It is recognized as an Important Bird Area by Bird Life International.
Important Species Found	<ul style="list-style-type: none"> • It is the home of the world's most one-horned rhinos. <ul style="list-style-type: none"> • Pobitora Wildlife Sanctuary has the highest density of one-horned rhinos in the world and second highest number of Rhinos in Assam after Kaziranga National Park. • Much of the focus of conservation efforts in Kaziranga are focused on the 'big four' species— Rhino, Elephant, Royal Bengal tiger and Asiatic water buffalo. <ul style="list-style-type: none"> • The 2018 census had yielded 2,413 rhinos and approximately 1,100 elephants. • As per the figures of tiger census conducted in 2014, Kaziranga had an estimated 103 tigers, the third highest population in India after Jim Corbett National Park (215) in Uttarakhand and Bandipur National Park (120) in Karnataka. • Kaziranga is also home to 9 of the 14 species of primates found in the Indian subcontinent.
Flora	<ul style="list-style-type: none"> • It is a mix of eastern wet alluvial grasslands, semi-evergreen forests and tropical moist deciduous forests. • It is primarily famous for its dense and tall elephant grasses intermixed with small swamplands. • It also includes an abundant cover of water lilies, water hyacinths and lotus.
Rivers and Highways	<ul style="list-style-type: none"> • The National Highway 37 passes through the park area. • The park also has more than 250 seasonal water bodies, besides the Diphlu River running through it.



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Why in news?

- Butterfly makes a rare call in Himachal. The paintbrush swift (*Baoris farri*) butterfly has been photographed for the first time in Himachal Pradesh.
- Paintbrush swift is rarely found in the State, home to 25% of the butterfly species found in India; 120 species of butterflies have been documented by the **Wild Bhattiyat Project in 2022**.
- It has been noticed first time in Himachal Pradesh's **Chamba district**.
- The paintbrush swift (*Baoris farri*), a butterfly species of the HesperIIDae family, was sighted and photographed in the second week of October during a field survey conducted under the Wild Bhattiyat Project initiated by the Bhattiyat Forest Range of the Dalhousie Forest Division of the Himachal Pradesh Forest Department in 2022.
 - Since the launch of the project, the department has so far documented 120 butterfly species.
- The species has never been photographed in Himachal Pradesh since its discovery in 1878.
- We have recorded and documented various uncommon butterfly species like the anomalous nawab, blank swift, tailed jay, siren, etc., which are frequently sighted, but the paintbrush swift has been sighted and photographed for the first time in the lower hills of the **Dhauladhar mountain range**.

**About Paintbrush Swift Butterfly**

- The paintbrush swift is **identified based on** two separated spots in the upper forewing cell.
- Other closely related species like the blank swift have no cell spot while the figure-of-eight swift has two conjoined cell spots. The species' larvae feed on bamboo and some other grass species.
- The paintbrush swift's **habitat distribution** is common in northeast, central & south India, and rare in Uttarakhand.
- This species is legally protected in India under **Schedule IV of the Wildlife (Protection) Act, 1972**.

Why in news?

- India's plans to produce so-called 'green hydrogen' — where the gas is produced without resulting in fossil fuel emissions — may end up worsening pollution if proper checks and balances are not in place, according to a study by environmental and energy think-tank, Climate Risk Horizons (CRH).

Key Highlights

- The National Green Hydrogen Mission, piloted by the Ministry of New and Renewable Energy (MNRE), expects to manufacture five million tonnes by 2030.
- This would require the installation of renewable energy capacity worth 125 GW and the use of 250,000 gigawatt-hour units of power, equivalent to about 13% of India's present electricity generation.
- As of August 2023, India's total renewable energy (RE) capacity stood at 131 GW.
- The 2030 green hydrogen plan thus envisages adding an equivalent RE capacity by 2030. This is over and above the 500 GW of RE capacity that India has committed to install by 2030 as part of the Paris Agreement.
 - To put that in perspective, India installed only 15 GW of new solar and wind capacity in 2023, against the 45 GW per year needed to reach the 2030 target.

National Green Hydrogen Mission

- **Aim:** To make India a 'global hub' for using, producing and exporting green hydrogen.
- It is a program to **incentivise** the commercial production of green hydrogen & make India a **net exporter** of the fuel.
- The **Mission will facilitate** demand creation, production, utilization and export of Green Hydrogen.
- **Objective:**
 - Developing green hydrogen production capacity of at least 5 MMT (Million Metric Tonne) per annum, alongside adding renewable energy capacity of about 125 GW (gigawatt) in India by 2030.
 - It aims to entail over Rs 8 lakh crore of total investments and is expected to generate six lakh jobs.
 - It will also lead to a cumulative reduction in fossil fuel imports by over Rs 1 lakh crore and an abatement of nearly 50 MT of annual greenhouse gas emissions.

Why in news?

- Developed countries — responsible for three-fourths of existing carbon emissions — will end up emitting 38% more carbon in 2030 than they have committed to, going by current trajectories, shows a study published last week by the Delhi-based think tank Council for Energy Environment and Water (CEEW).

Key Highlights

- The study, which comes ahead of the 28th Conference of Parties (COP-28) of the UN Framework Convention on Climate Change to be held in Dubai in November and December, shows that 83% of this overshoot will be caused by the U.S., Russia, and the European Union.
 - At COP-28, countries are expected to give an account of their Nationally Determined Contributions (NDCs), which are their commitments to the UN on emission cuts.
- The CEEW study noted that the NDCs of developed countries already fall short of the global average reduction of emissions to 43% below 2019 levels that is needed to keep temperatures from rising above 1.5 degrees Celsius. Instead, developed countries' collective NDCs only amount to a 36% cut.
- For a fighting chance at keeping warming below critical tipping points, decades of negotiations have obliged developed countries to lead global efforts to reduce greenhouse gas emissions with legally binding targets.
- Collectively, developed countries were to reduce emissions by 5% from their 1990 levels between 2008 and 2012, and by 18% during 2013 to 2020.
- Several countries have committed to achieving net zero carbon emissions by 2050.
 - Doing so would require steady measurable cuts every decade until that year.
- As an intermediate objective, countries presented data to the UN on their projected cuts until 2030.
 - To keep temperatures below 1.5 degrees Celsius, developed countries need to cut emissions to 43% below their 2019 level.
- However, the CEEW study found that based on their current emissions trajectories, their cuts would likely amount to only 11% by 2030.
- Except for two countries — Belarus and Norway — none of the developed countries seem to be on the path to meet their 2030 targets, though Japan and Kazakhstan are close, and are expected to miss their targets by only a single percentage point.



A New Mushroom Species from the Western Ghats

Environment

Why in news?

- A tiny, fragile-looking mushroom sporting a honey-yellow 'cap' found on the campus of the Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI) at Palode in Thiruvananthapuram, Kerala has been identified as a new species.
- Turning the spotlight once again on the remarkable Western Ghats biodiversity, the discovery also gives fresh impetus to the study of the region's fungal diversity.

Key Highlights

- The new species belongs to the genus *Candolleomyces*.
- The new species has been named *Candolleomyces albosquamosus* - 'albosquamosus' for the white woolly scale-like structures on its pileus or cap.
- Delicate in build, the mushroom grows to a height of just about 58 mm.
- Seven species of the genus *Psathyrella* reported earlier from India are now recognised as *Candolleomyces*.
- The discovery of a new species of the genus *Candolleomyces* in India is special given that there are only 35 species in this genus worldwide.

Ecological Significance

- Mushrooms like *Candolleomyces albosquamosus* play a crucial role in decomposing plant litter in tropical forests, contributing to the ecosystem's nutrient cycling.
- The discovery highlights the ecological importance of secondary saprophytic fungi in the forest ecosystem.

'Maoists' open fire at Aralam Wildlife Sanctuary

Environment

Why in news?

- Suspected Maoists reportedly opened fire at the Aralam Wildlife Sanctuary in Kannur in Kerala. The attack occurred inside the sanctuary, near Chavachi.

About Aralam Wildlife Sanctuary

- Aralam Wildlife Sanctuary is the **northernmost wildlife sanctuary** of Kerala (in the Kannur District).
- It is **55 km² in area** and located on the western slope of the
- **Western Ghats**.
- It was established in 1984 with its headquarters near Iritty.
- The sanctuary **borders** Wayanad-Brahmagiri, Wayanad's north slopes, Karnataka's Brahmagiri Wildlife Sanctuary, and Coorg's forests, with Katti Betta as its highest peak.
- It is nestled amidst the serene **Cheenkanni River** and the beautiful adjoining forests of Brahmagiri Hills.
- This is the **only protected area** of the West Coast Tropical Evergreen forest of Dipterocarpus-Mesua- Palaquium type.
- The presence of **Malabar Slender Loris** (*Loris lydekkerianus malabaricus*) with other five primate species is one of the main highlights of the sanctuary.
- Aralam Wildlife Sanctuary is listed as one of the **"Important Bird Area (IBA)"** by BirdLife International in 2003.
- The sanctuary is home for One Red data book species **Nilgiri Wood- Pigeon *Columba elphinstonii***.

Stop Taking Water for Granted

Environment

Why in News?

- The theme for World Food Day (October 16) this year — **'Water is Life, Water is Food'** — calls for urgent action in managing water wisely.

The Purpose of World Food Day

- The primary purpose of World Food Day is to draw attention to the critical issue of global food security. It serves as an international platform to emphasize the importance of providing nutritious food for all and addressing hunger and malnutrition worldwide. This day reminds us of our collective responsibility to ensure that no one is left behind when it comes to access to food and water.
- **Theme for 2023: "Water is Life, Water is Food. Leave No One Behind."**
- The theme for World Food Day 2023, "Water is Life, Water is Food. Leave No One Behind," underscores the pivotal role that water plays in food production and nutrition. It highlights the need to manage water resources sustainably to ensure an adequate supply of food for present and future generations while also addressing the issue of water scarcity.

Organized by FAO

- World Food Day is organized by the Food and Agriculture Organization (FAO) of the United Nations, a leading global agency dedicated to eradicating hunger, promoting food security, and fostering sustainable agriculture practices.

Commemorating the Establishment of FAO

- World Food Day is celebrated on October 16th each year, marking the day when the United Nations Food and Agriculture Organization was established. This agency plays a critical role in addressing global food challenges and promoting agricultural and nutritional advancements worldwide.

Why in news?

- India's 705 Scheduled Tribe (ST) communities — making up 8.6% of the country's population — live in 26 States and six Union Territories.

Constitution and scheduled areas

- Article 244, pertaining to the administration of Scheduled and Tribal Areas, is the single most important constitutional provision for STs.
- Article 244(1) provides for the application of Fifth Schedule provisions to Scheduled Areas notified in any State other than Assam, Meghalaya, Tripura, and Mizoram.
- The Sixth Schedule applies to these States as per Article 244(2).

Key Highlights

- Scheduled Areas cover 11.3% of India's land area, and have been notified in 10 States: Andhra Pradesh, Telangana, Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra, and Himachal Pradesh.
- In 2015, Kerala proposed to notify 2,133 habitations, five gram panchayats, and two wards in five districts as Scheduled Areas; it awaits the Indian government's approval.
- However, despite persistent demands by Adivasi organisations, villages have been left out in the 10 States with Scheduled Areas and in other States with ST populations.
- As a result, 59% of India's STs remain outside the purview of Article 244. They are denied rights under the laws applicable to Scheduled Areas, including the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013 and the Biological Diversity Act 2002.
- In 1995, the **Bhuria Committee**, constituted to recommend provisions for the extension of panchayat raj to Scheduled Areas, recommended including these villages, but this is yet to be done.
- The absence of viable ST-majority administrative units has been the standard bureaucratic response — an argument that has also been used to demand the denotification of parts of Scheduled Areas where STs are now a minority due to the influx of non-tribal individuals.

