NITIN SIR
CLASSES

CURRENT AFFAIRS

MAGAZINE

July 2025





Index

Editor's Note

Dear Students,

Let's be absolutely clear: **current affairs are not just important; they are the bedrock of success for the UPSC CSE exam!** To conquer this challenge, you need more than just knowledge; you need **unwavering analytical prowess, razor-sharp cognitive ability, a laser-focused approach, and the undeniable power of Logic, Examples, and Data (LED)** to back every point. And let's not forget the crucial flair for writing in the mains and the gift of gab that shines in the interview – none of this is achievable without a current affairs resource that cuts through the noise.

That's precisely why **Nitin Sir Classes** proudly presents our monthly magazine. Under our auspices, this magazine **doesn't just meet; it EXCEEDS** every one of these vital parameters. We've stripped away the frills to deliver the **absolute nitty-gritty**, meticulously crafted to sharpen every skill you need.

This isn't just our hope; it's our **firm, personal conviction** that this magazine will be your constant companion, propelling you forward on every single step of your journey toward realizing your cherished dream. **Success isn't accidental; it's the relentless effort.** Remember the timeless truth: "The last stroke of the hammer breaks a stone. This does not mean the first stroke is useless." Every single effort counts!

Stay relentlessly focused on your goal, armed with the right endeavour.

Warm greetings!

Nitin Kumar
Director
Nitin Sir Classes

Cryptocurrency Crossroads: Analysing India's Strategic Dilemma in a Digital World

In his article "***Needed, a Crypto Strategy***" (*Indian Express*, May 28, 2025), Indian strategist **C. Raja Mohan** warns that India risks falling behind in the digital race as Pakistan, backed by Trump-linked firms, embraces cryptocurrency. This essay explores his insights and broader expert opinions on how crypto intersects with policy, security, and geopolitics, urging India to act swiftly in shaping its future in a rapidly digitising world.

In today's fast-changing world of money and technology, one of the hottest topics is cryptocurrency — digital money like Bitcoin that is not controlled by any government or central bank. In "Needed, a Crypto Strategy" (*Indian Express*, May 28, 2025), Indian strategist C. Raja Mohan gives a clear warning: India must take cryptocurrencies seriously, especially as neighbouring Pakistan teams up with powerful global players linked to former U.S. President Donald Trump.

Mohan argues that while much of the world is quickly embracing or managing cryptocurrencies, India remains stuck — unsure of what to do. This delay could be risky, not just for the economy but for national security. He draws a powerful comparison: just as India once underestimated Pakistan's nuclear plans, it might now be underestimating its crypto ambitions.

India's Crypto Quagmire: Policy Paralysis and Public Paradox

India finds itself in a confusing position on cryptocurrencies. Millions of Indians are investing in crypto, yet the government has not set clear laws or policies to regulate this trend. Mohan calls this a dangerous "policy vacuum", warning, "India no longer has the luxury of ignoring the changing regional and global crypto landscape."

Kushagra Mehrotra, in "***Cryptocurrency Regulations: The Indian Scenario***" (SSRN, May 9, 2024), notes that India's stance shifted from silence to sudden action — like the **2018 RBI ban**, later overturned by the **Supreme Court** in 2020 (p. 7). Still, there is no official law explaining what people can or cannot do with crypto. The result? Confusion and missed opportunities.

Meanwhile, central institutions like the RBI remain cautious. **Mutyala Venkateswara Rao** in "***Cryptocurrency and its Implications for Central Bank Policy in India***" (*International Journal of Foreign Trade and International Business*, 2022) writes, "*The decentralised nature of cryptocurrencies challenges traditional centralised financial systems*" (p. 52). If digital currencies dominate, who controls inflation or interest rates?

While countries like the **U.S.** and **UK** set clear rules, India sends mixed signals. It taxes crypto profits but has not legalised crypto. It is like charging someone to drive a car without confirming it is allowed on the road. In "***The Taxation of Cryptoassets in India***" (*Journal of Tax Administration*, 2024), **Tarun Jain** notes that India's high tax regime for crypto "makes many investors nervous" and discourages legal use (p. 115).

India's crypto journey is like a car racing without road signs. Without swift action, it could crash into economic trouble or miss a major opportunity.

The Pakistani Pivot: A Digital Gamble or Strategic Brilliance?

While India hesitates, **Pakistan** is taking bold steps in cryptocurrency. In 2025, it launched the **Pakistan Crypto Council** (**PCC**), backed by the government to guide its crypto future. The Council even partnered with **World Liberty Financial Inc.** (**WLFI**), a firm linked to the Trump family, to use blockchain technology, promote financial inclusion, and mine digital coins using surplus electricity.

The PCC reflects a desire to modernise Pakistan's financial system. Yet, this move carries risks: the country's economy is fragile, governance is weak, and regulations are limited. This pivot is not sudden. Pakistan has long used "***strategic ambiguity***" — neither fully accepting nor rejecting cryptocurrencies. But now, with Trump showing interest in crypto deals abroad, Pakistan sees a chance to rebuild ties with the U.S., attract investment, and modernise.

Challenges persist. **Muhammad Arif Saeed** and **Muhammad Hassan Sial**, in "***Issues of Legislation of Cryptocurrency in Pakistan***" (*Annals of Social Sciences and Perspective*, 2023), note that Pakistan's repeated bans have created unclear rules and low public trust (p. 431). Many still associate crypto with scams.

Despite this, Pakistan's recent actions show a strong will to lead. In "***Legalisation of Cryptocurrency in Pakistan***" (*Journal of Law & Social Studies*, 2024), **Imtiaz Ahmad Khan**, et al. argues that "cryptocurrency's transparency gives people control over their financial lives" and could boost economic prosperity (p. 405). India should take note of this vision.

Trump's Digital Doctrine: Reimagining Global Crypto Power

Donald Trump's return to the White House in 2025 brought a major shift: a full embrace of cryptocurrency. Once sceptical, he now champions crypto. He launched the $TRUMP meme coin and issued orders that reshaped America's crypto policy.

Trump's aim is to end "***Operation Choke Point 2.0***" — a practice where banks avoided crypto businesses over regulatory fears. With clearer rules, Trump wants to make America a crypto leader. He appointed David Sacks as "***Crypto Czar***" to guide policy. This is a big turnaround. A government once hostile to crypto exchanges now welcomes them. Trump's ***Strengthening American Leadership in Digital Financial Technology*** **plan** includes USD-backed stablecoins and rejection of Central Bank Digital Currencies (CBDCs), which he views as overly controlling.

The goal is to maintain dollar dominance while enabling digital innovation. Countries like Pakistan are eager to join America's new crypto push, as seen in WLFI's deal with Pakistan. Trump's strategy promotes innovation without overregulation. By placing crypto in his America First agenda, he turns it into a tool of global influence. India must take this seriously. As the U.S. writes new financial rules and countries like Pakistan align, India cannot afford to lag behind.

Central Banks in Crisis?: Challenges to Monetary Sovereignty

Central banks like the RBI have long controlled interest rates, inflation, and currency. But cryptocurrencies challenge this control. These digital assets operate globally, are hard to trace, and escape central authority. Rao notes that "the decentralised nature of cryptocurrencies challenges traditional centralised financial systems" (p. 52). If Bitcoin replaces rupees in daily use, the RBI may lose its grip on the economy.

India has been cautious. While other nations launch CBDCs, India is still testing the Digital Rupee. There is concern that crypto could aid crime or terrorism — serious issues in a developing country with limited oversight tools. But this is about more than finance. It's about power. In a world where the U.S. uses the dollar to exert influence, digital currencies could disrupt global authority. Rao rightly argues that India needs "a balanced regulatory framework that fosters innovation while safeguarding macroeconomic stability" (p. 53). With over 100 million crypto users, India is poised to lead. But inaction could mean falling behind in a world led by others.

Taxing Troubles: India's Fiscal Grip on Digital Assets

India's taxation of crypto reveals a contradiction. The government collects taxes, but has not officially legalised crypto. This creates confusion: is crypto legal or not?

Jain explains that India applies "***a high tax incidence regime for cryptoassets***," treating them unlike other assets (p. 115). The 2022 budget imposed a **30% tax on crypto profits** and a **1% TDS on every transaction** — all without offering legal clarity. The outcome? Fear among startups, investors, and youth. Jain notes that this tough regime correlates with a drop in crypto transactions (p. 116). As taxes and rules get tougher, people take crypto underground.

This is dangerous. Unregulated crypto markets attract fraud. It also drives talent and innovation abroad. Instead of enabling safe growth, India's policies may be choking it. India can lead globally — but only with a fair, smart tax and legal system.

Geopolitical Ripples: Security, Regulation, and Crypto Warfare

Cryptocurrency is now a geopolitical tool. Mohan's article shows that Pakistan's crypto push, backed by U.S. firms, is about more than technology — it's about power. Cryptos are anonymous and fast-moving, ideal for shady dealings. Mohan warns, "India should pay close attention to Pakistan's crypto ambitions — especially amid the possible misuse… to fund terror and launder money."

Md Rajib Kamal and **Ranik Raaen Wahlstrøm**, in "***Cryptocurrencies and the Threat Versus the Act***" (*Finance Research Letters*, 2023), find that during conflicts like the Russia–Ukraine war, crypto became a tool to bypass sanctions (p. 3). It can be a weapon. At the same time, it is also soft power. Trump's crypto orders are shaping influence, not just finance. He wants the U.S. to be the crypto capital of the world. India must recognise this shift. Like nuclear arms in the past, crypto is both a risk and an opportunity. Ignoring it would be a mistake.

Conclusion: Charting India's Path in a Crypto-Driven Future

India is at a crossroads. One path leads to delay and irrelevance. The other leads to vision and leadership. Mohan's article is a wake-up call: crypto is reshaping global power. Pakistan's bold steps, backed by U.S. ties, show how fast the game is changing. With Trump pushing a crypto-forward agenda, the world is building new financial systems — and India must not be left behind. Research is clear: India is taxing without legalising, regulating without clarity. Meanwhile, Pakistan is attracting investment and modernising. Trump's doctrine adds urgency. Crypto is now a geopolitical tool.

If India delays, it risks repeating past errors. But with bold, smart policymaking, it can lead the way in digital finance. The time to act is now. India must craft a national crypto strategy — one that encourages innovation, protects users, supports markets, and strengthens security. In this digital age, the future will not wait.

