



**SIVARAJAVEL IAS ACADEMY**  
AN IDEAL INSTITUTE FOR **CIVIL SERVICE EXAMS**

# the **CATALYST**

**A Monthly Publication for Current Affairs**

**OCTOBER - 2023**



**OCTOBER 2023**

# The **CATALYST**

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The **CATALYST** is a monthly magazine for current affairs which tries to give aspirants an in-depth comprehension of certain topics which appeared in different sources over the month. The Magazine has been designed in such a way that the reading experience is enriching and insightful for the readers.

The contents have been grouped into a thematic structure to help aspirants focus on the overall GS syllabus.

## **Inside The Catalyst Magazine**

- I. Special Coverage
- II. Within the Sub themes first few topics will be Prelims oriented followed by indepth coverage of Mains Topics.
- III. Book Summary Relevant for UPSC Exam.
- IV. Fact Sheet and Quotes have also been provided.

*\*New sections will be added or removed based on the new updates we include in the forthcoming issues.*

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# the **CATALYST**

## From the Editor's Desk

Dear Readers,

Since 7 October 2023, the escalating crisis in Israel and the occupied Palestinian territory has caused large numbers of civilian deaths and injuries.

Irrespective of reasons and justifications, War is a costly affair and leaves a lasting impact on Human lives. It is a contradiction to the civilisations that we have developed over time.

There are several ethical justifications of war, disagreements about the moral costs of war but everyone would agree that peace is better for human development and war is hardly a solution for any conflict.

I would want to bring to your attention the following quotes regarding war:

1. War is never a lasting solution for any problem- A.P.J Abdul Kalam
2. The more you sweat in peace, the less you bleed in war-Norman Schwarzkop
3. 'There never was a good war or a bad peace.' – Benjamin Franklin.

As Peace is permanent, the world has to come together to sooner find a lasting solution in this conflict.

In this October Issue (From Oct 1 to Oct 30, 2023, Current Affairs), we have covered **a range of topics with special emphasis on Israel Palestine Conflict, List of Nobel Prize Winners, 10 years of BRI, Vienna Convention, PCA norms for NBFC's etc.** This month's Book summary is on **"Animal farm"** by George Orwell .

We are constantly motivated by the reception given by our dear readers. We aspire to enrich the forthcoming issues. All feedback is welcome and suggestions to improve the magazine can be sent to [sivarajaveliasacademy@gmail.com](mailto:sivarajaveliasacademy@gmail.com).

Sincerely,  
P.Mohan

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## ISRAEL-PALESTINE CONFLICT



### Context

Hamas launches 'Operation Al Aqsa Flood' with barrage of rockets, Israel declares 'state of alert' for war.

### Timeline of the Israeli-Palestinian conflict

The Israeli-Palestinian conflict dates back to the end of the nineteenth century.

**1947-United Nations adopted Resolution 181**, known as the Partition Plan, which sought to divide the British Mandate of Palestine into Arab and Jewish states.

**1948-State of Israel was created**, sparking the first Arab-Israeli War.

**1949-War ended in with Israel's victory**, but 750,000 Palestinians were displaced, and the territory was divided into 3 parts: the State of Israel,

the West Bank (of the Jordan River), and the Gaza Strip.

**1956- Suez Crisis and Israel's invasion of the Sinai Peninsula** made Egypt, Jordan, and Syria to sign mutual defence pacts in anticipation of a possible mobilization of Israeli troops.

**1967-Following a series of manoeuvres by Egyptian President Abdel Gamal Nasser, Israel pre-emptively attacked Egyptian and Syrian air forces, starting the Six-Day War.**

**Result:** Israel gained territorial control over the Sinai Peninsula and Gaza Strip from Egypt; the West Bank and East Jerusalem from Jordan; and the Golan Heights from Syria.

**1963-Six years later**, in what is referred to as the

**Yom Kippur War** or the October War, Egypt, and Syria launched a surprise two-front attack on Israel to regain their lost territory; the conflict did not result in significant gains for Egypt, Israel, or Syria.

**1979-** Following a series of cease-fires and peace negotiations, representatives from Egypt and Israel signed the **Camp David Accords**, a peace treaty that ended the thirty-year conflict between Egypt and Israel.

**1987-** Hundreds of thousands of Palestinians living in the West Bank and Gaza Strip rose up against the Israeli government in what is known as the **first intifada**.

**1993-Oslo I Accords** mediated the conflict, setting up a framework for the Palestinians to govern themselves in the



West Bank and Gaza, and enabled mutual recognition between the newly established Palestinian Authority and Israel's government.

**1995-Oslo II Accords** expanded on the first agreement, adding provisions that mandated the complete withdrawal of Israel from 6 cities and 450 towns in the West Bank.

**2000:**

Palestinians launched the second intifada lasted until 2005. In response, the Israeli government approved the construction of a barrier wall around the West Bank in 2002, despite opposition from the International Court of Justice and the International Criminal Court.

**2006-Factionalism** among the Palestinians flared up when Hamas won the Palestinian Authority's parliamentary elections, deposing longtime majority party Fatah.

**Result:** This gave Hamas, a political and militant movement inspired by the Palestinian Muslim Brotherhood, control of the Gaza Strip.

But, The United States and European Union, among others, did not acknowledge Hamas' electoral victory, as the group has been considered a terrorist organization by western governments since the late 1990s. Following Hamas' seizure of control, violence broke out between Hamas

and Fatah.

From 2006 to 2011—a series of failed peace talks and deadly confrontations culminated in an agreement to reconcile.

**2014-Fatah entered into a unity government with Hamas** who fought with the Israeli military and the offensive continued in Gaza.

**2015 - Palestinian** President Mahmoud Abbas of Fatah announced that Palestinians would **no longer be bound by the territorial divisions created by the Oslo Accords.**

**2018-Hamas militants fired over one hundred rockets into Israel,** and Israel responded with strikes on more than fifty targets in Gaza during a twenty-four-hour flare-up.

**Result:** The tense political atmosphere resulted in a return to disunity between Fatah and Hamas, with Fatah party controlling the Palestinian Authority from the West Bank and Hamas de facto ruling the Gaza Strip.

**Recent Developments:**

The Donald J. Trump administration reversed longstanding U.S. policy by canceling funding for the UN Relief and Works Agency, which provides aid to Palestinian refugees, and relocating the U.S. embassy from Tel Aviv to Jerusalem.

**Abraham Accords:** The Trump administration also helped broker the Abraham Accords, under which Bahrain and the United Arab Emirates normalized relations with Israel, becoming only the third and fourth countries in the region—following Egypt in 1979 and Jordan in 1994—to do so. Similar deals followed with Morocco and Sudan. Palestinian leader Mahmoud Abbas of Fatah rejected the accords, as did Hamas.

2021-Hamas, the militant group which governs Gaza, and other Palestinian militant groups launched hundreds of rockets into Israeli territory. Israel responded with artillery bombardments and airstrikes and after eleven days, Israel and Hamas agreed to a cease-fire, with both sides claiming victory.

**2022-The most far-right and religious government** in Israel's history, led by Benjamin 'Bibi' Netanyahu and his Likud party and comprising two ultra-Orthodox parties and three far-right parties formed the coalition government prioritized the expansion and development of Israeli settlements in the occupied West Bank.

**2023-Hamas launches 'Operation Al Aqsa Flood'** with barrage of rockets and Israel declares 'state of alert' for war.

Since then, the two sides have traded daily rocket fire,

and Israel ordered more than one million Palestinian civilians in northern Gaza to evacuate ahead of a ground invasion into Gaza Strip. This is leading to a serious 'humanitarian crisis'.

### **Mahatma Gandhi view on Israel-Palestine conflict:**

Although he had deep sympathies for the Jewish people who had historically been unjustly persecuted for their religion, *he did not support a Zionist state in Palestine based on two principal beliefs.*

First, Palestine was already home to Arab Palestinians, and

The settlement of Jews, which Britain actively enabled, was fundamentally violent.

### **India's Official Stand**

India's support for the Palestinian cause is an integral part of the nation's foreign policy. In 1974, *India became the first Non-Arab State to recognize Palestine Liberation Organization (PLO) as the sole*

and legitimate representative of the Palestinian people.

Apart from the strong political support to the Palestinian cause at bilateral and international levels, India has been extending various forms of economic assistance to the Palestinian people.

Prime Minister Narendra Modi paid a historic visit to Palestine on February 10, 2018, which was the *first-ever visit by an Indian Prime Minister to Palestine.*

India enhanced its annual contribution towards UN Relief and Works Agency in the Near East (UNRWA) from USD 1.25 Million to USD 5 Million in the back drop of financial crisis being faced by UNRWA.

### **India's reaction to ongoing conflict**

*India abstained from voting on a UN resolution,* which was not condemning Hamas for terror attacks and it also called for an immediate

humanitarian truce in the Israel-Hamas crisis.

*Recently, India votes in favour of a UN resolution that condemns Israeli settlement activities in 'Occupied Palestinian Territory'.*

India along with the U.S. and other countries expressed support for Israel, call for immediate release of hostages without mentioning a ceasefire and instead they called for "humanitarian pauses" in the war.

India's official position on the Israel-Palestine conflict remains unchanged, advocating for a two-state solution with Israel and Palestine as good neighbors.

### **Way Forward**

Maintaining a status quo in the Israel-Palestine conflict is a challenging endeavour, and India can play a constructive role by promoting a peaceful resolution based on a two-nation theory.



# NOBEL PRIZES 2023 – A COMPENDIUM

## A BRIEF

S.No	Stream	Name(s)	Subject
1.	Physics	Pierre Agostini Ferenc Krausz Anne L’Huillier	“for experimental methods that generate <i>attosecond pulses of light</i> for the study of electron dynamics in matter”
2.	Chemistry	Moungi G. Bawendi Louis E. Brus Alexei I. Ekimov	“for the discovery and synthesis of <i>quantum dots</i> ”
3.	Physiology or Medicine	Katalin Karikó Drew Weissman	“for their discoveries concerning <i>nucleoside base modifications</i> that enabled the development of effective mRNA vaccines against COVID-19”
4.	Peace	Narges Mohammadi	“for her fight against the <i>oppression of women in Iran</i> and her fight to promote human rights and freedom for all”
5.	Literature	Jon Fosse	“for his <i>innovative plays</i> and prose which give voice to the unsayable”
6.	The Sveriges Riksbank Prize in Economic Sciences	Claudia Goldin	“for having advanced our understanding of women’s labour market outcomes”

## PHYSICS NOBEL PRIZE

The laureates have been awarded for the demonstration of a way to create extremely short pulses of light that can be used to measure the rapid processes in which electrons move or change energy.

### Attosecond

An attosecond (symbol as) is a unit of time in the International System of Units (SI) equal to  $1 \times 10^{-18}$  of a second (one quintillionth of

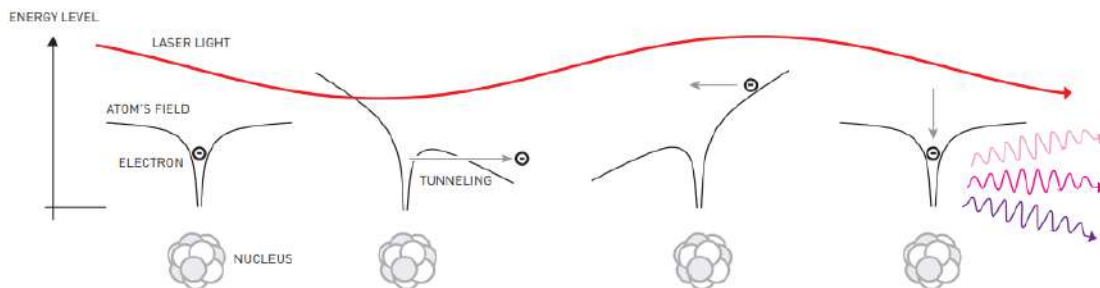
a second)

### How can an attosecond pulse of light created?

Attosecond pulses are created by focusing infrared laser light onto a noble gas

## Laser light interacts with atoms in a gas

Experiments that created overtones in laser light led to the discovery of the mechanism that causes them. How does it work?



- 1 An electron that is bound to an atom's nucleus cannot normally leave its atom; it does not have enough energy to lift itself out of the well created by the atom's electrical field.
- 2 The atom's field is distorted when it is affected by the laser pulse. When the electron is only held by a narrow barrier, quantum mechanics allow it to tunnel out and escape.
- 3 The free electron is still affected by the laser field and gains some extra energy. When the field turns and changes direction, the electron is pulled back in the direction it came from.
- 4 To reattach to the atom's nucleus, the electron must rid itself of the extra energy it gained during its journey. This is emitted as an ultraviolet flash, the wavelength of which is linked to that of the laser field, and differs depending on how far the electron moved.

target. The laser light hits atoms in the gas, liberating some of their electrons. The freed electrons fly away, loop back, and reconnect with their home atoms. This reconnection generates attosecond bursts of light that combine to form an attosecond laser pulse

### How fast is electron dynamics?

The movement of an atom in a molecule can be studied with the very shortest pulses produced by a laser. These

movements and changes in the atoms occur on the order of femtoseconds—a millionth of a billionth of a second. But electrons are lighter and interact faster, in the attosecond realm. An attosecond is a billionth of a billionth of a second.

### Applications of attosecond physics:

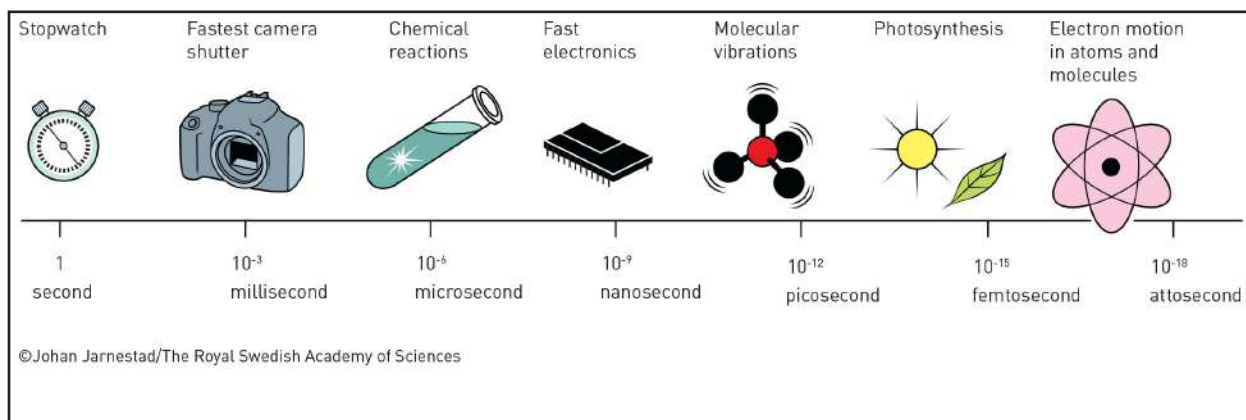
To capture 'images' of activities that happen in incredibly short time spans

Scientists can use such

pulses to explore short-lived atomic and molecular processes implicated in fields like materials science, electronics, and catalysis.

For medical diagnostics, attosecond pulses can be used to check for the presence of certain molecules based on their fleeting signatures.

These pulses could also be used to develop faster electronic devices, and better telecommunications, imaging, and spectroscopy.



# CHEMISTRY NOBEL PRIZE

The 2023 Nobel Prize in chemistry was awarded to Mounqi G. Bawendi, Louis E. Brus and Alexei I. Ekimov for the discovery and synthesis of quantum dots. These tiny particles have unique properties and now spread their light from television screens and LED lamps.

## Quantum Dots

Quantum dots (QDs), also called semiconductor nanocrystals, are semiconductor particles a few nanometres in size, having optical and electronic properties that differ from those of larger particles as a result of quantum mechanical effects.

Quantum dots are not bulk matter, neither they are atomic/ molecular particles. However, although real atoms are identical, most quantum dots comprise hundreds or thousands of atoms, with

inevitable variations in size and shape and, consequently, unavoidable variability in their wavefunctions and energies.

The key difference between carbon dots and quantum dots is that carbon dots are small carbon nanoparticles, whereas quantum dots are small semiconductor particles. Both carbon dots and quantum dots fall under the field of quantum mechanics. These are small nanoscale particles.

## Properties of Quantum dots:

- 1) Quantum dot emits lights of different colours.
- 2) When energy is applied to an atom, electrons are energised and move to a higher level. When the electron returns to its lower and stable state, this additional energy is emitted as light corresponding to a particular frequency.

Quantum dot crystals work in much the same way as the above phenomenon, but it behaves as one very large atom. The energy source used to stimulate a quantum dot is commonly ultraviolet light.

3) The frequency or colour of light given off is not related to the material used in the quantum dot, but by the size of the quantum dot.

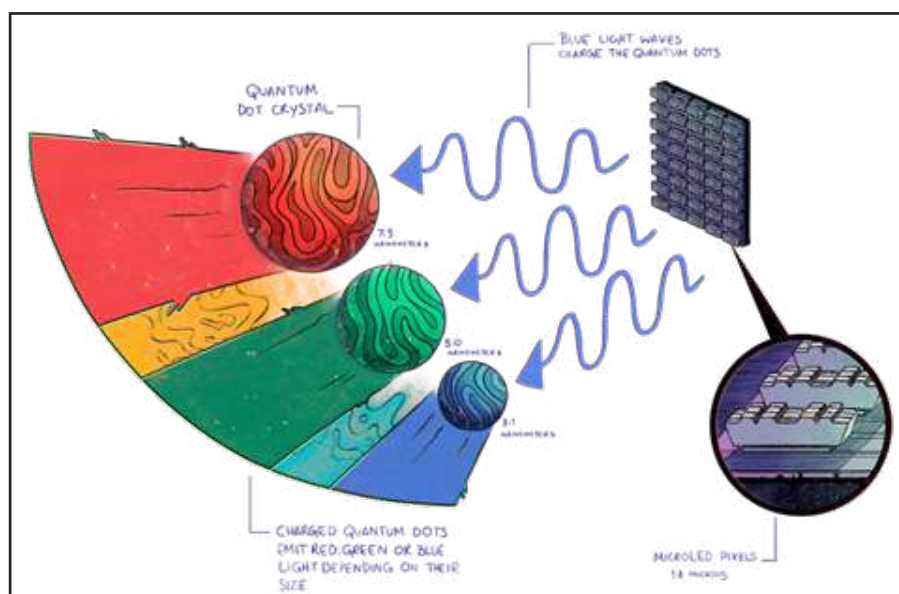
## Applications of Quantum dots

**Display Technology:** Quantum dots are used in quantum dot displays, also known as QLED (Quantum Dot Light Emitting Diode) displays. They enhance the color accuracy, brightness, and energy efficiency of displays compared to traditional LCD technology.

**Biological Imaging:** They are employed as fluorescent probes in biological and medical imaging. Their small size and bright, tunable emissions make them useful for tracking cellular and molecular processes.

**Solar Cells:** QDs have the potential to improve the efficiency of solar cells. Researchers are exploring their use in photovoltaics to capture a broader spectrum of light.

**LED Lighting:** QDs are used in LED lighting to produce high-quality,

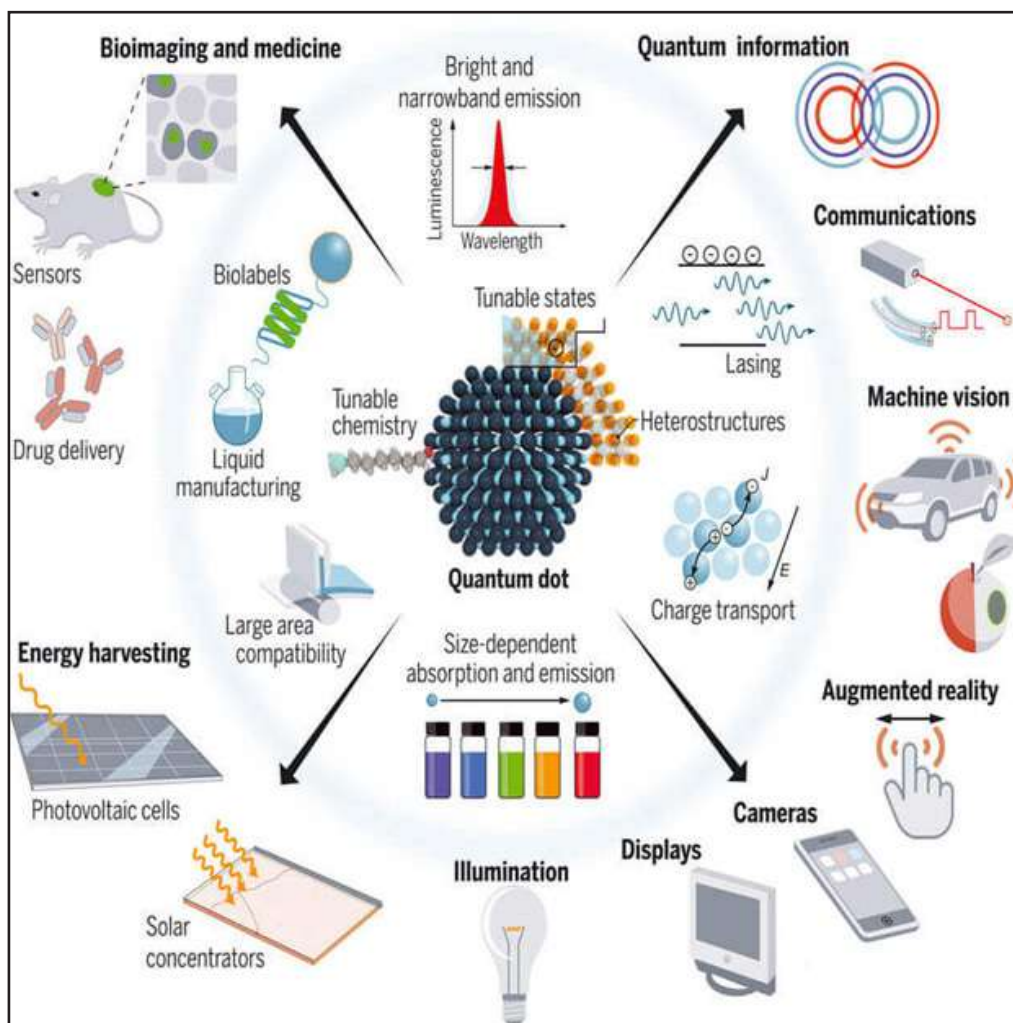


energy-efficient white light. They can be used to generate warm or cool white light with excellent color rendering.

**Quantum Computing:** QDs are being studied for their potential use in quantum computing due to their ability to trap and manipulate individual electrons and quantum states.

**Cancer Detection:** QDs functionalized with targeting molecules can be used for cancer detection. They can selectively bind to cancer cells, aiding in early diagnosis.

With an estimated total market size of USD 4 billion in 2021, quantum dots are used as high-quality light emitters in illumination and in display technology, as well as for biomedical imaging. Ongoing nanotechnology research also explores applications of quantum dots in infrared photodetection, solar energy conversion, light-emitting diodes, diagnostics and photocatalysis.



### Duality of Matter – the deBroglie Waves

Matter waves are a central part of the theory of quantum mechanics, being half of wave-particle duality. All matter exhibits wave-like behavior. For example, a beam of electrons can be diffracted just like a beam of light or a water wave.

Albert Einstein proposed that light can be described as a ‘particle’ (called a photon).

The concept that matter behaves like a ‘wave’ was proposed by French physicist Louis de Broglie in 1924, and so matter waves are also known as de Broglie waves.



# PHYSIOLOGY / MEDICAL NOBEL PRIZE

The Nobel Assembly at the Karolinska Institute awarded the 2023 Nobel Prize in Physiology or Medicine jointly to Katalin Karikó and Drew Weissman for their discoveries concerning nucleoside base modifications that enabled the development of effective mRNA vaccines against COVID-19

Through their groundbreaking findings, which have fundamentally changed our understanding of how mRNA interacts with our immune system, the laureates contributed to the unprecedented rate of vaccine development during one of the greatest threats to human health in modern times

## Nucleoside and nucleotide

Nucleosides have a nitrogenous base and a five-carbon carbohydrate group, usually a ribose molecule. Nucleotides are simply a nucleoside with one or more phosphate groups attached. The resulting molecule is found in ribonucleic acid or RNA.

If one hydroxyl (OH) group has been removed from the ribose, the deoxy versions of the nucleoside and nucleotide form the building blocks of deoxyribonucleic acid or DNA.

Nucleosides and nucleotides are closely involved in the preservation and transmission of the genetic information of all living creatures. In addition, they play roles in biological energy storage and transmission, signaling, regulation of various aspects of metabolism, and even an important role as an antioxidant. Mistakes or deficiencies in their synthesis usually lead to death. Overproduction or decreased elimination of nucleic acid derivatives also lead directly to medical conditions.

Five major nucleoside bases are common in human biology, including the purines (two-ring structure) adenine and guanine and the pyrimidines (one-ring structure) cytosine, uracil, and

thymine

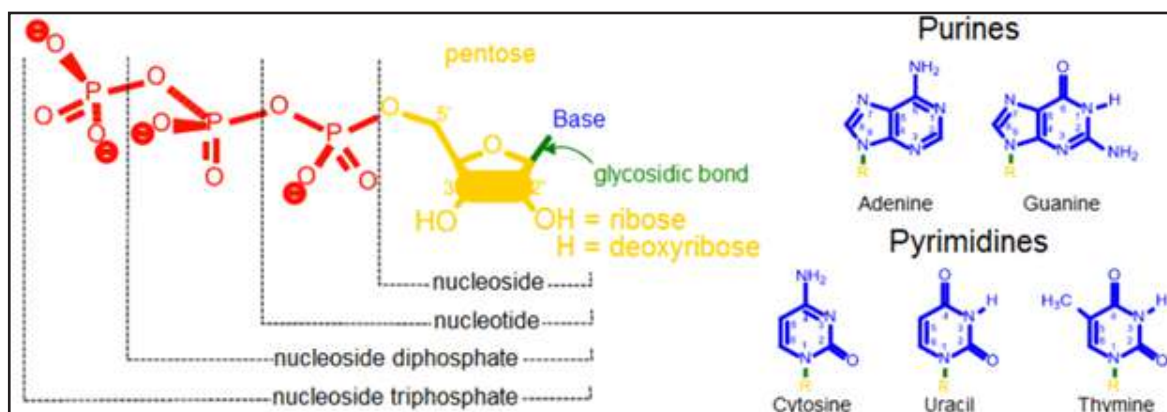
## mRNA

messenger RNA (mRNA), molecule in cells that carries codes from the DNA in the nucleus to the sites of protein synthesis in the cytoplasm (the ribosomes). The molecule that would eventually become known as mRNA.

## Transcription

Transcription is the process of making the mRNA molecule from DNA. Genetic information flows from DNA into protein, the substance that gives an organism its form. This flow of information occurs through the sequential processes of transcription (DNA to mRNA) and translation (mRNA to protein). Transcription occurs when there is a need for a particular gene product at a specific time or in a specific tissue.

In our cells, genetic information encoded in DNA is transferred to messenger RNA (mRNA), which is used





as a template for protein production.

During the 1980s, efficient methods for producing mRNA without cell culture were introduced, called in vitro transcription (IVT). It is a procedure that allows for template-directed synthesis of RNA molecules of any sequence.

### **Dendritic cell**

A dendritic cell (DC) is an antigen-presenting cell (also known as an accessory cell) of the mammalian immune system. A DC's main function is to process antigen material and present it on the cell surface to the T cells of the immune system

The nitrogenous bases are derived from pyrimidine and purine, two parent molecules. The common nucleotides' bases and pentoses are heterocyclic compounds.