Declaration of Area as a scheduled area

- The Fifth Schedule confers powers exclusively on the President to declare any area to be a Scheduled Area. Neither the Constitution nor any law provides any criteria to identify Scheduled Areas. However, based on the 1961
- Dhebar Commission Report**, the guiding norms for declaring an area as a Scheduled area are —
 - Preponderance of tribal population
 - Compactness and reasonable size of the area
 - A viable administrative entity such as A district, block or taluk
 - Economic backwardness of the area relative to neighbouring areas
- No law prescribes the minimum percentage of STs in such an area nor a cut-off date for its identification.
- This said, the 2002 Scheduled Areas and Scheduled Tribes Commission had recommended that "all revenue villages with 40% and more tribal population according to the 1951 Census may be considered as Scheduled Area (sic) on merit".
- The Ministry of Tribal Affairs communicated this to the States in 2018 for their consideration, but elicited no response.
- Compactness of an area means that all the proposed villages need to be contiguous with each other or with an existing Scheduled Area. If not, they will be left out.
- But contiguity is not a mandatory demarcating criterion. One example is Kerala's pending proposal, which ignores the conditions.
- The **Bhuria Committee** recognised a face-to-face community, a hamlet or a group of hamlets managing its own affairs to be the basic unit of self-governance in Scheduled Areas.
- But it also noted that the most resource rich tribal-inhabited areas have been divided up by administrative boundaries, pushing them to the margins.
- Therefore, determining the unit of the area to be considered — whether a revenue village, panchayat, taluka or district, with an ST-majority population — gave way to arbitrary politico-administrative decisions.
- However, PESA's enactment finally settled this ambiguity in law.

- The Act defined a 'village' as ordinarily consisting of "a habitation or a group of habitations, or a hamlet or a group of hamlets comprising a community and managing its affairs in accordance with traditions and customs".
- All those "whose names are included in the electoral rolls" in such a village constituted the gram sabha.
- The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, also known as the FRA Act, adopted this definition.
- Here, too, the gram sabhas are the statutory authority to govern the forests under their jurisdiction.
- As a result, the definition of a village expanded beyond the Scheduled Areas to include forest fringes and forest villages as well.
- However, gram sabhas are yet to demarcate their traditional or customary boundaries on revenue lands in the absence of a suitable law.
- FRA 2006 requires them to demarcate 'community forest resource', which is the "customary common forest land within the traditional or customary boundaries of the village or seasonal use of landscape in the case of pastoral communities, including reserved forests, protected forests and protected areas such as Sanctuaries and National Parks to which the community had traditional access".
- The traditional or customary boundary within revenue and forest lands (where applicable) would constitute the territorial jurisdiction of the village in the Scheduled Area.

Governance of Scheduled Areas

- The President of India notifies India's Scheduled Areas.
 - States with Scheduled Areas need to constitute a Tribal Advisory Council with up to 20 ST members.
 - They will advise the Governor on matters referred to them regarding ST welfare.
- The Governor will then submit a report every year to the President regarding the administration of Scheduled Areas.
 - The national government can give directions to the State regarding the administration of Scheduled Areas.
- The Governor can repeal or amend any law enacted by Parliament and the State Legislative Assembly in its application to the Scheduled Area of that State.
 - The Governor can also make regulations for a Scheduled Area, especially to prohibit or restrict the transfer of tribal land by or among members of the STs, and regulate the allotment of land to STs & money-lending to STs.
 - These powerful provisions, authority, and special responsibility vested with Governors, with the President's oversight, have largely remained a dead letter, except briefly in Maharashtra from 2014 to 2020.
- It was only when Parliament enacted the provisions in various laws applicable to Scheduled Areas, including the Panchayats (Extension to Scheduled Areas) Act, or PESA, in 1996 that the intent of the Constitution and the Constituent Assembly actually came alive.
- State panchayat laws had empowered the elected panchayat bodies, rendering the gram sabhas moot. But PESA empowered the gram sabhas to exercise substantial authority through direct democracy, and stated that structures "at the higher level do not assume the powers and authority" of the gram sabha.

Dam Safety

Polity

Why in news?

- India has almost 6,000 large dams and about 80% of them are more than 25 years old and carry safety risks.

About Dam Safety Act, 2021

- The Dam Safety Act was enacted by Parliament in 2021.
- The main objective of the act is **to provide a mechanism for the surveillance, inspection, operation, and maintenance of all specified dams across the country.**
- The Act constitutes **2 National bodies:**
 - The National Committee on Dam Safety.
 - National Dam Safety Authority.
- It also constitutes **2 State bodies:**
 - State Committee on Dam Safety.
 - State Dam Safety Organization.
 - These state-level bodies are **responsible for the surveillance, inspection, and monitoring of the operation and maintenance of dams within their jurisdiction.**

- The functions of the **National Committee on Dam Safety**;
 - Developing policies and recommending regulations regarding dam safety standards in India.
- The function of the **National Dam Safety Authority**;
 - To implement the policies of the National Committee on Dam Safety.
 - To provide technical assistance to State Dam Safety Organizations (SDSOs).
 - Resolving matters between SDSOs of states or between an SDSO and any dam owner in that state.
- An offence can lead to **imprisonment of up to 2 years, a fine, or both**.
- The Act applies to all specified dams built on both inter and intra-state rivers.
- Dam owners will be liable for the safe construction, operation, maintenance and supervision of a dam. They need to provide a dam safety unit in each dam.
- The **Dam safety unit will inspect the dams**:
 - Before and after the monsoon season.
 - During and after every earthquake, flood, calamity, or any sign of distress.
 - They will prepare an emergency action plan.
 - They will conduct risk assessment studies at regular intervals.
 - They will prepare a comprehensive dam safety evaluation.

Surrogacy

Polity

Why in news?

- The Supreme Court has protected the right of parenthood of a woman, suffering from a rare medical condition, by staying the operation of a law which threatened to wreck her hopes to become a mother through surrogacy.
- Medical board records showed the woman has "absent ovaries and absent uterus, hence she cannot produce her own eggs/oocytes".
- A government notification on March 14 this year amended the law, banning the use of donor gametes.
- It said "intending couples" must use their own gametes for surrogacy.
- The petition was filed in the Supreme Court challenging the amendment as a violation of a woman's right to parenthood.

Key Highlights

- "The amendment which is now coming in the way of the intending couple and preventing them from achieving parenthood through surrogacy, we find, is, prima facie contrary to what is intended under the main provisions of the Surrogacy Act both in form as well as in substance," a Bench of Justices B.V. Nagarathna and Ujjal Bhuyan held in a recent order.
- The petitioner's lawyer, argued that the **amended Paragraph 1(d) of the Surrogacy (Regulation) Rules, 2022**, by ruling out the use of donor eggs, had made it impossible for his client and her husband to continue with the process of surrogacy to achieve parenthood.
- He argued that the **2023 amendment contradicted Sections 2(r) and 4 of the Surrogacy Act, 2021**, which recognised the situation when a medical condition would require a couple to opt for gestational surrogacy in order to become parents.
- He referred to **Rule 14(a) of the Surrogacy Rules** which listed the
- medical or congenital conditions owing to which a woman could choose to become a mother through gestational surrogacy.
 - They included "having no uterus or missing uterus or abnormal uterus (like hypoplastic uterus or intrauterine adhesions or thin endometrium or small unicornuate uterus, T-shaped uterus) or if the uterus is surgically removed due to any medical condition such as gynaecological cancer".

About Surrogacy (Regulation) Act, 2021

- The Act **prohibits commercial surrogacy but allows altruistic surrogacy**.
 - In **altruistic surrogacy**, the surrogate mother receives no monetary remuneration other than medical bills and insurance coverage during the pregnancy.
 - **Commercial surrogacy** refers to surrogacy or associated treatments that are performed for a monetary gain or reward (in cash or kind) that exceeds the cost of basic medical care and insurance coverage.



Surrogacy is permitted when it is:

- For intending couples who suffer from proven infertility.
- Altruistic
- Not for commercial purposes
- Not for producing children for sale, prostitution or other forms of exploitation
- For any condition or disease specified through regulations.

Eligibility criteria for intending couple

- The intending couple should have a '**certificate of essentiality**' and a '**certificate of eligibility**' issued by the appropriate authority.
- A **certificate of essentiality** will be issued upon fulfilment of the following conditions:
 - A certificate of proven infertility of one or both members of the intending couple from a District Medical Board;
 - An order of parentage and custody of the surrogate child passed by a Magistrate's court; and
 - Insurance coverage for a period of 16 months covering postpartum delivery complications for the surrogate.
- The **certificate of eligibility** to the intending couple is issued upon fulfilment of the following conditions:
 - The couple being **Indian citizens and married for at least five years**;
 - **Between 23 to 50 years old (wife) and 26 to 55 years old (husband)**;
 - They **do not have any surviving child** (biological, adopted or surrogate); this would not include a child who is mentally or physically challenged or suffers from life threatening disorder or fatal illness;
 - Other conditions that may be specified by regulations.

Eligibility criteria for surrogate mother

- To obtain a **certificate of eligibility** from the appropriate authority, the surrogate mother has to be:
 - A **close relative** of the intending couple.
 - A **married woman** having a child of her own.
 - **25 to 35 years old**.
 - A **surrogate only once** in her lifetime.
 - Possess a **certificate of medical and psychological fitness** for surrogacy.
- Further, the surrogate mother cannot provide her own gametes for surrogacy.

National and State Surrogacy Boards

- The central and the state governments shall constitute the **National Surrogacy Board (NSB) and the State Surrogacy Boards (SSB)**, respectively.
- **Functions of the NSB include,**
 - Advising the central government on policy matters relating to surrogacy.
 - Laying down the code of conduct of surrogacy clinics.
 - Supervising the functioning of SSBs.

Parentage and abortion of surrogate child

- A child born out of a surrogacy procedure will be **deemed to be the biological child of the intending couple**.
- An abortion of the surrogate child requires the **written consent** of the surrogate mother and the authorisation of the appropriate authority.
- This authorisation must be compliant with the **Medical Termination of Pregnancy Act, 1971**.
- Further, the surrogate mother will have an option to withdraw from surrogacy before the embryo is implanted in her womb.

Offences and Penalties

- The offences under the Act include:
 - Undertaking or advertising commercial surrogacy.
 - Exploiting the surrogate mother.
 - Abandoning, exploiting or disowning a surrogate child; and
 - Selling or importing human embryo or gametes for surrogacy.
- The penalty for such offences is imprisonment up to 10 years and a fine up to 10 lakh rupees.

* ELECTORAL BONDS *

22/11/22

Min. of Finance.
(Dept. of Eco Affairs).

Electoral Bonds :- A Banking instrument to be used for funding eligible pol. parties.
(Intro - 2018) 1951 RPA & secured $> 1\%$ of votes in last Ele. to LS.

Validity :- 15 days (or else deposited PM Disaster Relief fund).

Denomination :- 1k, 10k, 100k, 1000k, 1cr. (in form of online) (Sold 4 times/yr) (But not in cash \rightarrow Black money possibility).

Procedure : Donor \rightarrow buys bonds from SBI \rightarrow give it to pol. party \rightarrow Pol. party encashes into designated Bank acc. \rightarrow Supervised by RBI

Amendments brought :-

* 15-day extension of term (earlier :- only 10 days).

* Validity - after expiry period, no payback to party of pol. party.

* Eligibility criteria - last ele's - $> 1\%$ of votes, that party registered in RPA 1951.

Other features :-
 \rightarrow multiples of 1000/-, it can be issued.
 \rightarrow Only authorised SBI branches can issue.
 \rightarrow Anonymity of donors.

\rightarrow Advantages :-

(i) Ensures Transparency (International corruption Index, 2022)
 By Transparency International India - 85/180 - ensuring transparency.

(ii) Safe & Digitalised funding (Non-acceptance of cash)
 Acc. to NIPFP (Nat. Inst. of Public Finance & Policy), 2017. use of Tech in Govt. Business
 $\approx 25\%$ of GDP - Black money estimated.

(iii) This ensures accountability.
 (RBI supervises pol. parties - designated accounts).