Reconfiguring Indo-US Defence Ties: From Frontline Triumph to Strategic Rift Post-Op Sindoor

Based on **Vivek Mishra**'s "***Operation Sindoor: Trump's Fault Lines***" (**ORF**, 28 May 2025) and **Dr Walter Ladwig**'s ***"Calibrated Force: Operation Sindoor and the Future of Indian Deterrence***" (**RUSI**, 21 May 2025), this essay explains how Operation Sindoor changed India's defence image. It showed that India could use its own technology and act on its own. This success proved India is ready to be a strong partner to United States. However, it also showed that US support can be uncertain during unstable politics. For both countries to stay close partners, they must build trust, avoid quick changes in policy, and work together to keep the Indo-Pacific region peaceful and secure.

Operation Sindoor was more than just a military win for India; it was a major turning point in its relationship with the United States. India carried out careful strikes on targets in Pakistan using weapons and tools made at home. This showed that India is building a strong and independent defence system. For a long time, the US has seen India mainly as a customer for its weapons. But this event showed India can be an equal partner. It also showed how changes in politics can affect important global relationships. Operation Sindoor opened new chances for the two countries to work together more fairly, while also showing the need for steady and trusted teamwork.

The success of Operation Sindoor was based on India's focus on using its own ideas and equipment. India showed that it could protect itself without needing help from other countries. Important assets like the BrahMos missile, the Akash-Teer air defence system, and special AI-powered drones were all made in India. This shows how much India has moved away from depending on other countries for defence. Programmes like "Make in India" and support from private companies helped make this happen. India is now building a defence system that is more flexible and better suited to modern needs.

It was not solely about the weaponry; India also reformed its military decision-making processes. Army leaders were given more power to act quickly, and old rules that slowed things down were changed. Because of these reforms, the military could respond faster and smarter. This operation was not just a show of power; it was a clear sign that India is ready to lead and protect itself with confidence and smart planning in future defence actions.

US Defence Complex: A Model in Question

In contrast, the United States adopts a different approach to defence planning, often perceived as less adaptable. The US usually uses very **expensive** and **complex systems** like the **F-35 jets** and **Patriot missiles**. These systems are powerful but cost a lot and take a long time to develop. In contrast, India uses simpler and more affordable tools that can still do the job well. Operation Sindoor showed how India's cheaper and quicker methods can be just as effective.

In the US, a few large companies control most of the military projects. This means there is less room for new ideas, and it often leads to higher costs. One example is spending $2.5 million on a missile to stop a drone that only cost $2,000. India, however, used a homemade solution that cost just $500. This shows how India is finding smarter and more cost-effective ways to defend itself. Operation Sindoor gives the world a strong lesson in practical, modern defence planning.

Restraint and Resolve: India's Strategic Posture

Another salient feature of **Operation Sindoor** was how carefully India used its **military power**. In the past, **big conflicts** in **South Asia** often got worse quickly. But this time, India stayed calm. Even when tensions were high, it did not attack Pakistani planes or start a bigger fight. Instead, it showed it could act strongly but wisely. This careful response helped India look responsible in the eyes of the world and made it clear that future threats will be taken seriously.

Dr Walter Ladwig, in his article "***Calibrated Force: Operation Sindoor and the Future of Indian Deterrence***" (**RUSI**, 21 May 2025), explains how India and Pakistan both avoided major military steps like full mobilisation or nuclear threats. India focused only on hitting places linked to terrorism, not the whole country. This new way of acting—called precision deterrence—shows India's growth as a stable and mature power in the region.

More importantly, the operation set a new rule: India will not tolerate attacks from across the border. Any future threats will bring fast and exact military action. If this approach continues, it could change how countries in South Asia deal with each other and help keep peace by making the costs of aggression very clear.

Geopolitical Repercussions and the Trump Variable

Even though India and the United States have become closer partners, their relationship faced problems during Donald Trump's second term as President. Trump upset many in India by comparing India and Pakistan as if they were equal in the conflict. He also suddenly claimed he helped stop the fighting, even though India had shown restraint on its own. His interest in making deals with Pakistan, including possible business ties in the region, made Indian leaders worry about how serious the US was about their partnership.

Trump's actions made the relationship seem more about personal choices than long-term friendship. While India acted calmly and clearly, Trump's mixed signals caused confusion. He even

said he stopped a nuclear war, but ignored the fact that India had been very careful not to let things get out of hand.

India reacted wisely. It sent teams to explain its side to other countries and stood firm on its anti-terrorism stance. India also began to work more closely with Europe and other countries in the Indo-Pacific region. This was a smart move to avoid depending too much on any one partner, especially the US, whose actions can change with different leaders. It showed India's maturity in global diplomacy.

Fault Lines in American Policy: The Pakistan Puzzle

However, President Trump's mixed messages about Pakistan created confusion in India. While he praised Pakistan and discussed trade deals, India stayed firm and clear in its stance. This caused concern in Delhi, where leaders worry that the US might not fully understand the threat from Pakistan or may support it again for quick political gains.

Such actions could harm the shared goals of fighting terrorism and keeping peace in the Indo-Pacific. Although the US Congress has shown support for India, this alone is not enough. Plans like the 'Pakistan Democracy Act' sound helpful, but without strong action from the US government, they remain mostly symbolic. In India, most people agree that Pakistan cannot be trusted as a fair democratic country. This makes it even more important for the US to match its words with real steps that reflect the current risks and challenges in the region.

The Road Ahead: Towards Institutional Reconfiguration

For India and the United States to build a strong and lasting defence partnership, they must look beyond changes in leadership and short-term politics. Their relationship should be based on respect, teamwork in new technology, and shared defence plans. Setting up joint research centres, easier technology sharing, and agreements to build equipment together can make their alliance stronger.

The US also needs to improve how it buys defence tools. Learning from India's flexible and lower-cost model could help reduce waste and encourage new ideas. At the same time, India should keep working closely with other partners like the EU, Japan, and Australia to maintain balance and independence.

Clear and reliable ways to talk during crises are just as important. Better communication and military cooperation will help both sides make smart decisions quickly and avoid misunderstandings during tense times. Strategic calmness is key.

Conclusion: A Symbiotic Vision for the Future

Operation Sindoor showed both the strengths and weaknesses in the defence ties between India and the United States. It proved that India can act strongly and smartly on its own, but also revealed how political oscillations in the US can affect their partnership. To build a better future together, both countries need to rely on stable plans, work on new technologies together, and agree on shared defence goals.

In today's world, where many powers are rising, India and the US can help each other stay strong. But this will only happen if they plan carefully and do not let short-term politics get in the way. Their relationship must be built on trust, honesty, and long-term teamwork. Moving from a one-time victory to a lasting partnership depends on how well they understand each other and work as true allies over time.

Can Computers Really think?

This essay, based on **Nishant Sahdev**'s "***Will AI ever Grasp Quantum Mechanics? Don't Bet on It***" (Mint, 30 May 2025), explains that although Artificial Intelligence can copy intelligent behaviour, it lacks consciousness—the awareness and experience needed to truly understand quantum mechanics. Without this inner experience, AI remains a useful tool but cannot reflect, wonder, or question like conscious beings can.

Artificial Intelligence, or AI, is all around us today. It is in the phones we use, the websites we visit, and the cars some people drive. AI helps doctors figure out what is wrong with patients, translates languages, writes stories, and even creates art. Because of all these clever things it can do, some people believe AI might one day become smarter than humans. Maybe it could even solve the biggest mysteries of science—including quantum mechanics.

Quantum mechanics is a strange part of physics that explains how tiny particles, like atoms and electrons, behave. These tiny things do not act in ways we would expect. They can be in two places at once or change just because someone is watching them. It is so puzzling that even the smartest scientists still argue about what it really means.

At the heart of this mystery lies a question that bridges science and philosophy: Can AI, no matter how advanced, ever truly understand quantum mechanics the way human beings do? The key idea explored in this essay is the consciousness gap—the absence of subjective experience in AI. This gap may forever limit AI's ability to grasp not just quantum mechanics, but the deeper truths about the universe itself.

What AI Can Do (And What It Cannot)

To begin with, it is important to understand the strengths of AI. Artificial Intelligence functions like a highly advanced calculator that can recognise patterns and solve problems using data. When provided with numerous examples, it learns to perform tasks with great accuracy. For instance, if given thousands of

photographs of animals, AI can learn to distinguish a cat from a dog. Similarly, if taught how humans communicate, it can conduct conversations that seem almost human.

There are AI systems that can compose poetry, play chess better than world champions, and assist scientists in developing new medicines. Furthermore, AI can solve complex physics problems, such as determining the probable location of particles at a specific moment. These abilities are undeniably remarkable.

Nonetheless, despite being capable of simulating various aspects of human intelligence, AI operates without genuine understanding. It lacks consciousness—the personal experience of thoughts, emotions, and awareness—which creates what is referred to as the consciousness gap. AI does not comprehend what a cat or dog truly is; it merely identifies patterns. It does not understand the importance of solving a problem because it does not experience curiosity, fulfilment, or confusion. This absence of inner experience prevents AI from achieving the depth of understanding that conscious beings possess.

What Is Consciousness?

Consciousness refers to the awareness an individual has of oneself and the environment. A conscious being is able to experience emotions such as joy, fear, and curiosity. It is capable of reflecting on its own thoughts, imagining future events, recalling past experiences, and pondering complex ideas, including the meaning of life.

Humans possess consciousness, and many animals are believed to have it as well. In contrast, Artificial Intelligence does not. Although it may respond with phrases such as, "I am happy to help!" when asked a question, it does not genuinely experience emotions. Its responses are generated based on patterns it has previously encountered. It functions similarly to a puppet whose movements mimic speech but lack actual thought.

This lack of personal, inner experience is known as the consciousness gap. In the context of quantum mechanics—which involves paradoxes and deep philosophical questions—this gap becomes especially important. True understanding may require more than data processing; it may require the thoughtful reflection that only conscious beings are capable of.

Quantum Mechanics: The Ultimate Puzzle

Quantum mechanics is one of the most puzzling ideas in science. It says that tiny particles can be in two places at once or be connected even if they are far apart. They do not act in ways we see in our everyday lives.

One famous example is called the "***double-slit experiment***". It shows that electrons act like waves when we do not watch them, but like particles when we do. Just observing them changes how they behave. That is really weird!