### **The breakthrough**

Karikó and Weissman noticed that dendritic cells recognize in vitro transcribed mRNA as a foreign substance, which leads to their activation and the release of inflammatory signaling molecules. They wondered why the in vitro transcribed mRNA was recognized as foreign while mRNA from mammalian cells did not give rise to the same reaction.

Karikó and Weissman realized that some critical properties must distinguish the different types of mRNA. RNA

contains four bases, abbreviated A, U, G, and C, corresponding to A, T, G, and C in DNA, the letters of the genetic code.

Karikó and Weissman knew that nucleoside bases in RNA from mammalian cells are frequently chemically modified, while in vitro transcribed mRNA is not. They wondered if the absence of altered bases in the in vitro transcribed RNA could explain the unwanted inflammatory reaction.

To investigate this, they produced different variants of mRNA, each with unique chemical alterations in their bases, which they delivered to dendritic cells. The results were striking: The inflammatory response was almost abolished when base modifications were included in the mRNA. This was a paradigm change in our understanding of how cells recognize and respond to different forms of mRNA.

Karikó and Weissman immediately understood that their discovery had profound significance for using mRNA as therapy. These seminal results were published in 2005, fifteen years before the COVID-19 pandemic.

In further studies published in 2008 and 2010, Karikó and Weissman showed that the delivery of mRNA generated with base modifications markedly increased protein production compared to unmodified mRNA. The effect was due to the reduced activation of an enzyme that regulates protein production.

Through their discoveries that base modifications both reduced inflammatory responses and increased protein production, Karikó and Weissman had eliminated critical obstacles on the way to clinical applications of mRNA.

### **mRNA vaccines**

An mRNA vaccine is a type of vaccine that uses a copy of a molecule called messenger RNA (mRNA) to produce an immune response.

The vaccine delivers molecules of antigen-encoding mRNA into immune cells, which use the designed mRNA as a blueprint to build foreign protein that would normally be produced by a pathogen (such as a virus) or by a cancer cell. These protein molecules stimulate an adaptive immune response that teaches the body to identify and destroy the corresponding pathogen or cancer cells.

The mRNA is delivered by a co-formulation of the RNA encapsulated in lipid nanoparticles that protect the RNA strands and help their absorption into the cells.

They also exhibit reactogenicity, the tendency of a vaccine to produce adverse reactions, similar to that of conventional non-RNA vaccines.

People susceptible to an autoimmune response may have an adverse reaction to messenger RNA vaccines.

The advantages of mRNA

vaccines over traditional vaccines are ease of design, speed and lower cost of production, the induction of both cellular and humoral immunity, and lack of interaction with the genomic

DNA.

While some messenger RNA vaccines, such as the Pfizer–BioNTech COVID-19 vaccine, have the disadvantage of requiring ultracold storage

before distribution, other mRNA vaccines, such as the Moderna, CureVac, and Walvax COVID-19 vaccines, do not have such requirements

## NOBEL PRIZE FOR PEACE

The Norwegian Nobel Committee has decided to award the Nobel Peace Prize for 2023 to Narges Mohammadi for her fight against the oppression of women in Iran and her fight to promote human rights and freedom for all.

She has become the second Iranian woman to receive the Nobel Peace Prize after Shirin Ebadi (awarded the Nobel Peace Prize in 2003). Shirin was also the first Muslim woman to receive the award

### Background

Her brave struggle has come with tremendous personal costs. Altogether, the governmental regime had arrested her 13 times, convicted her five times, and sentenced her to a total of 31 years in prison and 154 lashes. In September 2022 a young Kurdish woman, Mahsa Jina Amini, was killed while in the custody of the Iranian

morality police. Her killing triggered the largest political demonstrations against Iran's theocratic regime since it came to power in 1979. Her work has influenced hundreds of thousands of Iranians to take part in peaceful protests against the authorities' brutality and oppression of women under the slogan "Woman – Life – Freedom."

The regime cracked down hard on the protests: more than 500 demonstrators were killed. Thousands were injured, including many who were blinded by rubber bullets fired by the police. At least 20 000 people were arrested and held in regime custody.

The motto adopted by the demonstrators – "Woman – Life – Freedom" – suitably expresses the dedication and work of Narges Mohammadi.

**Woman.** She fights for women against systematic

discrimination and oppression.

**Life.** She supports women's struggle for the right to live full and dignified lives. This struggle across Iran has been met with persecution, imprisonment, torture and even death.

**Freedom.** She fights for freedom of expression and the right of independence, and against rules requiring women to remain out of sight and to cover their bodies. The freedom demands expressed by demonstrators apply not only to women, but to the entire population

### Other Recognitions

2023 - PEN/ Barbey Freedom to Write Award

2023 - UNESCO/ Guillermo Cano World Press Freedom Prize

Featured in BBC's list of 100 inspiring and influential women in 2022

## NOBEL PRIZE FOR LITERATURE

Norwegian author Jon Olav Fosse has been awarded the Nobel Prize for Literature in 2023 for his innovative plays and prose that 'give voice to the unsayable aspects of the

human experience'

His work is characterized by a radical reduction of language and dramatic action, which expresses powerful human emotions

like anxiety and powerlessness in simple terms. Fosse writes in Norwegian Nynorsk, the less common version of the Norwegian language.

# ECONOMICS NOBEL PRIZE

## CLAUDIA GOLDIN WINS 2023 NOBEL ECONOMICS PRIZE

Some of her findings after studying 2 centuries of labour market:

Female Labor Force Participation has been historically lower than male. In the 19th century, Industrialisation led to a decline in women's participation which was contrary to what was expected. She found that services led to an increase in the female workforce.

### Reasons:

While Gender Pay Gap, Education, etc are obvious reasons, her studies throw light on other aspects such as:

1. Women's own expectations and experiences influence the labor market. Often, for example, they watched their own mothers stay home even after their children had grown up.

2. Marriage proved to be a more serious barrier than

estimated.

3. Parenthood is a very important reason for lower wages. Modern systems reward the long and uninterrupted careers.

4. More importantly she feels that Inequalities outside are a result of inequalities inside households.

### What influences changes in female labour participation?

1. Women's opportunities for combining paid work and a family

2. Decisions relating to education and childrearing

3. Technical innovations

4. Laws and norms

5. Structural transformation of the economy.

Her life long work has given insights into Women's quest for career and family, coeducation in higher education, the impact of the birth control pill on women's career and marriage decisions, women's surnames after marriage as a social

indicator, etc.

"Ways in which we can even things out or create more couple equity also leads to more gender equality," - Claudia Goldin

Changes therefore begin at home. We need to change the way we work (both inside and outside our homes) and how we value caregiving if we are ever to achieve gender equality.

Fittingly, the Sveriges Riksbank Prize in Economic Sciences (Popularly called Nobel Prize for Economics) for Claudia Goldin marked a small step toward closing a gender gap among Nobel laureates in economics: Out of 93 economics winners, Goldin is just the third woman to be awarded the prize and the first woman to be the sole winner in any year.

# POLITY & GOVERNANCE

What's Inside?



सत्यमेव जयते

1. CASTE SURVEY
2. MERA YUVA BHARAT (MY BHARAT)
3. ANTI-DEFECTION AND SPEAKER

# CASTE SURVEY

## Context:

Recently, the Government of the State of Bihar released findings of the Caste Survey, 2023 which revealed that Other Backward Classes (OBCs) and **Extremely Backward Classes (EBCs)** together constitute 63 % of the state's total population.

## History of Caste Census

- **Post-independence-** Every Census in independent India from 1951 to 2011 has published data on Scheduled Castes and Scheduled Tribes, but not on other castes.
- **Pre- independence-** Before that, every Census until 1931 had data on caste.
- **World War II-** In 1941, caste based data was collected but not published due to time and cost constraints.
- **Mandal Commission-** It was constituted to estimate the OBC population which revealed that OBC stands at 52%.
- **SECC-** Socio Economic and Caste Census were launched in 2011 to avoid exclusion and inclusion errors in receiving benefits from the Government.
- **Support-** The Ministry of Rural Development provided financial and technical support to the States/UTs for conducting SECC 2011.
- **Ministry of Housing & Urban Poverty Alleviation** conducted the exercise in urban areas.
- **Publication-** The SECC data excluding caste data was finalised and published by the two ministries in 2016.

## What is the significance of caste survey?

**Appropriate representation** - Caste surveys are required to ensure a community's representation as per their share in the population.

**Representation for backward communities-** The idea is rooted in the belief that the backward communities have a higher share in the population but fewer representation in public institutions and politics.

**Policy formulation-** The caste survey has not only considered one's caste but also one's economic status, which would help in devising further policies and plans for the development of all classes.

**Better policies for OBCs' population-** In such circumstances, caste survey ensures **accurate assessment of the OBCs' population** to draft policies for their betterment, which may cover education, employment, and other development metrics.

**Example:** Bihar Caste Survey, 2023 found the new category **Extremely Backward Classes (EBCs)** due to the accurate assessment.

*The Justice Rohini Commission, which had been examining the question of "sub-categorisation" since 2017, submitted its report in July 2023, but its recommendations are not yet public.*

### Difference Between Census & SECC:

- The Census provides a portrait of the Indian population, while the SECC is a tool to identify beneficiaries of state support.
- Since the Census falls under the Census Act of 1948, all data are considered confidential, whereas according to the SECC website, "all the personal information given in the SECC is open for use by Government departments to grant and/or restrict benefits to households."



- **Welfare State-** It will be a pro-poor exercise for better planning and targeting of welfare schemes.
- **Ceiling-** The survey data will also reopen the longstanding debate over the %50 ceiling on reservation imposed by the Supreme Court in its landmark ruling in *Indra Sawhney v Union of India* (1992).
- **Model for others-** The Bihar and Tamil Nadu’s survey may well push other states to carry out similar exercises.

data according to their political motive.

- **Against casteless society -** Some groups argue that caste-based census is against the idea of a casteless society.

### What are the criticisms against caste survey?

- **Vote bank politics -** The data, coming months before next year’s Lok Sabha poll, underlines the electoral importance of OBCs and marginalised communities in making political gains.
- **Widen the social rifts -** There is a fear that caste census will widen the social rifts among different castes
- **Data integrity -** Integrity of data is questioned as ruling parties might alter the

#### PREVIOUS YEAR QUESTIONS

Consider the following statements: (2009)

1. Between Census 1951 and Census 2001, the density of the population of India has increased more than three times.
2. Between Census 1951 and Census 2001, the annual growth rate (exponential) of the population of India has doubled.

Which of the statements given above is/are correct?

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

**Ans: (d)**

## MEERA YUVA BHARAT (MY BHARAT)

### Context

Cabinet approves establishment of an autonomous body Mera Yuva Bharat

### About

Mera Yuva Bharat (MY Bharat) will serve as an overarching enabling mechanism powered by technology for youth development and youth led development and provide equitable access to youth to actualize their aspirations and build **Viksit Bharat** across the entire spectrum of the Government.

Mera Yuva Bharat (MY Bharat), **an autonomous body** will benefit the youth in the age group of 15-29 years, in line with the definition of ‘Youth’ in the National Youth Policy.

In case of programme components

specifically meant for the adolescents, the beneficiaries will be in the age group of 10-19 years. Mera Yuva Bharat (MY Bharat) will help in Setting the focus of the Government on Youth Led development and to make the Youth “active drivers” of development and not merely “passive recipients”.

The Prime Minister Shri Narendra Modi launched ‘Mera Yuva Bharat (MY Bharat)’ platform for youth of the country on October 31st, at Kartavya Path on the National Unity Day.

### THE VISION:

‘Mera Yuva Bharat (MY Bharat)’ is envisioned as a pivotal, technology-driven facilitator for youth development and youth-led development, with the overarching goal of providing equitable opportunities to empower the youth in realizing

their aspirations and contributing to the creation of a “**Viksit Bharat**” (developed India), across the entire spectrum of the Government.

It envisions a framework where the youth of our country can seamlessly connect with programs, mentors, and their local communities. This engagement is designed to deepen their understanding of local issues and empower them to contribute to constructive solutions.

### Need:

**India’s youth are to play a critical role in defining the future of the nation** -especially at the pivotal juncture of India’s 75 years of independence, as we embark on a paradigm shifting development journey over the next 25 years of building an Amrit Bharat by 2047.

**Vision 2047 requires a framework that can bring rural youth, urban youth and Rurban youth under a single platform.** The existing schemes of the Department were designed and launched at different points in time over the last 50 years with the then prevailing understanding of needs of rural youth in our society. The dynamic shifts in the urban-rural landscape have necessitated a re-evaluation of these approaches. It is imperative to create a framework that unites rural, urban, and rurban youth on a common platform. Mera Yuva Bharat can help to create such a framework.

**There is a need to establish a new contemporary technology led platform for the Government to engage with the present-day youth** - In today’s fast-paced world, characterized by rapid communication, the prevalence of social media, the emergence of new digital tools and cutting-edge technologies, a technology driven platform can connect youth to programs that can help them improve their capabilities and also connect them with community activities.

**Ensuring accessibility by creating a phygital ecosystem** – The Mera Yuva Bharat platform will create such a phygital eco-system and empower young individuals to become catalysts for community transformation.

They would act as “Yuva Setu,” linking the government with its citizens. Recently, a web portal of the Department of Youth Affairs, yuva.gov.in, hosted a nation-wide program called “Meri Maati Mera Desh” in which 50 million young people participated and helped to plant 23 million saplings to create Amrit Vatikas pan-India. Mera Yuva Bharat would help to create and sustain such a phygital eco-system that connects millions of young people in a network seamlessly.

**Mera Yuva Bharat supported by a technology platform would help to increase the Youth outreach efforts of the Department of Youth Affairs.**

### The establishment of Mera Yuva Bharat (MY Bharat) would lead to:

Leadership Development in the Youth:

Improve the leadership skills through experiential learning by shifting from isolated physical interaction to programmatic skills.

Investing more in youth to make them social innovators, leaders in the communities.

Setting the focus of the Government on Youth Led development and to make the Youth “**active drivers**” of development and not merely “**passive recipients**”.

Better alignment between youth aspirations and community needs.

Enhanced efficiency through Convergence of existing programmes.

Act as a one stop shop for young people and Ministries.

Create a centralized youth database.

Improved two-way communication to connect youth government initiatives and activities of other stakeholders that engage with youth.

Ensuring accessibility by creating a phygital ecosystem.

### NATIONAL UNITY DAY

- Rashtriya Ekta Diwas or the National Unity Day is celebrated on October 31 every year in the memory of Sardar Vallabhbhai Patel on his birthday.
- The first Home Minister of the country, affectionately known as the ‘Iron Man’ of India.
- He was dubbed “Sardar” (chief) for his leadership skills in leading the country through the struggle for independence and beyond but most notably during the integration of the princely states and also the India-Pakistan War of 1947

## ANTI-DEFECTION AND SPEAKER

### Context:

The Supreme Court on October 30 directed Maharashtra Assembly Speaker Rahul Narwekar to decide disqualification petitions filed under the Tenth Schedule (anti-defection law) of the Constitution against the Chief Minister Eknath Shinde camp in the Shiv Sena dispute by December 31, 2023.

### About anti defection and 10th schedule:

The **Tenth Schedule** of the Indian Constitution, also known as the Anti-Defection Law, was added by the **52nd Amendment in 1985**.

It lays down the provisions related to disqualification of members of Parliament (MPs) and State Legislatures on grounds of defection.

### Exception:

It allows a group of MP/MLAs to join (i.e., merge with) another political party without

inviting the penalty for defection.

And it does not penalise political parties for encouraging or accepting defecting legislators.

As per the 1985 Act, a ‘defection’ by one-third of the elected members of a political party was considered a ‘merger’.

But the **91st Constitutional Amendment Act, 2003**, changed this and now at least two-thirds of the members of a party must be in Favour of a “merger” for it to have validity in the eyes of the law.

### Discretion:

The decision on questions as to disqualification on ground of defection are referred to the Chairman or the Speaker of such House, which is subject to ‘**Judicial review**’.

**However, the law does not provide a timeframe within which the presiding officer has to decide a defection case.**



# INTERNATIONAL RELATIONS



What's Inside?

1. SOCIAL SECURITY AGREEMENT WITH ARGENTINA
2. VIENNA CONVENTION ON DIPLOMATIC RELATIONS
3. RAFAH CROSSING
4. INTERNATIONAL CRIMINAL COURT
5. OPERATION AJAY
6. 10 YEARS OF BELT AND ROAD INITIATIVE

## SOCIAL SECURITY AGREEMENT WITH ARGENTINA

### Context

India and Argentina sign social security agreement for professionals.

### About

An SSA (also known as Totalisation Agreement) is a bilateral instrument to protect the social security interests of workers posted in each other country. Being a reciprocal arrangement, an SSA is intended to provide for avoidance of double coverage i.e., coverage under the social security laws of both the home and host countries.

SSA addresses 3 issues, i.e.:

- i. **Detachment:** An exemption, allowed to employees sent on an assignment to another country, from social security contribution in the host country, provided they are complying with the social security system of the home country.
- ii. **Exportability of Pension** for employees sent on assignment to another country
- iii. **Totalisation of Benefits:** The period of service rendered by an employee in a foreign country is counted for determining the eligibility for benefits.

## VIENNA CONVENTION ON DIPLOMATIC RELATIONS

### Context

Forty-one Canadian diplomats have recently left India amid a rift over the murder of a Sikh separatist leader on Canadian soil.

Earlier, India asked Canada to withdraw dozens of its diplomatic staff and threatened to remove their immunity if they remained. Canadian officials called this a “violation of international law”.

Both Canada and the US have since called for New Delhi to uphold its obligations under the 1961 Vienna Convention on Diplomatic Relations while the Ministry of External Affairs insists that its actions had not gone against international laws.

India asserted that its move was aimed at ensuring diplomatic parity and remained fully consistent with the international conventions.

### What rules have the US and Canada warned India against flouting?

Canadian government said that India had formally conveyed its plan to unilaterally remove diplomatic immunities for more than 40 diplomats in Delhi.

This means 41 Canadian diplomats and their

42 dependents were in danger of having immunity stripped on an arbitrary date, and this would put their personal safety at risk.

Meanwhile US State department spokesperson Matthew Miller has urged India to uphold its international obligations – including those pertaining to “privileges and immunities enjoyed by accredited members of Canada’s diplomatic mission”.

### What is the Vienna Convention?

The Vienna Convention on Diplomatic Relations is an international treaty signed by 61 countries in 1961. It puts forth a framework for diplomatic interactions between independent nations and aims to ensure the ‘development of friendly relations among nations’. At present 193 countries are party to the document.

Under the Vienna Convention a diplomatic agent enjoys immunity from the criminal jurisdiction of the receiving State. Such individuals are also provided with immunity from its civil and administrative jurisdiction – with a few exceptions.

### What is Article 11.1 about?

India insists that its actions are consistent with the tenets set forth in Article 11.1 of the



Vienna Convention on Diplomatic Relations. This particular segment pertains to the size of international missions within other countries.

“In the absence of specific agreement as to the size of the mission, the receiving State may require that the size of a mission be kept

within limits considered by it to be reasonable and normal, having regard to circumstances and conditions in the receiving State and to the needs of the particular mission,” the Vienna Convention postulates.

## RAFAH CROSSING

### What is the Rafah crossing?

The Rafah border crossing from Gaza into Egypt is the only one of the Gaza crossing points that does not communicate with Israel. While it was intended to be a significant crossing, since the Hamas takeover in 2007 it has only intermittently been open to Palestinians, most notably during the brief period when the Muslim Brotherhood governed Egypt until 2013.

Israel and Egypt’s joint blockade of Gaza under Hamas has made the crossing highly politically sensitive in Cairo – a situation that was exacerbated by an Islamist insurgency in the Sinai, which led to Egypt imposing controls on who was allowed to travel to towns and cities close to the Rafah crossing, not least the city of Arish.

Rafah, once a smuggling hub, is split between Egyptian Rafah and Palestinian Rafah, with the border running through it. Egypt’s deliberate flooding of the border area in 2015 was designed to close smuggling tunnels that connected the two, which at one time allowed people and goods to pass from Gaza to Egypt.

### Why Is the Rafah crossing important in the current conflict?

It is on Gaza’s southern border with Egypt and



has become the focal point of efforts to deliver humanitarian aid and allow out injured people and foreign passport holders.

With Israel’s border crossings closed, Rafah is the only way that Gazans can leave the 360 sq km coastal strip.

Although Israel does not directly control the

Rafah crossing, it monitors all activity in southern Gaza from Kerem Shalom military base, and other surveillance.

Israel controls all sea and air access to Gaza

and most of its land borders. It tightened its existing restrictions into a total blockade after on Oct. 7, leaving Rafah as the only entry point for humanitarian aid.

## INTERNATIONAL CRIMINAL COURT

### Context

Armenia's Parliament has voted to join the International Criminal Court (ICC), which has strained its relationship with Russia. Russia had called Armenia's move an "unfriendly step" after the ICC issued an arrest warrant for President Vladimir Putin.

The decision comes amid tensions between Armenia and Russia due to a 2020 war with Azerbaijan, and Armenia's alignment with the West. It remains unclear how this move will affect their relationship and Armenia's involvement in Russia-led alliances.

### About International Criminal Court:

- The International Criminal Court is a permanent court to prosecute serious international crimes committed by individuals.
- It tries crimes such as genocide, war crimes, crimes against humanity, and aggression.
- The court was established to fight global impunity and bring to justice criminals under international law, regardless of their rank or stature.
- It is different from the United Nations' International Court of Justice, also at The Hague.

- The Head Quarter of ICC is in The Hague, The Netherlands
- Before the ICC became functional in 2002, its founding treaty was adopted by the UN General Assembly in 1998 in Rome, Italy, thereby making it the Rome Statute.

### Procedure to become Member of ICC

To become a member of the ICC or State party to the Rome Statute, countries have to sign the statute and ratify it under their respective legislatures.

123 countries are currently members of the ICC, with African countries making up the largest bloc.

Notably, countries including India, China, Iraq, North Korea and Turkey never signed the Rome Statute.

Others including the US, Russia, Israel and Syria signed, but never ratified

### Is India part of ICC?

India did not sign the Rome Statute, and thus, is not a member of ICC because of the issues pertaining to State sovereignty, National interests, Difficulty in collection of evidences, Problem to find impartial prosecutors, Definition of Crime.

## OPERATION AJAY

### Context

On the sixth day of the Israel-Hamas war, the Indian government launched 'Operation Ajay' to repatriate Indians from Israel and Palestine.

### About Operation Ajay

India has launched Operation Ajay to bring

back Indians from Israel as the conflict escalated with Israel retaliating against Hamas's attack.

Israel has declared war against Hamas and set up a war cabinet.

Operation Ajay is not technically an evacuation operation. It is an operation to repatriate its citizens

from Israel.

Special chartered flights will bring back the Indians. Indian Navy ships will be deployed if the need arises.

There are about 18,000 Indians in Israel, and about 16 in Palestine — a dozen in the West Bank and 3-4 people in Gaza.

### **Other Important operations of Indian Government:**

1. Operation Sukoon (2006): Indian Navy mission to evacuate Indian citizens from Lebanon during the Israel-Lebanon conflict, providing humanitarian assistance and support.
2. Operation Maitri (2015): Indian relief and rescue mission to provide assistance to Nepal in the aftermath of the devastating earthquake.
3. Operation Raahat (2015): Indian Armed Forces' rescue and evacuation mission to assist in the evacuation of Indian and foreign nationals from Yemen during a conflict.
4. Vande Bharat Mission (2020): A massive repatriation effort by the Indian government to bring back Indian nationals stranded abroad during the COVID-19 pandemic.
5. Operation Samudra Setu (2020): It was launched in May 2020 by the Indian Navy as part of the national effort to repatriate Indian citizens from overseas during the Covid-19 pandemic. The Indian Navy has launched Operation Samudra Setu-II for shipment of Oxygen-filled containers to India.
6. Operation Devi Shakti (2021): It was an operation carried out by the Indian Armed forces to evacuate Indian citizens and foreign nationals stuck in Afghanistan after the collapse of the Ashraf Ghani government.
7. Operation Ganga(2022): It is an evacuation mission to bring back all the Indian nationals who are currently stranded in Ukraine due to the Russia-Ukraine War.
8. Operation Kaveri (2023): It is a codename for India's evacuation effort to bring back its citizens stranded in Sudan amid intense fighting between the army and a rival paramilitary force there.
9. Operation Dost (2023): Operation Dost (Operation Friend) was the search and rescue operation initiated by the Government of India to aid Syria and Turkey, after the 2023 Turkey-Syria earthquake devastated both countries on 6 February 2023.

# 10 YEARS OF BELT AND ROAD INITIATIVE

## Context:

This year marks a decade since China's ambitious infrastructure funding project, the Belt and Road Initiative (BRI), was first outlined by President Xi Jinping.

## What was the idea behind the BRI, and how did its goals evolve over the years?

President Xi Jinping announced the Silk Road Economic 'Belt' during his visits to Kazakhstan in 2013. The 'Belt' plan was to revitalise a series of trading and infrastructure routes between Asia and Europe. Connectivity through Central Asia was a key element of the initiative.

Subsequently, President

Xi announced a sea trade infrastructure called 'Road'. This maritime 'Road' would connect China with Southeast Asia, Europe and Africa. The major focus has been to build ports, bridges, industry corridors and other infrastructure throughout South East Asia and the Indian Ocean.

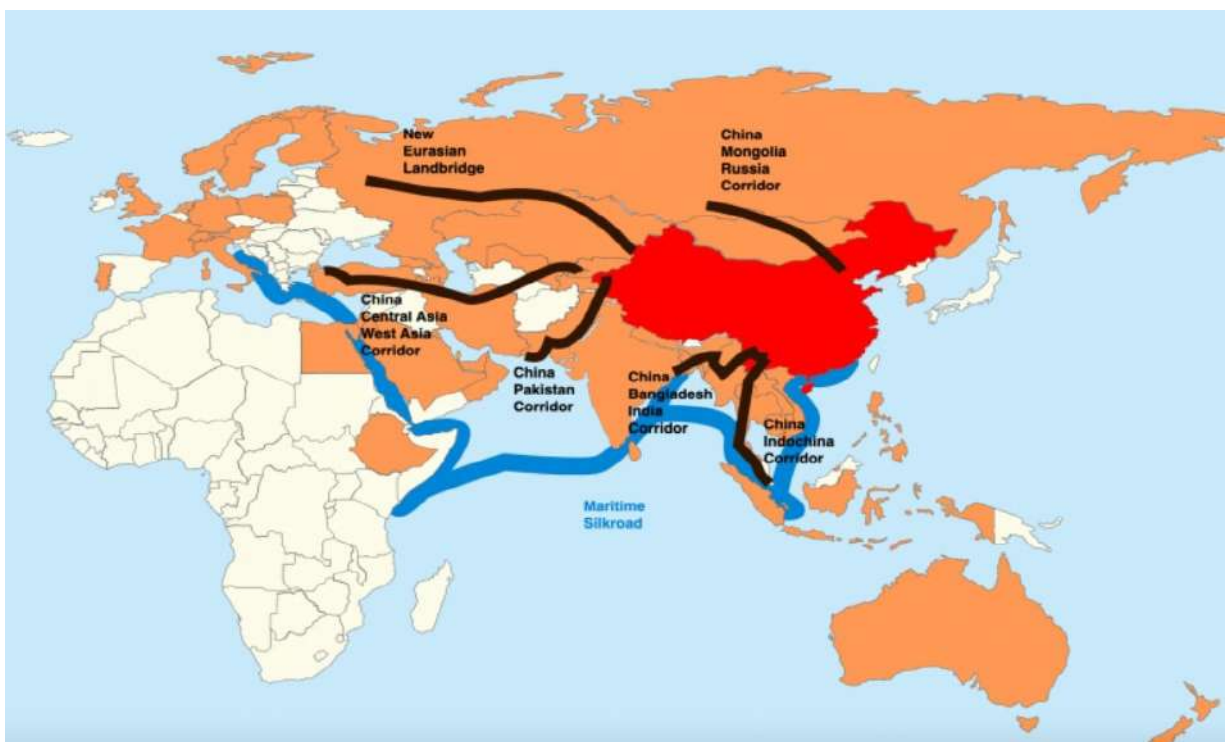
For some time, together these initiatives were referred to as the One Belt One Road Initiative (OBOR). Since 2015, it has been mostly referred to as the BRI.