(iv) Only those with $> 1\%$ of votes \rightarrow can avail funds (Non-wastage of funds).

(v) Min. capital requirements are not made, so even small capital donors can come forward.

\rightarrow Disadvantages :-

(i) Shallow Anonymity :- Donor details disclosed by pol. parties from SBI. accessed by society & Government (curse of anonymity).

(ii) concentrated to a few pol. parties :-
 SBI report on selling of EB's, 2022. 98% (only 4 parties).



Ignite IAS



igniteias.com

16

(iii) "Right to know" - is compromised.

Art. 19 SC - "Right to know" - especially in context of elections - aspect of FR "Art-19" (FSE).

(iv) promotes crony capitalism :- ^{mutual beneficial b/w company & pol party}
India ranks - 9/42

(v) Unaccountability :- ^{Crony Capitalism Index, 2018}

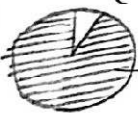
Earlier - pol parties are to be disclosed to EC for > 20 K funds.

(vi) Unchecked foreign funding :-

Ex: - FCRA Act (Foreign contri Reglⁿ Act, 2020).

(vii) More-valued Bonds are sold :-

(Small donors - unable to buy easily).



> 96% of bonds issued, value for 1 Cr each.
(SBI report on selling of EB's, 2022).

Measures

(i) Ensuring Transparency is important

Disclosing the funds made to public.

(ii) Clean money usage. (RBI - Hufport India, 2019 →

(iii) Accountability assurance. ^{"money laundering is to be avoided".}

SC, 2019 → "pol parties to submit details of donations received through EB's to ECI".

(iv) Anonymity provision to be addressed

* ECI, 2019 - "Anonymity of donations is to be reviewed"

(v) Black money. * Indrajit Gupta Committee - (donations collected - attach with PAN)

(vi) Registering in case of specified amt :-

ff. - A limit to be set to create Reg'n of donors.

Ex: - UK, Australia - register donors.

(vii) Reasonable Restrictions :- ^{after above limit ascertained by Govt's}

Ex: - In USA, RE's are imposed on Elections, EB's, etc.

GS-2

→ Election
→ Effect of EB's on Elections
→ Transparency & Accountability

Prelims

→ EB's...
→ Pol parties
→ RPA acts.



Context:

- The Kerala Tourism Development Corporation (KTDC) will develop the caravan park and camp shelter at Bekal fort.
- The KTDC has also submitted proposals to set up caravan parks at Ponmudi in Thiruvananthapuram and Bolgatty Palace in Kochi.
- The well-protected fort on a hillock overlooking the Arabian Sea boasts a stunning architecture and lush green environs.
- The caravan park at Bekal will be the first park in the public sector in the State.
- At present, there is only one Caravan Park in the State, run by a private player at Wagamon.

Caravan Park

It is a place where people with recreational vehicles can stay overnight, or longer, in allotted spaces known as "sites" or "campsites".

About Bekal Fort

- Bekal Fort is located in **Kasargod district**, Kerala.
- It is the **largest fort in Kerala**.
- It was built in the **17th century** by **Shivappa Nayaka** of the **Keladi dynasty**.
- The fort has seen rise and fall of several dynasties and later came under the control of the **Kingdom of Mysore**.
- **Structure:** The fort appears to emerge from the sea. Almost three-quarters of its exterior is in contact with water.
 - An **important feature of the fort** is the water-tank and the flight of steps leading to an observation tower built by Tipu Sultan.
 - The **fort's zigzag entrance** and surrounding trenches reveal its defensive strategy.
 - **Holes on the outer walls** are designed to defend the fort effectively from naval attacks. The upper holes are meant for aiming at the farthest targets; lower holes below for striking as enemy nearer and the lowest holes to attacking enemy closest to the fort.
 - The fort's solid construction **resembles** the Thalassery Fort and the St. Angelo Fort at Kannur built by the Dutch.

Why in news?

- In August this year, the Supreme Court Committee on Prison Reforms found suicide to be the leading cause of 'unnatural' deaths — deaths other than ageing or illnesses — among Indian prisoners, with U.P. recording the highest number of suicides between 2017 and 2021.

Prison Deaths Classification

- **Natural Deaths:** These deaths are attributed to ageing and illnesses. They often include various diseases such as heart conditions, HIV, tuberculosis, cancer, and other health-related issues. The number of natural deaths tends to increase as the prison population grows.
- **Unnatural Deaths:** This category encompasses a wider range of causes, including:
 - **Suicide:** Cases where inmates take their own lives using methods like hanging, poisoning, self-inflicted injury, drug overdose, or electrocution.
 - **Death due to inmates:** Deaths resulting from altercations or violence among prisoners.
 - **Death due to assault by outside elements:** Involves attacks by individuals or groups from outside the prison.
 - **Death due to firing:** Deaths caused by gunfire, often in cases involving security forces.
 - **Death due to negligence or excesses:** Deaths resulting from neglect, mistreatment, or excessive force by prison authorities.
 - **Accidental deaths:** These include deaths due to natural calamities like earthquakes, snakebites, drowning, accidental falls, burn injuries, and drug/alcohol consumption.

Reasons for the high number of deaths

- **Lack of Adequate Healthcare**
- **Insufficient Medical Staff:** Many prisons lack doctors, nurses, and medical staff, leading to inadequate medical care for prisoners. Minor health issues can escalate into life-threatening problems without prompt attention.

- **Shortage of Medicines and Equipment:** Limited availability of essential medicines and medical equipment hampers proper treatment. Chronic conditions, injuries, or illnesses are not adequately managed, increasing the risk of fatalities.
- **Delays in Referrals and Transportation:** Even when serious health concerns are identified, delays in referrals to outside hospitals and a lack of timely transportation (ambulances or escorts) can lead to worsening conditions or even death before medical aid is received.

Overcrowding and Poor Sanitation

- **Congestion and Lack of Ventilation:** Overcrowded prisons mean cramped living conditions with insufficient ventilation. Poor air circulation can lead to the rapid spread of airborne diseases, posing significant health risks to inmates.
- **Hygiene Issues:** Overcrowding often leads to inadequate sanitation facilities. Lack of clean water, sanitation, and hygiene facilities increases the likelihood of infectious diseases, creating an unhealthy environment for prisoners.
- **Psychological Impact:** Overcrowding induces stress, anxiety, and aggression among inmates. Mental health deteriorates in such environments, making prisoners more susceptible to illnesses and overall health decline.

Violence and Torture

- **Abuse by Prison Staff:** Physical and mental abuse by prison staff can result from power struggles, disciplinary actions, or personal biases. In extreme cases, this abuse can lead to severe injuries or fatalities.
- **Inmate Violence:** In an overcrowded, stressful environment, conflicts between inmates often escalate into violence. Extortion, gang-related activities, or personal disputes can lead to fatal altercations among prisoners.

Lack of Mental Health Support

- **Prevalence of Mental Health Issues:** Imprisonment, isolation from society, and the guilt associated with crimes can lead to various mental health problems among prisoners, including depression and anxiety.
- **Inadequate Mental Health Resources:** Prisons often lack mental health professionals, counselling services, and support programs. Inmates do not receive the necessary psychological help, making it difficult for them to cope with their emotions, potentially leading to self-harm or suicide.

Lack of Legal Aid and Fair Trial

- **Prolonged Incarceration:** Undertrials, often from marginalized communities, can spend years in jail without being convicted. Prolonged detention without a fair trial or legal representation increases their vulnerability within the prison system.
- **Coercion and Discrimination:** Underprivileged inmates might face coercion by law enforcement to confess or plead guilty. Discrimination based on caste, religion, or gender can lead to biased treatment within the legal system, affecting the fairness of trials.

Government measures in this regard

- **Model Prison Manual (2016):** The Model Prison Manual outlines inmates' rights to healthcare, necessitating investments in healthcare facilities within prisons. It mandates the establishment of mental health units and the training of officers to provide basic and emergency care. Suicide prevention programs have been formulated to address instances of self-harm.
- **Mental Healthcare Act (2017):** This Act ensures that prisoners have access to mental healthcare services, emphasizing the importance of mental health units within prisons and appropriate treatment for inmates with mental illnesses.

Judicial Measures

- **Supreme Court Committee on Prison Reforms:** Constituted in 2018 and headed by Justice Amitava Roy, this committee has submitted multiple reports and recommendations. It has addressed critical issues such as prison overcrowding, healthcare, legal aid, the rights of women and children in prisons, and measures like parole and furlough.
- **Landmark Judgments:** The Supreme Court has delivered several landmark judgments and directions on prison reforms. Cases such as *D.K. Basu v State of West Bengal* (1997), *Sunil Batra v Delhi Administration* (1978), and *Rama Murthy v State of Karnataka* (1997) have set important precedents. These rulings have emphasized the protection of prisoners' rights, prevention of custodial violence, and improvement of prison conditions.



NHRC recommendations

- **Monitoring Custodial Deaths:** The NHRC plays a proactive role in monitoring and investigating cases of custodial deaths. It ensures that proper guidelines and recommendations are issued to prevent such incidents.
- **Prison Inspections:** NHRC conducts regular inspections of prisons to assess conditions and suggest necessary reforms.
- **Awareness Programs:** The NHRC organizes workshops and seminars on prison reforms, creating awareness about prisoners' rights and the need for humane treatment within the prison system.

A Draft: Menstrual Hygiene Policy

Governance & Social Justice

Why in news?

- The central Government released Draft guidelines on menstrual policy.

Data

- The UN reports that approximately 1.2 billion women worldwide do not have access to basic sanitation & hygiene.
- Approximately 71% of girls in India have no knowledge about menstruation until they experience their first period.
- Out of a total of 10.8 lakh government schools, 15,000 do not have toilets and 42,000 do not have access to drinking water.
- Around half of girls use cloth as a menstrual product, while approximately 15% use locally made napkins.
- The state of Bihar exhibits the lowest proportion of girls utilising a hygienic method, with a percentage of 59.7%. Following close behind are the states of Madhya Pradesh and Meghalaya, with 61% and 65.6% respectively.
- The lack of proper menstrual hygiene is still a significant problem for women, particularly in developing countries such as India. Cultural beliefs, traditions, and societal biases hinder women from receiving the necessary menstrual health care.

Government actions taken to address menstrual hygiene:

- The Menstrual Hygiene Scheme was introduced in 2011 with the aim of supplying affordable sanitary pads to girls between the ages of 10 and 19.
 - The Suvidha scheme was introduced in 2019 to provide affordable eco-friendly and biodegradable pads. As of 2021-22, more than 1,128 million pads have been distributed through this program.
- The Rashtriya Kishor SwasthyaKaryakram aims to support the sexual and reproductive health of teenagers.
- In 2013, the Indian government introduced guidelines for installing mini incinerators in schools for the purpose of disposing of sanitary waste.

Draft of the menstrual hygiene policy:

- The menstrual hygiene policy is designed to address the ongoing issues related to menstruation in our country. The policy acknowledges the historical significance of this biological process.
- Every woman, girl, and individual who menstruates should have access to a safe and stigma-free experience during their menstruation.
- Every female individual in India, regardless of age or gender identity, should have access to safe and respectful resources for managing menstrual hygiene. This would contribute to enhancing their overall well-being and allowing them to reach their maximum potential in various areas of life such as education, health, and economic stability.

Purpose of the draft:

- To guarantee that women, girls, and individuals who menstruate can obtain safe, clean, and high-quality menstrual products and sanitation facilities.
- The goal is to establish a supportive atmosphere where everyone, regardless of gender, is provided with accurate information about menstruation and to tackle misconceptions, social stigmas, and gender-related challenges associated with it.
- The aim is to promote a supportive environment for menstruating individuals in various settings and encourage collaboration with social entrepreneurs and the private sector.
- Additionally, efforts will be made to improve the disposal of menstrual waste in an environmentally friendly manner.

Why in news?