Some scientists think that consciousness—our awareness of the world—might be part of the reason why particles behave this way. If that is true, then understanding quantum mechanics might require consciousness. And since AI does not have consciousness, it might never really "get" what is going on. The consciousness gap could mean that AI remains an observer of quantum mechanics, never a true participant in its mysteries.

Can AI Be Conscious One Day?

Some people believe that one day, AI will become so advanced that it will be conscious. They think that if you build a machine smart enough, it will start to think and feel like a human.

But many scientists disagree. They say that AI is just a machine that follows rules. It does not have a body, emotions, or personal experiences. Even if it talks like a person, it is still just copying patterns.

There is also a famous idea called the "***Chinese Room***" thought experiment. It says that just because a machine can respond in a language does not mean it understands that language. It is like someone following instructions to talk in Chinese without knowing what any of the words mean. AI is the same—it does not understand, even if it seems like it does.

If consciousness is required to close the gap between simulation and understanding, then AI may never bridge that gap. It may always remain a tool, not a conscious thinker.

The Limits of AI and Logic

AI uses logic and algorithms to solve problems. But not everything in life follows simple rules. In the 1930s, a mathematician named Kurt Gödel showed that in any system of logic, there will always be some truths that cannot be proven using that system. That means there are things that can be true, even if a computer cannot prove them.

Humans, on the other hand, can use intuition and imagination. We can look at something and have an "aha!" moment, even if we do not have all the facts. That kind of thinking helps us make scientific discoveries. AI does not have those "aha!" moments. It just follows what it has been trained to do. This reinforces the idea that the consciousness gap is not just philosophical—it has real consequences for how AI operates and what it can ultimately understand.

Understanding vs. Simulating

There is a big difference between understanding something and just simulating it. AI can simulate emotions, like saying "I am

sorry to hear that" when you share bad news. But it does not feel sorry. It does not know what sadness is. It is just using words that seem right based on its training.

The same is true for science. AI can simulate quantum systems and help scientists with their work. But it does not wonder why the universe is the way it is. It does not feel the excitement of discovering something new. It does not worry about whether its ideas are true. That kind of deep thinking only comes from conscious minds. The consciousness gap is what separates the simulator from the understander.

The Importance of Human Curiosity

Great scientists like **Albert Einstein** and **Niels Bohr** did not just solve maths problems. They asked big questions about reality. They used imagination, curiosity, and debate to explore the unknown. They even got things wrong sometimes, but those mistakes helped them learn. But AI does not get curious. It does not dream or wonder. It can only work with what it has been given. That is why it cannot lead the way in discovering new ideas. It can help, but it cannot be the explorer. The consciousness gap denies AI the very fuel of discovery—curiosity.

The Future of AI and Science

In the future, AI will keep getting smarter. It will help us solve problems faster and do things humans cannot. It might help build better computers, find new medicines, or even help with space travel. But we should remember that AI is a tool. It can do amazing things, but it is not alive. It is not a person. We should not treat it like it has feelings or give it control over decisions that need wisdom and care.

Some people worry that if we start trusting AI too much, we might forget the value of human thought. We might think that being smart is all that matters. But true understanding needs more than smartness. It needs curiosity, imagination, and consciousness—the very qualities that define the human experience.

Conclusion

AI is one of the most powerful tools humans have ever made. It can do things that once seemed impossible. But no matter how clever it gets, it does not have consciousness. It can solve problems, but it cannot wonder about them. It can say kind words, but it cannot feel kindness. It can help with science, but it cannot understand the mysteries of the universe.

So while AI will be a brilliant assistant, the job of discovering the true meaning of the universe might still belong to us. The consciousness gap may be the defining line that separates tools from thinkers, and simulations from true understanding. And maybe that is what makes us human.

Ecology Is the Real Economy

In recent years, the phrase "***Ecology is the permanent economy***" has become a powerful message for our time. First spoken by environmentalist Sunderlal Bahuguna and shared again by P. Ragavan in "***Ecology is the World's Permanent Economy***" (The Hindu, May 14, 2025), these words remind us of something very important: our survival and success as humans depends on the health of nature. Ecology is not a side issue. It is not just about saving trees or protecting animals. It is the very base of our economy and lives.

But why is it so hard for modern society to accept this? Even though we know about climate change, pollution, and the loss of animals and plants, many still believe that the economy — making money and growing industries — comes first. This essay explains why that idea is wrong. It shows how nature and the economy are not enemies. In fact, without nature, there can be no economy. By looking at history, science, culture, and philosophy, we can learn how to rebuild our lives in balance with the Earth.

The Link Between Ecology and Economy

The word "ecology" means the study of the home we all share — Earth. "***Economy***" means managing our home. So, both words come from the same root idea. Yet, in practice, the economy is often treated as if it stands alone, while the natural world is pushed aside. Governments and companies focus on profits, growth, and production, forgetting that everything — food, water, energy, and even the air we breathe — comes from the Earth.

Carl Folke and other scientists write in "***Reconnecting to the Biosphere***" (AMBIO, 40, 2011: pp.719–738) that humans are not separate from nature: "***People and societies are integrated parts of the biosphere***," they say. "***We depend on its life-support***" (Folke et al., p. 719). This means our economy is just one part of a much larger system: the Earth. It cannot survive if we destroy the very systems that keep us alive.

Unfortunately, we are already doing great damage. Forests are cut down, oceans are polluted, and the climate is warming fast. We are treating nature like a bank account from which we only withdraw, never deposit. But as Folke warns, the environment cannot keep giving forever without breaking (p. 721).

Lessons from History

To understand how we got here, we need to look at our past. In early human societies, people lived in close contact with nature. They hunted, gathered, and later farmed to meet their basic needs. Their use of natural resources was small and local. Many cultures, including those in India and among Indigenous peoples, had strong traditions of respecting the land.

But this changed with the rise of industrial societies. When machines, factories, and empires grew, so did the hunger for resources. Colonial powers took over lands, cleared forests, and dug up minerals to fuel their economies. Amitav Ghosh, in The Nutmeg's Curse: Parables for a Planet in Crisis (Penguin, 2021) tells the sad story of how the Dutch violently took over the Banda Islands for control of the nutmeg trade (Ghosh, pp. 1–10). This story is not just about spices. It is about how nature and people were turned into things to be used and controlled.

This thinking still continues today. We build huge cities, use more and more energy, and dump waste into rivers and seas. We act as if nature is endless and only valuable if it can be sold. But this is not true. As Ghosh warns, we are now in the "Anthropocene" — a new age where humans are changing the planet itself, often in dangerous ways (p. 6).

The Cost of Disconnection

Why have we let this happen? One reason is that many people today feel disconnected from nature. We live in cities with concrete buildings, busy roads, and glowing screens. It is easy to forget where our food comes from, or how trees clean the air. Robin Wall Kimmerer, a scientist and Indigenous writer, says, in Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants (Milkweed Editions, 2013, her students could name all the ways humans harm the planet, but could not name even one way we help it (Kimmerer, 2013, p. 7). This is a big problem. If we cannot imagine a good relationship with nature, how can we build one?

Kimmerer tells the story of Skywoman, a creation story from her people. Skywoman falls from the sky, is caught by geese, and helps create the Earth with the help of animals. This story teaches that we live with nature, not above it. It teaches gratitude, care, and balance. These values are needed today more than ever.

In Indian traditions too, nature is seen as alive and worthy of respect. Philosopher Meera Baindur explains that in Indian thought, humans are not separate from the world. Nature is not just something to use — it is part of who we are (Nature in Indian Philosophy and Cultural Traditions, Springer, 2015, p. 11). Many Indian texts talk about living in harmony with the Earth, not just for survival, but as a moral duty.

A Crisis of Culture and Values

Today's problems are not just technical — they are cultural. We have created a world where success is measured by money, not meaning. Our education, media, and politics often leave out the importance of nature. As P. Ragavan writes, we are suffering from "an emotional and spiritual alienation from the natural world." We do not feel the urgency in our bones, even though the Earth is crying out with floods, fires, and storms.

This disconnection also blinds us to our responsibilities. While other animals take only what they need, humans plan for years ahead and extract huge amounts of resources to feed our wants, not just our needs. This makes us powerful, but also dangerous. We are the only species that can destroy the planet — but also the only one that can choose not to.

Rethinking the Economy

If we truly believe that ecology is the permanent economy, then our systems must change. We need to stop treating nature as an externality — a side cost — and start valuing it as a core asset. Clean air, fertile soil, fresh water, and biodiversity are not luxuries. They are the real infrastructure of life.

Paul Hawken explains that we face many global problems — from pollution to poverty — but we also have the tools to solve them. The key is to act quickly, together, and with courage. "There is no time to wait," he writes in **Sustainable World Sourcebook** (**Sustainable World Coalition**, 2010), "Restoring balance and sustainability... will take our best minds and a critical mass of citizens" (Hawken, p. 2).

This also means changing what we count as progress. Today, governments use measures like GDP (Gross Domestic Product) to show how much an economy is growing. But GDP does not count damage to nature, unpaid care work, or health problems caused by pollution. We need better ways to measure true well-being — ones that include happiness, equality, and ecological health.

A New Way of Living

While these changes seem big, they can start small. Each person can choose to live in a way that respects the planet. This means buying less, wasting less, and supporting local, green businesses. It means using renewable energy, planting trees, and protecting wildlife. Most of all, it means remembering that we are not owners of the Earth, but its caretakers.

Robin Wall Kimmerer talks about "**the Honorable Harvest**" — a set of rules for living well with nature. These include: never take the first one, never take the last, take only what you need, use everything you take, and give something back (Kimmerer, 2013, p. 179). These are simple, powerful rules that even a child can understand — and the world badly needs.

Education must play a big role too. Schools should teach ecological literacy as seriously as reading or maths. Children should learn how food is grown, how ecosystems work, and why water is precious. They should also learn respect, patience, and wonder. As Baindur reminds us, these values have deep roots in many cultures — we just need to bring them back (Baindur, 2015, p. vii).

Conclusion: Building a Future in Harmony with Nature

The climate crisis, biodiversity loss, and pollution are not just problems to fix. They are messages telling us that we have taken the wrong path. They are reminders that we have forgotten something very old and very true: that the Earth is not a machine to control, but a living system to care for.

"Ecology is the permanent economy" is more than a slogan. It is a way of seeing the world. It asks us to stop chasing endless growth and start building societies that are fair, kind, and in balance with nature. It asks us to reconnect with the Earth — not with fear, but with love and responsibility. If we do this, we can create a world where all life can thrive — not in spite of nature, but because we live in harmony with it.