Initially, the BRI was based on five principles: (1) policy coordination (2) infrastructure connectivity (3) trade (4) financial integration and (5) people-to-people connections. Later, the sixth principle of 'Industrial cooperation' was

also added. Basically through the BRI, China wanted to resolve two major concerns, viz capital surplus and industrial overcapacity. It was also about increasing Chinese political influence in broader regions.

Between 2013 and 2018, the World Bank estimated that investment in BRI projects including energy projects was about \$575 billion. Earlier, the Organisation for Economic Co-operation and Development (OECD) also estimated that the BRI investment projects were likely to add \$1 trillion in funding between 2017 and 2027.

At the tenth anniversary of the initiative, the Chinese government declared that more than 150 countries and 30 international organisations





have embraced the BRI. It was also reported that 3,000 BRI projects valued at \$1 trillion, are currently underway across the globe.

Originally, the initiative proposed **six international Economic Corridors (EC)**: the New Eurasia Land Bridge; China-Central Asia-West Asia-EC; China-Mongolia-Russia-EC, China-Indochina Peninsula-EC, the China-Pakistan-EC (CPEC); and the Bangladesh-China-India-Myanmar (BCIM)-EC.

At the second BRI Forum in 2019, a list of 35 major corridors/projects was released. As a large number of BRI projects are being carried out in nearly all parts of the world, they are affecting all major economies even if they are not participating in the initiative.

### Why the countries like of India and the United States have accused China of engaging in 'debt trap diplomacy'?

Building infrastructure is never risk-free.. India was the first to point out issues concerning debt trap, lack of transparency and sustainability of BRI projects.

Later, the US and the EU also raised similar concerns. But there continues to be a huge infrastructure deficit in the Global South. So despite the criticism, BRI is still an attractive proposition to many developing countries in Asia, Africa and Latin America.

Strong Chinese strategic financial support has played a crucial role.

Economic conditions today are much more difficult than a decade ago. The Chinese have realised some weaknesses. They have already started talking about open, green and clean corridors and linking these projects with Sustainable Developments Goals. But if they follow these rules, some of the projects may not be feasible for funding.

### Has there been a cooling off regarding some of the initial enthusiasm?

Because of geopolitical tensions, the United States has sharpened its criticism of the BRI. In the beginning European policymakers looked at the BRI in a positive manner.

The EU itself has been promoting regional integration

initiatives throughout the world for decades. The EU and China, in fact, established a connectivity platform in 2015. A large number of European leaders participated in the first two BRI Forums.

Italy's recent apprehensions about the project and its possible departure from the BRI will be a symbolic setback as it was the only G7 country which had formally joined the initiative.

### What has progress been like on the China-Pakistan Economic Corridor (CPEC) front?

**China Pakistan Economic Corridor (CPEC)**

**Announced in** - 2013 as a part of BRI

**Location** - Enters Pakistan Occupied Kashmir (PoK) through the Karakoram





Highway in Gilgit Baltistan.

**Investment-** \$60 billion

**Aim-** It is 3000km long which is initiated to

To circumvent the Straits of Malacca and the South China Sea

To improve infrastructure within Pakistan for better trade with China and to further integrate the countries of South Asia

To connect the deep-sea Pakistani ports of Gwadar and Karachi to China's Xinjiang province and beyond by overland routes.

A large part of the CPEC is energy-related projects. The rest of the projects are in the road and railway infrastructure and Gwadar port.

## How does India view the BRI?

India's position on the BRI has remained relatively consistent since 2013. From the beginning, India had reservations about the BRI – mainly due to sovereignty-related issues, as the CPEC

goes through the Pakistan-occupied Kashmir (PoK), and geopolitical implications of projects in the Indian Ocean.

The importance of the Indian Ocean for China has increased significantly due to its expanding trade, energy transport and investments.

It started expanding its footprints in India's neighbourhood through investments in various ports in Bangladesh, Pakistan, Sri Lanka and Myanmar. As commercial ports could be easily converted into military use, these developments have troubled Indian policymakers and analysts.

China's economic presence in India's neighbourhood, including in South Asia, has already undergone substantial expansion. Moreover, many negative developments in broader India-China ties (trade deficit, border tensions, etc.) have also affected India's perceptions of the BRI.

While India has refrained from endorsing the BRI and has not taken part in any

BRI Forums, it has been an active participant in the China-headquartered Asian Infrastructure Investment Bank (AIIB) since its inception.

Many in the West have flagged the slowdown in the Chinese economy in recent years. Could this impact BRI projects?

For a long time, the world was used to the narrative of the rise and rise of China. In 2019, the Chinese economy was 42 times larger than what it was in 1980. In the last fifteen years, China was also a major contributor to global growth which gave a push for BRI

However, current geopolitical tensions resulting in 'decoupling' or 'de-risking' measures by the west to reduce their own economic dependence on China might adversely affect the Chinese economy as well as BRI expansion. So China will have to re-strategize some of the BRI projects..



# SOCIAL JUSTICE

What's Inside?

1. THE STATE OF INDIA'S SCHEDULED AREAS
2. BAIGA PVTG GETS HABITAT RIGHTS
3. LAKHPATI DIDI INITIATIVE
4. ESTABLISHMENT OF THE NATIONAL

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STRAY DOG MENACE IN INDIA

*GS-II Government policies and interventions for development in various sectors*

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MODERN SLAVERY

*GS-I Social empowerment, GS-II Significant Provisions of Constitution*

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# THE STATE OF INDIA'S SCHEDULED AREAS

## Context:

India's 705 Scheduled Tribe (ST) communities — making up 8.6% of the country's population — live in 26 States and six Union Territories. Article 244, pertaining to the administration of Scheduled and Tribal Areas, is the single most important constitutional provision for STs.

## Constitutional Framework 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.
- **Article 244(2):** In the mentioned states, the Sixth Schedule governs the administration of Scheduled and Tribal Areas.

## Geographical Scope of Scheduled Areas

- Scheduled Areas span 11.3% of India's land area, designated in 10 States: Andhra Pradesh, Telangana, Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra, and Himachal Pradesh. Kerala has proposed additional areas for notification, pending government approval.
- Despite demands from Adivasi organizations, numerous villages in Scheduled Areas and other regions with ST populations have been excluded from Article 244's purview. Consequently, 59% of India's STs lack the rights conferred by Scheduled Areas-related laws.

## Historical Recommendations

- **Bhuria Committee (1995):** This committee recommended extending panchayat raj to Scheduled Areas, including the villages, a suggestion yet to be implemented.

- **Denotification Debate:** Some argue for the denotification of parts of Scheduled Areas where non-tribal individuals have increased, citing the absence of viable ST-majority administrative units.

## Governance of Scheduled Areas

- The President of India designates Scheduled Areas.
- States with Scheduled Areas must establish a Tribal Advisory Council with up to 20 ST members to advise the Governor on ST welfare matters.
- The Governor reports annually to the President regarding Scheduled Areas' administration. They can also repeal or amend laws applicable to the Scheduled Area, regulate tribal land transfer, and control money-lending activities.
- These extensive powers granted to Governors and the President have remained largely inactive, with notable exceptions in Maharashtra from 2014 to 2020.

## Defining a Scheduled Area

- **Exclusive Presidential Power:** The Fifth Schedule exclusively grants the President the authority to declare Scheduled Areas.
- **Empirical Basis:** A 2006 Supreme Court ruling upheld the executive function of identifying Scheduled Areas and stated that it lacks the expertise to scrutinize this process.
- **Criteria:** Neither the Constitution nor any law specifies criteria for identifying Scheduled Areas. However, based on the Dhebar Commission Report (1961), key considerations include tribal population predominance, area compactness, administrative viability, and economic backwardness relative to neighboring regions.

## Settlement of Ambiguity

- The Provisions of the Panchayats (Extension to Scheduled Areas) Act, 1996, empowered gram sabhas within Scheduled Areas, reinvigorating the intent of the Constitution and the Constituent Assembly. This law enabled direct democracy and recognized the gram sabhas as primary authorities.
- PESA defines a village as a habitation or group of habitations managed by a community according to traditions and customs. This definition extended beyond Scheduled Areas to forest fringes and villages.
- Gram sabhas have yet to demarcate traditional boundaries on revenue lands.

FRA 2006 requires the demarcation of “community forest resource” areas within traditional boundaries.

## Conclusion

Understanding and expanding Scheduled Areas in India necessitates the notification of all habitations or groups of habitations with ST majorities outside existing Scheduled Areas.

Furthermore, geographical boundaries should encompass “community forest resource” areas where applicable and extend to customary boundaries within revenue lands.

These steps are essential for ensuring equitable governance and preserving the rights and welfare of India’s Scheduled Tribes.

# BAIGA PVTG GETS HABITAT RIGHTS

## Context

The Baiga Particularly Vulnerable Tribal Group (PVTG) of **Chhattisgarh** recently became the second to get habitat rights in the state, after the Kamar PVTG.

A total of 19 Baiga villages with a population of 6,483 people (2,085 families) have been given the habitat rights.

The Baiga community primarily resides in Rajnandgaon, Kawardha, Mungeli, Gaurela-Pendra-Marwahi (GPM), Manendra-Bharatpur-Chirmiri, and Bilaspur districts of the state. The community also lives in the adjacent districts of Madhya Pradesh.

## What are Habitat rights?

Habitat rights recognition provides the **community concerned** rights over their customary territory of habitation, **socio-cultural practices**, economic and livelihood means, **intellectual knowledge of biodiversity and ecology**, **traditional knowledge of use of natural resources**, as well as **protection and conservation of their natural and cultural heritage**.

Habitat rights safeguard and promote traditional livelihood and ecological knowledge

passed down through generations. They also help converge different government schemes and initiatives from various departments to empower PVTG communities to develop their habitats.

## What does ‘habitat’ mean, under what law are such rights granted?

Habitat rights are given to PVTGs under section 3(1) (e) [rights including community tenures of habitat and habitation for primitive tribal groups and pre-agricultural communities] of The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 also known as the **Forest Rights Act (FRA)**.

According to Section 2(h) of FRA, “Habitat includes the area comprising the customary habitat and such other habitats in reserved forests and protected forests of primitive tribal groups and pre-agricultural communities and other forest dwelling Scheduled Tribes.”

## Can habitat rights be used to stop activities like mining?

Yes, the habitat rights will help the PVTG protect their habitat from developmental activities harmful to them. The title may not be an ownership



title in the nature of a private property owner, but consent and consultation of the gram sabha will be needed for any developmental activity.

Forest Rights have legal protection under the Forest Conservation Act, the Land Acquisition law of 2013, and even the SC/ST Prevention of Atrocities Act. Grant of habitat rights under the Forest Rights Act provide an additional layer of legal protection.”

### Which tribes are termed PVTG?

According to the ministry of tribal affairs, tribal communities who are technologically backward, who have stagnant or declining population growth, extremely low level of literacy, and a subsistence level of economy are declared as PVTG. PVTGs have low health indices and largely reside in isolated, remote, and difficult areas in small and scattered hamlets/habitats.



The ministry has identified 75 PVTGs in 18 states and one Union Territory. In 2019, the MoTA started a scheme for their protection and improvement in terms of social indicators like

livelihood, health, nutrition and education to decrease their vulnerability.

### How many states have recognised habitat rights?

Out of 75 PVTG in India, only three have habitat rights. The **Bharia PVTG in Madhya Pradesh was the first, followed by the Kamar tribe and now the Baiga tribe in Chhattisgarh.**

### How many PVTGs does Chhattisgarh have?

There are seven PVTGs in Chhattisgarh, who live in 17 of the state's 33 districts. These are Kamar, Baiga, Pahadi Korba, Abujhmadiya, Birhor, Pando and Bhujia.

While the first five tribes have been declared PVTG by the central government, the remaining two, **Pando and Bhujia, have been given the tag by the state government.**

### How does the government fix a habitat?

Based on a detailed guideline given for this purpose in 2014 by the MoTA,

Four state-level departments — Forest, Revenue, Tribal and Panchayati Raj — are coordinating with the UNDP team to ascertain what can be termed as habitat.

The traditional tribal leaders of the tribe are consulted about the extent of their culture, traditions, occupation. It is corroborated by the government and then a habitat is declared.

## LAKHPATI DIDI INITIATIVE

### Context:

Prime Minister recently chaired a high-level meeting to review the progress made in realising his dream of making 2 crore 'Lakhpati Didis' in India.

### About Lakhpati Didi Initiative:

- It was announced by the Prime Minister in his Independence Day

speech on August 15, 2023.

- **Objective:** To encourage women to start micro-enterprises within their villages.
- Under the Lakhpati Didi Initiative, the government aims to train two crore women.
- The programme is aimed at training women in self-help groups (SHGs) so that



- they can earn a **sustainable income of at least Rs 1 lakh per annum** per household.
- The initiative has been **initiated by DAY-NRLM**, wherein **each SHG household** is encouraged to **take up multiple livelihood activities** coupled with **value chain interventions**, resulting in a **sustainable income of Rs 1 lakh or more** per year.
  - Under this scheme, **women will be trained in various skills**, such as **plumbing, LED bulb making, drone operation** and repair, and tailoring and weaving.
  - **After completing the training**, women will be provided with **opportunities to earn income using their skills**.
  - The ministry of rural development is adopting a whole-of-government approach for maximum impact through convergence to transform the rural economy with the enabling of 'Lakhpati Didis'.
- DAY-NRLM **adopts a demand-driven approach, enabling the States to formulate** their own State-specific poverty reduction action plans.
  - The Mission seeks to achieve its objective by investing in **four core components**.
    1. Social mobilization, **promotion, and** strengthening of self-managed and financially sustainable **community institutions of the rural poor women**;
    2. **Financial inclusion**;
    3. **Sustainable livelihoods**;
    4. **Social inclusion, social development** and access to entitlements through convergence;

## What is Deendayal Antyodaya Yojana-National Rural Livelihoods Mission (DAY-NRLM)?

- It is a **flagship poverty alleviation** program implemented by the Ministry of Rural Development, Government of India.
- **Aim:** To **reduce poverty** by **enabling the poor household to access gainful self-employment and skilled-wage employment** opportunities, resulting in sustainable and diversified livelihood options for the poor.

# Economic Development & Agriculture



What's Inside?

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## ESTABLISHMENT OF THE NATIONAL TURMERIC BOARD (NTB)

The Union government of India has notified the constitution of the national turmeric board, which will focus on the development and growth of turmeric and turmeric products in the country.

### About National Turmeric Board:

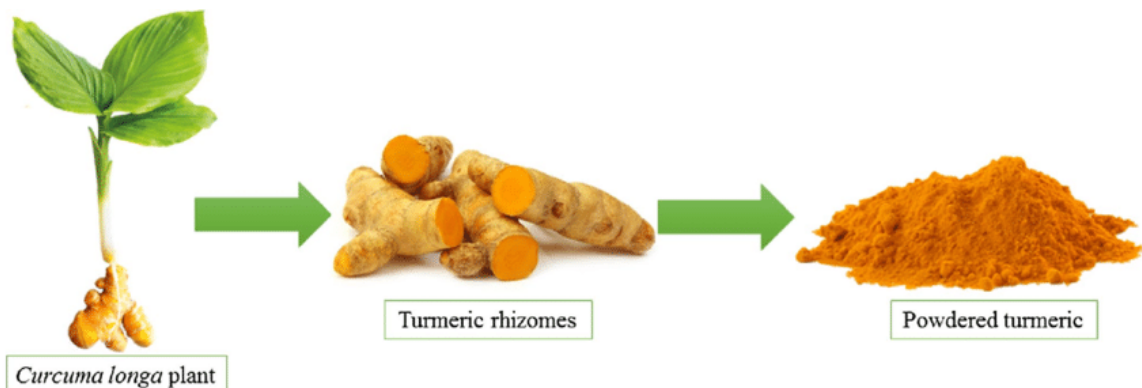
- It will focus on the development and growth of turmeric and turmeric products in the country.
- It will especially focus on capacity building and skill development of turmeric growers for harnessing greater benefits out of value addition.
- The Board will also promote quality and food safety standards and adherence to such standards.
- The Board shall have a Chairperson, who will be appointed by the Central Government.
- It will have members from the Ministry of AYUSH, Departments of Pharmaceuticals, Agriculture & Farmers Welfare, Commerce & Industry of the Union Government,

senior State Government representatives from three states (on rotation basis).

- It will have a secretary to be appointed by the Department of Commerce.
- The Ministry of Commerce will be the nodal department providing funds and infrastructure for the NTB.

### • About Turmeric (*Curcuma longa*):

- It is a perennial herbaceous plant belonging to the ginger family (Zingiberaceae).
- A friable well-drained red loamy soil in wet or garden lands under tropical conditions is an ideal condition.
- It can be grown in regions receiving an annual rainfall of 1500 mm and a temperature range of 20°C to 35°C.
- India is the largest producer, consumer and exporter of turmeric in the world.
- The largest producing states of Turmeric are Maharashtra, Telangana, Karnataka and Tamil Nadu.



## GOVERNMENT EASES AIRCRAFT RECOVERY RULES

The government has notified that the protection offered to a corporate debtor from the recovery of dues under the Insolvency and Bankruptcy Code 2016 will not cover aircraft, helicopters and engines.

This change will make it easier for lessors to recover their planes in case an airline goes bankrupt.

These changes were made after several experts said that earlier rules were in contravention of the

Cape Town Convention and Protocol of 2001 to which India is also a signatory.

### Cape Town Convention

Cape Town Convention on International Interests in Mobile Equipment, or Cape Town Treaty was signed in 2001 and became effective in 2006.

It was adopted under the International Civil Aviation Organisation (ICAO) and the

International Institute for the Unification of Private Law (UNIDROIT).

It aims to solve problems of obtaining certain rights to aviation assets such as aircraft engines, helicopters and airframes, which, by their nature, have no fixed location.

The Convention guarantees the rights of lessors to repossess leased high-value equipment such as aircraft, engines, and helicopters in case of payment defaults.

## RBI EXTENDS PCA FRAMEWORK TO GOVERNMENT NBFCs

The RBI has announced the extension of the Prompt Corrective Action (PCA) framework to Government Non-Banking Financial Companies (NBFCs), excluding those in the Base Layer, starting from October 1, 2024.

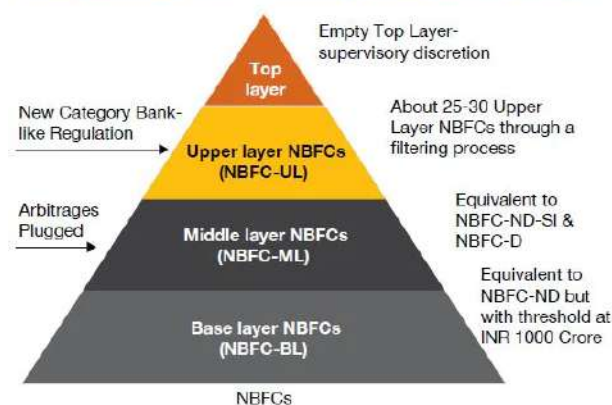
### About Prompt Corrective Action (PCA) Framework

The RBI introduced the PCA Framework in December 2002 as an early intervention mechanism, inspired by the US Federal Deposit Insurance Corporation’s PCA framework.

It is a watchlist of banks identified as financially weak by the central bank.

When a bank falls under PCA, the regulator imposes restrictions on its operations, such as curbs on lending activities.

Scale Based Approach – Introducing Scale Based Framework



Source: RBI’s Discussion Paper on Revised Regulatory Framework for NBFCs - A Scale-Based Approach

Earlier, the PCA Framework applied exclusively to commercial banks and not to cooperative banks or NBFCs.

The revised PCA framework came into effect on January 1, 2022. It places a heightened focus on capital adequacy, asset quality, and leverage.

The RBI has also updated the level of capital adequacy ratio shortfall that triggers classification into the “risk threshold three” category.

### Trigger Points for PCA Inclusion

**Capital-to-Risk Weighted Assets Ratio:** (CRAR) measures a bank’s capital in relation to risk-weighted assets.

If CRAR falls below 9%, the RBI takes action, including the submission of a capital restoration plan, restrictions on business activities, and dividend payments.

Additional steps may follow if CRAR is below 6% but equal to or above 3%.

**If net Non-Performing Assets (NPA)** exceed 10% but remain below 15%, the RBI initiates measures to reduce bad loans and strengthen credit appraisal skills.

**If Return on Assets (RoA)** drops below 0.25%, restrictions are imposed on deposit renewal, access to costly deposits and CDs, and the bank’s entry into new lines of business.

## About PCA Framework Expansion

Government-owned NBFCs, such as PFC, REC, IRFC, and IFCI, will now fall under the PCA framework.

These NBFCs will face restrictions on dividend distribution and profit remittances.

Promoters and shareholders will have limitations on equity infusion, and leverage reduction will be required.

Issuing guarantees or taking contingent liabilities on behalf of group companies will also be restricted.

Rationale for Expansion: NBFCs have witnessed substantial growth and have strong linkages with various financial segments. The framework serves as a mechanism for effective market discipline, ensuring that NBFCs adhere to financial prudence.

## RBI TO UNVEIL CARD-ON-FILE TOKENISATION (COFT)

The Reserve Bank of India (RBI) Governor has recently proposed the introduction of Card-on-File Tokenization (CoFT) facility at the issuer-bank level.

### Card-on-File Tokenisation (CoFT)

Card-on-file tokenisation involves replacing actual credit and debit card details with an alternative code known as a “token.”

This token is unique for a specific combination of card, token requestor, and device.

security of cardholders, and thereby redefining online transactions in India.

During a tokenised card transaction, the actual card details are not disclosed to the merchant. This shields sensitive information from potential security breaches during transaction processing.

Customers who have not enabled tokenisation will need to manually input their name, 16-digit card number, expiry date, and CVV (Card Verification Value) each time they make an online purchase.



Each token is distinct and tailored to the combination of the card, the token requestor (the entity facilitating tokenisation), and the merchant (which may or may not be the same as the token requestor).

It is aimed at enhancing the convenience and

### About Card-on-File Tokenisation

RBI has introduced Card-on-File Tokenization (CoFT) in 2021 and began implementation from 2022.

Until now, the cardholders had to create different tokens through each merchant's application or webpage. This would require time and effort from the users.

Going forward, tokens will be created at the issuer bank level and linked to their existing accounts with various e-commerce applications.

This will eliminate the duplication of the tokenization process at each app or website along with increased transaction security resulting in reduced card-data-related frauds.



# GLOBAL HUNGER INDEX, 2023

Recently, the 2023 edition of the Global Hunger Index was recently published by European NGOs of *Concern Worldwide and Welt Hunger Hilfe*.

## About Global Hunger Index 2023:

It aims to comprehensively measure and track global, regional, and national hunger.

The report attempts to “raise awareness of UN’s Sustainable Development Goal 2 (SDG 2) that endeavours to achieve ‘Zero Hunger’ by 2030.

The GHI score is calculated on a 100-point scale reflecting the severity of hunger, where zero is the best score (no hunger) and 100 is the worst.

The GHI 2023 provides a ranking of 125 countries.

## Key observations from GHI 2023

**Global:** The global average GHI score is 18.3, which is slightly lower than the score of 19.1 in 2015.

Since 2017, the prevalence of undernourishment has been on the rise and the number of undernourished people has climbed from 572 million to about 735 million.

South Asia and Sub-Saharan Africa are the world regions with the highest hunger levels, with GHI scores of 27 each, indicating serious hunger.

West Asia and North Africa are the regions with the third-highest hunger level, with a score of 11.9 indicating a “moderate” hunger level.

Latin America and the Caribbean are the only regions in the world whose GHI scores have worsened between 2015 and 2023.

The region with the second-lowest GHI score for 2023 is East and Southeast Asia.

After years of progress until 2015, advancement against hunger around the world remains largely at a standstill mainly due to various crises like the COVID-19 pandemic, Russia – Ukraine war, economic stagnation, climate change etc.

## India’s Rank:

**GHI 2023 places India at 111th position** with a score of 28.7, indicating a severe level of hunger. [slipped 4 positions as compared to last year (107)].

**India’s rank is below its neighbours** - Sri Lanka (60), Bangladesh (81), Nepal (69), and Pakistan (102).

The undernourishment rate in India is 16.6% and the under-five mortality rate is 3.1%.

The prevalence of anaemia in women between the ages of 15-24 stood at 58.1%.

More than 50% of women and adolescents are anaemic in the country, one of the highest across the world.

As per the index, **India also has the highest child-wasting rate** (weight to height ratio) in the world at 18.7%, reflecting acute undernutrition.

## India’s Criticism of GHI 2023

However, India questions the methodology and labelling it “erroneous and having malafide intent”.

The health of children is a factor in 3 of the 4 indicators used to calculate the index, so they cannot be considered general indicators of population health.

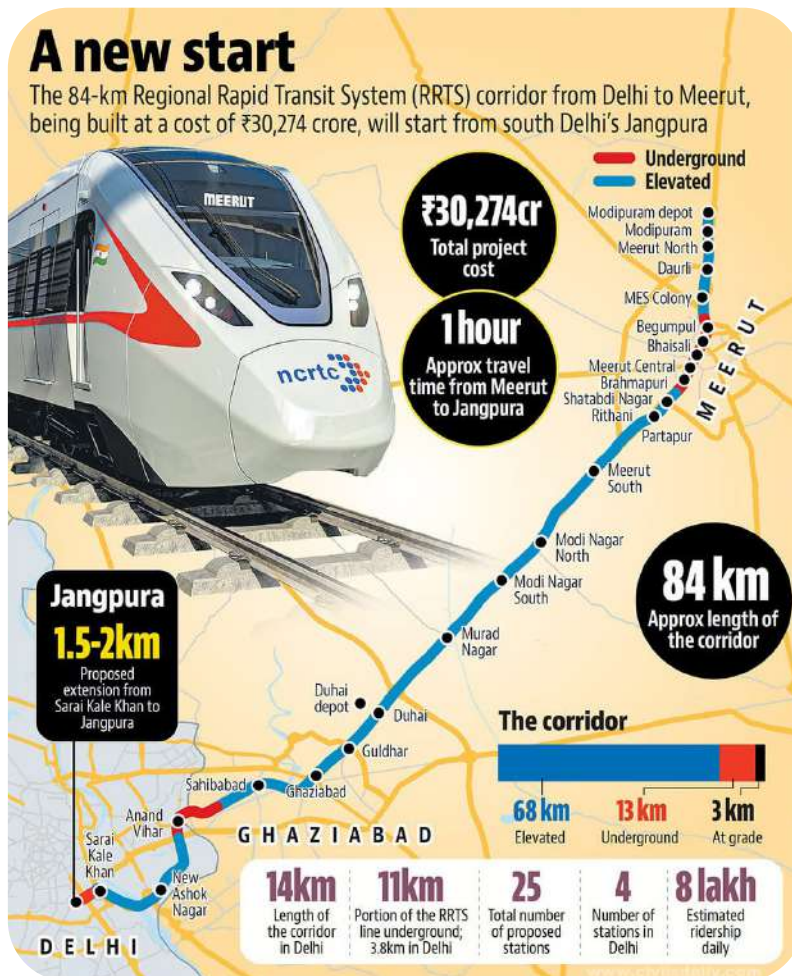
The indicators like stunting and wasting are not solely caused by hunger but rather are the results of numerous complex factors, such as sanitization, genetics, environment, and food use.