- Railways develops anti-freeze flushes and fuel tanks for journeys in J&K. The process of linking Kashmir to Kanniyakumari, through the new Udhampur-Srinagar-Baramulla Rail Link (USBRL) project, poses a unique challenge to the Railways in maintaining water and fuel in liquid form in sub-zero temperatures during the winters.

Key Highlights

- To circumvent the problem of water freezing in toilets and fuel tanks, engineers at the Rail Coach Factory (RCF) in Kapurthala have designed and implemented indigenous innovations.
- While the LHB coach design is prominently used by the Railways, it did not have temperature control systems.
- In winter, temperatures in the J&K region plummet to minus-eight to minus-12 degrees Celsius.
 - There is a problem if the water freezes in the tanks.
 - The flushes and the toilets won't work as the water won't get circulated.
 - There will be no supply of water in the taps.
- Another major challenge is that if the water tank is full, there is a hazard that it will develop cracks and burst, as ice has the tendency to expand.

About RCF

- The RCF had designed double-walled composite insulated water tanks of capacities ranging between 450 litres and 685 litres.
- The water tank mimics thermoplastic bottles with two walls and an insulation layer of foam in the middle, which traps the air.
- This will maintain water in liquid form in sub-zero conditions from 16 to 20 hours. The water may remain cold but it won't freeze.
- In another innovation, the RCF has borrowed technology from the defence services to tackle the problem of freezing water in the supply pipelines.
 - They are using heated pipes with a distributed heating system covered by insulation. The water will remain cold at five to eight degrees Celsius in liquid form.
- To contain energy loss, geysers will be deployed at the point of use in toilets, where only as much water as is needed by the users will be heated. A similar technology is being deployed in the fuel tanks for locomotives by the RCF.

Why in news?

- Prime Minister Narendra Modi flagged off the country's first Regional Rapid Transit System (RRTS), calling the Nammo Bharat train a glimpse of India's promising future.

Key Highlights

- The RRTS is a new rail-based, semi-high-speed, high-frequency commuter transit system.
- With a design speed of 180 kmph, it is a regional development initiative, which is designed to provide high-speed trains for intercity commuting every 15 minutes, going up to a frequency of every five minutes when required.
- Developed at a cost of more than ₹30,000 crore, the train will allow a commuter to travel between Delhi and Meerut in less than an hour.
- A total of eight RRTS corridors have been identified for development in the National Capital Region.
- Three RRTS corridors have been prioritised for implementation in the first phase: Delhi-Ghaziabad-Meerut; Delhi-Gurgaon-SNB-Alwar; and Delhi-Panipat.
- Officials in the Housing and Urban Affairs Ministry said the rapid transit system being developed in the country is a state-of-the-art regional mobility solution, comparable to the best in the world.

Why in news?

- Growth in India's gross Goods and Services Tax (GST) revenues slowed to a 27-month low of 10.2% in September, from around 10.8% in the previous two months. However, collections improved 2.3% over August revenues to touch Rs.1,62,712 crore.
- Revenues from domestic transactions, including services imports, were 14% higher than the tax collected from these sources during September 2022.
- This is the fourth time that the gross GST kitty has crossed the Rs.1.60 lakh crore mark in 2023-24, the Finance Ministry said.

Key Highlights

- GST inflows from goods imports had recovered from two months of contraction to grow 3% in August, but shrank again in September, albeit by a fraction.
- GST revenues from goods imports dropped 0.11% from last September.
- The last time that GST revenues grew at a slower pace was in June 2021, when collections rose a mere 2% amid the second wave of the COVID-19 pandemic.
- The revenues in that month were based on domestic transactions between June 5 and July 5, since taxpayers were given various relief measures in the form of waivers and reduction in interest on delayed filings for firms with an aggregate turnover up to Rs.5 crore.
- Last month's GST revenues, based on transactions carried out in August, included Central GST (CGST) collections of Rs.29,818 crore, State GST (SGST) of Rs.37,657 crore, and Integrated GST (IGST) of Rs.83,623 crore, which included Rs.41,145 crore collected on goods imports.
- GST compensation cess inflows were Rs.11,613 crore, including Rs.881 crore collected on the import of goods.
- "The government has settled Rs.33,736 crore to CGST and Rs.27,578 crore to SGST from IGST. The total revenue of Centre and the States in the month of September, 2023 after regular settlement is Rs.63,555 crore for CGST and Rs.65,235 crore for the SGST," the Finance Ministry said.

Manipur Highest, Bihar Sees Contraction

- Revenues in strife-torn Manipur, which recovered from a contraction in August, recorded the highest growth among States in September, rising 47%.
- GST revenues in Telangana grew 33%, followed by Jammu and Kashmir (32%), Arunachal Pradesh (27%), Tamil Nadu (21%), and Karnataka (20%).
- As many as 17 States recorded revenue growth below the national average of 14%, while 12 States reported 14% or higher growth. States seeing a slower uptick included Gujarat, Uttar Pradesh, Kerala, Haryana, Odisha, and Jharkhand, with Delhi, Meghalaya, & Assam recording the weakest growth of 2%, followed by West Bengal (3%).
- Bihar was the only State to report an actual contraction in GST collections in September, with revenues down 5%.
- The Union Territories of Lakshadweep, and Andaman and Nicobar Islands also clocked a sharp decline in revenues, which fell 45% and 30% year-on-year, respectively.
- By contrast, revenues shot up 81% in the Union territory of Ladakh.

Kerala Registers 12% Growth In GST Revenues In Sept.

- Kerala has registered 12% year-on-year growth in Goods and Services Tax (GST) revenue in September.
- The collection for a given month pertains to the consumption of goods and services in the previous one. The State has recorded steady growth in GST revenues in the first and second quarters of the 2023-24 fiscal compared to the corresponding period last year.
- In the first quarter of the 2023-24 fiscal, Kerala had recorded 12% growth in GST revenues in April 2023, 11% growth in May and 26% growth in June compared to same months in 2022.
- In the second quarter, the State had recorded 10% growth in GST revenues in July and 13% growth in August compared to the same months in 2022. And as per the latest figures, 12% in September.
- The collection for July 2023 stood at Rs.2,381 crore against Rs.2,161 crore. The collection for August 2023 stood at Rs.2,306 crore. It was Rs.2,036 crore in August 2022.

Why in news?

- Special scheme to allow individual or entity to earn Green Credit, trade it on a dedicated exchange.
- Green Credit
- Green Credit refers to a unit of an incentive provided for specified activities that deliver a positive impact on the environment; to obtain credits, one needs to register the activity via a website.
- "A Green Credit programme is being launched at the national level to leverage a competitive market-based approach for incentivising environmental actions of various stakeholders," the Environment, Forest, and Climate Change Ministry said in a notification.
- This programme is a follow-up action of the 'LiFE'-(Lifestyle for Environment) campaign. The notification added that the new programme is a voluntary one.

Statistical Performance Indicators (SPI)**Economy****Why in News?**

- The World Bank's compilation of Statistical Performance Indicators (SPI) ranks India 67 among 174 countries in 2019. Analysis reveals both shortcomings and a commendable performance in various aspects of SPI.

Key Highlights

- As India celebrates its election to the United Nations Statistical Commission, India's own official statistical system has come under scrutiny within the country recently.
- **Questions have been raised about the credibility of the statistics** it produces and the competence of the official statisticians.
- Even acclaimed **statistical methods** devised to generate these statistics, which were subsequently adopted by other developing countries, now face questioning.
- What is even more surprising is the assertion that the **results** of statistical exercises, such as censuses and surveys, are **claimed to be of poorer quality** when compared to data from administrative sources, most of which suffer from uncertain coverage and conceptual shortcomings. In general, the statistical system is now facing a trial.
- In this context, looking at the international rankings of national statistical systems compiled by the World Bank can provide valuable insights.

Statistical Performance Index

- **The SPI (Statistical Performance Index) and its Dimensions**
- The World Bank compiles SPIs to assess the performance of national statistical systems across 174 countries.
- The **SPI is based on the assessment of five dimensions of performance**, commonly referred to as the **five pillars** of a national statistical system.
- Five Pillars of SPI are:
 - Data use;
 - Data services;
 - Data products;
 - Data sources,
 - Data infrastructure.
- According to the latest available scores from 2019, **India's overall SPI score stands at 70.4, placing it in the 67th rank** among the 174 countries assessed.
- The pillar-wise scores show **India's lower performance in the 'Data use' and 'Data products' pillars, with scores of 80 and 60, respectively**, resulting in poor rankings.

Why in news?

- The Union Cabinet has recently approved a memorandum of cooperation (MoC) between **India** and **Japan** on a **Semiconductor Supply Chain Partnership**.

About the initiative

- MoC between India and Japan:**
 - The MoC aims to strengthen cooperation between **India** and **Japan** towards **enhancement of semiconductor supply chain**, due to the importance of semiconductor for the advancement of **industries & digital technologies**.
 - It will remain in **force** for a period of **5 years**.
 - It will support both **G2G** (Government to government) and **B2B** (business-to-business) types of bilateral cooperation.
- Significance**
 - Japan has become the **second Quad partner** after the US to sign an agreement with India for the joint development of the **semiconductor ecosystem** and maintain the resilience of its **global supply chain**.
 - Japan is among the **top five countries** to have a semiconductor ecosystem, with around **100 semiconductor manufacturing plants**.
 - It will give leverage to the Japan-India Semiconductor Supply Chain Partnership and **IJICP**.

Significance of establishing semiconductor industry in India:

- The global semiconductor market was **\$573.44 billion** in **2022**.
- The current demand for semiconductors in India is around **\$24 billion**, which is met entirely through **imports**.
- The demand for semiconductor will be increased due to factors such as the increasing semiconductor content in consumer electronics and automobiles, including electric vehicles, the adoption of 5G and IoT devices, and more.
- China's growing influence in the **chip manufacturing** and **assembly** sector has raised concern about the **security** associated with such **products** and uninterrupted supply of such products.
 - China has **banned** many of such supply during the **pandemic** and afterwards.

India's initiatives on Semiconductors:

- PLI for Large Scale Electronics Manufacturing:**
- This Production Linked Incentive Scheme (PLI) offers incentive to boost **domestic manufacturing** and attract **large investments** in mobile phone manufacturing and specified electronic components, including Assembly, Testing, Marking and Packaging (ATMP) units.
- It will boost the **electronics manufacturing** landscape and establish India at the global level in **electronics sector**.
- It will extend an incentive of **4% to 6%** on incremental sales (over base year) of goods manufactured in India to eligible companies, for **5 years** after the base year.

Programme for Development of Semiconductors and Display Manufacturing Ecosystem in India:

- It was launched in **2021** with the aim to promote semiconductor and **display manufacturing** by providing capital support and technological collaborations.
- It is implemented by the Ministry of Electronics and Information Technology (MeitY).
- It will provide **fiscal support**
- Of up to **50%** of the projects cost to execute **high capital intensive** and **resource incentive project**.
- To establish **high-tech clusters** with the **necessary infrastructure**- land, semiconductor grade water, power, logistics and research ecosystems.
- To approve applications to set up at least 2 greenfield semiconductor fabs and two display fabs in the country.
- Incentivises- Semi-conductor Laboratory; Semiconductor Design Companies; Compound Semiconductors / Silicon Photonics / Sensors (including MEMS) Fabs etc.

Design Linked Incentive (DLI) Scheme:

- The DLI offers **financial incentives** and design infrastructure support across **various stages** of development and deployment of **semiconductor design(s)** for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design(s).

- The support will be provided for **5 years**.
- **Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECs):**
- It aims to offset the disability for **domestic manufacturing** of electronic components and semiconductors by providing **financial incentive** of **25%** on capital expenditure for the identified list of electronic goods.
- **Chips to startups (C2s) programme:**
- It aims to train **85,000 engineers** in the field of **Very Large-Scale Integration(VLSI)** and **embedded** system design of semiconductors.
- It will give **financial incentives** to institutions working on projects which could lead to the development of **175 application-specific integrated circuits**, working prototypes of 20 system on chips (SoC) and **IP core repository** by **2027**.
- An SoC is an **integrated circuit** that integrates most or all components of a computer or other electronic system.