Prelims

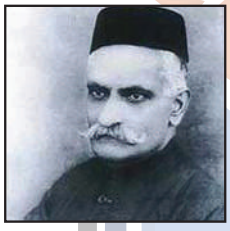
Motilal Nehru

Sub- Topic: *Modern Indian History significant events, personalities, issues.*

Context:

164th Birth Anniversary of prominent freedom fighter Motilal Nehru.

Who was Motilal Nehru?



Motilal Nehru (**1861–1931**) was a **distinguished Indian lawyer**, **political leader**, and a **pivotal figure** in the Indian freedom movement during the colonial period. He was a **two-time President of the Indian National Congress** and the **father of Jawaharlal Nehru**, **India's first Prime Minister**.

Contributions to the Indian Freedom Movement

- **Leadership in the Indian National Congress: Motilal Nehru** served as Congress President twice, in **1919** (**Amritsar**) and **1928** (**Calcutta**), during critical phases of the independence struggle.
  - He played a key role in shaping Congress policy, especially as the movement transitioned from **constitutional methods to mass civil disobedience** under **Mahatma Gandhi's influence**.
- **Founding the Swaraj Party:** In response to the suspension of the **Non-Cooperation Movement** after the Chauri Chaura incident in 1922, **Motilal Nehru**, along with **CR Das**, founded the **Swaraj Party** in 1923.
  - The **Swaraj Party** aimed to **enter legislative councils** and **oppose British rule** from within, marking a strategic shift in the freedom movement. This approach provided a platform to challenge colonial policies and demand self-governance (Swaraj) through constitutional means.
- **The Nehru Report (1928):** Motilal Nehru chaired the committee that drafted the Nehru Report, the first major Indian effort to frame a **constitution for self-government**.
  - The Nehru Report advocated for **dominion status**, **fundamental rights**, and a **parliamentary system**. Although it was ultimately rejected by the British and some Indian groups, it became a reference point for future constitutional reforms and negotiations.
- **Participation in Mass Movements: Motilal Nehru** was an active participant in the **Non-Cooperation Movement** (**1920–22**) and the **Civil Disobedience Movement**, both of which aimed to mobilise Indians against British rule through boycotts, non-violent protests, and Satyagraha.
  - He abandoned his lucrative **legal practice**, adopted **khadi**, and set an example by **burning foreign goods** and embracing a simpler lifestyle in solidarity with the movement.
- **Advocacy for Social Reform:** Motilal Nehru promoted women's rights and education, recognising that social progress was integral to national freedom. He helped establish the **Swaraj Ashram** in **Allahabad**, which became a centre for promoting education and Indian culture.
- **Journalism and Public Opinion:** He founded and edited influential newspapers such as ***The Leader*** and ***The Independent***, which became platforms for nationalist ideas and mobilisation. Through journalism, he articulated the demand for natural rights and unity across religious and racial lines, reinforcing the secular and inclusive vision of the freedom movement.

Behramji Malabari

Sub- Topic: *Modern Indian History significant events, personalities, issues.*

Context:

172nd Birth Anniversary of social reformer **Behramji Malabari**.

Who was Behramji Malabari?

- **Behramji Merwanji Malabari** (1853–1912) was a prominent **Parsi poet**, **journalist**, **author**, and **social reformer from India**.
- He is best remembered for his pioneering efforts in advocating for **women's rights**, particularly against **child marriage** and **enforced widowhood**, and for his broader work in social reform during the late 19th and early 20th centuries.

Major Contributions

- **Advocacy Against Child Marriage and Enforced Widowhood:** Malabari was a leading voice against the practices of child marriage and enforced widowhood, which were deeply entrenched in Indian society at the time.
  - In 1884, he published ***Notes on Infant Marriage and Enforced Widowhood***, which he sent to thousands of influential figures in both India and Britain, highlighting the plight of women and demanding legislative action.

- **Role in the Rukhmabai Case and Legal Reform:** Malabari played a pivotal role in the **famous Rukhmabai case** of 1885, where a young woman, Rukhmabai, was ordered by a court to either live with her husband (to whom she had been married as a child) or face imprisonment.
  - Through powerful editorials and public advocacy, Malabari brought national and international attention to the case, eventually contributing to the passage of the **Age of Consent Act** of **1891**, which raised the minimum age of consent for girls in India from **10 to 12 years**.
  - He also contributed to the passage of the **Criminal Law Amendment Act of 1885** in the UK, which raised the age of consent there as well.
- **Promotion of Women's Education and Welfare:** In 1908, he co-founded the **Seva Sadan Society** in **Bombay**, a pioneering social welfare organisation dedicated to the rehabilitation, education, and empowerment of women who had been exploited or marginalised by society.
- **Campaign Against Sati and Other Social Evils:** Malabari was a vocal critic of the practice of Sati (the burning of widows), working alongside other reformers to eradicate the practice, especially in rural areas where it persisted despite legal bans. He also worked to dispel superstitions and challenge the misinterpretation of Hindu scriptures by the priestly class, which he believed perpetuated harmful customs.
- **Literary and Journalistic Work:** As editor of the ***Indian Spectator*** and through his poetry and prose, Malabari used literature and journalism as tools for social change.

Famine Commission of 1901

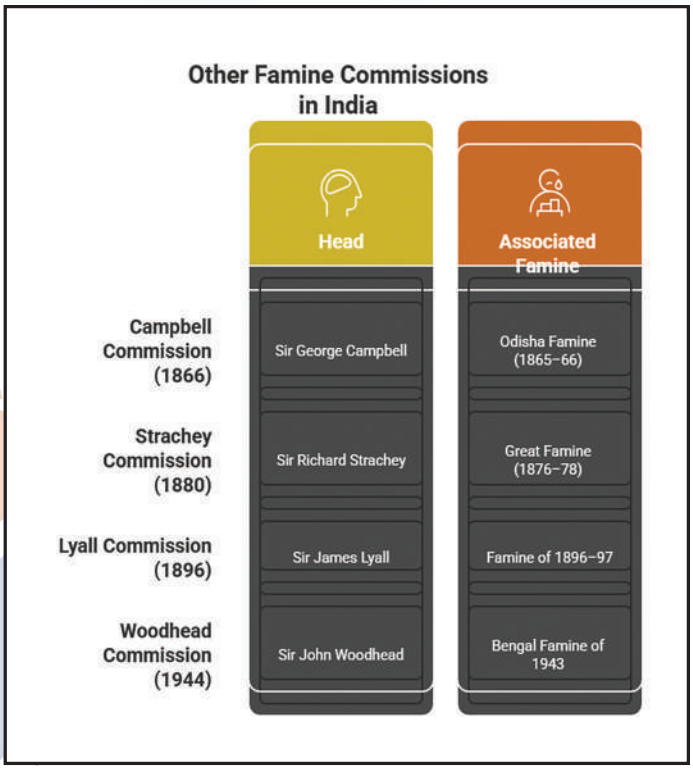
Sub-Topic: *The Freedom Struggle — its various stages and important contributors/contributions from different parts of the country.*

Context:

The **Famine Commission of 1901**, also known as the **MacDonnell Commission**, was established in the aftermath of the severe famine of **1899–1900**, which affected large parts of India and resulted in widespread distress and mortality. **Lord Curzon**, the then Viceroy of India, appointed the commission to review existing famine policies and recommend improvements based on recent experiences.

Key Recommendations

- **Early Relief Measures:** Emphasised the need for **prompt distribution of advances for the purchase of seeds and cattle**, and for the digging of temporary wells to support agricultural recovery.



- **Appointment of Famine Commissioners:** Advocated for the appointment of a famine commissioner in any province where relief operations were expected to be extensive, to ensure better coordination and management.
- **Non-Official Assistance:** Recommended enlisting non-official (voluntary and community) assistance on a larger scale to supplement government efforts.
- **Transport and Infrastructure:** Stressed the importance of improving transport facilities, which would facilitate the movement of food grains and relief materials to affected areas.
- **Agricultural Banks and Irrigation:** Urged the **opening of agricultural banks** and the improvement of irrigation facilities to enhance agricultural resilience and reduce vulnerability to drought.
- **Agricultural Improvement:** Called for vigorous measures to improve agricultural practices and methods, thereby increasing productivity and food security.
- **Continuous Official Vigilance:** Recommended that the official machinery dealing with famine should function year-round, not just during crises, to ensure preparedness and timely intervention.

Shirui Lily Festival

Sub- Topic: *Indian Culture - Salient aspects of Art Forms.*

Context:

The **Shirui Lily Festival**, named after the **endemic Shirui Lily flower**, began in **Ukhrul district** of Manipur on **May 20, 2025**, after a **two-year hiatus** due to ethnic violence between the **Kuki-Zo and Meitei communities**.

More on News

- The return of the **Shirui Lily Festival**, a five-day cultural celebration, was meant to symbolise a fragile peace in the conflict-ravaged state.
- The **2025 edition**, running from **May 20-24**, marks the **75th anniversary** of the Shirui Lily's discovery, making it a special occasion for both **tourism** and **conservation** efforts.

What is the Shirui Lily Festival?

- **Organised by:** Manipur government's Department of Tourism.
- **First held:** 2017.
- **Type of festival:** Eco-tourism and cultural festival.
- **Location:** Ukhrul district, home to the Tangkhul Naga community.
- **Purpose:** Raise awareness about the Shirui Lily (Manipur's state flower) and promote tourism in the Ukhrul hills.

- **Events included:** Cultural performances, music concerts, beauty pageant, trash-collection marathon, and cooking competition.
- **Timing:** Coincides with the blooming season of the Shirui Lily; this year from May 20 to May 25.
- **Related festival:** Manipur also hosts a major tourism festival named after the Sangai (Manipur's state animal).

Mains

Caste Census in India: A Bold Step Towards Inclusive Social Justice

Sub-Topic: *Government policies and interventions for development in various sectors and issues arising out of their design and implementation.*

Context:

The Cabinet Committee on Political Affairs (CCPA), chaired by the Prime Minister, has approved caste enumeration in the upcoming decadal Census, reversing the 2021 position where the government had declined such inclusion. This decision addresses a long-standing demand from political parties and social justice advocates and has far-reaching implications for governance, affirmative action, and electoral representation.