Likewise, under-five mortality can also be the result of factors other than hunger.

It is based on an opinion survey with a very small sample size of only 3,000 people. In a country with a high population like India, this sample size is highly likely to give inaccurate results.

So, the Global Hunger Index has been disregarded by the Indian government, which referred to it as a flawed indicator of “hunger” that did not accurately represent India’s situation.

# INDIA'S FIRST REGIONAL RAPID TRANSIT SYSTEM (RRTS)



India's first dedicated mass rapid transit system for regional connectivity also called as 'Namo Bharat Train.'

The RRTS is designed to operate at speeds of up to 180 km/hour and is expected to reduce the travel time between Delhi and Meerut to less than an hour.

## About RRTS:

RRTS is a new rail-based, semi-high-speed, high-frequency commuter transit system with a design speed of 180 Kmph for better connectivity.

The RRTS is an integrated, mass transit network aimed at promoting balanced and sustainable urban development in the National Capital Region (NCR).

The National Capital Region Transport Corporation (NCRTC) is responsible for implementing this project across the NCR.

## CENTRE RAISES MSP FOR RABI CROPS

The Cabinet Committee on Economic Affairs (CCEA) has increased the Minimum Support Prices (MSP) for all Rabi crops for the financial year 2024-25.

### About MSP

Minimum Support Prices (MSP) is the minimum price that the government considers remunerative, introduced in the 1960s to support farmers.

However, the government is not legally bound to pay MSP. It is run entirely on executive directions.

It is one of the most important measures to ensure Food Security and alleviate rural poverty, procure food grains for public distribution, etc.

### Current status of MSP

At present, MSP is declared for 23 agricultural commodities by the government on the recommendation of the Commission for Agricultural Costs and Prices (CACPC) before cropping season, apart from this Fair and Remunerative Price (FRP) for sugarcane is also declared. It includes,

7 Cereals (paddy, wheat, maize, bajra, jowar,

ragi and barley)

5 Pulses (chana, arhar/tur, urad, moong and masoor)

7 Oilseeds (rapeseed-mustard, groundnut, soybean, sunflower, sesamum, safflower and niger seed)

4 Commercial crops (cotton, sugarcane, copra and raw jute)

### Criticisms

Farmers’ organizations have criticized the MSP hike as “meagre” and insufficient to cover the rising input costs, such as fertilizers and diesel prices.

Farmers argue that the increase in MSP does not match the increase in the cost of essential inputs like fertilizers and diesel. This situation can erode their profitability and income security.

NEW MSPs FOR RABI CROPS			
Crops	2023-24*	2024-25*(A)	Hike (%)
Lentil	6,000	6,425 (425)	7
Mustard <sup>^</sup>	5,450	5,650 (200)	3.7
Wheat	2,125	2,275 (150)	7
Safflower	5,650	5,800 (150)	2.6
Barley	1,735	1,850 (115)	6.6
Gram	5,335	5,440 (105)	2

\* Rs Per Quintal; (A) - Absolute increase in Rs Per Quintal; <sup>^</sup> Mustard & Rapeseed

## ‘SUPER-RICH’ INCOMES’ SHARE EBBING AMID MIDDLE-CLASS MOBILITY: CBDT

The Central Board of Direct Taxes (CBDT) said that India’s tax base has widened sharply since 2013-14, with individuals moving up the income ladder and the proportion of super-rich taxpayers’ incomes declining.

### Key points from the Income Tax Data

From 2013-14 to 2021-22, the number of income tax returns submitted by individuals increased from 3.36 crore to 6.37 crore.

Individuals are rising the economic ladder in a positive trend. Individual taxpayers filing returns in higher income levels grew significantly, showing that individual taxpayers are moving into higher income categories.

The top 1% of individual taxpayers’ proportionate contribution to the gross total

income of all individual taxpayers fell somewhat, from 15.9% to 14.6%. This shows a slight drop in income concentration among the super-rich.

Over nine years, the average gross total income for individual taxpayers increased by 56%, from approximately 4.5 lakh to around 7 lakh. Notably, the least 25% of individual taxpayers had their average income increase by 58%, while the richest 1% experienced a 42% gain.

Increases in individuals’ gross total income across income levels have resulted in higher net direct tax revenues. These revenues have increased from 6.38 lakh crore in 2013-14 to 16.61 lakh crore in 2022-23.

## GREEN CREDIT PROGRAMME AND ECOMARK SCHEME

### Context

To take ahead the ‘LiFE’ - ‘Lifestyle for Environment’ movement announced by the Hon’ble Prime Minister in 2021, the Ministry of Environment, Forest and Climate Change

has introduced two pioneering initiatives that indicate the country’s pro-active approach to climate change, sustainability and promotion eco-conscious practices. These initiatives, the Green Credit Program (GCP) and the Ecomark



Scheme, seek to encourage environmentally friendly practices rooted in tradition and conservation; reflecting the ideas of LiFE concept.

## About

### Green Credit Program (GCP): Incentivizing Environmental Actions

Green Credit Program (GCP) notified on 13th October, 2023 is *an innovative market-based mechanism designed to incentivize voluntary environmental actions across diverse sectors*, by various stakeholders like individuals, communities, private sector industries, and companies.

The GCP's governance framework is supported by an inter-ministerial Steering Committee and The **Indian Council of Forestry Research and Education (ICFRE)** serves as the **GCP Administrator**, responsible for program implementation, management, monitoring, and operation.

In its initial phase, the GCP focuses on two key activities: *water conservation and afforestation*. Draft methodologies for awarding Green Credits have been developed and will be notified for stakeholder consultation. These methodologies set benchmarks for each activity/process, to ensure environmental impact and fungibility across sectors.

A **user-friendly digital platform** will streamline the processes for registration of projects, its verification, and issuance of Green Credits. **The Green Credit Registry and trading platform**, being developed by ICFRE along with experts, would facilitate the registration and thereafter, the buying and selling of Green Credits.

To obtain Green Credits, individuals and entities must register their activities through the central government's dedicated app/website. The Administrator will **verify the activity through a designated agency**, with self-verification for small projects. Once verification is complete, the

### What is Income Tax Return (ITR)?

- An Income Tax Return (ITR) refers to the form through which an individual, company, firm, or any other taxpayer reports details of their income, deductions, tax payments, and refunds, if applicable, to the Income Tax Department.
- It serves as a declaration and a summarized statement that income earned by the taxpayer in a financial year is taxable and has been duly declared.

Administrator will grant a Green Credit certificate which will be tradable on the green credit platform.

## Ecomark Scheme: Promoting Eco-Friendly Products

The philosophy behind LiFE, (Lifestyle for Environment) is nudging individual choices and behavior towards sustainability. In line with this approach, the MoEF&CC has recast its Ecomark notification so that consumers are able to *make choices among products and thereby opt for those products that are eco-friendly in their design, process etc.*

The Ecomark Scheme, notified on 13th October 2023, replaces the previous Notification. *It provides accreditation and labelling for household and consumer products that meet specific environmental criteria while maintaining quality standards as per Indian norms.*

Products accredited under the Ecomark Scheme will adhere to specific environmental criteria, ensuring minimal environmental impact. It will build consumer awareness of environmental issues and encourage eco-conscious choices. It will also motivate manufacturers to shift towards environmentally friendly production.

The scheme seeks to ensure accurate labelling and prevent misleading information about products.

The **Central Pollution Control Board administers the Ecomark Scheme in partnership with Bureau of Indian Standards (BIS)**, which is

the national body for standards and certification.

Both initiatives mark significant steps in promoting sustainable living, environmental conservation, and, through individual and collective choice, embody eco-friendly practices

in India. They align with global sustainability goals and reflect the government's commitment to conservation and protection of the environment.

## FORTIFICATION OF FOOD PRODUCTS

### Context

Supreme court directs Centre to apprise it about action taken for rice fortification labelling norms.

### About

Fortification is the addition of key vitamins and minerals such as iron, iodine, zinc, and Vitamin A and D to staple foods such as rice, milk and salt to improve their nutritional content.

### Why fortify staple food?

1. A quick and cost-efficient way to address malnutrition
2. Does not require behaviour change.
3. Provides nutrition without any change in characteristics of food.

### Is fortification the only way to address micronutrient deficiency?

The government admits that a diversified diet and regular intake of fruits and vegetables is an important source of micronutrients. But a large section of the population may not be able

to afford a diversified diet regularly. So, adding iron to a widely-consumed staple like rice was adopted to reduce iron deficiency within a short span of time.

### What experts have to say?

Despite the intended benefits, some experts have expressed concerns regarding mass fortification.

“Men can see a variety of bad effects. An increase in serum ferritin levels is associated with increased risk of chronic diseases like diabetes and hypertension. Iron requirements for Indians, which have been revised down, can be met with a reasonably diversified diet,” experts say.

As explained by FSSAI, fortification only bridges the gap between the need and actual consumption of required micronutrients through food.

Fortified foods can fulfill our body's nutrient demand for healthy well-being. But, one should include these foods without compromising healthy food items such as consuming fruits, nuts, vegetables, and seeds.

## PUNJAB'S BAN THE CULTIVATION OF PUSA-44 PADDY VARIETY

### Context:

Punjab Chief Minister Bhagwant Singh Mann announced that the state will ban the cultivation

of the PUSA-44 paddy variety from next year onwards.

#### As a solution to micronutrient deficiency:

**Data from the National Family Health Survey 2019-21** shows that 57 percent of women in the reproductive age group (15-49) are deficient in iron. Moreover, studies have shown that about a fifth of the children (0-5 years) who do not have access to a nutritious and diversified diet suffer from vitamin-A deficiency, while vitamin-D deficiency has been termed a silent epidemic.



## About PUSA-44:

It is a **paddy variety** which was developed in 1993 by the **Indian Council of Agricultural Research (ICAR)**.

By the end of 2010s, it had gained widespread popularity among farmers across the Punjab, covering approximately **70 to 80% of the area under paddy cultivation**.

Farmers claim that PUSA-44 yields nearly 85 to 100 man (34 to 40 quintals) per acre, while other varieties' yield average is 28 to 30 quintals per acre.

## Concerns

It is a **long-duration variety**, taking around 160 days to mature.

This is around 35 to 40 days more than other varieties, requiring 5-6 extra cycles of irrigation.

With Punjab facing **severe groundwater depletion** and the availability of short-duration paddy varieties, the government aims to conserve one month of irrigation water by banning the variety.

Moreover, this variety is also known to **exacerbate** the long-running issue of **stubble burning in the state**.

This variety generates around **2 per cent more stubble** than short varieties, which becomes a significant concern when cultivated on a large scale.

## Key facts about the ICAR

It is an **autonomous organisation** under the Department of Agricultural Research and Education (DARE), **Ministry of Agriculture and Farmers Welfare**, Government of India.

It was formerly known as Imperial Council of Agricultural Research.

It was established on 16 July 1929 as a registered society under the **Societies Registration Act, 1860** in pursuance of the report of the Royal Commission on Agriculture.

The Council is the apex body for **co-ordinating, guiding and managing research** and education in **agriculture** including horticulture, fisheries and animal sciences in the entire country.

With 113 ICAR institutes and 71 agricultural universities spread across the country this is one of the largest national agricultural systems in the world.

**Headquarters:** New Delhi.

# ICRISAT JOINS ONE CGIAR GLOBAL INITIATIVE

## Context

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), with a focus on tropical dryland agrifood system innovation, has joined the One CGIAR integrated partnership.

## Consortium of International Agricultural Research Centres (CGIAR)

The CGIAR is a publicly funded network of agrifood systems research centres, works for transforming food, land, and water systems in a climate crisis. It has more than 8,000 employees, working in over 80 countries.

**Members:** The CGIAR consists of **15 international agricultural research** institutes.

The list includes Africa Rice Center (formerly WARDA), Ivory Coast; Centro Internacional de Agricultura Tropical (CIAT), Columbia; Center for International Forestry Research (CIFOR), Indonesia; Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT), Mexico; International Potato Center (CIP), Peru; International Center for Agricultural Research in the Dry Areas (ICARDA), Syria; and ICRISAT, India.

**Purpose:** To reduce poverty and hunger, improve human health and nutrition, and enhance ecosystem resilience through high-quality international agricultural research, partnership and leadership.

## One CGIAR

The One CGIAR transition is a dynamic

reformulation of CGIAR's partnerships, knowledge, assets and global presence, aiming for greater integration and impact in the face of the interdependent challenges facing today's world.

The One CGIAR partnership involves the CGIAR System Organisation and 12 One CGIAR research centres. The partnership will **help build a unified approach to transforming food, land, and water systems to address the challenges posed by climate crisis.**

### **International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)**

ICRISAT is a non-profit, non-political organization founded in 1972. Its charter was signed by the FAO and the UNDP.

**Aim:** To conduct agricultural research for development in Asia and sub-Saharan Africa.

ICRISAT holds a special status as a UN organization in India. This makes it eligible for special immunities and tax privileges.

**Headquarters:** Patancheru, Hyderabad

It also has regional centers in Mali and Kenya and research stations in several African countries.

## **UPSC CSE Prelims 2021**

**Q. In the context of India's preparation for Climate-Smart Agriculture, consider the following statements:**

- 1. The 'Climate-Smart Village' approach in India is a part of a project led by the Climate Change, Agriculture and Food Security (CCAFS), an international research programme.**
- 2. The project of CCAFS is carried out under Consultative Group on 'International Agricultural Research (CGIAR) headquartered in France.**
- 3. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India is one of the CGIAR's research centres.**

**Which of the statements given above are correct?**

- A. 1 and 2 only**
- B. 2 and 3 only**
- C. 1 and 3 only**
- D. 1, 2 and 3**

**Ans: (d)**

#### **Explanation**

The Climate-Smart Village project in India is a CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). The CCAFS started piloting the Climate-Smart Village in 2012 in Africa (Burkina Faso, Ghana, Mali, Niger, Senegal, Kenya, Ethiopia, Tanzania, and Uganda) and South Asia (Bangladesh, India, and Nepal). Hence, statement 1 is correct.

Climate Change, Agriculture and Food Security (CCFAS) is carried out under CGIAR (formerly the Consultative Group for International Agricultural Research). The Headquarters of CGIAR is in Montpellier, France. CGIAR is a global partnership that unites international organizations engaged in research about food security. Hence, statement 2 is correct.

Statement 3 is correct.

**Therefore, option (d) is the correct answer**

## REFERENCE FUELS

### Context

Indian Oil has successfully commenced the production of Reference Gasoline and Diesel Fuels for the first time in India.

### About Reference Fuels

These fuels are used for calibration and testing of vehicle by Automobile manufacturers and testing agencies like ICAT (International Centre for Automotive Technology) and ARAI (Automotive Research Association of India).

The indigenous development of this product

is in-line with the vision for “Atmanirbhar Bharat”.

India is dependent on imports to cater to the demand for this specialized fuel. These indigenously developed products will lead to import substitution at better price and minimum lead time for the Vehicle manufacturers.

Reference fuels (Gasoline and Diesel) are premium high-value products, used for calibration and testing of vehicles by Auto OEMs and organizations involved in testing and certification in the automotive field.

## NANO DAP PLANT

### Context

Union Home and Cooperation Minister Amit Shah said nanotechnology will be the game changer in agriculture in the days ahead. Addressing a large number of farmers after inaugurating the Country’s first Nano DAP plant by IFFCO near Kalol in Gandhinagar, the Minister said it is the need of the hour to adopt natural farming and reduce the use of fertilizers in agriculture without compromising the scale of the production.

### About

Nano-DAP (Di-ammonium Phosphate) is a nanotechnology-based agri-input developed by the Indian Farmers Fertilizer Cooperative Limited (IFFCO).

It will have 8% nitrogen and 16% phosphorus compared to 18% nitrogen and 46% phosphorus contained in the conventional granular bag.

A 500 ml bottle of nano-DAP is equal to a 50kg bag of regular DAP. The cost of a bottle of nano-DAP is ₹600 (without subsidy) while conventional DAP is priced at ₹1,350 per bag (with fertilizer subsidy).

IFFCO has obtained a 20-year patent for nano-urea and nano-DAP, entitling them to receive a 20% royalty for global usage of these products.

### Benefits of Nano DAP

- Nutrient use efficiency is more than 90 percent under optimum field conditions.
- Enhances Crop Growth and Quality.
- It is cheaper than conventional DAP and is economical for the farmers
- Reduces pollution of soil, air and water due to excessive use of phosphatic fertilizers.
- Reduced production cost and increased output will also boost the annual income of Indian farmers.
- It is eco friendly as nano DAP will minimally contaminate the land.

# GEOGRAPHY,

# E ENVIRONMENT,

# B IODIVERSITY AND

# DISASTER MANAGEMENT

What's Inside?

1. STAGHORN CORAL
2. GANGETIC RIVER DOLPHIN
3. KANWAR TAAL LAKE
4. GREY WHALES
5. WORLD ENERGY OUTLOOK 2023
6. GHOST PARTICLE
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11. DECEPTION ISLAND
12. EARTHQUAKES IN AFGHANISTAN
13. INVASIVE PLANT SPECIES
14. CYCLOGENESIS AND WACE PATTERN
15. ALGAE'S SURPRISING POTENTIAL TO HELP EASE CLIMATE CHANGE WORRIES



## STAGHORN CORAL

### Context

Genomic markers of disease resistance in staghorn corals have been recently found.

### About

1. It is one of the most important corals in the Caribbean.
2. It can form dense groups called “thickets” in very shallow water.
3. **Appearance:** Staghorn corals are golden tan or pale brown with white tips and they get their color from the algae that live within their tissue. They have antler-like branches and typically stem out from a central trunk and angle upward.

4. **Behavior and Diet:** Staghorn coral get food from photosynthetic algae that live inside the coral’s cells. They also feed by capturing plankton with their polyps’ tentacles. When staghorn corals are abundant, they provide shoreline protections from large waves and storms.



## GANGETIC RIVER DOLPHIN

### Context:

Ganga-Ghagra basin canals pose a threat to dolphins.

### About:

1. The Ganges river dolphin is known as the “Tiger of the Ganges” for the role it plays as a top predator, and because it is an ecosystem indicator species – much like a tiger is in a forest.
2. It is legally protected in all countries within which it is found and is the National Aquatic Animal of India.
3. Both Indus and Ganges river dolphins are considered to be living fossils, as they are the most ancient dolphin species still alive.
4. Ganges river dolphin can only live in freshwater and is essentially blind. They hunt by emitting ultrasonic sounds, which bounces off of fish and other prey, enabling them to “see” an image in their



mind. Females are larger than males and give birth once every two to three years to only one calf.

5. **Behavior:** They are frequently found alone or in small groups, and generally a mother and calf travel together.
6. Many names in local languages are reminiscent of the noise the dolphin makes when it breathes, such as susu, soos, shushuk, socho, shus and suongsu.
7. **Diet:** Ganges river dolphins eat a large variety of small and medium sized fish and crustaceans.



**8. Conservation status:**

- Schedule 1 of the Indian Wildlife (Protection) Act 1972,
- Appendix 1 of the Convention on International Trade in Endangered Species

(CITES)

- Appendix 1 of the Convention on Migratory Species (CMS)
- Listed as “endangered” on the IUCN Red List.

## KANWAR TAAL LAKE

**Context**

Bihar’s only wetland of international importance under the Ramsar Convention lies neglected and is on the brink of drying up, even as the state is pitching other waterbodies for the classification.

**About**

- **Kanwar Taal or Kabar Taal Lake or Kabartal Wetland** located in the State of Bihar
- It is the Asia’s largest freshwater oxbow lake
- The Site is one of 18 wetlands within an extensive floodplain complex; it floods during the monsoon season to a depth of 1.5 metres.
- This absorption of floodwaters is a vital

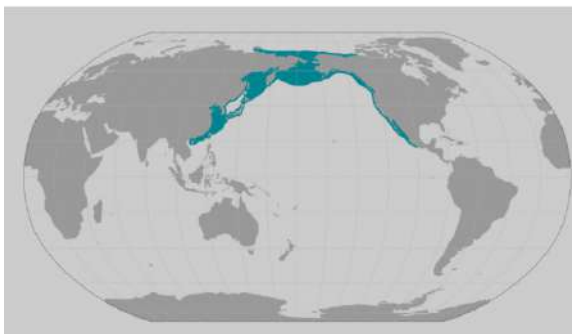
service in Bihar State where 70% of the land is vulnerable to inundation.

- Five critically endangered species inhabit the site, including three vultures – the red-headed vulture, white-rumped vulture and Indian vulture – and two waterbirds, the sociable lapwing and Baer’s pochard.



## GREY WHALES

**Context**



Grey whales experience major population swings as a result of Arctic conditions, research shows.

**About**

Once common throughout the Northern Hemisphere, grey whales are now only regularly found in the North Pacific Ocean where there are

two extant populations, one in the eastern and one in the western North Pacific.

Grey whales make one of the longest annual migrations of any mammal, traveling about 10,000 miles.

**Behavior and Diet**

Grey whales, not a social animal, are frequently observed traveling alone or in small, mostly unstable groups. Although large aggregations may be seen in feeding and breeding grounds. Like other baleen whales, long-term bonds between


















individuals are thought to be rare.

They are primarily bottom feeders that consume a wide range of benthic (sea floor) and epibenthic (above the sea floor) invertebrates,

such as amphipods.

### Other Arctic species

Land Mammals	Birds	Other Animals
 <p data-bbox="327 598 419 623">Arctic Fox</p>	 <p data-bbox="688 607 789 631">Snowy Owl</p>	 <p data-bbox="973 607 1184 631">Arctic Woolly Bear Moth</p>
 <p data-bbox="323 890 424 915">Arctic Hare</p>	 <p data-bbox="688 890 789 915">Arctic Tern</p>	 <p data-bbox="1047 901 1113 926">Walrus</p>
 <p data-bbox="327 1191 419 1216">Arctic fox</p>	 <p data-bbox="693 1199 780 1224">Bald eagle</p>	 <p data-bbox="1020 1172 1139 1197">Beluga Whale</p>
 <p data-bbox="290 1475 454 1500">Caribou / Reindeer</p>	 <p data-bbox="676 1489 798 1514">Canada Goose</p>	 <p data-bbox="1025 1452 1133 1477">Hooded Seal</p>
 <p data-bbox="327 1804 419 1829">Polar Bear</p>	 <p data-bbox="644 1788 829 1813">Brunnich's Guillemots</p>	 <p data-bbox="1022 1788 1133 1813">Bearded Seal</p>

# WORLD ENERGY OUTLOOK 2023

## Context:

The World Energy Outlook 2023 was released by the International Energy Agency (IEA) recently.

**Published every year**, the WEO provides critical analysis and insights on trends in energy demand and supply.

## Highlights of the report:

This Outlook assesses the evolving nature of energy security fifty years after the foundation of the IEA.

It also examines what needs to happen at the COP28 climate conference in Dubai to keep the door open for the 1.5 °C goal.

This Outlook explores three scenarios that provide a framework for exploring the implications of various policy choices, investment, and technology trends.

The **Stated Policies Scenario** is based on current policy settings and also considers the implications of industrial policies that support clean energy supply chains as well as measures related to energy and climate.

The **Announced Pledges Scenario** gives governments the benefit of the doubt and explores what the full and timely implementation of national energy and climate goals, including net zero emissions targets, would mean for the energy sector.

The **Net Zero Emissions by 2050 Scenario** maps out a transition pathway that would limit global warming to 1.5 °C.

And, as it does every year, the Outlook examines the implications of today's energy trends in key areas including investment, trade flows, electrification, and energy access.

Following Russia's invasion of Ukraine, instability in the Middle East could lead to further disruption to energy markets and prices.

In the Stated Policies Scenario, the average

annual growth rate of 0.7% in total energy demand to 2030 is around half the rate of energy demand growth of the last decade. Demand continues to increase through 2050.

In the Net Zero Emissions by 2050 Scenario, electrification and efficiency gains proceed even faster, leading to a decline in primary energy of 1.2% per year to 2030.

Solar manufacturing growth is outpacing the rise of solar PV deployment, creating some risks of imbalances but huge opportunities for the world to accelerate energy transitions.

Numerous new LNG export projects (60% of which are accounted to the US and Qatar) are set to overturn gas markets.

Fossil fuel share in the global energy supply is projected to reduce from around 80% to 73% by 2030.

Global energy-related carbon dioxide (CO<sub>2</sub>) emissions peaking by 2025. Renewables are set to contribute 80% of new power capacity by 2030 in the stated policies scenario (STEPS), with solar PV alone accounting for more than half of this.

Extreme volatility in energy markets highlighted the importance of affordable, reliable, and resilient supply.

Several countries have adopted policies that encourage the diversification of supply chains for clean energy technologies.

This includes policies to promote clean energy technology manufacturing, for instance, the Inflation Reduction Act in the United States, the Net Zero Industry Act in the European Union, and the Production Linked Incentives scheme in India.

The global economy is assumed to increase at an average of 2.6% per year to 2050 in the three scenarios, while the global population expands from 8 billion today to 9.7 billion in 2050. Energy, carbon, and mineral prices find different

equilibrium levels across the scenarios, but the potential for volatility remains high.

## Findings of World Energy Outlook 2023 for India:

According to World Energy Outlook 2023, India will see the largest energy demand growth of any country or region in the world over the next 3 decades.

**Power consumption** – India will exceed the whole of Africa now.

**Air-conditioner usage** – Residential ownership to see 9 fold increase by 2050.

**Energy demand** – A sharp rise as temperatures cross the 25-degree Celsius threshold.

**Energy supply** - To rise to 60.3 exajoules (EJ) by 2050.

**Investments** – Need to nearly triple by the end of this decade to be on a trajectory to meet its net zero emissions target.

**Annual CO2 emissions** – To rises nearly 30% by 2050, which is one of the largest increases in the world.

Implication over India's climate – Over the

past 5 decades, more than 700 heatwave events occurred.

## International Energy Agency:

The International Energy Agency (IEA), an autonomous organization, works to ensure reliable, affordable and clean energy to its 30 member countries, 8 association countries and beyond.

It was established in the wake of the 1973 (set up in 1974) oil crisis after the OPEC cartel had shocked the world with a steep increase in oil prices. **The IEA has four main areas of focus, i.e. 4Es:**

- Energy security,
- Economic development,
- Environmental awareness and
- Engagement worldwide.

**India became an associate member of International Energy Agency in 2017.**

**Mexico** officially became the **International Energy Agency's 30th member** country in February 2018, and its first member in Latin America.

It is **headquartered in Paris, France**

# GHOST PARTICLE

## Context

China is building an enormous telescope in the western Pacific Ocean. Its job will be to detect "ghost particles", also known as neutrinos. The telescope will be the largest of its kind, scientists say in an article published in Nature earlier this month.

## About

China's new telescope, "Trident", will span 7.5 cubic kilometers in the South China Sea. It will be 10,000 times more sensitive. It will be the largest of its kind.

It will detect "ghost particles", also known

as neutrinos.

At present, the largest neutrino-detecting telescope is the University of Madison-Wisconsin's "IceCube" telescope.