India Semiconductor Mission:

- It will establish a specialized and independent "**India Semiconductor Mission (ISM)**" body to decide the **long-term strategies** to develop **semiconductors and display ecosystem**.
- It includes the schemes:
- '**Modified Scheme for setting up of Semiconductor Fabs in India**': Fiscal support of **50%** of the **project cost** on setting up Silicon **Complementary Metal-Oxide Semiconductor (CMOS)** based Semiconductor Fab in India.
- '**Modified Scheme for setting up of Display Fabs in India**': Fiscal support of **50%** of Project Cost on pari-passu basis for setting up of Display Fabs in India.
- 'Modified Scheme for setting up of Compound Semiconductors / Silicon Photonics / Sensors Fab / Discrete Semiconductors Fab and Semiconductor ATMP / Outsourced Semiconductor Assembly and Test (OSAT) facilities in India'.
- **Product Design Linked Incentive:** financial incentives of up to **50%** of the eligible expenditure subject to a ceiling of Rs.15 Crore per application.
- '**Semicon India Future Design**': Design Linked Incentive (DLI) Scheme.

Digital Crop Survey

Economy

Why in news?

- Highlighting that the present system of estimation of crop area and production is completely manual, the Centre has asked states and Union Territories (UTs) to digitise the process by adopting the Digital Crop Survey System from July next year.

Need for the Digital Crop Survey:

- **Manual Collection and Compilation:** Currently, the collection and compilation of crop statistics in India is largely manual, except in a few states. This manual process leads to delays and is prone to manual errors.
- **Limited Digital Systems:** Only a few states, such as Karnataka, Telangana, and Andhra Pradesh, have established digital data collection systems using GPS-enabled mobile applications. These systems are used for collecting crop area and CCEs (Crop Cutting Experiments) data directly from the field. In other states like Maharashtra and Madhya Pradesh, digital systems are in place for crop area recording.
- **Reliability of Agricultural Production Estimates:** India faces challenges due to the lack of reliable agricultural production estimates. There is a need for real-time assessment estimates of crops to make informed decisions in the agricultural sector.
- **Technological Intervention:** Given these challenges, there is a need to reform the existing production estimation system by leveraging technological intervention.

Guidelines for the Digital Crop Survey:

- The Economics, Statistics and Evaluation Division (ESED) under the Ministry of Agriculture and Farmers' Welfare (MoA&FW) has finalized guidelines for the Digital Crop Survey.
- According to these guidelines, all states and Union Territories (UTs) are required to automate and digitize the process of area enumeration/girdawari of crops at the field level. This process, referred to as the Digital Crop Survey, is mandated to begin from the 2024-25 Agricultural Year.

- In India, the agricultural year starts in July and ends in June of the following year.
- As per the guidelines, states and UTs are expected to use GPS-enabled mobile applications to collect data on crop sowing for each plot during each season. This data is then to be shared at the village level, aggregated, and provided to the Department of Agriculture and Farmers' Welfare (DA&FW) through API (Application Programming Interface).

Digital Crop Survey Parameters:

- As part of the Digital Crop Survey, states are required to collect data on essential parameters, which include:
- **Village Information:** This encompasses details like village name, year, season, farmer ID, and farm ID.
- **Crop Data:** For each farm plot, data must be gathered on the crop name, crop variety, crop sown area, and geotags of crop photos.
- **Farm Details:** This section covers geotags of the farm boundary where the crop is sown, sowing/planting dates at the farm plot level, irrigation types at the farm plot level, and irrigation sources at the farm plot level.

Survey Initiation:

- The central government initiated a pilot Digital Crop Survey in several states earlier this year, which laid the groundwork for this nationwide effort.

Revised Estimate Release Timeline:

- In a separate development, the Ministry of Agriculture and Farmers' Welfare (MoA&FW) has revised the timelines for releasing agricultural estimates.
- Under the previous system, the ministry used to release estimates in five phases. However, the fourth phase, typically released in August, has been discontinued.
- Instead, the ministry will now release the final estimates that encompass all states and all seasons (kharif, rabi, summer) in September-October.
- This marks a significant departure from the previous practice, where final estimates were released in the following February.

India Skills Program

Economy

Why in news?

- The Ministry of Skill Development & Entrepreneurship launched the India Skills 2023-24 program and felicitated WorldSkills 2022 winners. India had secured 11th position in the global competition last year.

India Skills Program

- It is the biggest skill competition in India held every two years exhibiting extraordinary talent from across the country with the support of State Governments and Industry.
- Also, the IndiaSkills serves as a stepping stone to the WorldSkills Competition.
- Participants who will excel in India Skills at the national level will take part in the global event.
- The next WorldSkills Competition is to be held in Paris.
- These competitions provide both a benchmark for high performance and a way to assess vocational excellence among the workforce.

About WorldSkills Competition

- It is the most extensive skill competition globally, taking place biennially.
- It is conducted by WorldSkills International, which has 86 member countries.
- WorldSkills is an international charity that organises world and national championships for vocational skills and is held every two years in different parts of the world, and also hosts conferences about vocational skills. WorldSkills India is an initiative of the National Skill Development Corporation (NSDC) under the Ministry of Skill Development and Entrepreneurship.

About the WorldSkills Competition 2022

- WorldSkills Competition 2022 Special Edition was the official replacement for WorldSkills Shanghai 2022.
- It saw over 1,000 competitors from 58 countries in 61 skills.



- India participated in 50 skills including new-age skills like robot system integration, additive manufacturing, industry 4.0, digital construction, mobile application development, and renewable energy.

Periodic Labour Force Survey

Economy

Why in news ?

- Recently, the Ministry of Statistics & Programme Implementation has released the Periodic Labour Force Survey (PLFS) – Quarterly Bulletin for July – September 2023.

PLFS AND OBJECTIVES:

- The **Periodic Labour Force Survey (PLFS)** by the National Sample Survey Office (NSSO) was initiated in April 2017 with the aim of providing frequent and timely labour force data. The survey serves two primary purposes:
 - estimating key employment and unemployment indicators every three months for urban areas and
 - conducting an annual assessment in both rural and urban areas.
- The recent PLFS report for July – September 2023 was the twentieth quarterly bulletin in the series.
- The fieldwork for this period was completed timely, except for a few samples in Manipur and Telangana, which were considered casualties.
- Notably, the revisit schedules were primarily conducted via telephone (about 96.2% of the time) since June 2020.

KEY FINDINGS FROM THE QUARTERLY BULLETIN – JULY TO SEPTEMBER 2023:

- Labour Force Participation Rate (LFPR) Increase:**
 - LFPR in urban areas for individuals aged 15 years and above rose from 47.9% in July – September 2022 to 49.3% in the same period of 2023.
 - Notably, LFPR increased for both males and females during this period.
- Worker Population Ratio (WPR) Growth:**
 - WPR in urban areas for individuals aged 15 years and above increased from 44.5% in July – September 2022 to 46.0% in the same period of 2023.
 - Similar to LFPR, WPR exhibited growth for both males and females.
- Unemployment Rate (UR) Decline:**
 - UR in urban areas for individuals aged 15 years and above decreased from 7.2% in July – September 2022 to 6.6% in the same period of 2023.
 - While male UR was at 6.0% in 2023, female UR declined from 9.4% to 8.6% during this period.

Labour Force Participation Rate (LFPR):

- LFPR is defined as the percentage of persons in labour force (i.e., working or seeking or available for work) in the population.

Worker Population Ratio (WPR):

- WPR is defined as the percentage of employed persons in the population.

Unemployment Rate (UR):

- UR is defined as the percentage of persons unemployed among the persons in the labour force.

Current Weekly Status (CWS):

- The activity status determined on the basis of a reference period of last 7 days preceding the date of survey is known as the current weekly status (CWS) of the person.

Operation Ajay

International Relations

Why in news?

- India brought back the first batch of citizens from crisis-hit Israel under Operation Ajay.

About Operation Ajay

- It is consistent with our PM's motto of not leaving any Indian behind.
- India has initiated "Operation Ajay" to evacuate its citizens from conflict-stricken Israel.
- This marks the second evacuation operation of the year, following Operation Kaveri, which brought back Indian citizens from Sudan earlier.
- The decision to initiate Operation Ajay comes in response to recent conflicts in the region, including a Hamas attack on Israel and the subsequent military strike on the Gaza Strip.
- According to the Ministry of External Affairs spokesperson, Israel has nearly 18,000 Indians and the airlift operation is aiming to cater to those who are willing to be evacuated. People are being accommodated in aircraft on a "first-come, first-serve" basis. Officials have indicated that the number of evacuees may increase if the crisis prolongs.

Ferry to Sri Lanka

International Relations

Why in news?

- PM Modi launches the passenger ferry service between **Nagapattinam** and **Kankesanthurai**.

Significance

- The service is **expected to strengthen ties between the two countries and boost trade and tourism**.
- It is **aligned with the 'neighbour-first' policy, which will fortify India-Sri Lanka ties**.
- It will **lead to enhanced connectivity** that would stimulate trade and tourism between the two countries, especially given Nagapattinam's array of tourist destinations.

Indian Ocean Rim Association's (IORA) Council

International Relations

Why in news?

- Reinforcing Indian Ocean Identity' was the banner theme at the **Indian Ocean Rim Association's (IORA) Council of Ministers (COM)** held in Colombo on October 11, that was attended by foreign ministers and senior officials of the 23-nation grouping of countries.

About IORA

- The Indian Ocean Rim Association includes 23 countries from Africa, West Asia, South Asia, South East Asia, Australia and littoral states situated in and around the Indian Ocean.
- The grouping, whose apex body is the Council of Foreign Ministers that meet once a year, moves by rotation through members every two years.
- Sri Lanka took charge as Chair this year from Bangladesh, and India is Vice-Chair, meaning that the troika of IORA is within the South Asian region.
- IORA's membership includes 23 countries:
- It also has 11 dialogue partners:
- While the IORA was formed in 1997 (then called the Indian Ocean Region-Association for Regional Cooperation) in Mauritius, its genesis came from a speech Nelson Mandela gave in Delhi in 1995.
- He was invited by then Prime Minister P.V. Narasimha Rao as the guest for Republic Day, and said at a ceremony that India and South Africa should explore "the concept of an Indian Ocean Rim of socioeconomic cooperation and other peaceful endeavours" that could help developing countries within multilateral institutions "such as the United Nations, the Commonwealth and the Non-Aligned Movement".

Significance of IORA

- A third of the world's population** (2.6 billion people) live in the region, and 80% of global **oil trade**, 50% of the **world's containerised cargo** and 33% of its **bulk cargo** passes through it.
- The region produces a combined total of \$1 trillion in **goods and services** and intra-IORA trade is billed at around \$800 billion.



- India's other regional organisations, like SAARC (South Asian Association for Regional Cooperation) and BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation), face their own challenges.
- While the QUAD (Quadrilateral Security Dialogue), has made progress, it remains U.S.-led, along with military allies Australia and Japan.
- Meanwhile, China is actively trying to rope in India's neighbours with groupings like the Belt and Road Initiative (BRI), China-Indian Ocean Region Forum on Development Cooperation, China-South Asian Countries Poverty Alleviation and Cooperative Development Centre, which exclude India. IORA, however, remains a "safe space" for India and other countries of the region that wish to keep out the constant challenge of big-power rivalries.
- **IORA membership is based on consensus**, and Pakistan has not been admitted to the grouping since it first applied in 2001, on the basis that it has not extended MFN (most favoured nation) status to India, making the IORA a less contentious space for India as well, compared to groupings like the Shanghai Cooperation Organisation (SCO).

Sri Lanka Announces Free Visas for Indians to Boost Tourism

International Relations

Why In News?

- Sri Lanka waived visa fee for Indians and tourists from six other countries, as part of its efforts to boost tourist arrivals and help rebuild the island nation's battered economy following last year's financial crash.