Historical Evolution of Caste Enumeration in India

- Pre-Independence:
  - The last comprehensive caste census was conducted in 1931.
  - Though data was collected in 1941, it was never published.
- Post-Independence:

Legal and Constitutional Framework

- Census is a Union subject under Entry 69 of the Seventh Schedule.
- Governed by the Census Act, 1948—but this does not mandate caste enumeration.
- Several petitions in the Supreme Court are pending, seeking directions for a caste census.

- Since 1951, the Census has only recorded caste data for Scheduled Castes (SCs) and Scheduled Tribes (STs).
- Other Backward Classes (OBCs) and other castes have been excluded.

2011 Socio-Economic and Caste Census (SECC):

- Conducted as a separate exercise at a cost of ₹4,900 crore, under the Ministry of Rural Development.
- Data remains unpublished, reportedly due to inconsistencies (e.g., listing 46 lakh castes).
- Lacked legal backing under the Census Act, 1948, and was poorly designed and executed.

Changing Government Positions and Political Context

- Earlier Position (2021): The government cited logistical and practical difficulties and ruled out caste enumeration beyond SC/ST.

Administrative Status of the Pending Census

- The 2021 Census has been delayed due to the COVID-19 pandemic.
- It involves two parts:
  - House Listing and Housing Census
  - Population Enumeration
- The questionnaire is now being updated to include caste data.
- The tenure of Registrar General of India (RGI) extended till August 2026—a signal of preparations.

- Bihar and Tamil Nadu surveys showing effective caste-based targeting created momentum.

Significance of the Caste Census

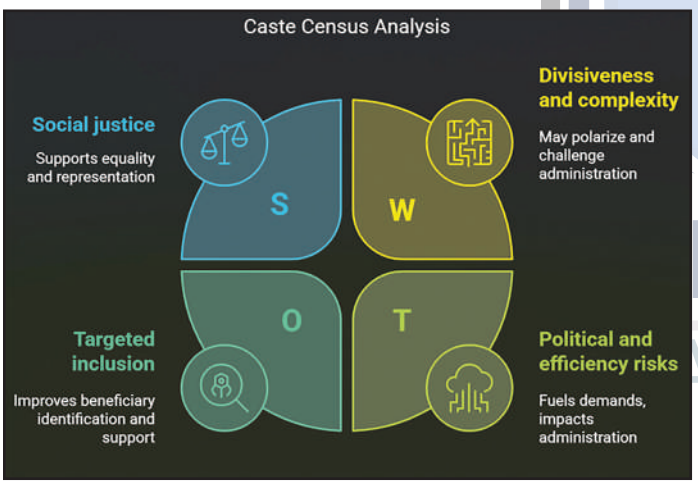
- Policy and Welfare Targeting
  - Enables data-driven policy by identifying gaps in welfare delivery.
  - Allows better targeting of schemes under laws like the National Food Security Act. E.g., Bihar's 2023 caste survey found 90% of people needed subsidised food, versus 84% under NFSA.
- Sub-Categorisation of OBCs
  - Addresses intra-OBC inequities through 'quota within quota' mechanisms.
  - Dominant castes currently corner benefits—detailed data will correct this.
  - Supports the efforts of the Justice G. Rohini Commission on sub-categorisation.
- Electoral Delimitation
  - Delimitation is frozen until the post-2026 Census as per constitutional provisions.
  - Caste data will impact Lok Sabha and Assembly seat redrawing, altering power balances.
- Legal and Judicial Clarity: OBC reservations in local bodies (as per Articles 243D(6) and 243T(6)) have faced judicial stays in states like Maharashtra, UP, Karnataka—due to a lack of empirical caste data.

Arguments in Favour of a Caste Census

- Social Imperative
  - Caste remains central to Indian society. Only 5% of Indian marriages were inter-caste (2011–12).
  - Political representation and cabinet formation are influenced by caste affiliations.
- Constitutional Imperative
  - Articles 15(4), 16(4), and 340 allow for affirmative action based on social and educational backwardness.
  - Caste census aligns with these constitutional mandates.
- Administrative and Moral Imperative
  - Helps identify ghost beneficiaries, improve beneficiary targeting, and ensure creamy layer exclusion.
  - Prevents dominant OBCs from cornering disproportionate benefits.

Arguments Against the Caste Census

- Social Divisiveness: Risks entrenching caste identities, possibly polarising society.



  - Administrative Complexity: Over 4,000 jatis; accurate classification is a logistical challenge.
- Political Fallout
  - Could fuel quota demands from groups like Marathas, Jats, and Patidars.
  - May breach the 50% cap on reservations upheld in Indra Sawhney v. Union of India (1992).
- Risk to Efficiency: Overexpansion of the reservation could impact administrative efficiency (Article 335).
- Lessons from SECC 2011 Failure
  - SECC reported 46 lakh castes due to poor questionnaire design.
  - It lacked legal sanction, unlike the Census Act.
  - In contrast, Bihar's 2023 caste survey, with 214 pre-listed castes, was successful.

Court's Power to Modify Arbitral Awards

Sub-Topic: *Structure, organisation and functioning of the Executive and the Judiciary.*

Context:

In a significant ruling on arbitration law, the Supreme Court of India has held that courts can modify arbitral awards under limited and specific circumstances.

Arbitration is a formal method of dispute resolution where parties agree to submit their dispute to one or more impartial arbitrators, who render a binding decision known as an arbitral award. It is a consensual process, meaning both parties must agree to arbitrate—often through an arbitration clause in a contract or a separate agreement after a dispute arises. Arbitration in India is primarily governed by the Arbitration and Conciliation Act, 1996, which is modelled on the UNCITRAL Model Law and the UNCITRAL Conciliation Rules. This Act consolidated and replaced earlier laws to provide a comprehensive, modern framework for both domestic and international arbitration, as well as conciliation.

Scope of Court Intervention Under Section 34

- The judgment emphasised that the power granted to courts under Section 34 remains tightly confined.
- "The scope of judicial intervention under Section 34 is confined to the limited grounds expressly provided," the bench stated. This includes setting aside awards that are:
  - Against the public policy of India
  - In conflict with fundamental policy or basic notions of morality and justice
  - A result of fraud, corruption, or procedural unfairness
- However, the court affirmed that certain minimal modifications may be permitted to uphold justice without undermining the autonomy of the arbitral process.

Article 142: Powers and Cautionary Use

- Chief Justice Khanna also noted that the Supreme Court retains inherent powers under Article 142 of the Constitution to ensure "complete justice" in exceptional arbitration cases.
- Still, the use of such powers must align with the objectives of the Arbitration and Conciliation Act, 1996, and must not undermine the Act's principles.

Dissenting View Opposes Modification Power

- Justice K. V. Viswanathan dissented from the majority view, arguing that Section 34 strictly provides for setting aside an arbitral award, not modifying it.
- He contended that courts do not have the statutory authority to alter awards unless explicitly provided by law.

Concerns Over International Arbitration Norms

- Legal experts opposing the court's power to modify arbitral awards warned that such a precedent could lead to international enforcement issues.
- They argued that converting arbitral awards into court-decreed modifications could undermine India's credibility under global arbitration frameworks like the New York Convention.

Childhood Hypertension in India

Sub-Topic: *Welfare schemes for vulnerable sections of the population.*

Context:

High blood pressure is often seen as a health issue for older adults — a concern for middle-aged individuals, not for children still in school.

More on News

- But in India, this assumption is rapidly becoming outdated.
- A growing number of children and adolescents are now being diagnosed with elevated blood pressure, often without knowing it until symptoms become too severe to ignore.

Rising Childhood Hypertension in India: A Silent Epidemic

- According to the Comprehensive National Nutrition Survey (CNNS) conducted between 2016–18, 7.3% of Indian adolescents were found to have hypertensive blood pressure levels — rising to 9.1% in urban areas.
- More recently, National Family Health Survey-5 (NFHS-5) data shows that 12% of teens aged 15–19 already have elevated blood pressure.

Processed Food Problem Among Indian Children

- One of the biggest contributors to this health crisis is the increasing consumption of ultra-processed foods.
- Chips, instant noodles, sugary snacks, and salty packaged items dominate the diets of many Indian children today.
  - These foods are high in salt and low in nutrition, engineered to be addictive through bold, artificial flavours that overpower traditional, home-cooked meals.
- Indian adolescents now consume over 8 grams of salt daily — nearly double the WHO-recommended intake for adults.
  - Much of this salt comes from packaged snacks and fast foods, increasing the likelihood of long-term unhealthy eating habits and increasing their risk of hypertension.

Can India's Mid-Day Meal Scheme Be Part of the Solution?

- India's PM POSHAN (mid-day meal) scheme, the world's largest school meal programme, serves over 120 million children in 1.27 million schools.
  - It already plays a vital role in reducing hunger, improving school attendance, and bridging social divides.
- As of 2025, primary students receive 450 calories and 12g of protein per meal, while upper primary students receive 700 calories and 20g of protein.
  - In a country where more than half the population cannot afford a healthy diet (as of 2022), this scheme serves as a critical safety net.

Moving Beyond Basic Nutrition: Making School Meals Engaging and Educational

- While PM POSHAN meets caloric needs, the meals are often repetitive and lack diversity or flavour that appeals to children already hooked on processed foods. What if we could combine nutrition delivery with taste, variety, culture, and food education?
- Introducing regionally inspired menus, using fresh local produce, and even involving students in meal planning and preparation could create a more joyful and educational relationship with food.

Japan's ShoKuiku Model: A Blueprint for Food Education

- Japan offers a successful example through its ShoKuiku or food education programme. In Japanese schools, children:
  - Learn about nutrition, meal planning, and food origins.
  - Participate in meal prep and serving.
  - Enjoy freshly cooked, seasonal meals with no processed snacks or vending machines.
- This approach helps children make informed choices, learn portion control, understand sodium intake, and develop gratitude toward food — all while keeping childhood obesity rates low and food-related health risks in check.

Vietnam's Adaptation of Food Education in Schools

- Vietnam localised the ShoKuiku model in 2012 through a partnership between its Ministry of Education and Ajinomoto. The initiative included:
  - Nutrition education in the curriculum.
  - Tailored meal planning using software.
  - Special training for school cooks.
- By 2022, the programme had scaled to 62 out of 63 provinces, with 4,262 schools adopting the model.

- Healthier, more varied school meals, better food acceptance, and higher awareness among parents and students — all without major infrastructure changes.

Child Labour in India

Sub-Topic: *Welfare schemes for vulnerable sections of the population.*

Context:

On Labour Day 2025, a striking print advertisement by Ogilvy India caught national attention. With the provocative headline — "This Labour Day, 7.8 million workers should be laid off" — it delivered a powerful message.