Situated in the Antarctic, the telescope's sensors span around 1 cubic kilometer.

## Project Timeline

- Pilot Phase (2026): TRIDENT will initiate a pilot project to fine-tune operations.
- Full Deployment (2030): The complete detector will be operational, embarking on a quest to expand the frontiers of neutrino astronomy.



## Ghost particle or Neutrinos

Atoms make up our universe. Anything that has mass is made up of atoms.

For a long time, scientists thought atoms were the smallest particle in existence—before discovering that they are themselves comprised of even tinier “subatomic” particles: protons (which have a positive charge), electrons (negative charge), and neutrons (no charge).

Neutrinos are a type of electron but, like neutrons, they do not have any charge. They are among the most abundant particles in our universe — with trillions of neutrinos passing through you at any given second—and also among the tiniest.

Neutrinos were long believed to be massless, until scientists found evidence that they do have a very small mass. Neutrinos’ weak charge and almost nonexistent mass have made them notoriously difficult for scientists to observe.

They can only be “seen” when they interact with other particles. The rarity of interactions with other particles makes them almost impossible to track. That’s why they’re called ghost particles—the vast majority skirt around undetected.

### Detection

Detecting neutrinos is challenging due to their weak interactions.

Specialized detectors like neutrino observatories are used

### Significance

Play a crucial role in astrophysics, contributing to our understanding of stars, supernovae, and cosmic rays. Neutrinos can change between different flavors, known as neutrino oscillation, which was a groundbreaking discovery

## CHALLENGES IN GREEN HYDROGEN DEVELOPMENT

### Context

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).

### Challenges Ahead

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.

The MNRE has defined green hydrogen as hydrogen produced in a way that emits no more than two kg of carbon dioxide per kg of such hydrogen. Currently, producing one kg of ‘grey

hydrogen’, as it is known, ends up emitting nine kg of carbon dioxide. The main concern is that if electrolyzers were run 24x7, they would be expected to operate even at night when no solar power is available. The required electricity comes from India’s coal-powered grid in general, it will in fact increase carbon emissions, since about 70% of the electricity on the grid is coal-generated — more in non-daylight hours when solar generation is nil.

Another challenge is that India’s standards allow the use of biomass — which also results in carbon emissions when burnt — to produce green hydrogen.

Fuel cells which convert hydrogen fuel to usable energy for cars, are still expensive.

The hydrogen station infrastructure needed to refuel hydrogen fuel cell cars is still widely underdeveloped.

### Green Hydrogen Standard for India

The standard issued by the Ministry of New and Renewable Energy (MNRE),



Government of India outlines the emission thresholds that must be met in order for

hydrogen produced to be classified as 'Green', i.e., from renewable sources.

The scope of the definition encompasses both electrolysis-based and biomass-based hydrogen production methods.

### Green hydrogen includes

- Hydrogen produced using renewable energy
- production through electrolysis or
- Production through conversion of biomass
- Produced from electricity generated from

renewable sources which is stored in an energy storage system or banked with the grid in accordance with applicable regulations

In the case of use of electrolysis and biomass, non-biogenic greenhouse gas emissions arising from the whole processes shall not be greater than 2 kilogram of carbon dioxide equivalent per kilogram of Hydrogen (kg CO<sub>2</sub> eq/kg Hydrogen), taken as an average over last 12-month period

Bureau of Energy Efficiency shall be the Nodal Authority for accreditation of agencies for

the monitoring, verification and certification for Green Hydrogen production project

## GLACIAL LAKE OUTBURST FLOODS IN SIKKIM

### Context

Sikkim recently experienced a glacial lake outburst flood.

### About

On the night of October 3, 2023, the South Lhonak Lake in North Sikkim breached, causing a Glacial Lake Outburst Flood (GLOF). Located approximately 60 kilometres downstream of the lake, in Chungthang town of Mangan district, was the 1,200 MW Teesta III dam, the biggest hydropower project in Sikkim. The dam was decimated by the GLOF, which also unleashed devastation on downstream areas and communities

Hydropower projects in the region, including the Teesta III dam, have been developed despite the known risks of seismicity, landslides, and climate-related disasters. Such projects have exacerbated the vulnerability of the region to natural disasters.

### What is GLOF?

Glacial lakes, like the South Lhonak Lake, are large bodies of water that sit in front of, on top of, or beneath a melting glacier. As they grow larger, they become more dangerous because glacial lakes are mostly dammed by unstable ice or sediment composed of loose rock and debris. In case the boundary around them breaks, huge amounts of water rush down the side of the mountains, which could cause flooding in the downstream areas.

This is called glacial lake outburst floods or GLOF.

GLOF can be triggered by several reasons, including earthquakes, extremely heavy rains and ice avalanches

### South Lhonak Lake

South Lhonak Lake is a glacial-moraine-dammed lake, located in Sikkim's far northwestern region. It is one of the fastest expanding lakes in the Sikkim Himalaya region, and one of the 14 potentially dangerous lakes susceptible to Glacial lake outburst flood



It is formed due to the melting of the Lhonak glacier.

### Chunghang Dam

Chunghang Dam is the largest hydropower project in Sikkim.

This dam is part of the 1,200-megawatt (MW) Teesta Stage III Hydro Electric Project, in which Sikkim government is the majority stakeholder.

The Chunghang Dam breached due to the sheer force and speed of the water from GLOF.

The huge amounts of water released from the dam further worsened the flooding of Sikkim.

### Teesta River

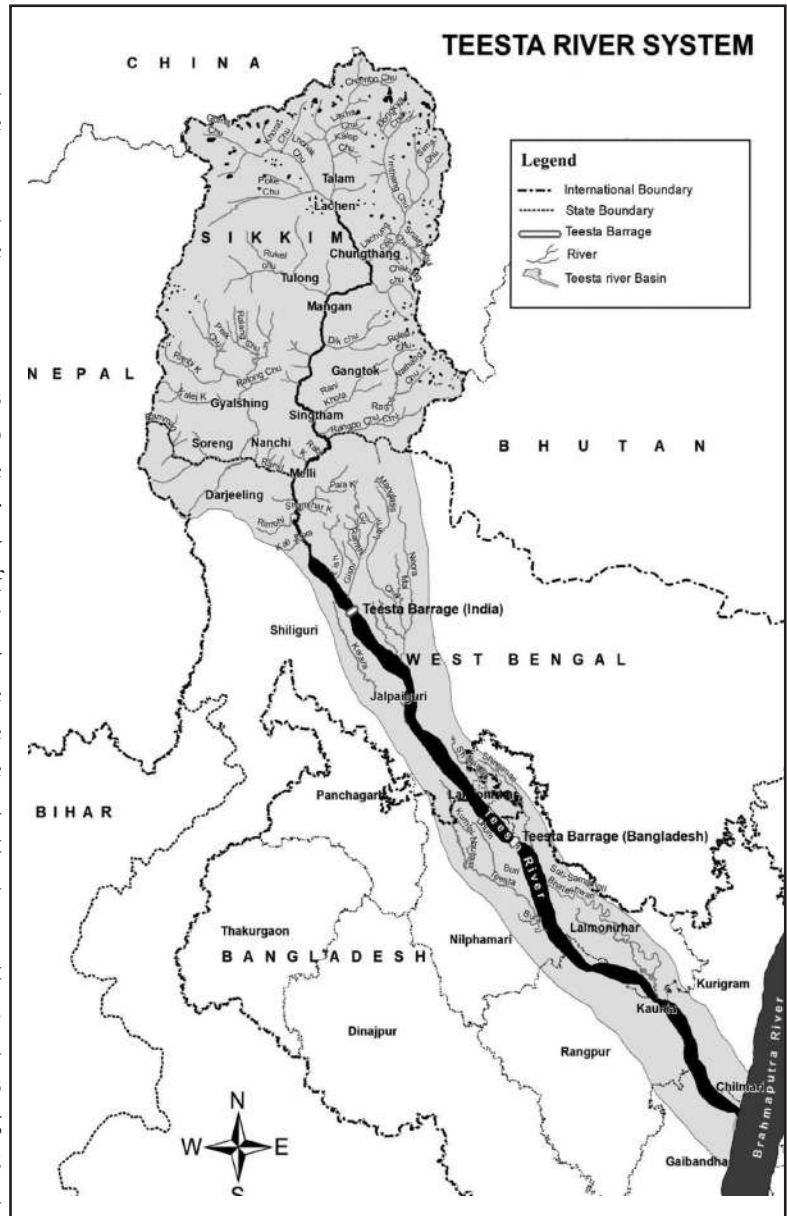
It originates in the Himalayas near Chunthang, Sikkim and flows to the south through West Bengal before entering Bangladesh. Originally, the river continued southward to empty directly into the Padma River (main channel of Ganga in Bangladesh) but around 1787 the river changed its course to flow eastward to join the Jamuna river. The Teesta Barrage dam helps to provide irrigation for the plains between the upper Padma and the Jamuna. Teesta river water conflict is one of the most contentious issues between India and Bangladesh.

The flow of the Tista is greatest during the summer (June to September), when the monsoon rains are heaviest and glaciers supply abundant meltwater. Its lower reaches are marked by flooding and frequent, violent course changes; navigation is impaired by shoals and quicksand near the junction with the Jamuna

### Teesta III

Teesta III is part of a cascade network of dams in the Teesta basin with a combined installed

capacity of 4,694 MW. To date, only a few of these projects have been commissioned (the 110 MW Chujachen HEP, 96 MW Jorethang Loop, 96MW Dikchu HEP, 97 MW Tashiding HEP and the 510 MV Teesta V). Ramman II and Ranjit III are also other hydropower projects. Others have been scrapped, have changed hands between developers or have been delayed. All the dams on the Teesta and its tributaries are run-of-the river



systems (which entail guiding the flowing waters of a river through a canal or penstock to spin a turbine and so, generate electricity)

# ZEALANDIA

## Context

Scientists recently discovered a new continent that had been missing from our knowledge for 375 million years. This continent, called Zealandia, is mostly underwater but consists of a group of islands, similar to New Zealand.

## About

Zealandia is a long, narrow microcontinent that is mostly submerged in the South Pacific Ocean.

A microcontinent is a landmass that has broken off from a main continent. Zealandia broke off from Antarctica about 100 million years ago, and then from Australia about 80 million years ago.

Zealandia is about half the size of Australia, but only 7 percent of it is above sea level.

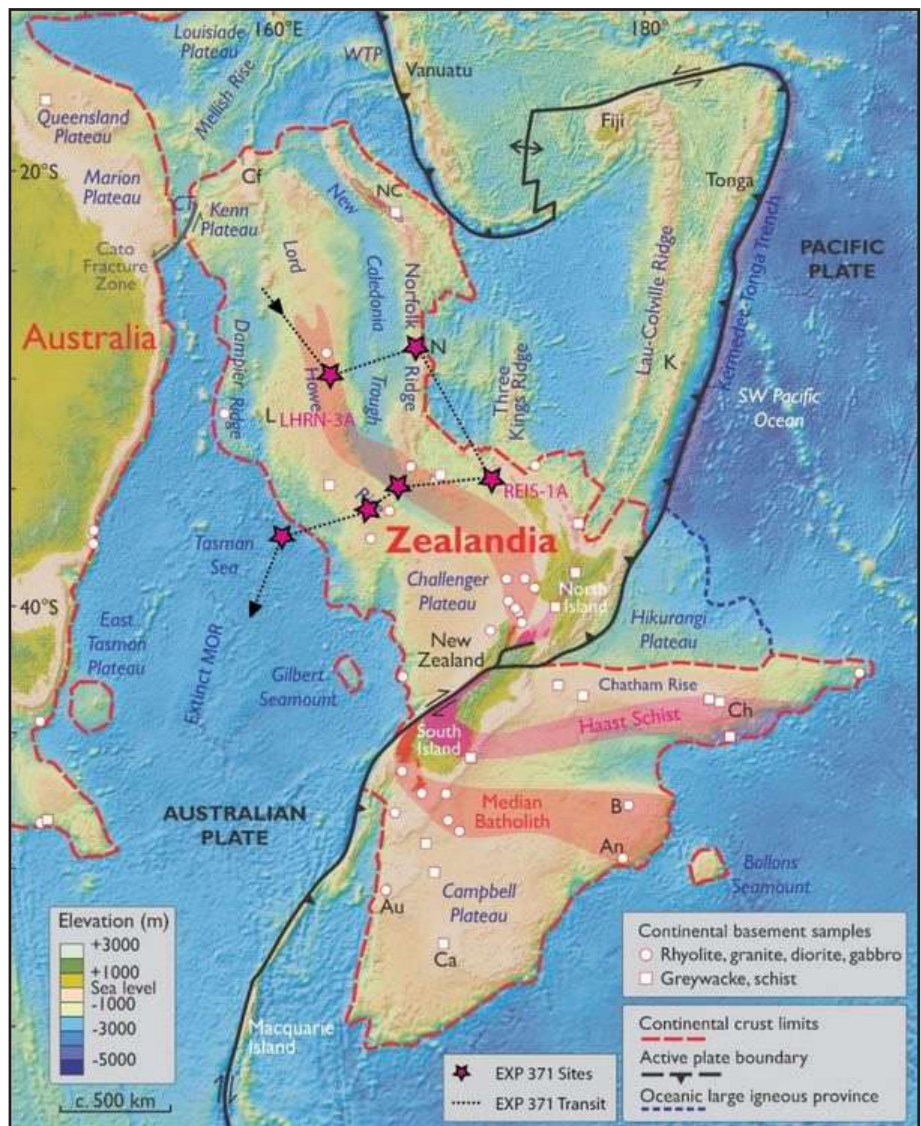
## ZEALANDIA - A CONTINENT

Zealandia was originally part of the ancient supercontinent Gondwana, dating back 1 billion to 542 million years ago. Sometime, probably, 83 million years ago, the supercontinent Gondwana started being pulled apart leading to the emergence of the present-day continents.

As Gondwana split up, the world's smallest, thinnest and youngest continent struck out on its own. It's thought that all or part of Zealandia may have existed as an island for a while. But, then around 25 million years ago, it sank and disappeared

beneath the ocean.

Geologists define a continent as a major land mass, including both dry land and the continental shelves that lie off the coast. A continent is made of continental crust – a base of igneous,





metamorphic and sedimentary rocks. (Oceanic crust is made up of basalt and is thinner and denser than continental crust.) A continent should also have areas of high elevation when compared to the surrounding seabed. What isn't defined is size – there is no minimum size requirement for a continent.

Zealandia meets these definitions. It is a continuous expanse of continental crust, linked together by the islands of New Caledonia to the north, North, South and Stewart Islands (Te Ika-a-Māui, Te Waipounamu and Te Punga o Te Waka a Māui), the Auckland Islands and Campbell Island to the south and the Chatham Islands to the west. Zealandia's continental crust is physically separate from Australia's continental crust. Zealandia is also significantly elevated, rising about 3,000 m above the surrounding oceanic crust.

### Volcanic Activity

Zealandia is a very tectonically active region. Part of the microcontinent is on the Australian plate, while the other part is on the Pacific plate.

The northern part of Zealandia is very volcanic. There are six major areas with active volcanoes, the largest being the Taupo Volcanic

Zone on the North Island. Geothermal activity caused by the interaction of the Australian and Pacific plates also means there are many natural geysers and hot springs scattered throughout Zealandia.

Both the North and South Islands have volcanic mountain ranges running through their centers. The North Island is dominated by the North Island Volcanic Plateau, while the primary mountain range of the South Island is the Southern Alps. Both mountain ranges are slowly getting higher through a process called tectonic uplift.

### Underwater Zealandia

The submerged part of Zealandia is rich in mineral deposits, although New Zealand's government strictly controls undersea mining activity. There are also many natural gas fields scattered throughout Zealandia. The Maui natural gas field in the Tasman Sea is the largest.

Underwater Zealandia is of value to science as well as business. During glacial periods, sea levels fell, and more of Zealandia was above water. Zealandia's submerged fossils provide valuable clues to life during those time periods.

## NATIONAL FRAMEWORK FOR CLIMATE SERVICES

### Context

India is embarking on a major programme to launch its maiden national-level framework towards providing climate services and information.

### About

#### Global Framework for Climate services

The Global Framework for Climate Services (GFCS) is a partnership of governments and organisations at a global level, for the production and better usage of climate information and services.

The GFCS aims to facilitate researchers and users of climate information and services to join hands in order to make informed and actionable decisions for the long-term betterment.

The announcement to establish a GFCS was

made during the third World Climate Conference held in Geneva in 2009. This framework, led by National Meteorological and Hydrological Services (NMHS) in their respective nations, includes



active participation of policymakers, planners, investors and vulnerable communities or sectors, as they need climate information and services in a user-friendly format, so that they can prepare for expected trends and changes in the long run.

GFCS envisages to generate high-quality data from national and international databases on temperature, rainfall, wind, soil moisture and ocean conditions and other vital weather parameters. This is aimed at creating long-term historical averages of these parameters, as well as maps, risk and vulnerability analyses, assessments and long-term projections and scenarios.

The five major components under GFCS are

- Observations and Monitoring
- Research
- Modelling and Prediction
- Climate Services Information System
- User Interface Platform
- Capacity Building.

At present, the priority sectors where the GFCS focuses upon are agriculture and food security, energy, health, water and disaster risk reduction.

## National Framework for Climate Services

In lines with the global framework, the national framework will be based on country-specific weather and stakeholder needs. Unlike the GFCS, the nodal agency for the formulation and implementation of the national framework in India will be the Indian Meteorological Department.

Along with the identified sectors of focus, India could add other relevant sectors like transport, tourism and other emerging sectors from time to time.

Initially, the NFCS will work in bridging functioning gaps between the various agencies who require climate services. These include the

hydrological, power, renewable energy, transport, dams and irrigation, health agencies are central, state and other levels.

## Need for NFCS

**Addressing Functional Gaps:** The NFCS will be crucial in addressing coordination gaps among agencies relying on climate services, such as hydrology, power, renewable energy, transportation, dams, irrigation, and health. It aims to enhance integration and data sharing among these sectors.

**Expanding Sectoral Focus:** Initially targeting key sectors like agriculture, energy, health, water, and disaster risk reduction, India can include other relevant sectors like transportation and tourism.

**Strengthening Data Collection:** The NFCS will bolster India's observational network on land and sea, improving data collection capabilities. This data will be instrumental in running more accurate weather and climate models for precise climate predictions.

**Customised Climate Information:** Climate data and information products will be tailored to meet user requirements. This customisation will aid in identifying trends in agriculture, health, population distribution, infrastructure planning, energy generation, and more.

**Enhancing Climate Resilience:** NFCS will actively support efforts to prepare for and adapt to changing climate conditions, mitigating the impacts on various sectors, including water supplies, health risks, extreme events, farm productivity, and infrastructure development.

## Implementation of NFCS

Since the 2009 declaration of frameworks for climate services, Switzerland, China, Germany and the United Kingdom have launched the NFCS.

Countries where the NFCS implementation is in the advanced stages include Benin, Burkina Faso, Cameroon, Cote d'Ivoire, Gambia, Guinea,



Madagascar, Moldova, Niger, Senegal, Chad, Togo, Tanzania, Vanuatu and South Africa.

With the first workshop organised recently in Pune, India has joined Cuba, Ghana, Liberia, Malawi, Nigeria, Rwanda, Sierra Leone, Democratic Republic of Congo, Congo Brazzaville and Ethiopia, where the NFCS-related national consultation workshops are being planned.

India will be soon releasing the statement of NFCS after consensus received from the key

partnering stakeholders.

Though the idea of having NFCS in India dates back to 2008, it did not take off as desired. With climate vagaries and extreme events affecting India, and the world, becoming more frequent, the early implementation and acceleration of NFCS will be possible when planned in a mission-mode and is driven by the country’s highest decision-making office.

## DECEPTION ISLAND

### Context

NASA Earth took to Instagram to share a satellite image of ‘Deception Island’. Notably, Deception Island, located off the Antarctic Peninsula, is one of the only places in the world where ships can sail directly into the center of an active volcano. The horseshoe-shaped island surrounds Port Foster, a harbour and the flooded caldera of the volcano.

### About

#### Location and Geographical Features

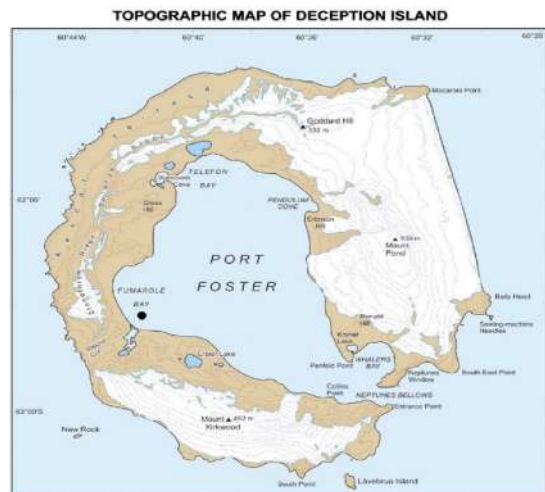
Deception Island is in the South Shetland Islands close to the Antarctic Peninsula with a large and usually “safe” natural harbor, which is occasionally affected by the underlying active volcano.

This island is the caldera of an active volcano, which seriously damaged local scientific stations in 1967 and 1969. The island previously held a whaling station. It is now a tourist destination with over 15,000 visitors per year. Two research stations are operated by Argentina and Spain during the summer season.

While various countries have asserted sovereignty, it is still administered under the Antarctic Treaty System. Deception Island is designated as an Antarctic Specially Managed Area, emphasizing the need for the preservation and protection of its unique geological, ecological, and historical value

Located within the Bransfield Strait, the

island is roughly circular and horseshoe-shaped.



The highest peak, Mount Pond on the east side of the island while Mount Kirkwood is on the west.

Over half (57%) of the island is covered by glaciers up to 10 m thick, ice-cored moraines, or ice covered pyroclasts. The centre of the island has

been flooded by the sea to form a large bay, now called Port Foster. The bay has a narrow entrance, called Neptune's Bellows. The port is a basin with several small submarine cones and domes.

## EARTHQUAKES IN AFGHANISTAN

### Context

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. Multiple earthquakes have destroyed entire villages in the country.

In June 2022, a magnitude 6.1 earthquake in Khost and Paktika provinces resulted in over 1,000 casualties.

In 2015, a major earthquake in northeast Afghanistan and northern Pakistan killed over 200 people.

A 6.1-magnitude earthquake in 2002 claimed about 1,000 lives in northern Afghanistan.

In 1998, earthquakes in northeast Afghanistan caused at least 4,500 deaths.

### Frequent Earthquakes in Afghanistan: Causes and Impact

#### 1. Frequent Earthquakes in Afghanistan:

Afghanistan is prone to earthquakes due to its location on multiple fault lines.

The Indian and Eurasian tectonic plates meet in this region, leading to tectonic activity.

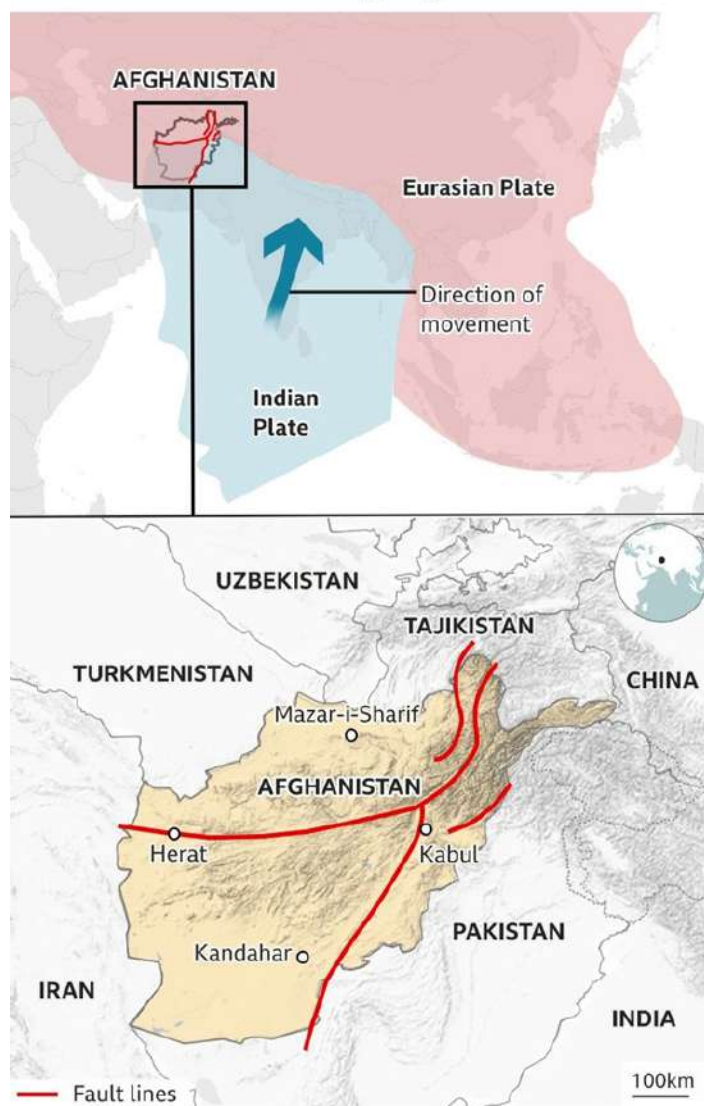
#### 2. Geological Complexity:

Afghanistan is located on the Eurasian plate.

Western Afghanistan experiences subduction of the Arabian plate northward, while the Indian plate does the same in the east.

Southern Afghanistan sees the convergence

### Fault lines crossing Afghanistan



of the Arabian and Indian plates, both subducting northward under the Eurasian plate.

The Hindu Kush mountain range and the Pamir Knot add geological complexity to the region.

The collision and convergence of these plates result in folding and faulting of the Earth's crust.

### **3. Plate Boundaries and Tectonic Stress:**

The ongoing northward movement of the Indian Plate towards the Eurasian Plate causes compression.

This compression leads to the uplift of the Himalayas and the transmission of tectonic stress throughout the region, including Afghanistan.

The crust deformation, fault formation, and seismic activity are consequences of this tectonic stress.

### **4. Specific Fault Systems:**

Afghanistan is crisscrossed by various active fault systems, including the Chaman Fault and the Main Pamir Thrust.

These faults are the sources of many earthquakes in the region.

## **Impact of Earthquakes in Afghanistan:**

Afghanistan's buildings are often not earthquake-resistant, constructed from materials like timber, adobe (mud bricks), or weak concrete.

Earthquakes often trigger landslides in the mountainous regions, causing additional destruction.

Landslides can block roads, hindering rescue efforts.

Afghanistan's remote locations and adverse weather conditions, such as rain, snow, fog, and extreme cold, further complicate rescue and relief operations.

The country's ongoing humanitarian crisis with millions of displaced people adds to the vulnerability during earthquake events.

## **INVASIVE PLANT SPECIES**

### **Context**

More than half (About 66 percent) of the country's natural systems are threatened with invasive species, according to the report published in the Journal of Applied Ecology. The study offered the first account indicating distribution status of high-concern invasive plants spread across the country.

### **Findings of the study:**

The study revealed that 11 high-concern invasive plant species including *Lantana camara*, *Prosopis juliflora* and *Chromolaena odorata* were present in 20 states, impacting 158,000 plots in 358,000 square kilometers of natural areas.

The study estimated that loss due to biological invasions would cost the Indian economy up to \$182.6 billion.

High concern invasive plants were recorded in 22 per cent natural areas and predicted to potentially threaten 66 percent of natural areas, according to the report.