Key Highlights

- India has remained Sri Lanka's top source market for many years. This year, over 2 lakh Indian tourists — constituting 20 % of the total tourist arrivals — have visited the island nation until September.
- As part of its decisions this week, the Cabinet announced implementation of a pilot project to issue free tourist visas to tourists from China, India, Russia, Thailand, Indonesia, Malaysia, and Japan until March 31, 2024.

Several measures

- According to a statement on the weekly Cabinet decisions, published by the Department of Government Information, the move is part of "**several new programmes**" planned for the promotion of the Sri Lankan tourism industry, one of the chief foreign exchange earning sectors for the country, apart from exports and worker remittances.
- **Sri Lanka's tourism sector is struggling** to bounce back after three major setbacks in the last few years — the Easter Sunday terror attacks in 2019, the coronavirus pandemic in 2020 and 2021, and the unprecedented economic crisis in 2022.
- Until now, Indian tourists were charged \$20 with their visa application online. The decision to issue free tourist visas is likely to boost tourist arrivals including from India, officials said.

India & China-Bhutan Boundary Talks

International Relations

- **Context:** China and Bhutan held their 25th round of boundary talks in Beijing and signed a Cooperation Agreement on the "Responsibilities and Functions of the Joint Technical Team (JTT) on the Delimitation and Demarcation of the Bhutan-China Boundary."

About the boundary talks

- The Boundary talks between Bhutan and China were held after a gap of seven years and indicate significant progress has been made.
- Bhutan and the Tibetan Autonomous Region share a contiguous border to Bhutan's north and west. Since 1984, Bhutan and China had held 24 rounds of talks to resolve the disputes until 2016, but the 25th round appeared to have been held up after the Doklam Standoff between Indian and Chinese armies in 2017, and then the COVID-19 pandemic in 2019-2021.
- However, the two sides used the pause to hold talks at other levels in rapid succession, especially after China threatened to open a new front for a border dispute to Bhutan's east.
- Since then, the Expert Group of diplomats on both sides met in 2021 to agree on a 3-step roadmap, and the first boundary delimitation technical talks were held in August 2023.

3-Step Roadmap

- The 3-Step roadmap MoU signed by the Bhutanese Foreign Minister and Chinese Assistant Foreign Minister in 2021, and the JTT established to implement the roadmap by the Expert Group in August are hoping to draw a line clearly delineating Bhutanese and Chinese territory for the first time.



- Bhutan and China don't have diplomatic ties, as Bhutan has traditionally avoided diplomatic relations with all the United Nations Security Council permanent members. The 3-Step Roadmap involves first, agreeing to the border "on the table"; then visiting the sites on the ground; and then formally demarcating the boundary.

India's concerns about the talk

- For India, given the breakdown in its ties with China over the standoff at the Line of Actual Control from 2020, any hint of closer ties between China and one of its closest neighbours is a cause for worry.
- More specifically, New Delhi is watching the demarcation discussions over Doklam, as amongst the proposals China has placed on the table is an agreement to "swap" areas in Doklam under Bhutanese control with areas in Jakarlung and Pasamlung which China claims.
- The Doklam trijunction cuts very close to India's Siliguri corridor a narrow area that connects the North Eastern States to the rest of India and India would not like to see China gain access to any area closer to it.
- Since the Doklam standoff in 2017, China has doubled down on its control of the Doklam plateau, and according to a recent Pentagon report, has continued to build "underground storage facilities, new roads, and new villages in disputed areas in neighbouring Bhutan," erasing many of the strategic gains that New Delhi had hoped for after China agreed to step back from the standoff point in 2017.
- Finally, India's worry is over China's demand for full diplomatic relations with Bhutan, and opening an Embassy in Thimphu.
- Given India's challenges with Chinese projects and funding in other neighbouring countries including Bangladesh, Nepal, Sri Lanka and the Maldives, any Chinese presence in a small country like Bhutan would be problematic.
- However, Bhutan's leadership has thus far said that all decisions would consider India's interests and that it has always consulted India on issues of concern.

Qatar hands death penalty to 8 ex navy men

International Relations

Why in news?

- Qatar hands death penalty to 8 former Indian Navy men

Details of the issue

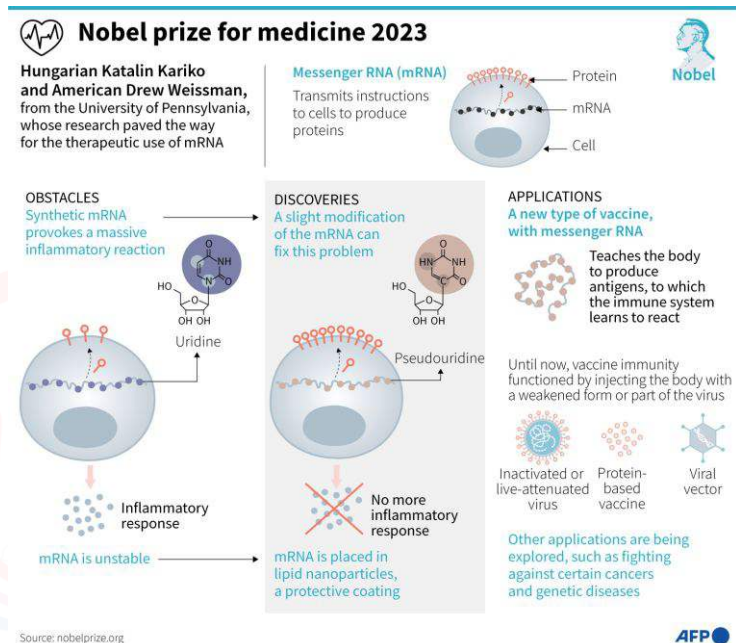
- **Eight former personnel of the Indian Navy** have been **sentenced to death** by a court in Qatar in an **alleged case of espionage**.
- The **charges** against these Indian nationals **were not disclosed by Qatari authorities**, but it's believed **they were working with a private company** in Qatar to **oversee the induction of Italian small stealth submarines**.
- **India expressed shock** and disappointment at the death sentence and is actively exploring all possible legal options to secure their release.
- The **Ministry of External Affairs** in India has stated that it attaches **"high importance" to this case** and will provide consular and legal assistance to the Indian nationals.
- This **case has implications for India's diplomatic ties with Qatar**, which is a powerful Gulf state with which India has been trying to build friendly relations.
- Efforts are being made to **work with the Qatari establishment** to address the situation due to Qatar's significant role in international diplomacy.
- India's former Ambassador to Doha, **Deepak Mittal**, **met with the detainees** during their detention, and the **Indian government has been closely monitoring** the situation and providing support.
- India is **following a legal playbook similar to the Enrica Lexie-Italian Marine case**, emphasizing **adherence to international laws and legal procedures**.
- The government is **committed to following due process** in accordance with **international laws and the laws of the country** where the former Navy personnel are being held, to resolve the situation.
- In addition to the GoI's efforts, the **families of the former Navy personnel have also filed a Mercy Plea to the Emir of Qatar**, who is known to **grant pardons during Ramadan and Eid**.

Why in news?

- The 2023 Nobel Prize in Physiology or Medicine has been awarded to Hungarian biochemist Katalin Karikó and American physician-scientist Drew Weissman. Announcing the names, the Royal Swedish Academy of Science said they had been feted for "**discoveries concerning nucleoside base modification that enabled the development of effective mRNA vaccines against COVID-19**". Dr. Karikó is the 13th woman to win the prize.

Key Highlights

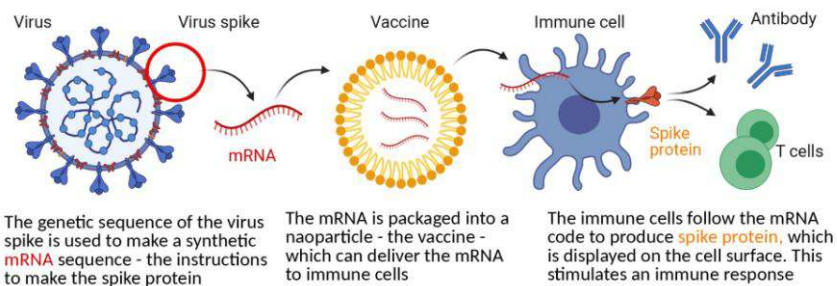
- mRNA stands for messenger RNA, a type of molecule that carries instructions from the DNA to a cell's cytoplasm, where those messages are 'read' to produce various proteins.
- In the late 1980s, scientists realised that mRNA could become the basis for a new kind of vaccines if some hurdles could be overcome.
- The idea was to inject the body with a modified mRNA that would instruct cells to build a certain protein, which could then provoke the body's immune system to 'attack' it as well as prepare itself to encounters with the same protein in future.
- This protein could be something produced by a virus — such as the spike protein of SARS-CoV-2. But the mRNA would have to survive its journey inside the body and be able to enter a cell.



Advantages of mRNA Based Vaccines

- mRNA vaccines are considered safe as mRNA is non-infectious, non-integrating in nature, and degraded by standard cellular mechanisms.
- They are highly efficacious because of their inherent capability of being translatable into the protein structure inside the cell cytoplasm.
- Additionally, mRNA vaccines are fully synthetic and do not require a host for growth, e.g., eggs or bacteria. Therefore, they can be quickly manufactured inexpensively to ensure their "availability" and "accessibility" for mass vaccination on a sustainable basis.

How mRNA vaccines work



Study about Internal Structure of Mars

Science & Technology

Why in news?

- Mars's liquid iron core is likely to be surrounded by a fully molten silicate layer, according to a pair of studies published in Nature.
- These results offer a new interpretation of the interior of Mars, suggesting its core is smaller and denser than previously proposed.
- Seismological study of Mars to understand the interior of the red planet was carried out in 2019.
- The InSight Mars Lander used an instrument called the Seismic Experiment for Interior Structure (SEIS) to record seismic waves passing through Mars's interior.

- Data from three years of quakes in Mars, including two seismic events caused by meteorite impacts, were used for the study.

Measurement analysis

- The analysis of measurements from the NASA InSight lander's Seismic Experiment for Interior Structure (SEIS) project in 2021 suggested the presence of a large but low-density core, composed of liquid iron and lighter elements such as sulphur, carbon, oxygen and hydrogen.

Lighter elements

- However, the result of the two studies published in Nature results suggest that the core has a higher proportion of lighter elements than is feasible according to estimates of the abundances of these elements early in Mars's formation history.
- The two studies found that the liquid iron-nickel core of Mars is surrounded by an approximately 150 km-thick layer of near-molten silicate rock, the top of which was previously misinterpreted as the surface of the core.
- This decrease in core radius implies a higher density than estimated in the earlier InSight study. These estimates can more easily be reconciled with our existing knowledge of chemical abundance on Mars.
- The molten state of this layer suggests that its temperature must be at least 2,000 Kelvin.
- This could be a sign that Mars had a turbulent interior following its formation, rather than a calmer one that more gently transported and shed heat to interplanetary space.

About Mars	
Size and Distance	<ul style="list-style-type: none"> • It is the fourth planet from the Sun and the second-smallest planet in the Solar System. • Mars is about half the size of Earth.
Similarity to the Earth (Orbit and Rotation)	<ul style="list-style-type: none"> • As Mars orbits the Sun, it completes one rotation every 24.6 hours, which is very similar to one day on Earth (23.9 hours). • Mars' axis of rotation is tilted 25 degrees with respect to the plane of its orbit around the Sun. This is similar to Earth, which has an axial tilt of 23.4 degrees. • Mars has distinct seasons like Earth, but they last longer than seasons on Earth. • Martian days are called sols—short for 'solar day'.
Other Features	<ul style="list-style-type: none"> • The reason Mars looks reddish is due to oxidation or rusting of iron in the rocks, and dust of Mars. Hence it is also called the Red Planet. • It has the largest volcano in the solar system i.e., Olympus Mons. • It has two small moons, Phobos and Deimos.

Cloud Seeding can Produce Rainfall

Science & Technology

Why in news?