More on News

- The subheading explained the twist: "In a country with 35.6 million unemployed adults, there are 7.8 million children working. Let the adults do the work and let the children go to school."
- This campaign, embodying David Ogilvy's timeless mantra — "Big ideas are usually simple ideas" — shed light on the urgent and persistent crisis of child labour in India.

Grim Reality of Child Labour in India

- Human Rights Violations: Despite years of policy promises and legal frameworks, child labour continues to be a serious human rights violation in India.
- UNICEF Analysis: According to a UNICEF analysis of the Periodic Labour Force Survey (2018-19), the number of child labourers in India ranges from 1.8 million (using the national definition) to 3.3 million (under international standards).
  - Nearly half of all working children are employed within their own families.
  - The agricultural sector employs the highest number of child workers, followed by manufacturing and construction industries.

Worst Forms of Child Labour: Hazardous and Inhumane

- Most Dangerous: The most dangerous forms of child labour are found in industries like:
  - Matchstick and firework production
  - Glass and leather manufacturing
  - Brick kilns
  - Coal mines
  - Construction work
- Various Concerns: These sectors expose children to toxic materials, long work hours, low wages, and frequent physical and verbal abuse.
  - Many children suffer from injuries, long-term health problems, and are denied even basic hygiene and medical access.

Child Labour and Poverty: A Vicious Cycle

- The International Labour Organisation (ILO) recognises child labour as both a cause and consequence of poverty.
- In poor households, children are often compelled to work to supplement family income or for mere survival.
  - This has devastating effects on education and health.
- India also carries the burden of hosting half the world's wasted children (low weight-for-height), showing the direct link between malnutrition and forced child labour.

Gaps in Data and Governance

- Despite constitutional protections under Article 24 and legal bans in the Child and Adolescent Labour (Prohibition and Regulation) Act, 1986 (amended 2016), enforcement remains dangerously weak.
  - In 2021, only 613 cases were registered under the Act.
  - In a Parliament session, a question regarding child labour statistics by gender and region went unanswered.
- The last Census was held in 2011, and the 2021 Census has not yet been conducted, leaving a data vacuum that hinders effective policymaking.
- This lack of reliable data makes it nearly impossible to gauge the true scale of the problem, let alone solve it.

Prelims

Digital Accessibility is a Fundamental Right for PwDs

Sub-Topic: *Indian Constitution—historical underpinnings, evolution, features, amendments, significant provisions and basic structure.*

Context:

In a landmark decision on April 30, 2025, the Supreme Court of India reinterpreted Article 21 of the Constitution to include the 'right to digital access', directing the government to revise Know-Your-Customer (KYC) norms to ensure universal digital accessibility for persons with disabilities (PwDs).

What Legal Safeguards Exist for Persons with Disabilities in India?

- Equality and Dignity: India's Constitution—through the Preamble, Fundamental Rights, and Directive Principles of State Policy—obligates the state to secure equality and dignity for PwDs.
- **Legal Dimension:** This mandate is further advanced by the Rights of Persons with Disabilities (RPwD) Act, 2016, which adopts a social-barrier model of disability.
  - It recognises that disability arises not just from impairments but from the societal, physical, and systemic obstacles that hinder full participation in society.

- **Accessibility:** Section 42 of the RPwD Act specifically requires the government to ensure that all audio, print, and electronic media are accessible. This includes:
  - Audio descriptions
  - Sign-language interpretations
  - Captions on digital content
  - Universal design standards for electronic goods and digital platforms

UN Convention on the Rights of Persons with Disabilities (UNCRPD)

It is a landmark international human rights treaty adopted by the UN General Assembly on December 13, 2006. It aims to promote, protect, and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity. The UNCRPD covers a wide range of civil, political, economic, social, and cultural rights. The Convention is legally binding on states that have ratified it. As of November 2024, it has been ratified by 191 parties (190 states and the European Union).

Supreme Court's Directive on Inclusive Digital Access

- In its ruling, the Supreme Court reaffirmed that accessibility is a constitutional imperative under Article 21—the right to life and dignity.
- Citing its previous verdicts, including Rajive Raturi vs Union of India (2024), the court emphasised that digital services must incorporate accessibility from the outset.
- Highlighting the broader impact of the digital divide, the court noted that inaccessible systems affect not just PwDs but also rural populations, senior citizens, economically weaker sections, and linguistic minorities.

Article 143: Presidential Reference Highlights Concerns Over SC Verdict on Bill Assent

Sub-Topic: *Structure, organisation and functioning of the Executive and the Judiciary.*

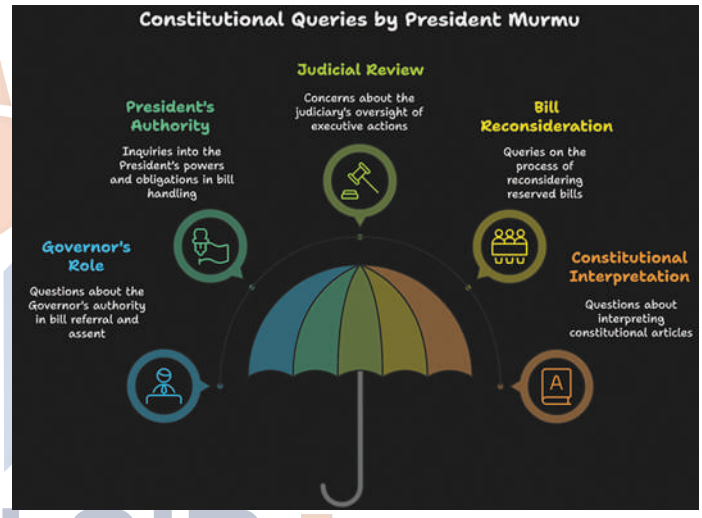
Context:

President Droupadi Murmu, in a rare move, sought the opinion of the Supreme Court through a Presidential Reference, on whether the court can "impose" timelines and prescribe the manner of conduct of Governors and the President while dealing with State Bills sent to them for assent or reserved for consideration.

Supreme Court's Stand

- The court invoked Article 142 to deem all 10 Bills as assented to, calling the Governor's delay illegal.
- The ruling came in response to the Tamil Nadu Governor withholding or delaying assent to 10 Bills passed and repassed by the State Assembly.
- Supreme Court bench (Justices J.B. Pardiwala & R. Mahadevan) ruled that Governors and the President must act within a reasonable time on Bills passed by State legislatures, ideally within three months.
- It emphasised the need to protect federalism and democratic processes from arbitrary gubernatorial delays.

Presidential Reference under Article 143:



- President Droupadi Murmu, advised by the Union government, referred 14 questions to the Supreme Court under Article 143(1), asking:
  - Whether the President and Governors can be subjected to timelines by the judiciary under Articles 200 and 201.
  - Whether Article 142 powers were correctly applied to override constitutional processes.
  - Whether small Benches can rule on matters requiring constitutional interpretation.
  - Whether such matters fall under exclusive original jurisdiction under Article 131.

What is a Presidential Reference?

Constitutional Basis: Article 143

A Presidential Reference is a mechanism provided under Article 143 of the Indian Constitution, which allows the President of India to seek the opinion of the Supreme Court on questions of law or fact of public importance.

There are two parts to Article 143:

- Article 143(1): The President can refer to the Supreme Court a question of law or fact that has arisen or is likely to arise, and is of public importance, and seek its advisory opinion.
- Article 143(2): If there is a dispute involving pre-constitutional treaties or agreements, the President can refer such matters to the Supreme Court.

Key Features of Article 143(1)

- Discretionary Power of the President: The President may decide to seek the Court's opinion but usually acts on the advice of the Council of Ministers.
- Advisory Nature: The Supreme Court's opinion under Article 143 is not binding, unlike its rulings in regular cases.
- Supreme Court's Discretion: The Court may decline to answer a reference if it deems the question not justiciable or inappropriate (as it did in the Ram Janmabhoomi-Babri Masjid Reference in 1993).
- Heard by Constitution Bench: Such references are generally heard by a five-judge Constitution Bench as per Article 145(3), which deals with cases requiring interpretation of the Constitution.

Past Examples of Presidential Reference

- In Re Berubari Union (1960) – Regarding the ceding of Indian territory to Pakistan.
- Keshav Singh's Case (1965) – On legislative privileges vs fundamental rights.
- Babri Masjid case (1993) – The SC declined to answer on historical facts due to pending litigation.
- Cauvery Water Disputes (1991) – On the Tribunal's jurisdiction and implementation.

Panchayat Advancement Index (PAI)

Sub-Topic: *Devolution of powers and finances up to local levels and challenges therein.*

Context:

India's journey toward evidence-based governance faces significant roadblocks, with experts highlighting persistent delays in Census operations and the inconsistent availability of long-term, time-series data.

More on News

- Additionally, the change in methodologies across surveys and the complexity of government databases further limit the usability of data for decision-making.
- Although the Indian government has launched several initiatives, such as the National Data Sharing and Accessibility Policy (NDSAP), 2012, and portals like Data.gov.in, accessibility and usability remain major concerns for researchers, elected representatives, and the general public.

PAI: A Milestone in Data-Driven Panchayati Raj

- The Panchayat Advancement Index (PAI) Baseline Report 2022-23, was officially released in April 2025 by the Ministry of Panchayati Raj, marks a significant shift.
- The PAI is a composite index based on 435 local-level indicators—including 331 mandatory and 104 optional metrics—capturing 566 unique data points.
  - These indicators align with the Localisation of Sustainable Development Goals (LSDGs) and the National Indicator Framework (NIF) by the Ministry of Statistics and Programme Implementation.
- Data from over 2.16 lakh gram panchayats (GPs) were validated and analysed, offering detailed insights across nine LSDG themes.
  - What sets the PAI apart is its accessibility—designed so that even a sarpanch or ward member, with minimal support, can understand their GP's standing and what steps need to be taken to improve.
- However, not all states performed equally.
  - While 25 States/UTs submitted nearly complete validated data, Uttar Pradesh submitted data for only 40% of its GPs (23,207 out of 57,702), raising concerns about transparency and development in India's most populous state.