The data indicated that invasive cover increases with temperatures up to a threshold and declines with increasing rainfall, seasonal vegetation opening and human modification index.

### **Which type of biome will be worst affected?**

- Savannas were reported to have the highest susceptibility (87 per cent) to invasions, followed by moist grasslands and dry deciduous forests each at 72 per cent.
- The evergreen forests were found to be least suitable for invasive species at 42 per cent susceptibility. However, the suitability of individual alien plants and its drivers varied for each species.
- Nilgiri Biosphere Reserve in Western Ghats was one of the largest impacted hotspot areas due to invasion dominated by *Lantana camara*, *Prosopis juliflora* and *Chromolaena odorata*.
- Southern Eastern Ghats were found to host the most densely invaded landscapes with maximum vegetation of *Prosopis juliflora* and

Lantana camara.

- Fragmented forests of Central Indian Highlands were also largely and densely invaded forest systems, typically along the ecocline between dry and moist systems.

- Savannas were largely invaded by woody *Prosopis juliflora*, particularly surrounding semi-arid protected areas

### Prevalence of Invasive Alien species:

- The study pointed out that *Lantana camara* had the largest expanse spread across 574,186 square kilometres, covering 50 per cent of natural areas occurring across all natural systems.

- *Mikania micrantha* had comparatively least expanse stretching over an area of 148,286 square km, covering 13 percent of the natural area but mainly in moist grasslands and forests.

- “Most species depicted the eco-climatic affinity of these plants. For example, 94 percent invasion of *Prosopis juliflora* coincided with dry grassland savannas and dry deciduous forests.

- Species like *Senna tora*, *Xanthium strumarium* and *Mesosphaerum suaveolens* were predominant in dry savannas and deciduous forests.

- *Mikania micrantha* and *Ageratina adenophora* were distributed in moist grasslands and evergreen forests.

### What are the major factors driving invasion of Alien species?

Human modifications, shifting soil moisture regime, historical propagation of invasive plants and altered cycles of natural disturbances are the main driving factors behind the invasions.

The increasing work population densities and proportional increase of demand for food, infrastructure, energy and socio-ecological drivers further threaten to intensify and possibly escalate the accelerating invasion.

### Negative Impact

Increase in invasive species means loss in ecosystem services from forests and increased propagules that is a vegetative structure that if detached from a plant can give rise to a new plant into agricultural areas will result in economic losses

Regarding the impact on carnivorous animals who depend on herbivores, an increase in the invasive plants which are unpalatable will translate into lack of food and result in reduced carrying capacity for herbivores, eventually causing decline and shortage of food for the apex predators.

### Impact on core tiger populated regions:

- The survival of apex predators like tigers depends on abundance of herbivores, which in turn depend on habitats free from the negative impacts of plant invasions. Proliferation of invasive plants jeopardizes these delicate ecosystems, with far reaching impacts on species and people dependent on these ecosystems.

- Plant invasions alter habitats and reveal intricate ecological changes across biomes

### Way forward

Managing invasive species demands more than mere removal — it necessitates context-sensitive restoration, stakeholder participation, and adaptive holistic policies that can enable positive changes

## CYCLOGENESIS AND WACE PATTERN

### Context:

A new study suggests a shift in the Arabian Sea's cyclogenesis potential, which may be linked to a shift in the 'Warm Arctic, Cold Eurasian' pattern as well as regime shifts and global warming.

### Cyclone-genesis:

Cyclogenesis is an indicator that denotes the chance of a cyclone forming. It depends on some parameters, including the sea surface temperature, the ocean heat content, change in winds from the surface into the upper atmosphere (or the vertical shear), and rotation of winds near the surface. If these conditions line up, they will sow the seed



for a cyclone, but we still don't fully understand why some seeds sprout and grow into cyclones and some don't.

The crucial question is why this switch – a rapid increase – occurred around this time. The present study notes that the rapid increase in the cyclogenesis potential over the Arabian Sea coincides with a shift in the so-called 'Warm Arctic, Cold Eurasian', or WACE, pattern. Again: a shift rather than a trend.

Global warming also experienced a slowdown around the same time (although this continues to be debated). More interestingly, scientists have argued that a so-called 'regime shift' occurred in the same period as well. Such shifts are not unheard of; a similar event was noted in the mid-1970s.

**WACE pattern:**

The warm Arctic–cold Eurasia (WACE)/ warm Arctic-cold Siberia (WACS) is one phase of the surface air temperature (SAT) dipole pattern over the Arctic–Eurasian region at mid- to high latitudes.

The increasing trend in warm Arctic–cold Eurasia pattern appears to be related to the anomalous atmospheric circulations.

WACE is a pattern of warm surface temperatures over the Arctic and a large blob of cold surface temperatures over Eurasia. This pattern is associated with upper level circulation changes that reach into the Indian Ocean sector.

WACS is an internal mode of winter temperature variability, which cannot be excited by greenhouse gases and solar forcing. Observational and simulated results suggest that frequent occurrences of that WACS pattern are instigated by warm phases of Atlantic Multidecadal Oscillation (AMO).

North Atlantic warming may activate the WACS by generating a background Atlantic-Eurasian wave train characterized by enhanced Ural Mountain ridge and East Asian trough, which is conducive to recurrent WACS pattern.

The wave train-induced the Barents Sea ice melting can act as an amplifier, reinforcing the

WACS. Although increased greenhouse gases favor a uniform warming pattern, they may contribute to WACS formation by affecting AMO.



**ATLANTIC MULTICEDAL OSCILLATION:**

The Atlantic Multidecadal Oscillation (AMO), also known as Atlantic Multidecadal Variability (AMV) is the theorized variability of the sea surface temperature (SST) of the North Atlantic Ocean on the timescale of several decades.

**Impact on India:**

In recent years, scientists have pondered over the impact the changing Arctic can have on the monsoons in the subcontinent. The link between the two is growing in importance due to the extreme weather events the country faces, and the heavy reliance on rainfall for water and food security.

The changes in the atmospheric circulation due to diminishing sea ice combined with the warm temperatures in the Arabian Sea contribute to enhanced moisture and drive extreme rainfall events. In 2014, India deployed IndARC.

India's first moored-underwater observatory in the Kongsfjorden fjord, Svalbard, to monitor the impact of the changes in the Arctic Ocean on the tropical processes such as the monsoons.



# ALGAE'S SURPRISING POTENTIAL TO HELP EASE CLIMATE CHANGE WORRIES

## Context

Microalgae have adopted a unique strategy to adapt to global warming. Study finds microalgae are firing up a light-responsive protein to use sunlight for growth.

## Microalgae

Microalgae are microscopic algae that are invisible to the naked eye. They are typically found in freshwater and marine systems.

They are unicellular species that exist individually or in chains or groups. Unlike higher plants, microalgae do not have roots, stems, or leaves.

Microalgae are capable of performing photosynthesis. They produce approximately half of the atmospheric oxygen and capture the carbon dioxide from the atmosphere.

## About the Study and Rhodopsin protein

As climate change reduces the availability of nutrients in the sea, marine microalgae or eukaryotic phytoplankton fire up a protein called rhodopsin.

It is related to the protein in the human eye responsible for vision in dim light.

This light-responsive protein is helping the microalgae flourish with the help of sunlight in place of traditional chlorophyll.

Rhodopsins are proposed to be major light capturers in the ocean. They absorb light as much as chlorophyll-based photosynthesis in the sea to generate energy and food.

## Importance and applications of Microalgae

They play a crucial role in the food chain as they serve as a primary source of nutrition for a wide range of aquatic organisms. They are often consumed by various aquatic creatures, including zooplankton, which, in turn, are eaten by larger organisms like fish.

Some species of microalgae, such as spirulina and chlorella, are highly nutritious and are used as dietary supplements. They are rich in proteins, vitamins, minerals, and other essential nutrients.

Microalgae can be used to produce biofuels, such as biodiesel. They have a high lipid content, which can be converted into fuel through various processes.

Microalgae can help in wastewater treatment and carbon capture. They can absorb nutrients and pollutants from water and help improve water quality.

Microalgae are used in biotechnology to produce various compounds, including pigments, pharmaceuticals, and chemicals.



# SCIENCE & TECHNOLOGY

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# CAR-T CELL THERAPY

## Context:

Breakthrough cancer treatment to be available in India for 1st time as CAR-T cell therapy gets DCGI nod.

## About:

**Chimeric antigen receptor (CAR) T-cell therapy** is a way to get immune cells called T cells (a type of white blood cell) to fight cancer by changing them in the lab so they can find and destroy cancer cells.

This type of treatment can be very helpful in treating some types of cancer, even when other treatments are no longer working.

## How CAR T-cell therapy works

### Normal immune mechanism:

The immune system recognizes foreign substances in the body by finding proteins called antigens on the surface of those cells.

Immune cells called T cells have their own proteins called receptors that attach to foreign antigens and help trigger other parts of the immune system to destroy the foreign substance.

The relationship between antigens and immune receptors is like a lock and key. Just as a lock can only be opened with the right key, each foreign antigen has a unique immune receptor that is

able to bind to it.

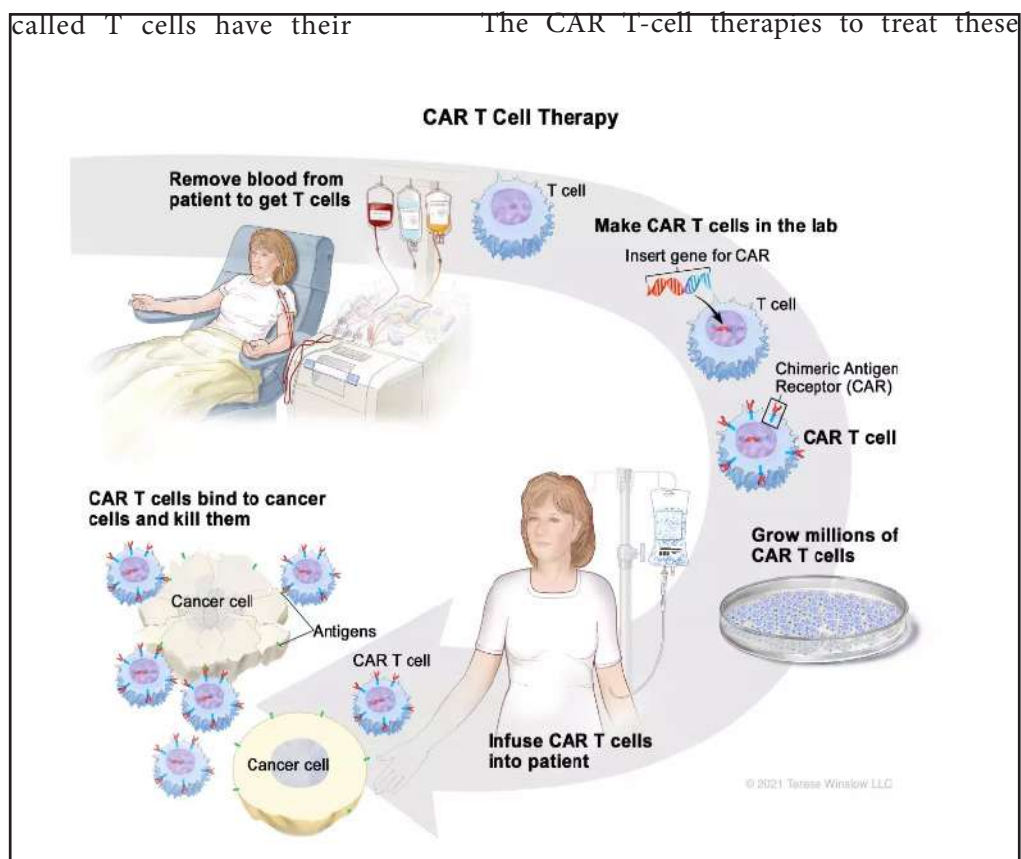
Cancer cells also have antigens, but if your immune cells don't have the right receptors, they can't attach to the antigens and help destroy the cancer cells.

### Generation of Chimeric antigen receptors (CARs) on T-Cells:

In CAR T-cell therapies, 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.

### Specificity to particular type of cancer:

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.



cancers are made to attach to the CD19 antigen and will not work for a cancer that does not have the CD19 antigen.

### Process for CAR T-cell therapy

It is a long process which involves,

- Collecting the T cells from the patient
- Making the CAR T cells

- CAR T-cell infusion back to the patient

### Side-effects

CAR T-cell therapy can be very effective against some types of hard-to-treat cancers, but it can also sometimes cause serious or even life-threatening side effects

## LYMPHATIC FILARIASIS

### Context

Lao PDR is now the second country after Bangladesh to eliminate lymphatic filariasis (LF) in 2023.

### About

Lymphatic filariasis, commonly known as elephantiasis, is a neglected tropical disease. Infection occurs when filarial parasites are transmitted to humans through mosquitoes. Infection is usually acquired in childhood and causes hidden damage to the lymphatic system.

### Cause and transmission

Lymphatic filariasis is caused by infection with parasites classified as nematodes (roundworms) of the family Filariodidea. There are 3 types of these thread-like filarial worms:

*Wuchereria bancrofti*, which is responsible for 90% of the cases

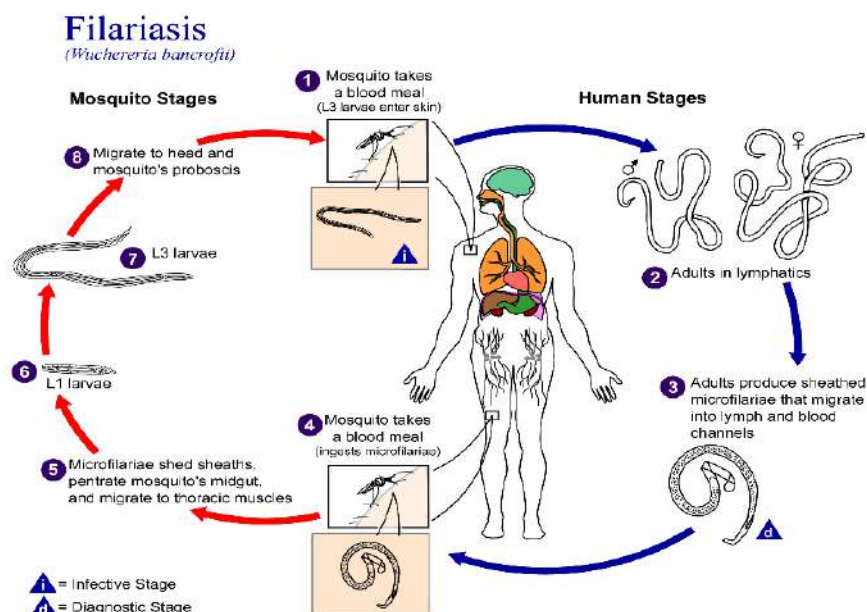
*Brugia malayi*, which causes most of the remainder of the cases

*Brugia timori*, which also causes the disease.

Mosquitoes are infected with microfilariae by ingesting blood when biting an infected host. Microfilariae mature into infective larvae within the mosquito.

When infected mosquitoes bite people, mature parasite larvae are deposited on the skin, from where they can enter the body.

The larvae then migrate to the lymphatic vessels where they develop into adult worms, thus continuing a cycle of transmission.





## Symptoms

Lymphatic filariasis infection involves asymptomatic, acute and chronic conditions. The majority of infections are asymptomatic, showing no external signs of infection while contributing the transmission of the parasite.

These asymptomatic infections still cause

damage to the lymphatic system and the kidneys and alter the body's immune system.

## Treatment

Elimination of lymphatic filariasis is possible by stopping the spread of the infection through preventive chemotherapy.

# DIGITAL TWIN

## Context:

Automotive Research Association of India (ARAI) has signed an MoU with IIT Guwahati for Establishment of Common Engineering Facility Center titled "Digital Twin Center for Emerging Automotive Systems" in Hub and Spoke model.

## About Digital Twin:

It is a 3D virtual representation of a city or system that provides real-time insights into the performance, operation, or profitability of a city. For example, let's say a city government wants to develop a new transport system. By creating a digital twin of the city, they can simulate the transport system and see how it will function in real-world conditions.

## How is it built?

A Digital Twin city uses the most comprehensive, and high-definition, geospatial coverage in 2D, 3D, 4D, and 360 degrees, captured through advanced sensors.

For that, moving objects on-ground and in the sky, including from drones, are processed, productized and published in near-real time using cutting-edge AI/ML, computer vision, data analytics and geospatial technologies.

## Significance of Digital Twin:

Can improve efficiency, coordination, and governance of cities. E.g., digital twins can be used to optimize traffic flow and reduce congestion, improve the efficiency of public transportation systems, manage energy consumption, monitor air and water quality, and identify areas that are vulnerable to natural disasters.

1. Enables better planning of infrastructure

at lower costs.

2. Can support climate-smart cities or green infrastructure.
3. Can improve healthcare, education, agriculture, and other areas
4. Could revolutionize the way we plan and manage cities.
5. Could improve the quality of life for urban residents.
6. This could lead to more sustainable and efficient use of resources

## Challenges

- Requires large amounts of data collection and processing.
- Can be costly and time-consuming to develop.
- Requires expertise in data analysis and 3D modeling

## About Automotive Research Association of India (ARAI)

Automotive Research Association of India (ARAI), established in 1966, is the leading automotive R&D organization of the country set up by the Automotive Industry with the Government of India.

ARAI is an autonomous body affiliated to the Ministry of Heavy Industries, Government of India. The Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India, has recognized ARAI as a Scientific and Industrial Research Organisation (SIRO).

## CORS NETWORK

### Context

Union Minister of State (Independent Charge) Science & Technology, MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space, Dr Jitendra Singh launched state-of-art latest National Survey Network. The nationwide “Continuously Operating Reference Stations” (CORS) Network will be operated by the Survey of India.

### About

#### Continuously Operating Reference Stations (CORS)

Global Navigation Satellite Systems (GNSS) has revolutionized our ability to access location information. It measures its distances from a bunch of satellites orbiting over the earth through radio signals.

However, this system isn't perfect and can have errors like satellite orbits, satellite clock errors, receiver noise, and delays caused by the Earth's atmosphere. These errors can make our location less accurate, up to around 10-11 meters.

To improve this accuracy limit, Survey of India has established a network of Continuously Operating Reference Stations (CORS).

These stations provide very precise real-time positioning, with an accuracy of about  $\pm 3$  cm. They also offer various positioning services for different users in the geospatial and scientific communities.

The Survey of India has set up more than 1,000 CORS stations across India.

### Applications

It can be used in different government schemes like SVAMITVA project for mapping of rural abadi areas, PM-Gati Shakti National Master Plan for Multi-Modal Connectivity, Smart Cities & AMRUT Project for urban development, Bharatmala and Sagarmala Projects for improving the logistics sector among others.

CORS based precision services will greatly improve auto-navigation and machine control in sectors like Agriculture, Mining, Construction, Transport and Civil Aviation sector.

The data from CORS will also be valuable for various scientific studies like Upper Atmosphere and Space weather studies, Meteorology and weather forecast, Plate motion and Tectonic studies, Seismology and Hydrology etc.

## AI IN OPHTHALMOLOGY

### Context

From retinal disease diagnosis to automated screening, AI's use in ophthalmology can improve patient care and enhance the efficiency of eye disease diagnosis and treatment.

### About

Artificial Intelligence (AI) is a branch of computer science that focuses on creating computer systems and software that can perform tasks like problem-solving, learning, reasoning, understanding natural language, and perceiving the environment.

The aim of AI is to develop systems that can

mimic and replicate various aspects of human intelligence or cognitive functions, and thereby automate and enhance processes, make predictions, assist in decision-making, and improve the efficiency and capabilities of systems and devices.

### AI in Medicine

AI can analyze data from sensors and predict when equipment or machinery will require maintenance, reducing downtime.

AI can be used, with machine learning, to analyze and interpret images and videos, making it useful in reading and coming up with interpretations of scans and other diagnostics.

Already, robotics has been employed in precision surgery, with good outcomes, and faster recovery periods.

## AI in ophthalmology

AI has made significant advancements in the field of ophthalmology, offering a range of potential applications that can improve patient care and enhance the efficiency of eye disease diagnosis and treatment.

**Retinal disease diagnosis:** AI algorithms can analyse retinal images, such as fundus photographs and optical coherence tomography (OCT) scans, to detect and classify various retinal diseases, including diabetic retinopathy, age-related macular degeneration (AMD), and glaucoma. These AI systems can help identify diseases at an early stage, allowing for timely treatment and reducing the risk of vision loss.

**Automated screening:** AI-powered screening programmes can assist in the early identification of eye diseases by analysing large datasets of retinal images. This can be particularly useful in regions with limited access to ophthalmologists, and in mobile medical camps.

**Glaucoma diagnosis and management:** AI can aid in monitoring glaucoma progression by analysing visual field tests and OCT scans. It helps ophthalmologists in making more informed decisions about the treatment and management of glaucoma patients.

**Customized treatment plans:** AI can recommend personalised treatment plans for patients with conditions like AMD. By analyzing patient data and clinical information, AI can assist in tailoring treatment strategies to maximize effectiveness. Already, AI is also being used regularly by ophthalmologists in surgical assistance. During eye surgeries, AI can provide real-time guidance to surgeons by tracking eye movements, enhancing precision, and reducing the risk of complications. AI is also used to diagnose and stage Retinopathy of Prematurity (ROP), a blinding disease affecting premature and low birth weight babies and in telemedicine.

AI is also being used to discover new drugs for

ophthalmic conditions by analysing vast datasets to identify potential therapeutic targets and compounds and in predicting whether individuals may develop eye diseases, based on their health records, lifestyle factors, and genetic data.

Convolutional Neural Networks (CNNs) are commonly used for image-based ophthalmic applications. The model has to be taught to recognise patterns and make predictions based on the provided data. It is fine-tuned using the validation dataset and parameters are adjusted as needed until it reaches an acceptable level of performance.

## Smart vision glasses

An innovation that has come to really benefit people with vision impairments is the smart vision glasses. These glasses incorporate a combination of hardware, software, and artificial intelligence (AI) to provide a range of features aimed at improving the visual experience for those with vision challenges. Smart glasses are equipped with cameras and sensors to capture the user's surroundings. Advanced image recognition algorithms and AI are employed to identify and describe objects, text, people, and more within the wearer's field of vision. This information is then conveyed to the user, often through audio feedback. Smart glasses can also convert printed text into audible speech, allowing users to "read" signs, documents, labels, and other text-based content. This helps individuals navigate and understand their environment. The glasses can offer real-time directions, guiding users through indoor and outdoor spaces using GPS and mapping data.

## Challenges Ahead:

**Dependence on Quality Datasets:** AI systems rely heavily on high-quality, diverse, and unbiased datasets. Flawed or biased training data can lead to inaccurate or biased AI predictions.

**Regulatory and Ethical Challenges:** When technology goes digital, regulatory and ethical challenges arise, including issues related to data privacy, informed consent, and patient trust.

**Need for Rigorous Validation:** AI models in healthcare need rigorous validation in real-life

clinical settings to ensure their effectiveness. Regular updates with emerging datasets are essential to prevent obsolescence.

**Legal Responsibility:** Determining responsibility in case of errors made by AI in healthcare can be legally complex. This is an important aspect of implementing AI systems in a medical context.

**High Implementation Costs:** The costs of

implementing AI in healthcare can be prohibitively high, making it a challenge for many institutions to afford these technologies.

**Complementing Human Clinicians:** Despite the challenges, the ultimate goal should be to use AI as a valuable tool in ophthalmology for early disease detection, diagnosis, and treatment. However, AI should complement, not replace, human clinicians.

## GAGANYAAN

### Context

ISRO chief S. Somanath said Gaganyaan's first Flight Test Vehicle Abort Mission-1 (TV-D1) was successfully accomplished.

### About Flight Test Vehicle Abort Mission-1(TV-D1)

Flight Test Vehicle Abort Mission 1 (TV-D1) is the first of two abort missions to test crew safety mechanisms for the Gaganyaan mission.

#### Aim:

To check the effectiveness of the Crew Escape System(CES) in taking the Crew Module(CM) to safety in case of an emergency during the Gaganyaan mission.

#### Objectives:

Flight demonstration and evaluation of Test Vehicle sub systems.

Flight demonstration and evaluation of the Crew Escape System including various separation systems.

Crew Module characteristics & deceleration systems demonstration at higher altitude & its recovery.

#### Features:

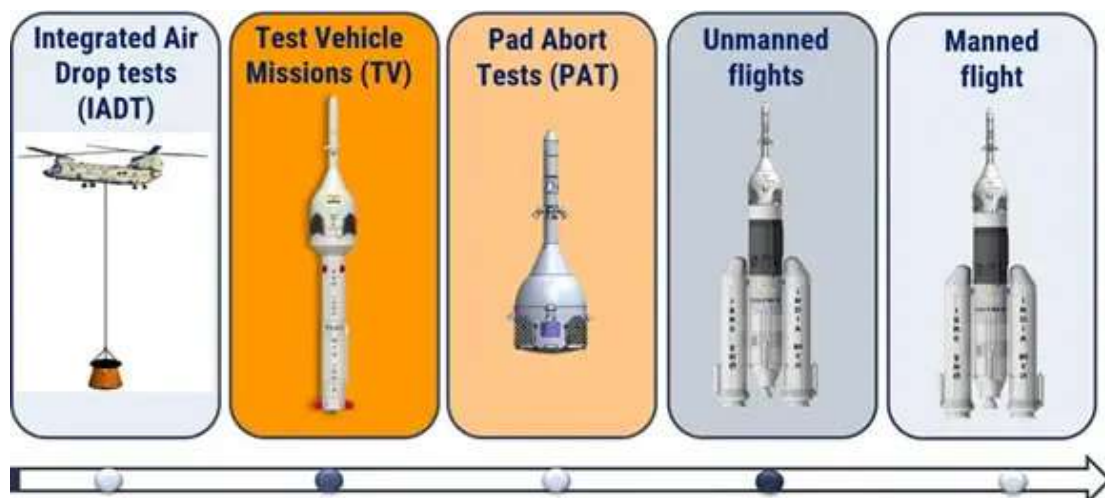
The test vehicle is a single-stage liquid rocket.

It carries the Crew Module (CM) and Crew Escape Systems (CES) along with other components like the CM fairing (CMF) and Interface Adapters.

The CM is the part where astronauts will stay during the Gaganyaan mission. For this test (TV-D1), an unpressurized version of CM is used.

The flight will simulate the abort condition.

CES with CM will be separated from the Test Vehicle at an altitude of about 17 km.





Subsequently, the abort sequence will be executed with the separation of CES, parachutes deploying and eventually, the CM landing safely in the sea.

### Significance of this test:

The success of this test flight will set the stage for the remaining qualification tests and unmanned missions, leading to the first Gaganyaan mission with Indian Astronauts.

## Different Phases of Gaganyaan Mission

ISRO plans to execute two unmanned missions as part of the Gaganyaan mission projects before the final manned mission due to safety concerns of the project.