- IITM Pune demonstrates cloud seeding can produce rainfall. The approximate cost of producing water through cloud seeding was 18 paise per litre; the cost will drop by more than 50% if we use indigenous seeding aircraft.

Key Highlights

- A cloud seeding experiment carried out in Solapur city, which falls on the leeward side of the Western Ghats and hence gets low rainfall — 384 mm and 422 mm of total rainfall during the period June to September 2018 and 2019, respectively — was able to achieve 18% relative enhancement in rainfall, which is approximately 8.67mm more rainfall.
- The relative enhancement of accumulated rainfall was seen over two hours after seeding the clouds.
- In all, the total enhancement of water availability through cloud seeding experiments was 867 million litres.
- The experiment — Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX phase-4) was a scientific investigation conducted in Solapur city during the summer monsoon period of 2018 and 2019.
 - The primary objective was to investigate the efficacy of hygroscopic seeding in deep convective clouds and to develop a cloud seeding protocol.
 - The experiment used two aircraft for studying various cloud parameters and for seeding the clouds.
 - The study found that cloud seeding is an effective strategy for enhancing rainfall in a region under suitable conditions.
- A randomised seeding experiment was undertaken to study the effectiveness of cloud seeding in producing rainfall.



- In total 276 convective clouds were chosen, and 150 were seeded while the remaining 122 clouds were not seeded.
- In our previous work we have found certain characteristics in a cloud such as the liquid water content in the cloud, the vertical motion in the cloud, which is an indicator of the growth of the cloud, will help inform us if the cloud will rain or not. Based on several criteria we know if a convective cloud has a potential to rain as all clouds cannot rain.
- Convective clouds with a depth of over one kilometre and likely to evolve into deep cumulus clouds were targeted.
- The seeded clouds produced more rainfall than the unseeded clouds," Dr. Thara Prabhakaran from the Indian Institute of Tropical Meteorology, Pune and the corresponding author of the paper.
- **Calcium chloride flare** was used for seeding the clouds.
 - A cloud seeding flare releases these particles when triggered.
 - The seeding was done at the base of the warm convective clouds and at a time when the clouds were in their growing stage so that the seed particles could enter the clouds with minimum dispersion.
- The convective cloud bases are found at 500-1,500 metres altitude during the summer monsoon period and around 2,000 metres or more altitude during the monsoon break periods, which depends on the moisture content in the lower atmosphere.
- Since the clouds are found at lower heights, the base of the convective clouds is warm, around 15 degrees C.
- But cloud seeding alone cannot mitigate droughts but can help produce 18% more rainfall and partially address water requirements. Undertaking cloud seeding as catchment-scale projects can possibly help in managing drought conditions.
- The study was carried for two years to first study and understand the microphysics and characteristics of convective clouds that can be targeted to enhance rainfall.
- The two-year study has helped develop a high-resolution numerical model that can help stakeholders to identify target locations, clouds that can be seeded, and a suitable seeding strategy to enhance rainfall in an area.
- One of the most important findings of the study was that not all cumulus clouds produce rainfall when cloud seeding is done.
- We found 20-25% of cumulus clouds produce rainfall if cloud seeding is done correctly.
- The micro physics of clouds vary widely and so not all clouds produce rainfall through cloud seeding. Though the relative enhancement of rainfall was 46% as measured by automatic rain gauges, the actual increase in rainfall over a 100 sq.km area was only 18%.

World Reported Twice as many Cholera Cases in 2022 as in 2021

Science & Technology

Why in news?

- World Reported Twice as Many Cholera Cases in 2022 as in 2021 says WHO. Most cholera cases continue to be reported from Africa and Asia, with Europe accounting for a few "imported cases"

About Cholera

- Cholera is a water-borne disease caused by two strains called O1 and O139 of the bacteria *Vibrio cholerae*.
- Of these, O1 is responsible for almost all outbreaks; outbreaks of O139 are rare and none have been recorded outside Asia.
- According to the World Health Organization (WHO)'s weekly epidemiological record, published on September 22, the world reported more than twice as many cholera cases in 2022 as it did in 2021 (Chart 1).
- Between these years, more than twice as many countries also reported at least 10,000 suspected as well as confirmed cases of cholera.
- Both these trends suggest a reversal of a short-term trend, of declining prevalence since 2019. The reversal also complicates a target the WHO specified in 2017, to reduce the number of cholera deaths worldwide by 90% by 2030.
- According to the United Nations health body, "Cholera transmission is closely linked to inadequate access to clean water and sanitation facilities." *Vibrio cholerae* bacteria also favour warmer waters with lower salinity.
- All these conditions are created as a result of climate change — which increases the likelihood of floods, heatwaves, intense monsoonal rains and storms, and the duration of warm periods — and war.

- The epidemiological record report blames the uptick on the decline of the COVID-19 pandemic, and its restrictions; "limited investments" in providing care to those most vulnerable to the disease; the effects of climate change; and increasing conflict.

- It is an acute diarrhoeal infection caused by **ingestion of food or water contaminated with the bacterium *Vibrio cholerae***.
- It remains a global threat to public health and an indicator of inequity and lack of social development.
- **Symptoms**
 - It is an extremely virulent disease that can cause severe acute watery diarrhoea.
 - Profuse watery diarrhoea, Vomiting, Leg cramps etc
- The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water.
- Currently, there are three WHO pre-qualified oral cholera vaccines (OCV), **Dukoral, Shanchol, and Euvichol-Plus**.
- All three vaccines require two doses for full protection.

WHO Approves Use of Malaria Vaccine with Adjuvant Tech

Science & Technology

Why in news?

- The **R21/Matrix-M malaria vaccine** developed by the University of Oxford and the Serum Institute of India, leveraging Novavax's adjuvant technology, was recommended for use by the World Health Organization (WHO), after meeting required safety, quality and effectiveness standards.

Adjuvant

- An adjuvant is an ingredient in a vaccine that enhances the immune system's response to that vaccine.
- Adjuvants help the immune system better recognize what's in a vaccine and remember it longer, increasing the amount of time that a vaccine may offer protection.
- Matrix-M adjuvant is derived from saponins, naturally occurring compounds found in the bark of the Quillaja saponaria tree in Chile. Saponins have a history of medicinal use.
- The Matrix-M component is a proprietary saponin-based adjuvant from Novavax, which is licensed to the Serum Institute for use in endemic countries, while Novavax retains commercial rights in non-endemic countries.

Features of R21

- The R21, also known as the Matrix-M malaria vaccine, is the second disease-specific vaccination ever created.
- In 2021, the WHO authorised RTS, S or mosquirix, the first-ever malaria vaccine.
- Nine nations, including the Maldives, Sri Lanka, Kyrgyzstan, Paraguay, Uzbekistan, Argentina, Algeria, China (2021), and El Salvador (2021), have received this certification from the WHO Director-General since 2015.

About malaria

- Malaria is a parasite-based illness spread by mosquitoes. It is spread by the Plasmodium parasite (Plasmodium vivax) carried by an infected Anopheles mosquito. This mosquito bites a person, releasing the parasite into the circulation.
- It is most common in Africa, followed by Asia and Latin America, and is found in tropical and subtropical temperatures where the parasites can grow. The Middle East and Europe are also somewhat impacted, though to a far lesser extent.
- According to the World Malaria Report from 2020, there were around 229 million cases of malaria worldwide in 2019, and the disease spread by mosquitoes claimed 409,000 lives.

The National Strategic Plan of India for Malaria Elimination

Following are the goals of the NSP for Malaria Elimination:

- To guarantee that every case of malaria is correctly diagnosed as a parasite infection and that every confirmed case is treated in full, achieve universal coverage of case detection and treatment services in endemic districts.

- To proceed towards the complete eradication of malaria, the surveillance system must be improved to identify, alert, investigate, classify, and respond to all cases in all districts.
- Utilise an effective vector control intervention to achieve nearly universal coverage of the population at risk for malaria.
- With the right vector control intervention, work towards almost universal coverage of the population at risk for malaria.
- In order to execute a combination of focused interventions for malaria elimination, ensure good programme administration and coordination at all levels.
- By 2027, the Indian government hopes to have eradicated malaria in the country.
- MERA-India (Malaria Elimination Research Alliance)
- Indian Council of Medical Research (ICMR) founded
- It is a group of collaborators engaged in the fight against malaria.
- **Global step**
- Under its "E-2025 Initiative," the WHO has also identified 25 nations with the capacity to eradicate malaria by 2025.
- According to the WHO's Global Technical Strategy for Malaria 2016–2030, case incidence and fatality rates from malaria are expected to decline by at least 40% by 2020, at least 75% by 2025, and at least 90% by 2030 compared to baseline year 2015.
- In 11 countries with high malaria burdens, including India, WHO has launched the High Burden to High Impact (HBHI) initiative.
- Four states—West Bengal, Jharkhand, Chhattisgarh, and Madhya Pradesh—have begun implementing the "High Burden to High Impact (HBHI)" initiative.

Immuno ACT's Cell Therapy

Science & Technology

Why in news?

- IIT Bombay-incubated Immunoadoptive Cell Therapy (ImmunoACT), in which drugmaker Laurus Labs holds about 34% stake, has received Central Drugs Standard Control Organisation's (CDSCO) marketing authorisation approval of the 'first' humanised CD19-targeted Chimeric Antigen Receptor T cell (CAR-T cell) therapy product for relapsed/refractory B-cell lymphomas and leukaemia (blood cancer) in India.

About CAR-T Cell Therapy

- Chimeric Antigen Receptor (CAR) T-cell therapy is a type of immunotherapy that uses a patient's own T cells, a type of white blood cell, to recognize and attack cancer cells.
- In CAR T-cell therapy, T cells are taken from the patient's blood and are changed in the lab by adding a gene for a receptor (called a chimeric antigen receptor or CAR), which helps the T cells attach to a specific cancer cell antigen. The CAR T cells are then given back to the patient.
- Since different cancers have different antigens, each CAR is made for a specific cancer's antigen. For example, in certain kinds of leukemia or lymphoma, the cancer cells have an antigen called CD19. The CAR T-cell therapies to treat these cancers are made to that does not have the CD19 antigen.
- This type of treatment can be very helpful in treating some types of cancer, even when other treatments are no longer working.

About T cells

- T cells, also known as T lymphocytes, are a type of white blood cell that plays a central role in the immune system. They are one of two primary types of lymphocytes, with B cells being the other type. T cells can be distinguished from other lymphocytes by the presence of a T-cell receptor (TCR) on their cell surface.



Why in news?

- In a move meant to put the Indian system of medicine on the world map and provide it with a common standardised language, the Union government has sought the inclusion of Ayurveda and related systems in the **11th revision of the World Health Organization's International Classification of Diseases (ICD)**, as the second module of a supplementary chapter on traditional medicine conditions.

About International Classification of Diseases (ICD)

- The ICD is the global health information standard for mortality and morbidity statistics.
- WHO was entrusted with the ICD at its creation in 1948.
- ICD is increasingly used in clinical care and research to define diseases and study disease patterns, as well as manage health care, monitor outcomes and allocate resources.
- More than 100 countries use the system to report mortality data, a primary indicator of health status. This system helps to monitor death and disease rates worldwide and measure progress towards the Millennium Development Goals.
- About 70% of the world's health expenditures (USD \$ 3.5 billion) are allocated using ICD for reimbursement and resource allocation.

Avian Influenza Viruses Undergo Major Evolutionary Changes

Science & Technology

Why in news?

- A recent study published in Nature reveals major changes in the ecology and evolution of highly pathogenic avian H5 influenza viruses, including a shift in global distribution.