A Tool for Inclusive Governance

- The newly launched PAI Portal serves as a powerful tool for local officials, elected representatives, and even civil society organisations (CSOs).
- It allows users to generate constituency-wise reports, aiding Members of Parliament and MLAs in planning targeted interventions to achieve the SDGs.
- For example, under the "Healthy Panchayat" indicator, a GP's performance can now be directly correlated to specific healthcare outcomes, highlighting gaps and guiding prompt interventions.
  - This outcome-oriented data empowers all stakeholders—from frontline health workers to civil society—to play an informed role in rural development.

Indian Economy

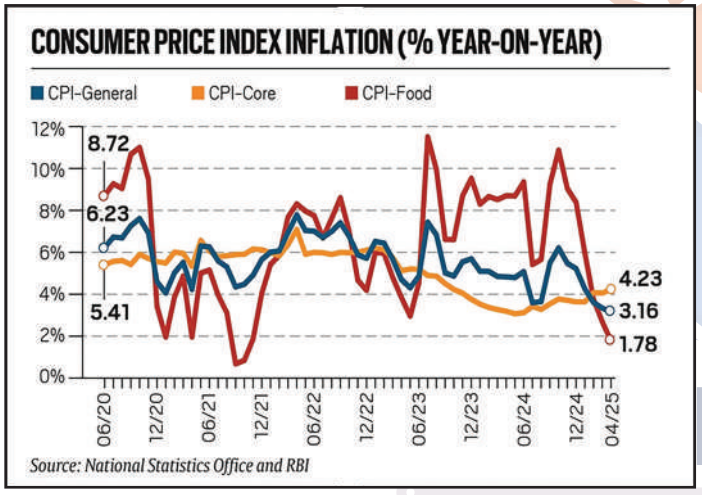
Mains

India's Inflation Softens

Sub-Topic: Indian Economy and issues relating to Planning, Mobilisation of Resources, Growth, Development and Employment.

Context:

Between February 2023 and February 2025, the **Reserve Bank of India (RBI) held its benchmark repo rate steady at 6.5%,** despite mounting calls for monetary easing.



More on News

- This two-year period saw **headline consumer price index (CPI) inflation average 5.2%,** while **consumer food price index (CFPI)** inflation was significantly higher at **7.6%.**
- Meanwhile, **core inflation**—which excludes volatile food and fuel prices—**averaged a modest 4.1%, well within the RBI's medium-term target of 4%.**
- Many economists and policymakers argued that the **RBI should focus more on core inflation rather than headline CPI,** since food and fuel prices are largely influenced by supply-side shocks like weather anomalies or geopolitical developments, beyond the reach of traditional monetary tools like interest rate changes.
- Notably, the **Union Commerce and Industry Minister criticised the practice of using food inflation as a guide for rate decisions, calling it an *"absolutely flawed theory."***

Why RBI's Rate Cut Came Later Than Expected

- **Delayed Policy Easing:** Despite core inflation falling to just 3.1% by June 2024, the **RBI delayed its policy easing,** finally **reducing the repo rate by 0.25 percentage points** each in February and April 2025, bringing it down to 6%.
- **High Food Inflation:** From July 2023 to January 2025, **food inflation remained elevated due to two major supply shocks:**
  - The **Russia-Ukraine war,** which disrupted global agri-commodity supplies and pushed up prices.
  - A **prolonged El Niño weather event** (April 2023 to May 2024), which led to poor monsoon rains, reduced winter rainfall, and intense heatwaves—hurting agricultural output and fuelling food price inflation.
- **Reversal:** However, recent months have seen a sharp reversal in inflation trends:
  - **April 2025 CFPI inflation dropped to 1.8%**, its lowest since October 2021.
  - **Headline CPI inflation declined to 3.2%,** the lowest since July 2019.
  - Interestingly, **core inflation rose slightly to 4.2%**, the highest since September 2023.

Food Inflation Outlook: Positive Signals

- **India's food inflation outlook appears benign for several reasons:**
- **Improved Monsoon:** The end of **El Niño and the onset of a mild La Niña** has **improved the monsoon forecast for 2025.**
- **Crop Arrivals:** India has seen record crop arrivals from the kharif (monsoon-sown) and rabi (winter) harvests.
- **Stable Food Prices: T**he **FAO food price index** in April stood at 128.3 points, **well below its March 2022 peak of 160.2.**
  - The **USDA forecasts record global output of wheat, rice, corn, and oilseeds for 2025-26.**

Oil Prices, Rupee Stability, and Import Trends: A Boon for Inflation Control

- **Fuel inflation has also cooled:** Brent crude oil is trading at just above $65 per barrel, compared to $83 a year ago.
- **Recovered Rupee:** The Indian rupee, which had weakened to a record 87.99/$ in February 2025, has recovered to 85.5/$ as of mid-May.

- **Foreign Reserves:** Foreign exchange reserves have **rebounded to $690.62 billion,** following heavy foreign portfolio outflows in late 2024 due to Trump-era protectionist policies.
- **FPIs:** Foreign portfolio investors (FPI) **have returned, pumping $1.3 billion into Indian markets in May 2025.**
- **Disflationary Pressure:** At the same time, **Chinese and Vietnamese goods are being redirected to India due to US tariffs,** creating **disinflationary pressures.**
  - The Indian government has responded with **anti-dumping duties on several Chinese imports like aluminium foils,** PVC paste resin, solar glass, and more—ensuring protection for domestic industries without spurring overall inflation.

Agrivoltaics in India

Sub - Topic: E-technology in the aid of farmers.

Context:

In 1981, German scientists **Adolf Goetzberger and Armin Zastrow** laid the foundation for a revolutionary idea — integrating agriculture and solar energy generation. Their research proposed raising solar panels about **2 meters above the ground** to allow crops to grow underneath, thereby introducing the concept of **agriphotovoltaics (APVs)**.

What are Agriphotovoltaics (APVs)?

- APVs integrate **solar power generation** with **agricultural activities**. Instead of competing for land, APVs make dual use of it: crops are cultivated beneath or between rows of elevated solar panels. Farmers benefit from:
  - The **sale of electricity** to the grid through a **feed-in tariff (FiT)**.
  - The ability to grow crops, especially **shade-loving and high-value varieties**, under a more controlled microclimate.
  - Improved **land productivity**, income stability, and **reduced heat stress** on plants due to moderated microclimatic conditions.
- **Two primary layouts support cultivation in APV systems:**
  - **Interspace Orientation** – crops grow between panel rows.
  - **Overhead-Stilted Orientation** – panels are elevated, allowing crops to grow beneath.

What's Holding APVs Back in India?

- **High Capital Costs**: Most Indian farmers are **smallholders with less than 2 hectares of land**, making **high-capital investments** in APVs inaccessible.
  - A **1-MW ground-mounted solar plant** over 5 acres costs approximately **Rs 2.7 crore** — with APVs requiring **11% more investment** for elevated structures and interspace farming provisions.
- **Low Feed-in Tariffs (FiTs)**: Without a **remunerative feed-in tariff (FiT)**, the economics remain unfavourable.
  - For instance, under Rajasthan's PM-KUSUM scheme, the current FiT of **Rs 3.04/unit** results in a **15-year payback** for a ground-mounted solar plant.
  - However, if tariffs matched the **thermal average purchase price (Rs 4.52/unit)**, the **payback drops to just four years**, vastly improving APVs' appeal.
- **Lack of National Standards**: India lacks formal **technical or performance guidelines** for APVs. In contrast:
  - Japan mandates APVs to be **temporary and removable**, with a **minimum panel height of 2 m** and limits crop yield loss to **20%**.
  - Germany's **DIN SPEC 91434** standard requires **66% yield retention** and **caps land lost to solar structures at 15%**, ensuring agriculture remains the priority.
- **Smallholder Exclusion**: Unless APVs are scaled through **Farmer Producer Organisations (FPOs)** or cooperatives, smallholders risk being left behind.

Policy and Investment Pathways

- To scale APVs effectively, India needs two foundational shifts:
- **Strong Farmer-Centric Policies:**
  - Establish **national APV standards** on panel height, yield protection, and land-use balance.
  - Revise **PM-KUSUM** to include APVs as eligible components.
  - Ensure farmers **retain agricultural rights** even when leasing land for solar.
- **Economic Incentives and Support:**
  - Offer **attractive FiTs** that reflect true power costs and solar potential.
  - Support from financial institutions like **NABARD** through **credit guarantees** and **capital grants** can further lower entry barriers.
  - Provide **financial support for FPOs and cooperatives** to set up APV systems.
  - Launch **capacity-building and training programmes** for farmers to manage APVs.
- India can draw from **success stories** like the Sahyadri FPO in Maharashtra, which runs a **250-kW APV project** cultivating grapes and citrus under solar panels. Their experience underscores the role of institutions in **reducing risks and enabling market access**.

Boosting High-Tech Manufacturing

Sub- Topic: Changes in Industrial Policy and their Effects on Industrial Growth.

Context:

Global manufacturing is rapidly transitioning toward innovation-driven, high-tech products, fuelled by advanced R&D, skilled labour, and complex supply chains.

Key Indicators Reveal Gaps

- **Manufacturing Sector:** In 2023, India's manufacturing sector reported a per capita value added of $0.32K (K=1000) and productivity of $8.9K—figures that fall well below the global averages of $2K and $32K, respectively, according to **World Bank data.**
- **Value Added:** India's **total manufacturing value added stood at $461 billion,** in stark contrast to **China's $4,658 billion and the U.S.'s $2,497 billion.**
- **Productivity:** When it comes to productivity driven by R&D and innovation, developed economies maintain a clear lead—**with the U.S. at $159K and Germany at $103K.**
  - Among Asian nations, **Taiwan ($79K), Malaysia ($36K), and China ($21K)** have also made significant strides.
- To compete, India must increase productivity, R&D investment, and high-tech capabilities.

Revamping Technical Education for Innovation

India's engineering institutions must evolve to meet industry demands. Key reforms needed:

- **Entrance Exams:** Shift focus from rote learning to problem-solving, creativity, and fundamental knowledge.
- **Curriculum Overhaul:** Reduce reliance on theoretical learning; increase practical training (50% weightage).
- **Advanced Labs & Workshops:** Upgrade facilities for product design, tooling, and prototype development.
- **Industry-Aligned R&D:** Set up assembly lines and innovation hubs within campuses.

Strengthening Core Engineering Beyond IT & AI

- **Engineering:** While semiconductors, AI, and IT are crucial, India must also prioritise core engineering disciplines: Civil, Mechanical, Electrical, Chemical, Electronics, Automobile, Metallurgy, Biotechnology.
- **Infrastructure Development:** Build high-speed manufacturing systems for diverse terrains (mountains, deserts, oceans).
- **R&D Investment:** Increase from **0.65% to 2% of GDP** to match global leaders like the U.S.