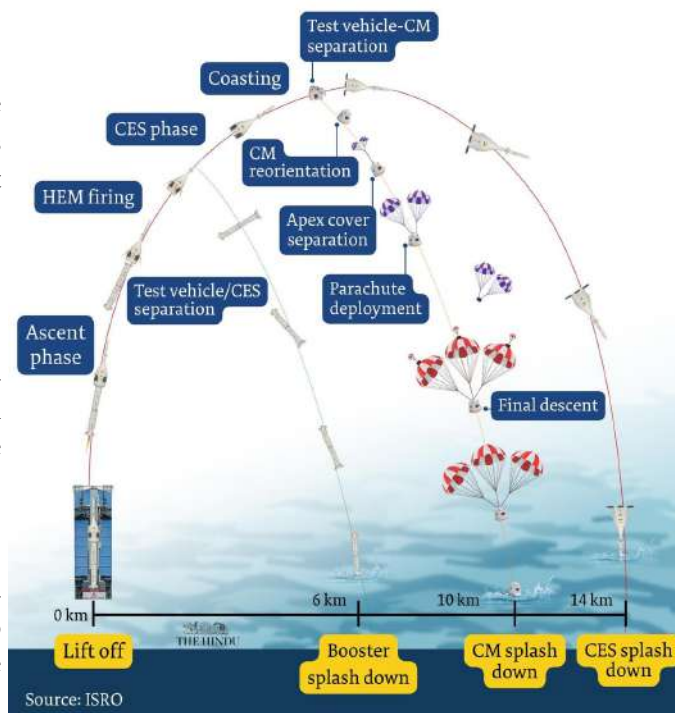
### Testing phase:

- Before executing the unmanned and manned mission, ISRO has planned to demonstrate numerous tests including the following ones:
- Integrated Air Drop Test (IADT): This Test is intended to validate the deceleration system (parachute and pyro's) performance using an IAF chopper
- Pad Abort Test (PAT): The test will involve dropping the crew module from a helicopter and will help understand the impact from various heights and velocity.
- Test Vehicle (TV) flights: The Test Vehicle is a single-stage liquid rocket developed for this abort mission.

### Unmanned missions:

- It will be for technology demonstration, safety and reliability verification and will be heavily instrumented to study the performance of systems before crewed flight. Some advanced tests are:
- Airdrop test for the parachute system, Flight test of the test vehicle, Abort test to demonstrate.
- Water Survival Test Facility (WSTF): ISRO, along with the Indian Navy carried out

## Maiden test flight of Gaganyaan mission



## Gaganyaan's Flight Test Vehicle Abort Mission-1 (TV-D1)

Crew Escape System (CES)  
15.5 m

Crew Module

Test Vehicle  
19.5 m

THE HINDU

Source: ISRO

WSTF to initial recovery trials of Crew Module in Feb 2023. The trials were part of the preparation for crew module recovery operations.

- Vyommitra: The 'female' robot astronaut the humanoid designed and developed ISRO to fly aboard unmanned test missions before

the Gaganyaan human space-flight mission.

#### **Manned mission:**

Human spaceflight module of Gaganyaan aims to send a 3-day manned mission to the Low Earth Orbit (LEO) of 400 km with a crew of 3 members and bring them safely back to Earth.

## MULTIMODAL AI SYSTEMS

### **Context:**

There has been a paradigm shift within AI (Artificial Intelligence) towards Multimodal Systems, allowing users to engage with AI through a combination of text, images, sounds, and videos. These systems aim to replicate human-like cognition by encompassing multiple sensory inputs.

### **About Multimodal AI Systems**

Multimodal AI refers to artificial intelligence systems that incorporate and process multiple types or modes of data to make more accurate determinations, derive insightful conclusions, or provide precise predictions for real-world problems.

Multimodal AI systems are designed to train with and utilize a variety of data types, including video, audio, speech, images, text, and conventional numerical datasets.

Multimodal audio systems operate on similar principles, as demonstrated by Whisper, OpenAI's open-source speech-to-text translation model, which forms the foundation for GPT's voice processing capabilities.

### **Recent Developments in Multimodal AI**

#### **OpenAI's ChatGPT**

OpenAI has recently introduced improvements to its GPT-3.5 and GPT-4 models. These enhancements enable the models to analyze images and engage in speech synthesis, resulting in more immersive interactions with users.

OpenAI is actively working on "Gobi," a project with the goal of creating a dedicated

multimodal AI system, separate from the GPT models.

#### **Google's Gemini Model**

Google has developed a new multimodal large language model known as Gemini. This model is yet to be officially released.

Google's extensive collection of images and videos from its search engine and YouTube gives it a significant advantage in the multimodal AI domain.

The presence of Gemini places substantial pressure on other AI systems to rapidly advance their capabilities in the multimodal space.

### **Advantages of Multimodal AI over Unimodal AI**

**Rich Representation of Information:** Multimodal AI leverages a variety of data types, including text, images, and audio, resulting in a richer and more comprehensive representation of information.

**Enhanced Contextual Understanding:** The utilization of diverse data types enhances the contextual understanding of data, leading to more accurate predictions and well-informed decisions.

**Improved Performance and Robustness:** By combining data from multiple modalities, multimodal AI achieves better performance, increased robustness, and the capability to handle ambiguity effectively.

**Broad Applicability:** Multimodal AI broadens its applicability across various domains and facilitates cross-modal learning, making it a versatile approach.

**Holistic Understanding:** Multimodal AI provides a more holistic and human-like understanding of data, enabling innovative applications and deeper comprehension of complex real-world scenarios.

## Applications of Multimodal AI

**Autonomous Driving and Robotics:** Multimodal AI finds applications in fields such as autonomous driving and robotics, where it helps process diverse data sources to make informed decisions.

**Medicine:** In the medical field, multimodal AI is used for analyzing complex datasets from CT scans, identifying genetic variations, and simplifying the communication of results to medical professionals.

### Speech Translation:

Speech translation models, such as Google Translate and Meta's SeamlessM4T, benefit from multimodality to offer translation services across various languages and modalities.

Recent developments include Meta's ImageBind, a multimodal system capable of processing text, visual data, audio, temperature, and movement readings.

Multimodal AI explores the integration of additional sensory data like touch, smell, speech, and brain MRI signals, enabling future AI systems to simulate complex environments and scenarios.

## Challenges of Multimodal AI

### Data Complexity and Resource Intensiveness

The diverse and voluminous data required for Multimodal AI can pose challenges in terms of data quality, storage costs, and redundancy management, making it an expensive and resource-intensive endeavor.

### Contextual Understanding

Teaching AI to understand nuanced meanings from identical input, especially in languages or expressions with context-dependent meanings, proves challenging without additional contextual cues like tone, facial expressions, or gestures.

### Data Set Availability

Availability of complete and easily accessible data sets is a challenge. Public data sets may be limited, costly, or suffer from aggregation issues, affecting data integrity and potentially introducing bias into AI model training.

### Dependency on Multiple Data Sources

Multimodal AI relies on data from multiple sources. If any of the data sources are missing or malfunctioning, it can result in AI malfunctions or misinterpretations, leading to uncertainty in AI responses.

### Complex Neural Networks

Neural networks in Multimodal AI can be complex and challenging to interpret, making it difficult to understand how AI evaluates data and makes decisions. This lack of transparency can hinder debugging and bias elimination efforts.

## SECOND SPACEPORT OF ISRO AT KULASEKARAPATTINAM

### Context:

The Indian Space Research Organisation (ISRO) is planning to set up its second spaceport at Kulasekarapattinam in Thoothukudi district of Tamil Nadu. sector.

### About

Unlike ISRO's existing space station in Sriharikota, this new facility will be exclusively used by the private sector for launching Small Satellite Launch

Vehicles (SSLVs).

**Kulasekharapatnam** is a town in the Thoothukudi district of Tamil Nadu. It was an ancient port dating to the 1st century AD and was contemporaneous to the existence of Kollam, Cheran, and Pandyan ports.

Kulasekarapattinam spaceport will be exclusively dedicated to Small Satellite Launch Vehicles (SSLVs) developed by the private

## Why is Kulasekarapattinam being chosen as a launching site by ISRO?

Proximity to the seashore makes Thoothukudi ideal for “straight southward” launches. From Sriharikota, such southward-bound launches are not possible as the rockets have to fly around Sri Lanka.

When rockets are launched from kulasekarapattinam, the Dogleg maneuver will not be required, as there is no landmass along the flightpath in the southward direction.

Dogleg maneuver is a sharp turn that causes a rocket to deviate from a straight flight path. This maneuver requires more fuel in the rocket which eats into the payload capacity of the launcher.

Like the Sriharikota spaceport in the Satish Dhawan Space Centre, Thoothukudi was selected as a spaceport due to its nearness to the equator. A rocket launch site should be on the east coast

and near the equator.

ISRO has its Liquid Propulsion Systems Centre (LPSC) at Mahendragiri in Tirunelveli district, where it assembles the second and fourth-stage engines for the PSLV.

Instead of transporting the second and fourth stages to Sriharikota from Mahendragiri, it would be easier to shift them to the launch pad if it is built in Kulasekarapattinam, which is around 100 km away.

## Concerns of the inhabitants of Kulasekarapattinam:

- Land encroachment
- Forceful migration
- Fear of radioactive emissions
- Increases in the prices of rent and other commodities

### Small Satellite Launch Vehicles (SSLVs)

- **SSLVs are 3-stage launch vehicles designed for launching small satellites, with a capacity of approximately 500 kilograms into a 500-kilometer planar orbit.**
- **These vehicles offer several advantages, including low cost, a quick turnaround time, flexibility in accommodating multiple satellites, on-demand launch feasibility, and minimal infrastructure requirements.**

## IN-SPACE

### Context

Indian National Space Promotion and Authorization Centre (IN-SPACe) unveiled the decadal vision and strategy for the Indian space economy, on October 10.

### About

IN-SPACe is the single-window, autonomous, nodal agency under the Department of Space. The decadal vision and strategy has been developed by IN-SPACe and ISRO along with other stakeholders.

At present, the Indian space economy is valued at around ₹6,700 crore (\$8.4 billion) with a 2% share in the global space economy.

As per IN-SPACe’s projection, India’s space economy has the potential to reach ₹35,200 crore (\$44 billion) by 2033 with about 8% of the global share.

At present, the share of the domestic market is ₹6,400 crore (\$8.1 billion). The export market share is ₹2,400 crore (\$0.3 billion). The aim is to increase the domestic share to ₹26,400 crore (\$33 billion), and the export share to ₹88,000 crore (\$11 billion).

Besides, an investment of ₹17,600 crore (\$22 billion) is envisioned in the next 10 years

The decadal vision addresses creation



of demand, local manufacturing capabilities, infrastructure and provides a clear and comprehensive regulatory framework that will encourage and facilitate NGE (non-governmental entities) participation in the growth of the space sector.

In its vision document, IN-SPACe has highlighted that it wants to establish a Space Outreach Wing to create demand by developing unique applications from space-based data for government and consumers. The wing will concentrate on creating a global space marketplace, with support from the public and private sectors.

IN-SPACe also aims to market ISRO's regional navigation satellite system, Navigation with Indian Constellation (NavIC), in the Indian Ocean Region (IOR).

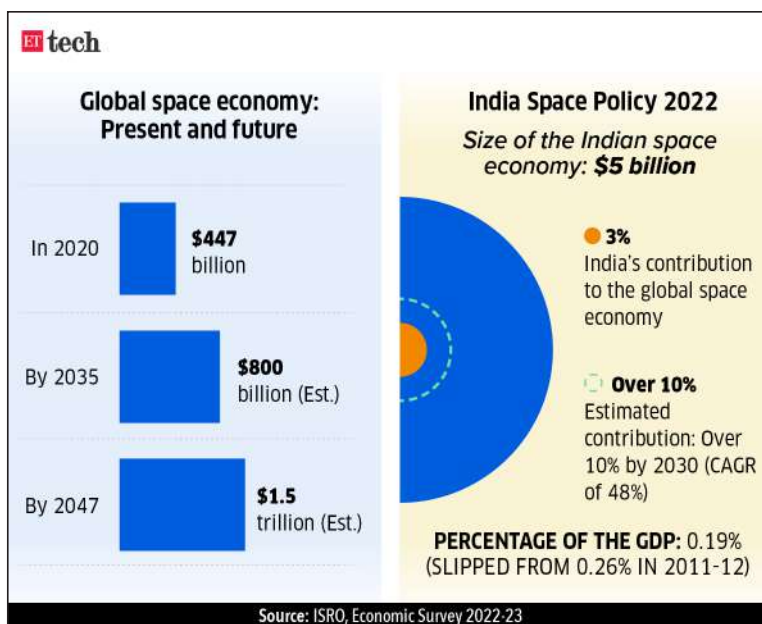
Regarding the salient features of the decadal vision and strategy, the space ecosystem is broadly divided into three groups – Space-for-Earth, Access-to-Space and Space-for-Space.

IN-SPACe aims to achieve the decadal vision and strategy for Indian space economy through 10 key strategic and enabling capabilities, which are

1. Demand generation
2. Earth Observation (EO) platform
3. Communication platform
4. Navigation platform
5. Research & Development eco-system
6. Creation of a talent pool
7. Access to finance
8. International synergy
9. Collaboration
10. Policy and regulation

## Recommendations for Growth of Space Economy:

- Encourage mass adoption of satellite internet to rival terrestrial communication.
- Expand strengths in satellite and launch vehicle manufacturing to become a global leader in end-to-end space component production.
- Develop capabilities in high-commercial-potential sectors like space mining, in-space manufacturing, and in-orbit servicing.
- Explore emerging ventures like space tourism and entertainment for future cost-effective services.
- Innovate in green space with sustainable fuel, reusable spacecraft, and eco-friendly technologies.



## PINK BOLLWORM

### Context

The Pink Bollworm (PBW) is causing significant damage to cotton fields in northern Rajasthan, Haryana, and Southwestern Punjab, with the infestation being more widespread and serious than before.

Farmers have been using Bt cotton seeds, which have lost their effectiveness against the PBW. The situation has led to a drastic reduction in cotton yields, making it financially unviable for many farmers.

### Pink Bollworm

The pink bollworm (*Pectinophora gossypiella*) is an insect that is a pest in cotton farming. It is native to Asia but has become an invasive species in most cotton-growing countries around the world. It is considered possibly the most destructive pest on cotton worldwide.

### Impact of Pink Bollworm

The infestation by this insect pest has been common in the cotton belt of northern Rajasthan, Haryana and Southwestern Punjab since 2021. But



the damage reported is much more widespread and serious this time.

The PBW larvae burrow into the developing fruits (bolls) of cotton plants, and the damage affects both the weight and quality of the harvested bolls containing the lint fibre and seeds inside.

The government of Rajasthan announced that farmers in the districts of Hanumangarh and Ganganagar, whose crops have been impacted, will receive relief within ten days due to the chaos this is causing.

## NASA'S PSYCHE MISSION

### Context

Elon Musk-led SpaceX launched NASA's mission to the asteroid Psyche recently. The mission will launch from the space agency's Kennedy Space Center in Florida on the company's Falcon Heavy rocket.

Psyche is both the name for the mission and the asteroid that it plans to visit. Led by Arizona State University, it was chosen by NASA in 2017 as one of the two missions for its Discovery Program.

### Asteroid Psyche

The Psyche mission is a journey to a unique metal-rich asteroid orbiting the Sun between Mars and Jupiter. What makes the asteroid Psyche unique is that it appears to be the exposed nickel-iron core of an early planet, one of the building

blocks of our solar system.

Deep within rocky, terrestrial planets - including Earth - scientists infer the presence of metallic cores, but these lie unreachably far below the planets' rocky mantles and crusts.

Because we cannot see or measure Earth's core directly, Psyche offers a unique window into the violent history of collisions and accretion that created terrestrial planets.

The mission is led by Arizona State University. NASA's Jet Propulsion Laboratory is responsible for mission management, operations and navigation. The spacecraft's solar-electric propulsion chassis will be built by Maxar (formerly SSL) with a payload that includes an imager, magnetometer, and a gamma-ray spectrometer.

# MALARIA VACCINE RECOMMENDED FOR USE BY WHO

## Context:

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

To date the R21/Matrix-M malaria vaccine has been licensed for use in Ghana, Nigeria and Burkina Faso.

## About R21/Matrix-M Malaria vaccine:

The R21 vaccine is the second malaria vaccine recommended by WHO, following the RTS,S/AS01 vaccine, which received a WHO recommendation in 2021.

Both vaccines are shown to be safe and effective in preventing malaria in children and, when implemented broadly, are expected to have high public health impact.

The Matrix-M component is a proprietary saponin-based adjuvant developed by Novavax and licensed to the Serum Institute for use in endemic countries.

The Chilean soapbark tree (*Quillaja saponaria*) produces soap-like molecules called QS saponins that are important vaccine adjuvants.

These highly valuable compounds are sourced by extraction from the bark, and their biosynthetic pathway is unknown.

## Malaria facts:

Malaria, a mosquito-borne disease, places a particularly high burden on children in the African Region, where nearly half a million children die from the disease each year.

World Malaria Day is observed every year on 25th April.

## 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.

## Indian initiatives:

### National Malaria Control Programme (NMCP):

Launched in 1953, it is built around three key activities:

1. Insecticidal residual spray (IRS) with DDT
2. Monitoring and surveillance of cases
3. Treatment of patients

### National Framework for Malaria Elimination 2016-2030:

Based on WHO Global Technical Strategy for Malaria 2016–2030 (GTS), the goals of the NFME are:

- Eliminate malaria (zero indigenous cases) throughout the entire country by 2030.
- Maintain malaria-free status in areas where malaria transmission has been interrupted and prevent re-introduction of malaria.

### Malaria Elimination Research Alliance-India (MERA-India):

It has been established by Indian Council of Medical Research (ICMR) with the conglomeration of partners working on malaria control.

# YARKOVSKI EFFECT

## Context:

NASA's OSIRIS-REx mission successfully collected a sample from asteroid Bennu and is now on an extended mission to study Apophis. The mission was significant for understanding the early solar system, potential asteroid impacts, and the Yarkovsky effect on asteroids.

The effect was first measured in 1991–2003 on the asteroid 6489 Golevka.

## Yarkovsky effect:

The Yarkovsky effect is a phenomenon in space where the way an asteroid absorbs and re-emits solar radiation can alter its trajectory over time. This effect can lead to small but significant changes in an asteroid's path, potentially influencing its orbit and posing collision risks with Earth.

The Yarkovsky effect is a force acting on a rotating body in space caused by the anisotropic emission of thermal photons, which carry momentum. It is usually considered in relation to meteoroids or small asteroids (about 10 cm to 10 km in diameter), as its influence is most significant for these bodies.

The Yarkovsky effect is a consequence of the fact that change in the temperature of an object warmed by radiation lags behind changes in the incoming radiation. That is, the surface of the object takes time to become warm when first illuminated, and takes time to cool down when illumination stops.

## How Does it Work?

When an asteroid absorbs sunlight, it heats up.

As the asteroid rotates, the heated surface moves into the shadow, where it cools down and emits infrared radiation.

This emission pushes the asteroid slightly, causing a change in its orbit over time.

## Significance:

The Yarkovsky Effect can cause asteroids to drift in their orbits.

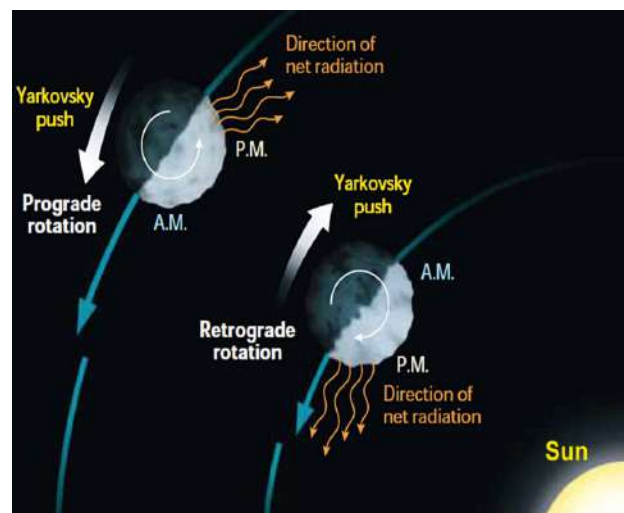
It plays a crucial role in the long-term dynamics of asteroids, especially small ones.

The effect can change the fate of potentially hazardous objects, either pushing them away from or towards a collision course with Earth.

OSIRIS-REx and the Yarkovsky Effect:

OSIRIS-REx will help astronomers study the Yarkovsky effect on asteroids.

This phenomenon can be challenging to study as it varies based on the shape of each asteroid.







# SECURITY

What's Inside?

1. WHITE PHOSPHORUS
2. DNA AND FACE MATCHING SYSTEMS AT POLICE STATIONS
3. FIFTH POSITIVE INDIGENISATION LIST OF 98 ITEMS AT SWAVLAMBAN 2.0

## WHITE PHOSPHORUS

### Context

Human Rights Watch (HRW) says the Israeli military recently used white phosphorus munitions in Lebanon and Gaza.

### About

White phosphorus is a wax-like, toxic substance that burns at more than 800 degrees Celsius (nearly 1,500 degrees Fahrenheit) – high enough to melt metal.

It is often colourless, white or yellow, and has a garlic-like odour.

### White phosphorus munitions

White phosphorus munitions are difficult to extinguish, continuing to flare until the phosphorous has been burned up or until it is no longer exposed to oxygen.

It can be deployed through artillery shells, bombs, rockets or grenades.

### Effect on humans

White phosphorus can burn the skin down to the bone, and the chemicals can be absorbed by the body, causing dysfunction in multiple organs, including the liver, kidneys and heart.

It can cause metabolic disorders in humans.

Is white phosphorus banned?

White phosphorus is not explicitly banned by international conventions — though its use in a dense, civilian population is considered illegal by many experts.

### Under 1980 Convention on Certain Conventional Weapons:

Protocol III of the 1980 Convention on Certain Conventional Weapons prohibits incendiaries or the use of other substances to attack civilian populations. But to be considered an “incendiary weapon”, an item needs to be “primarily designed” to set fire or cause burns.

White phosphorus is also used as a smokescreen, to signal or to illuminate a target. This allows militaries to argue that its use is not covered by Protocol III, to which Israel is in any case not a signatory.

### Under Chemical Weapons Convention (CWC):

The Chemical Weapons Convention (CWC) is a treaty that establishes a comprehensive ban on the use of chemical weapons. White phosphorus, although a chemical agent and toxic, is not covered by the CWC

## DNA AND FACE MATCHING SYSTEMS AT POLICE STATIONS

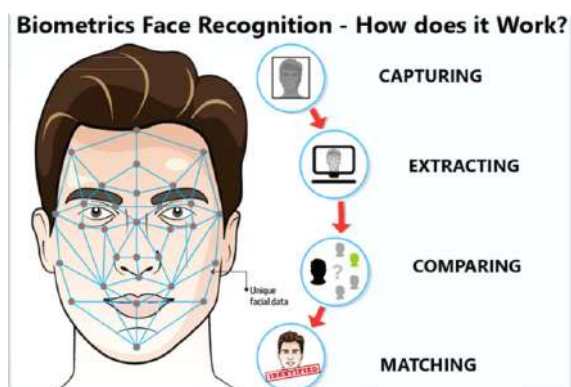
### Context:

Over a year after Parliament passed the Criminal Procedure Identification Act (CrPI), 2022; the Centre is preparing to introduce ‘DNA and Face Matching’ systems in 1,300 police stations nationwide, despite the Act’s provisions not yet being fully implemented.

### Criminal Procedure (Identification) Act 2022:

About:

The Act replaces the similar colonial-era



Identification of Prisoners Act, 1920.



The new law allows investigators to collect certain identifiable information of convicts and other persons for purposes of identification and investigation in criminal matters.

### **Legal sanction of data collection:**

The new law provides a legal sanction to the police to take physical and biological samples of convicts as well as those accused of crimes.

It empowers police to collect:

- Fingerprints
- Palm prints and footprints
- Photos
- Iris and retina scans
- Analysis of physical and biological samples
- Behavioural attributes
- Signature and handwriting

Measurements and photographs for identification have three main purposes:

- To establish the identity of the culprit against the person being arrested,
- To identify suspected repetition of similar offences by the same person and
- To establish a previous conviction.
- Persons in preventive detention:

The Act also seeks to apply to persons detained under any preventive detention law.

### **Role of National Crime Records Bureau (NCRB):**

The law also empowers the National Crime Records Bureau (NCRB) to store, preserve, share with any law enforcement agency and destroy the record of measurements at the national level.

The records can be stored up to a period of 75 years.

### **Punishment:**

It also does away with the condition of an offence being punishable by at least one year or more of imprisonment for the “measurements”

to be taken.

### **Exemptions:**

It only grants an exemption in the form of mandatory consent for “biological samples”, except in cases where the accused is arrested for sexual abuse of women and children or for an offence carrying a minimum punishment of seven years.

### **Powers of Magistrate:**

Under the act, a Magistrate may direct a person to give details for the purpose of an investigation or proceeding under the CrPC.

Depending on certain factors (such as the area concerned), the Magistrate may be a Metropolitan Magistrate, a Judicial Magistrate of the first class, or an Executive Magistrate.

### **Records of juveniles:**

The Act does not explicitly bar taking measurements of juveniles.

The provisions of the (Special Act) Juvenile Justice Act, 2015 regarding the destruction of records of conviction under the Act, shall apply.

What is the ‘DNA and Face Matching Systems’ Technology?

### **Face Matching System:**

Face Matching System is an algorithm-based technology which creates a digital map of the face by identifying and mapping an individual’s facial features, which it then matches against the database to which it has access.

In the Automated Facial Recognition System (AFRS), the large database (containing photos and videos of peoples’ faces) is used to match and identify the person.

Image of an unidentified person, taken from CCTV footage, is compared to the existing database using Artificial Intelligence technology, for pattern-finding and matching.

### **DNA Matching Systems:**

DNA matching systems, also known as DNA profiling or DNA fingerprinting, are techniques used to compare and identify individuals based

on their unique genetic characteristics.

These systems analyze specific regions of an individual's DNA, which are highly variable among people, to create a unique genetic profile for each individual.

DNA matching is commonly used in criminal investigations to link suspects to crime scenes or victims. DNA evidence found at a crime scene, such as blood, hair, or bodily fluids, can be compared to the DNA profiles of potential suspects.

## FIFTH POSITIVE INDIGENISATION LIST OF 98 ITEMS AT SWAVLAMBAN 2.0

### Context:

The Defence Minister has released the fifth Positive Indigenisation List of 98 items during the plenary session of 'Swavlamban 2.0', the 2nd Edition of the Naval Innovation and Indigenisation (NIIO) Seminar – 'Swavlamban' 2023.

### Positive Indigenisation List (PIL)

The Positive Indigenisation List consists of items that can only be procured by the Indian armed forces from domestic manufacturers, including those from the private sector or DPSUs.

The concept of the positive indigenization list entails that the Indian Armed Forces, comprising the Army, Navy, and Air Force, will exclusively source the listed items from domestic manufacturers.

These manufacturers may include entities from the private sector or Defense Public Sector Undertakings (DPSUs).

### Significance of indigenisation of defence sector:

This initiative is in line with India's vision of 'Atma Nirbharta' (self-reliance) and aims to boost the domestic defence industry, enhance investment, and reduce dependency on imports.

To achieve indigenization, the DPSUs will utilize different routes under the 'Make' category, focusing on in-house development through the capabilities of Micro, Small, and Medium Enterprises (MSMEs) and the private Indian industry.

The MoD has taken numerous steps for self-reliance in the defence sector and Positive Indigenisation Lists is one of the most important

transformative reforms in pursuit of indigenisation.

It will provide ample visibility and opportunity to the domestic industry to understand the trend and futuristic needs of the Armed Forces and create requisite R&D and manufacturing capacity within the country.

It also recognises the fact that the defence sector will be one of the key contributors to the nation's economy and growth in the next five to 10 years.

### Story so far:

The DMA had earlier promulgated four Positive Indigenisation Lists comprising 411 military items.

### Present scenario:

The Fifth Positive Indigenisation lays special focus on import substitution of components of major systems besides important platforms, weapon system & sensors and munitions which are being developed and likely to translate into firm orders in the next five to ten years.