Key Highlights

- Highly pathogenic avian H5N1 virus activity has intensified globally since 2021, infecting and killing increasing numbers of wild birds and poultry, as well as posing a risk to mammals (including humans).
- H5N1 emerged in China in 1996.
- The scale of H5 outbreaks in wild birds has escalated beyond Asia since 2014, but the origins of recent resurgences and the underlying evolution of these viruses has been unclear.
- Dr. Vijaykrishna Dhanasekaran from the University of Hong Kong and others examined the changing origins and trends of highly pathogenic avian H5 outbreaks using epidemiological data collected by the Food and Agricultural Organization and the World Organization for Animal Health between 2005 and 2022, alongside the analysis of more than 10,000 whole viral genomes.
- Key resurgent events were identified in 2016/17, with genome analysis revealing that the viral lineages originated in Asia.
- By contrast, two new H5 viruses identified between 2020 and 2022 that emerged from African and European bird populations indicate a notable shift in H5 epicentre away from Asia and into other continents.
- These strains were determined to have evolved through genetic reassortment with low pathogenic viral variants as they disseminated.
- The authors suggest that the increasing persistence of avian influenza in wild bird populations is driving the evolution and spread of new strains.
- "These results highlight a shift in the Highly Pathogenic Avian Influenza (HPAI) H5 epicentre beyond Asia and indicate that increasing persistence of HPAI H5 in wild birds is facilitating geographic and host range expansion, accelerating dispersion velocity and increasing reassortment potential," they write.
- The authors suggest that these findings highlight the continued relevance of elimination strategies to limit viral spread and to control the prevalence of highly pathogenic avian influenza within global bird populations, as well as the importance of understanding viral evolution to mitigate and react to new strains.

Why in News?

- The Indian Space Research Organisation (ISRO) commenced the first uncrewed developmental flight of its 'Gaganyaan' human spaceflight mission from Sriharikota, designated TV-D1

Key Highlights

- The launch vehicle, a single-stage rocket, carried a crew module fit with a crew-escape system (CES) to an altitude of 12 km. There, the CES detached itself with the crew module from the rocket and climbed up to 17 km.
- In response to a command, the CES separated from the crew module, leaving the module to reorient itself before dropping over the Bay of Bengal. Its descent was slowed first by drogue parachutes and then by the main parachutes.
- Finally, the module splashed into the Bay a short distance from Sriharikota, where the Indian Navy hauled it out. The CES also splashed down farther down range.
- The flight tested the CES's ability to protect the crew in case the rocket malfunctioned, and collected data via sensors to inform future tests. The test's value will be based on this data.
- According to ISRO chairman S. Somanath, ISRO has many tests planned to develop confidence that the organisation can safely launch humans to orbit. Even the parachutes used for TV-D1 underwent 16 tests.
- The automatic launch sequence held back the launch with a few seconds on the clock. Mr. Somanath subsequently announced that TV-D1 would be postponed. But ISRO personnel were able to quickly identify and resolve the problem, and the launch was rescheduled.
- These checks and balances are expensive, but are in place to prevent greater costs later. Plans for the programme were first readied in 2009 at an estimated ₹12,400 crore.
- The Union Cabinet granted its approval in December 2018 at ₹9,023 crore assuming first flight by 2022. But the COVID-19 pandemic and other commitments have caused delays such that the earliest the first crewed flight can happen is currently 2025.
- Last week, Prime Minister Narendra Modi called on ISRO to launch humans to the moon by 2040.
- Even with the requisite financial support, this would be a very tight deadline, but as with fastidiousness, contemporary geopolitics has also rendered returning to the moon non-negotiable.
- Fortunately, with 'Gaganyaan', ISRO has indicated how a balance can be struck: plan ahead, boost local manufacturing, test exhaustively, launch when ready.
- The deadline may be missed, but the mission can be undertaken with confidence while also improving local capabilities.

Gaganyaan

- The Gaganyaan project **aims** to showcase the ability to send a crew of three individuals into space, where they will orbit at a distance of 400 km for a mission lasting three days. The ultimate goal is to ensure their safe return to Earth, with a landing in the waters of the Indian Sea.
- Gaganyaan is a **mission initiated by ISRO**.
- ISRO & Indian Navy has carried out initial recovery trials of the Crew Module in the Navy's Water Survival Test Facility (WSTF) in Kochi. The **Gaganyaan schedule includes sending three flights into orbit**.
- A **total of three flights** are planned to be launched under the Gaganyaan program. The Gaganyaan programme involves sending three spacecraft into orbit.
- As per the Gaganyaan schedule, there will be three missions launched into orbit.
- Two flights** will be unmanned, while **one flight** will have human crew members.
- The project is successfully completed by utilising an optimal strategy that takes into account the in-house expertise, the experience of the Indian industry, the intellectual capabilities of Indian academia and research institutions, as well as the cutting-edge technologies available from international agencies.

Why in news?

- The Indian Air Force (IAF) has placed two contracts with Bharat Dynamics Ltd. (BDL) for the indigenous **Astra Beyond Visual Range (BVR) air-to-air Missile** and the first batch is expected to be inducted by the end of the year, according to defence sources.

Key Highlights

- The Astra is fully integrated on the Su-30MKI.
- In August, it was successfully test fired from the Light Combat Aircraft (LCA) Tejas off the coast of Goa during which the missile was released from the aircraft at an altitude of about 20,000 ft.
- The IAF plans to arm its frontline fighters with the Astra-MK1 and officials have said that the Astra-2 would become the mainstay of the IAF's BVR missile arsenal, reducing import dependency.
- In May 2022, the Defence Ministry signed a contract with BDL for supply of Astra Mk-I missiles and associated equipment for the IAF and the Navy at a cost of ₹2,971 crore.

**Astra Missiles**

- Astra is an Indian family of all-weather beyond-visual- range air-to-air missile, developed by the Defence Research and Development Organisation.
- Different missiles of this family are capable of engaging targets at varying distances of 500 m up to 340 km.
- Astra Mark 1**
 - Limited series production of Astra Mk-1 missiles began in 2017.
 - The Astra Mark 1, has a maximum head-on launch range of 100 kilometres, a speed of 4.5 Mach, and launch clearance up to 20 kilometres in height (66,000 ft).
 - The Astra may either be launched by the mother ship or in buddy mode.
 - Extensive and rigorous trials have validated the Astra missile's warhead capability, maximum launch ranges against head-on and maneuvering targets, long-range target engagement capability, clear missile separation at supersonic speeds, and launch under high 'G' forces, and multiple missile launches against multiple targets.
 - The Astra-1 is meant to carry a 15-kilogram pre-fragmented high explosive warhead that is ignited by a radio proximity fuse.
 - The missile's Electronic Counter-Countermeasure (ECCM) capabilities allow for unrestricted operation in an Electronic Counter-Countermeasure (ECM) environment.
 - Astra MK-1 already in Service is better than the Chinese PL-12 used by Pakistan and China.
- Astra Mark 2**
 - Astra MK-2 is the new version of Astra MK-1 with better range and launched from an ejector.
 - The Astra MK-2 has conventional dual-pulse rocket motor with improved grain quality and with solid fuel.
 - It is longer in length as a result of which more quantity of fuel can be loaded resulting in better range.
 - Thus Astra Mk2 missile easily exceeds the performance of the USA made AIM-120D AMRAAM & Chinese made PL-15. It has been tested to 180 km. What sets it apart is its striking affordability.
 - Astra MK-2 shares most of the key features of its predecessor Astra MK-1 such as aerodynamics, design, smokeless propulsion, Ku band AESA seeker, etc., so its development process has been very fast.
 - Astra MK-2 is likely to be inducted into IAF service by end of 2023 or Q1 2024 max as every system from design, body, dual pulse rocket motor, actuators, various sensors, warhead, instruments and Ku band AESA seeker has been validated and tested.
 - It will also come with improved high-angle off boresight capability, improved ECCM system, will sport a data link (first for Indian missile) & an AESA radar which will improve the first kill probability by a significant margin.

Why in news?

- The Chief of the Air Staff unveiled a new Ensign for the force, as it marked its 91st anniversary, by the inclusion of the Air Force Crest in the top right corner of the Ensign, towards the fly side.
- This year, the Air Force Day parade was held at the Air Force Station, Bamrauli in Prayagraj.
- The air display held in the afternoon on the banks of the Triveni Sangam, saw a few lakh people turn up to watch the aerial manoeuvres.

About New Ensign

- Explaining the new Ensign, a statement said the IAF Crest has the **national symbol, the Ashoka lion**, on the top with the words **Satyameva Jayate in Devanagari below it**.
- Below the Ashoka lion is a Himalayan eagle with its wings spread, denoting the fighting qualities of the IAF, it stated, adding, "A ring in light blue colour encircles the Himalayan eagle with the words 'Bharatiya Vayu Sena' and the motto of the IAF is inscribed below Himalayan eagle in golden Devanagari."



Key Highlights

- In the event the **Sarang helicopter** display team has gone from a four-helicopter to a five-helicopter military display team.
- In another first, the newly inducted **C-295 transport aircraft** made its maiden appearance, while the legacy **MiG-21 Bison** made what is likely its last appearance in an air display, prior to the planned phasing out by 2025.
- The **theme** for this year's **Air Force Day** was "**IAF — air power beyond boundaries**", which the Air chief said aptly reflected the "**inherent global reach of air power and how air power will prove decisive in future conflicts**".
- This is the **first Air Force Day Parade to be commanded by a woman officer**, Group Captain Shaliza Dhami.
- She is also the first woman officer of the IAF to command a combat unit.
- The parade had an all-woman contingent of newly inducted Agniveer Vayu personnel.
- The parade also included a flight of **Garud Commandos** of the IAF for the first time, as they completed 20 years of service.
- The Air chief presented Unit Citations to four IAF Units — 16 Squadron, 142 Helicopter Unit, 901 Signal Unit and 3 Base Repair Depot for their contribution to the service.

Radiation Detection Equipment

Defence & Security

Why in news?

- Radiation detection equipment (RDE) will soon be installed at eight land crossing points along India's borders with Pakistan, Bangladesh, Myanmar and Nepal to check the trafficking of radioactive materials for its possible use in making nuclear devices.
- The RDE will be installed at the integrated check posts and land ports of Attari (Pakistan border), Petrapole, Agartala, Dawki and Sutarkandi (all on the Bangladesh border), Raxaul and Jogbani (Nepal) and Moreh (Myanmar).

Radiation Detection Equipment (RDE)

- Radiation detectors, also known as **particle detectors**, are instruments designed for the detection and measurement of subatomic particles.
- Radioactive materials emit subatomic particles (i.e., electrons, protons, neutrons, alpha particles, gamma rays, and numerous mesons and baryons) as they decay.

How RDEs Work?

- RDEs are equipped with the following capabilities to detect and address potential threats effectively.
- **Raise Alarms:** RDEs can raise alarms in the presence of specific types of radiation: Gamma radiation & Neutron radiation.
- **Generate Video Frames:** RDEs have the capability to generate video frames, allowing for visual inspection of suspected objects.
- **Differentiation Abilities:** RDEs can differentiate between special nuclear material and naturally occurring radiation.
- This is essential to prevent false alarms triggered by harmless substances like fertilizers and ceramics.
- RDEs can also detect high-energy gamma isotopes, a characteristic attribute of recycled uranium, further enhancing their detection capabilities.

Phasing Out Cheetah, Chetak Helicopters From 2027

Defence & Security

Why in news?

- The armed forces have been attempting to replace the Cheetah and Chetak helicopters for well over a decade.

About LUH

- LCH is the **first indigenous Multi-Role Combat Helicopter**.
- **Designed and developed by:** Hindustan Aeronautics Limited (HAL).
- **Specifications:**
 - Maximum take-off weight: 3,100 kg.
 - Can carry a useful load of 1,500 kg.
 - Maximum speed: 220 km/h, cruise speed: 200 km/h.
 - Service ceiling (maximum altitude it can reach): 6,500 meters.
- **Range:** Approximately 500 km.
- **Features:** It has potent ground attack and aerial combat capability.
- Equipped with a 3-axis autopilot for stable and controlled flight in various conditions.
- Features a modern glass cockpit with digital avionics and instrumentation.
- Includes a weather radar system for real-time weather information.
- Cockpit lighting works with night-vision goggles for low-visibility conditions.

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