### About 'Swavlamban 2.0':

The Navy has surpassed its target set last year to develop 75 futuristic technologies in partnership with domestic Micro, Small and Medium Enterprises (MSME) and startups which are going to be launched as 'Swavlamban 2.0'.

It is an effort to foster innovation and indigenisation for self-reliance in defence in keeping with the vision of Atmanirbhar Bharat.

It will put in place dedicated structures for the end-users to interact with academia and industry.





# HISTORY



# ART & CULTURE



What's Inside?

1. INDIAN KNOWLEDGE SYSTEMS (IKS)
2. VAJRA MUSHTI KALAGA
3. SASHTRA RAMANUJAN PRIZE
4. BABA BANDA SINGH BAHADUR SINGH ANNIVERSARY
5. SAINT VALLALAR

## INDIAN KNOWLEDGE SYSTEMS (IKS)

### Context

UGC to train over 1,000 teachers to teach Indian knowledge systems from degree level.

### About

The Indian Knowledge System (IKS) is a methodical transmission of knowledge from one generation to the next. It is a well-structured system and process of knowledge transfer, rather than just a tradition. For instance, the Vedic literature – Upanishads, Vedas, and Upvedas are all part of the Indian Knowledge System.

### Initiatives for promotion of IKS

As a concept, IKS was introduced through the National Education Policy (NEP) 2020.

Indian Knowledge System (IKS), an innovative cell was established in 2020 under the Ministry of Education (MoE).

### Activities under IKS Division

It provides for funding support of Rs.30-40 lakh over two years to the institute that establishes the IKS center and conducts related activities.

Promotion of IKS Internship Programme,

under which selected students will be paired with IKS experts to work on short research projects, activities/workshops, etc.

The IITs also have a keen interest in IKS.

Eg., IIT Guwahati has started a PhD programme and short duration course on ‘Spoken Sanskrit’ and ‘Spoken Assamese’.

University Grants Commission (UGC) has released draft guidelines for the incorporation of the Indian knowledge systems (IKS) in higher education for undergraduate (UG) and postgraduate (PG) courses.

Recently, Central government had asked for inclusion of traditional medicine on WHO’s list and the inclusion of Ayurveda and related systems on the WHO list will provide it with a common language that allows health professionals to share standardized information across the world.

‘PROJECT UDBHAV’ by Ministry of Defence, aims to synthesize ancient wisdom with contemporary military practices, forging a unique and holistic approach to address modern security challenges.

## VAJRA MUSHTI KALAGA

### Context

Vajra Mushti Kalaga, a traditional martial art was held as part of Dasara celebrations at the Mysuru Palace.

### About

Vajra Mushti is a unique Indian martial art that incorporates various techniques of hand-to-hand combat like grappling, wrestling and striking techniques.

Vajra Mushti, which literally means Thunderbolt Fist, is characterised by the utilization of a knuckleduster, a small metal weapon.

The knuckleduster, also known as Vajra Mushti, usually made of animal horns like buffalo,

elephant (ivory), is worn on the knuckles of the fighter.



The main objective of this Indian martial art form is to neutralize the opponent and counter his weapon.

Whosoever draws the blood from the opponent's head first is declared the winner. Though this form of wrestling was popular during the period of the Vijayanagar rulers who reigned between the 14th and the 17th centuries, it has gone extinct and takes place only during Dasara.

Medieval travellers from Portuguese noticed this form of wrestling during the Navaratri celebrations in Vijayanagar empire and have also left detailed accounts of it.

## SASHTRA RAMANUJAN PRIZE

### Context:

Ruixiang Zhang, Assistant Professor, University of California, Berkeley, USA will be awarded with the 2023 SASTRA Ramanujan Prize for his outstanding contributions in mathematics.

### About Sastra Ramanujan Prize:

The prize was instituted in the year 2005.

It is awarded every year by the SASTRA University on its campus near Kumbakonam in Tamil Nadu, on Ramanujan's birth anniversary, December 22.

The prize is conferred annually to mathematicians from across the world who is less than 32 years of age, working in an area influenced by the Srinivasa Ramanujan.

The age limit is 32 years to commemorate the fact that Ramanujan accomplished a phenomenal body of work in this short span.

Cash prize: It carries a citation and an award of \$10,000.

This award has gained global repute ever since it was instituted.

Other recipients: Manjul Bhargava and Akshay Venkatesh



## BABA BANDA SINGH BAHADUR SINGH ANNIVERSARY

### Context:

Prime Minister of India paid tribute to Sikh warrior Baba Banda Singh Bahadur on 350th birth Anniversary.

### About Baba Banda Singh Bahadur

#### Early Life

- Baba Banda Singh Bahadur, originally known as Lachman Dev, emerged as a prominent Sikh warrior and the commander of the Khalsa army.

- His journey into Sikhism was a transformative one, as he became a devout disciple of Guru Gobind Singh, who bestowed upon him the name Gurbaksh Singh.

- Banda Singh Bahadur's life took a significant turn when he arrived in Khanda, Sonipat, where he assembled a military force and started a struggle against the Mughal Empire.

#### Establishment of Khalsa Rule

- Upon consolidating his authority in

Punjab, Banda Singh Bahadur initiated a series of reforms.

- He abolished the oppressive Zamindari system, an exploitative land revenue system, and ensured that property rights were granted to the tillers of the land.

- In addition to his land reforms, Banda Singh Bahadur introduced the Nanak Shahi coins, showing his commitment to Sikh values and principles.

### Early Conquests

- His early conquests demonstrated his commitment to the Sikh cause.

- His first major confrontation took place at the Battle of Sonipat, where he led the Sikh army and clashed against the Mughals.

- In 1709, he achieved victory in the Battle of Samana, leading to the capture of the Mughal city of Samana.

- These victories set the stage for the Sikhs to expand their influence into the Cis-Sutlej areas of Punjab.

- Banda Singh Bahadur even established his capital in Mukhlisgarh, renaming it as Lohgarh, which translates to 'fortress of steel,' and issued his own currency.

### Mughal response and the Persecution

- The rise of Banda Singh Bahadur and the Sikhs in Punjab caused great concern for the Mughal Emperor Bahadur Shah, as it disrupted communication between Delhi and Lahore, the capital of Punjab.

- In response, the Mughal Empire organized a formidable force to subdue and eliminate Banda Singh Bahadur.

- The Sikhs, under Banda Bahadur's leadership, made a strategic move to Lohgarh to prepare for the battle and despite successfully defeating the initial Mughal forces, the Sikhs found themselves besieged by an overwhelming Mughal army of 60,000 troops.

- Banda Singh Bahadur tried to recoup and reorganise and therefore, issued Hukamnamas (decrees) to the Sikhs, urging them to join him. In 1712, the Sikhs gathered near Kiratpur Sahib.

- As the Mughal Empire was facing succession wars for the throne, Banda Singh Bahadur managed to recapture Sadhaura and Lohgarh in 1712.

- In 1715, the Mughal governor of Lahore, Abd al-Samad Khan, led an army to besiege Banda Singh Bahadur and his Sikh forces in a village.

- The Sikhs defended their position, however, but the Mughal assault eventually led to the capture of Banda Singh.

- Subsequently, in 1716, during the reign of Mughal Emperor Farrukhsiyar, Banda Singh Bahadur, along with 700 of his followers, were executed in Delhi.

- This event was witnessed by a European visitor, an East India Company diplomat, who sent a letter to the governor of Fort William in Calcutta.

## SAINT VALLALAR

### Context

India celebrated the 200th birth anniversary of Ramalinga Adigalar, also known as Vallalar, on 5th October, 2023.

### About

Vallalar, Ramalinga Swamigal and Ramalinga Adigal, was one of the most famous Tamil Saiva Saints and also one of the greatest Tamil poets of

the 19th century and belongs to a line of Tamil saints known as "gnana siddhars" (gnana means higher wisdom).

### Organizations:

- Vallalar was strongly against the caste system and initiated the 'Samarasa Vedha Sanmarga Sangam' in 1865, later renamed 'Samarasa Suddha Sanmarga Sathya Sangam.'



- He established 'The Sathya Dharma Salai,' a free food facility in Vadalur, Tamil Nadu in 1867, serving all people without caste distinctions. In January, 1872, Vallalar opened the 'Sathya Gnana Sabha' (Hall of True Knowledge) in Vadalur.

- The Samarasa Suddha Sanmarga Sathiya Sangam was spread and passed on by him not only in theory but mainly in practice by his own way of living which by itself is an inspiration for his followers.

- Through the notion of Suddha Sanmarga Sangam, the saint endeavored to eliminate the caste system. According to Suddha Sanmarga, the prime aspects of human life should be love connected with charity and divine practice leading to achievement of pure knowledge.

### **Philosophical Beliefs and Teachings:**

- One of Vallalar's primary teachings was "Service to Living Beings is the path of Liberation/ Moksha."

- According to Suddha Sanmarga, the prime aspects of human life should be love, connected with charity and divine practice, leading to pure knowledge.

- Vallalar believed that the intelligence possessed by humans is illusory (Maya) intelligence and not accurate or final.

- He emphasized "Jeeva Karuniam" (Compassion for living beings) as the path of final intelligence.

- He forbade killing animals for the sake of food and advocated feeding the poor as the highest form of worship.

- He advocated feeding the poor as the highest form of worship. Ramalinga espoused the veneration of the radiant flame emanating from a lit lamp, not as a deity unto itself, but rather as a profound symbol representing the enduring omnipotence of the Divine, as opposed to the adoration of statues within a monotheistic framework

- Today there are spiritual groups spread out all over the world who practice the teachings of Ramalingam and follow the path of Arut Perum Jothi.

### **Vallalar as Social reformer:**

Vallalar's vision transcends religious, caste, and creed barriers, recognizing divinity in every atom of the universe. He advocated a casteless society. He was opposed to superstitions and rituals. He forbade killing animals even for the sake of food. He condemned inequality based on birth.

## “ANIMAL FARM” by George Orwell

Animal Farm is a beast fable, in the form of a satirical novel by George Orwell, first published in England on 17 August 1945. It tells the story of a group of anthropomorphic farm animals who rebel against their human farmer, hoping to create a society where the animals can be equal, free, and happy. Ultimately, the rebellion is betrayed and, under the dictatorship of a pig named Napoleon, the farm ends up in a state as bad as it was before.

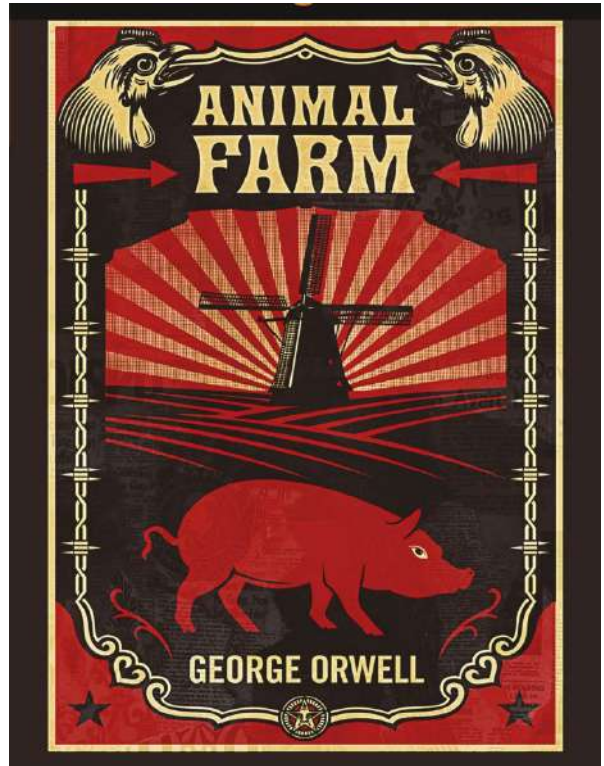
According to Orwell, *Animal Farm* reflects events leading up to the Russian Revolution of 1917 and then on into the Stalinist era of the Soviet Union, a period of time when Russia lived under the communist ideology made by Joseph Stalin. Orwell, a democratic socialist, was a critic of Stalin and hostile to Moscow-directed Stalinism, an attitude that was critically shaped by his experiences during the Barcelona May Days conflicts between the POUM (POUM stands for Workers’ Party of Marxist Unification in Spanish) and Stalinist forces during the Spanish Civil War.

### Book Summary

Old Major, a prize-winning boar, gathers the animals of the Manor Farm for a meeting in the big barn. He tells them of a dream he has had in which all animals live together with no human beings to oppress or control them. He tells the animals that they must work toward such a paradise and teaches them a song called “Beasts of England,” in which his dream vision is lyrically described. The animals greet Major’s vision with great enthusiasm.

When he dies only three nights after the meeting, three younger pigs—Snowball, Napoleon, and Squealer—formulate his main principles into a philosophy called Animalism. Late one night, the animals manage to defeat the farmer Mr. Jones in a battle, running him off the land. They rename the property Animal Farm and dedicate themselves to achieving Major’s dream. The cart-horse Boxer devotes himself to the cause with particular zeal, committing his great strength to the prosperity of the farm and adopting as a personal maxim the affirmation “I will work harder.”

At first, Animal Farm prospers. Snowball



works at teaching the animals to read, and Napoleon takes a group of young puppies to educate them in the principles of Animalism. When Mr. Jones reappears to take back his farm, the animals defeat him again, in what comes to be known as the Battle of the Cowshed, and take the farmer’s abandoned gun as a token of their victory. As time passes, however, Napoleon and Snowball increasingly quibble over the future of the farm, and they begin to struggle with each other for power and influence among the other animals.

Snowball concocts a scheme to build an electricity-generating windmill, but Napoleon solidly opposes the plan. At the meeting to vote on whether to take up the project, Snowball gives a passionate speech. Although Napoleon gives only a brief retort, he then makes a strange noise, and nine attack dogs—the puppies that Napoleon had confiscated in order to “educate”—burst into the barn and chase Snowball from the farm. Napoleon assumes leadership of Animal Farm and declares that there will be no more meetings. From that point on, he asserts, the pigs alone will make all of the decisions—for the good of every animal.

Napoleon now quickly changes his mind about the windmill, and the animals, especially Boxer, devote their efforts to completing it. One day, after a storm, the animals find the windmill toppled. The human farmers in the area declare smugly that the animals made the walls too thin, but Napoleon claims that Snowball returned to the farm to sabotage the windmill. He stages a great purge, during which various animals who have allegedly participated in Snowball's great conspiracy—meaning any animal who opposes Napoleon's uncontested leadership—meet instant death at the teeth of the attack dogs.

With his leadership unquestioned (Boxer has taken up a second maxim, "Napoleon is always right"), Napoleon begins expanding his powers, rewriting history to make Snowball a villain. Napoleon also begins to act more and more like a human being—sleeping in a bed, drinking whisky, and engaging in trade with neighboring farmers. The original Animalist principles strictly forbade such activities, but Squealer, Napoleon's propagandist, justifies every action to the other animals, convincing them that Napoleon is a great leader and is making things better for everyone—despite the fact that the common animals are cold, hungry, and overworked.

Mr. Frederick, a neighboring farmer, cheats Napoleon in the purchase of some timber and then attacks the farm and dynamites the windmill, which had been rebuilt at great expense. After the demolition of the windmill, a pitched battle ensues, during which Boxer receives major wounds. The animals rout the farmers, but Boxer's injuries weaken him.

When he later falls while working on the windmill, he senses that his time has nearly come. One day, Boxer is nowhere to be found. According to Squealer, Boxer has died in peace after having been taken to the hospital, praising the Rebellion with his last breath. In actuality, Napoleon has sold his most loyal and long-suffering worker to a glue maker in order to get money for whisky.

Years pass on Animal Farm, and the pigs become more and more like human beings—walking upright, carrying whips, and wearing

clothes. Eventually, the seven principles of Animalism, known as the Seven Commandments and inscribed on the side of the barn, become reduced to a single principle reading "all animals are equal, but some animals are more equal than others."

Napoleon entertains a human farmer named Mr. Pilkington at a dinner and declares his intent to ally himself with the human farmers against the laboring classes of both the human and animal communities. He also changes the name of Animal Farm back to the Manor Farm, claiming that this title is the "correct" one.

Eventually, the pigs begin walking on their hind legs and take on many other qualities of their former human oppressors. The Seven Commandments are reduced to a single law: "All Animals Are Equal / But Some Are More Equal Than Others." Looking in at the party of elites through the farmhouse window, the common animals can no longer tell which are the pigs and which are the human beings.

There are messages in the book that ring true even today. One of the most well-known quotes is "All animals are equal, but some animals are more equal than others." A rule that was conveniently changed from the initial "all animals are equal."

It is a telling comment on how leaders change the rules to suit their own agendas, on governments guaranteeing equality to all but ensuring power and privileges to a select few. It is a warning against Totalitarianism.

# FACT SHEET

## GENERAL STUDIES – II

### POLITY

#### Prison

- ◆ According to the Prison Statistics India (PSI) report by National Crime Records Bureau (NCRB), a total of 2,116 prisoners died in judicial custody, with almost 90% of cases recorded as natural deaths in 2021. U.P. recorded the highest number of overall deaths.
- ◆ Recently, 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.

### SOCIAL ISSUES

#### Health

- ◆ India is set to become the global hub of medical technology and devices with the market size estimated to grow up to US\$ 50 billion by 2050 from the present \$11 billion.
- ◆ From a market share of 1.5 per cent, India hopes to increase its market share to 10-12 per cent over the next 25 years.
- ◆ The world-class medical devices made indigenously are available to Indian patients at approximately 1/4th to 1/3rd the price of their imported counterparts.

#### Food Security

**State Of Food Security and Nutrition In the World (SOFI) Report, 2023: by UN FAO.**

#### *Highlights:*

- ◆ The number of people facing hunger worldwide has increased by over 122 million since 2019 due to the pandemic, repeated weather shocks, and conflicts, including the war in Ukraine.
- ◆ Approximately 2.4 billion individuals, largely women, and residents of rural areas, did not have consistent access to nutritious, safe, and sufficient food in 2022.
- ◆ Child malnutrition is still alarmingly high. In 2021, 22.3% (148 million) children were stunted, 6.8% (45 million) were wasted, and 5.6% (37 million) were overweight.
- ◆ As urbanization accelerates, there is a noticeable increase in the consumption of processed and convenience foods, leading to a spike in overweight and obesity rates.
- ◆ Previously self-sustaining rural regions are now found to be increasingly dependent on national and global food markets.
- ◆ By 2050, it's projected that 70% of the global population will reside in cities. This significant



demographic shift necessitates a reorientation of food systems to cater to these new urban populations and eradicate hunger, food insecurity, and malnutrition.

- ◆ In a specific case study from Mumbai, where the cost of meals has risen by a staggering 65% in just five years. In contrast, salaries and wages have only increased by 28%-37% during the same period. It serves as a stark example of the challenges faced by urban populations in India.
- ◆ South Asia, with 1.4 billion people, recorded the highest number (72%) of individuals unable to afford a healthy diet between 2019 and 2021.
- ◆ India has the lowest cost of a healthy diet among BRICS nations and its neighbours. However, it remains unattainable for a substantial portion of the population due to income disparities. In 2021, 74% of Indians could not afford a healthy diet.

## INTERNATIONAL RELATIONS

### 'International Migration Outlook 2023': by OECD.

#### *Highlights:*

- ◆ In 2021 and 2022, India became the primary source of migration to OECD countries (4 lakh new migrants), surpassing China.
- ◆ The OECD region experienced record refugee inflows due to the Russia-Ukraine war, with over 10 million people becoming internally displaced or refugees.
- ◆ All top four destination countries (The United States, Germany, the United Kingdom and Spain) registered large year-on-year increases, between 21% and 35%.
- ◆ In 2022, family migration remained the primary category of entry for new permanent-type migrants, representing 40% of all permanent-type migration.

## GENERAL STUDIES – III

### ECONOMY

#### Resources

- ◆ According to the Union Coal Ministry, Tamil Nadu was the largest producer of lignite in 2022-23 with around 50% of the production, followed by Gujarat (27%) and Rajasthan (22%).
- ◆ In terms of export of lignite, Tamil Nadu had the highest share of 51.6%, followed by Gujarat and Rajasthan.

#### Female Labour Force Participation

##### *Worldwide Trend:*

- ◆ World Bank estimates (2022) show that the worldwide female Labour Force Participation Rate (LFPR) was 47.3% in 2022 (remains relatively low).
- ◆ Despite the remarkable advancements observed in the global economies, there has been a persistent decline in the LFPR of women in developing nations.

## **Periodic Labour Force Survey (PLFS) Data for Women in India**

- ✦ Married women show a considerably lower Labour Force Participation Rate (LFPR), primarily in the age group of 25-29.
- ✦ For women in the working age group (15-59 years), LFPR is only 35.6 per cent in India (39% for Rural; 26.5% for Urban areas) in 2021-22.
- ✦ Female LFPR in India between 1990 and 2022 has decreased from 28% to 24%.

## **AGRICULTURE**

- ✦ According to the Union Home Ministry, the share of India's domestic seed trade in the global market is only 4.5%, leaving a vast scope for improvement.
- ✦ India's share in the world seed export is only 0.6%.

## **ENVIRONMENT**

### **Child marriage and Climate change**

- ✦ Almost 9 million girls around the world are facing an increased risk of child marriage along with climate disasters, according to a report by 'Save the Children', a charity organisation.
- ✦ Approximately 2/3rd of child marriages are concentrated in regions bearing higher-than-average climate risks, revealed Global Girlhood Report 2023.
- ✦ Currently, an estimated 30 million girls reside in the top 10 countries identified as child marriage and climate hotspots.
- ✦ Analysis of historical data shows that a 10% increase or decrease in rainfall is associated with a 1% increase in child marriage globally.
- ✦ In parts of Ethiopia worst hit by drought and food shortages, rates of child marriage rose by 119% in 2022 compared to 2021.
- ✦ A 2020 study found that in Bangladesh, girls aged 11–14 were shown to be twice as likely to marry in years following extreme heat.
- ✦ Heavy rainfall in Niger in 2022 resulted in severe flooding that left over 2.6 million students out of school. This disproportionately affected girls, increasing the risk of child marriage.
- ✦ After Cyclone Freddy, child marriages surged in Malawi. In the first half of 2023, 438 boys and 528 girls were married off, compared to just 17 boys and 28 girls during the same period in the previous year.
- ✦ The Central Sahel region (including Burkina Faso, Mali and Niger) faces conflict, poverty and the world's highest rates of child marriage.

## **SCIENCE AND TECHNOLOGY**

- ✦ The Indian Prime Minister has praised telecom operators' achievement in expanding 5G service in urban areas, claiming that more than 80% of India's urban population now had access to high-speed technology.

1. Basohli Pashmina, a more than 100-year-old traditional craft from Jammu and Kashmir's Kathua district, has got the Geographical Indication (GI) tag. It is a hand-spun product known for extreme softness, fineness, light-weight and insulating properties.
2. Three other indigenous products from Arunachal Pradesh – Yak Churpi, Khamti rice and Tangsa textile – also have been granted the GI tag.
3. India reached an unprecedented milestone of 100 medals at the Asian Games 2023. This is the first time in history, India has achieved this remarkable feat.
4. More than 1,000 university teachers across the country are being equipped with a working understanding of Indian traditions, culture and way of life, to enable them to teach relevant courses on Indian Knowledge Systems (IKS) at the UG and PG levels from the next academic session. In fact, UGC intends to train 15 lakh teachers in IKS over the next two years.
5. Delhi began the exercise of spraying a PUSA bio-decomposer for the fourth consecutive year. But it takes 20-25 long days for decomposition (35-40 days for natural decomposition). Mechanization and utilisation of straw for packaging or turning it into fertilisers reduce the need for decomposition. In this context, the potential of the microbial solution to help deal with the stubble-burning problem is still unclear.
6. A long-lost tectonic plate dubbed 'Pontus' was recently discovered in the west Pacific Ocean by chance when scientists were studying ancient rocks in Borneo.
7. The 3rd Battalion of the Naga Regiment got the President's Colour award. It is also called 'Nishan', is a military tradition and is seen as the recognition of a battalion's feats. 'Colour' symbolises the collective spirit of the battalion, and its acts of valour forged in sweat and blood.
8. Kannauj, a city in Uttar Pradesh, is known as the "City of Attars" and the "Perfume Capital of India". It has been creating attar for north of 400 years. Truckloads of flowers are brought from neighbouring areas for this purpose.
9. The International Olympic Committee (IOC) formally ratified the inclusion of cricket in the 2028 Olympic Games in Los Angeles at the 141st IOC Session in Mumbai.
10. President Draupadi Murmu inaugurated the Fourth Agriculture Roadmap of Bihar for the period 2023-2028. It aims to address the challenges posed by climate change. It also aims to increase agricultural productivity, adoption of modern agricultural practices and value addition in the agricultural value chain.
11. Recently, for the first time in the last 50 years, the meeting of the IMF and the World Bank was held in the African continent; at Marrakesh city of Morocco. It is important when the continent has been facing a variety of challenges, from conflicts to a series of military coups, from persistent poverty to natural disasters.
12. Indian and Malaysian armies have initiated "Exercise Harimau Shakti 2023." This joint bilateral training exercise, held at Umroi Cantonment in India, aims to strengthen military capabilities and



also symbolizes the enduring friendship between both countries and reinforcing their commitment to regional security and stability.

13. The Finance Ministry has made changes to the IGST Act and thereby exempted payments made for goods imported through ocean freight from 5% integrated GST with effect from October 1, 2023. Currently, importers are required to pay 5% GST under the Reverse Charge Mechanism.
14. Term deposit rates have surged to their highest levels in the past five years as banks rush to meet strong credit demand, according to the RBI's monthly bulletin. The liquidity crunch is causing banks to attract more deposits. Outflows on account of tax payments and increased demand for credit ahead of the festival season have also tightened access to liquidity.
15. In July 2022, India had turned a net importer of steel for the first time in four-odd years. Lower-priced offerings coming in, mostly from China, and a slowdown in export orders led to the difference.

## TERMS IN NEWS

1. **Green Drought:** Karnataka is witnessing a 'Green drought'. In such conditions, vegetation may appear green but there is stunted growth and soil moisture stress, impacting yields drastically.
2. **White Saviour Complex:** It is a psychological construct that describes, the people of underdeveloped nations (majority non-white) and are seen as passive recipients of white benevolence. A white person is depicted as liberating, rescuing, or uplifting non-white people. [Modern-day version of the poem "The White Man's Burden" (1899) by Rudyard Kipling].
3. **Labeling theory:** It suggests that people's self-identity and behaviour are influenced by the terms used to describe or classify them (Self-tagging or Self-stereotyping).

## QUOTES/POEMS (FOR ESSAY & GS)

1. **Separation of Power:** "Power tends to corrupt, and absolute power corrupts absolutely" - *Lord Acton*.
2. **Children:** "Children learn more from what you ARE than what you TEACH" - *W. E. B. DuBois*
3. **Environment:** "If civilization is to survive, it must live on the interest, not the capital, of nature" - *Ronald Wright*.
4. **Diet:** "I shall content myself with merely declaring my firm conviction that...restraint in diet, both as to quantity and quality, is as essential as restraint in thought and speech" - *Mahatma Gandhi*.
5. **Industrial Revolution:**

"It was the best of times; it was the worst of times;  
It was the age of wisdom; it was the age of foolishness;  
It was the epoch of belief; it was the epoch of incredulity;  
It was the season of light; it was the season of darkness;  
It was the spring of hope, it was the winter of despair."

— *Charles Dickens, 'A Tale of Two Cities'*.