Status of the Manufacturing Sector

The manufacturing sector in India is **experiencing steady, though somewhat uneven, growth.** As of early 2025, **19 out of 23 key manufacturing industry groups recorded positive growth compared to the previous year.** The **sector's contribution to GDP is estimated at 13–14% in 2025,** with the Confederation of Indian Industry (CII) citing a higher figure of 17%. Industrial output, as measured by the **Index of Industrial Production (IIP),** showed a 5% growth in January 2025, up from 4.2% in January 2024. The **Manufacturing Purchasing Managers' Index (PMI)** has remained robust, reaching 58.2 in April 2025-a 10-month high and well above the 50-mark that indicates expansion.

Vizhinjam International Seaport: Unlocking India's Strategic Trade Potential

Sub-Topic: Infrastructure: Energy, Ports, Roads, Airports, Railways etc.

Context:

The Vizhinjam International Seaport in Kerala, inaugurated in 2025 by Prime Minister Narendra Modi, marks a transformative moment in India's maritime infrastructure.

About Vizhinjam International Seaport

- Located just **10 nautical miles** from the **international East-West shipping route, Vizhinjam** is India's first deep-water container transshipment port, aimed at enhancing India's trade efficiency, strategic autonomy, and global maritime influence.
- Historically significant, Vizhinjam has roots in ancient trade, dating back to mentions in The **Periplus of the Erythraean Sea (1st century AD)** and inscriptions from the **Pandya-Chola period.**

Strategic Importance of Vizhinjam Port

- **Closest Indian Port to International Shipping Route**
  - Just 10 nautical miles away from the international **East-West maritime corridor.**
  - Offers direct connectivity to major global markets in Europe, Asia, the U.S., and Africa.

Reducing Dependency on Foreign Ports

- Currently, **75% of India's transshipment cargo is handled at Colombo,** Singapore, and Klang.

- The port aims to **reclaim Indian cargo,** saving an estimated $200–220 million annually in logistics costs.

❖ **Natural Deep Draft Advantage**

- A **20-metre natural draft** enables accommodation of Ultra Large Container Vessels (ULCVs).
- MSC Irina, the **world's largest container ship,** is expected to dock soon.

❖ **Port-Led Development Model: Sagarmala and PM Gati Shakti**

- The port is a part of **Sagarmala Project**, aimed at modernising ports and integrating them with industrial corridors.
- Under **PM Gati Shakti**, infrastructure like **railways, highways, and airports** are being integrated for seamless cargo movement.
- Focus on **ease of doing business**, attracting **FDI** and **private investment** in maritime logistics.

❖ **India's Global Maritime Engagement**

- Vizhinjam supports the India-Middle **East-Europe Economic Corridor (IMEEC)**, announced at the G-20 **Summit**.
- Kerala is projected as a **key gateway** for this corridor, further globalising the state's economy.
- Reduces India's vulnerability to **geopolitical disruptions** at foreign ports.

❖ Strategic and Geopolitical Implications

- Enhances India's **influence in the Indian Ocean Region (IOR)**.
- Counters **China's string of pearls** via ports like **Hambantota** and **Gwadar**.
- Strengthens India's **Sagarmala** and **PM-Gatishakti** initiatives through integrated multimodal connectivity.

Policy Recommendations and Concerns

❖ **Avoid Redundancy in Port Infrastructure**

- The proposed transshipment hub in **Colachel (40 km away)** may undermine Vizhinjam's viability.
- Recommend a **Greenfield Port Policy** to prevent similar projects within **750–1,000 km radius**.

❖ **Reconsideration of VGF Repayment Terms**

- Concerns over the ₹**817.8 crore VGF** potentially escalated to ₹**10,000 crore**.
- Given strategic importance, **the Union Government could revisit the repayment clause**.

India's Human Development Index (HDI) Performance (UNDP 2025 Report)

Sub - Topic : Inclusive Growth and issues arising from it.

Context:

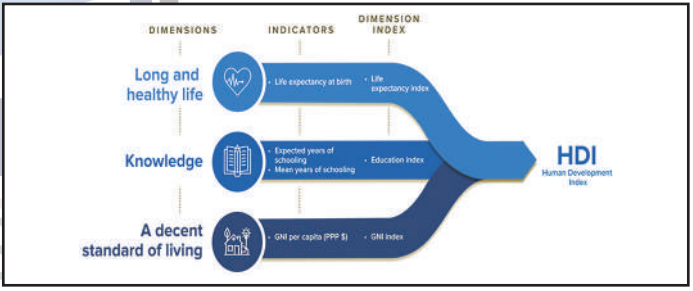
India has made notable progress on the **Human Development Index (HDI)**, climbing from **rank 133 in 2022 to 130 in 2023** out of 193 countries, according to the **2025 Human Development Report** released by the **United Nations Development Programme (UNDP)** on **May 6, 2025**.

More on News

❖ The country improved its **Human Development Index (HDI)** value from **0.676 in 2022 to 0.685 in 2023**, signalling consistent progress in key dimensions such as health, education, and standard of living.

❖ The report also highlights a sobering reality: **inequality continues to severely impact India's development outcomes**, slashing its HDI score by a staggering **30.7%** — one of the highest reductions recorded in Asia.

❖ India has continued to stay in the **medium human development category** but is now **approaching the high human development threshold**, which requires an HDI value above 0.700.



Health, Education, and Income Trends

❖ **Life Expectancy and Health Initiatives:**

- India's **life expectancy** rose from **71.7 years to 72.0 years**, the **highest level recorded** since the HDI was introduced.
- This rise reflects **India's strong recovery from the COVID-19 pandemic** and effective health interventions.
- Key national programmes contributing to this success include:
  - **National Rural Health Mission**
  - **Ayushman Bharat**
  - **Janani Suraksha Yojana**
  - **Poshan Abhiyaan**

- **Education Gains:**
  - The **expected years of schooling** remained almost constant, changing slightly from **12.96 to 12.95 years**.
  - The **mean years of schooling** rose from **6.57 to 6.88 years**, indicating better access to education.
  - The report praised India's progress since 1990 in school education, attributing success to:
    - **Right to Education Act**
    - **Samagra Shiksha Abhiyan**
    - **National Education Policy 2020**
  - However, the report emphasised that **quality and learning outcomes** still need improvement.
- **Economic Development:**
  - India's **Gross National Income (GNI) per capita**, measured in **2021 purchasing power parity (PPP)**, increased from **USD 8,475.68 to USD 9,046.76**.
  - Since 1990, GNI per capita has grown over **four times**, from **USD 2,167.22 to USD 9,046.76**, driven by sustained economic growth and social welfare schemes.

Gender Inequality: A Key Challenge

- While **health and education inequalities** have lessened, **income and gender disparities** continue to pose major challenges.
- The report pointed out that **female labour force participation** and **political representation** in India remain low.
- However, a **recent constitutional amendment** mandating that **one-third of legislative seats be reserved for women** was seen as a positive and transformative move towards gender equity.

Poverty Reduction and Social Protection

- India's development has been fuelled by targeted **social protection and welfare programmes**, contributing to notable poverty reduction. Between **2015–16 and 2019–21**, **135 million Indians escaped multidimensional poverty**.
- Significant contributors to this achievement include:
  - **MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act)**
  - **Jan Dhan Yojana** (financial inclusion)
  - **Digital inclusion initiatives**

India's Rise in AI and Technological Leadership

- The 2025 HDR, titled **"A Matter of Choice: People and Possibilities in the Age of AI,"** also focuses on the transformative role of artificial intelligence in human development.
- India is increasingly positioning itself as a **leader in the global AI ecosystem**:
  - **20% of Indian AI researchers now remain in the country**, compared to nearly zero in 2019.
  - AI is being **deployed across sectors**, including **agriculture, healthcare**, and **public services**.
  - New initiatives aim to **democratise AI access**, ensuring broader inclusion.

Global Outlook: A Slowing Trajectory

- The report noted that globally, **human development progress is slowing down**, at the **slowest rate since 1990**. However, optimism about AI remains high:
  - **70% of global respondents** expect AI to **increase productivity**.
  - **64% believe AI will create new job opportunities**, especially for **youth**.
- Without the COVID-19 pandemic, the world was **on track to reach very high human development by 2030**.
- That milestone is now **at risk of being delayed by decades**, the report warned.

Global Food Crisis 2024

Sub- Topic: Food Security

Context:

In 2024, the global hunger crisis worsened significantly, affecting more than **295 million people** across **53 countries and territories**, as per the latest *Global Report on Food Crises (GRFC)*. This marked an increase of **13.7 million** people compared to 2023, highlighting a continuing trend of rising acute food insecurity.

Acute Food Insecurity: A Growing Crisis

- According to the report, around **23 per cent** of the total population assessed faced **acute levels of food insecurity**.
- Alarmingly, this marks the **fifth consecutive year** that this figure has remained above 20 per cent, and the **sixth consecutive year** of rising acute food insecurity and child malnutrition in some of the world's most vulnerable regions.

The GRFC defines **acute food insecurity** as the disruption of one or more dimensions of food security — **availability**, **access**, **utilisation**, or **stability** — to the extent that it threatens lives and livelihoods and exceeds the capacity of local systems to respond. Notably, **India** was **not included** among the 53 countries analysed in this year's report.

Key Drivers of the Crisis

- **Conflict** – The single largest contributor, conflict-affected **around 140 million people** in **20 countries and territories**. Countries like Sudan, South Sudan, the Gaza Strip, Haiti, and Mali faced catastrophic levels of food insecurity. A famine has officially been confirmed in Sudan.
- **Economic Shocks** – Including inflation and currency devaluation, these were major drivers of hunger in **15 countries**, affecting **59.4 million people**.
  - This figure, although slightly lower than in 2023, remains **nearly double pre-COVID-19 levels**. Countries hit hardest include **Afghanistan, South Sudan, Syria**, and **Yemen**.
- **Climate Extremes** – Driven by El Niño, **droughts and floods** pushed **18 countries** into food crises, affecting **over 96 million people**. Record-high air temperatures and widespread flooding led to crop failures, particularly in **southern Africa**.
- **Forced Displacement** – Nearly **95 million** forcibly displaced people — including internally displaced persons (IDPs), asylum seekers, and refugees — were living in countries facing food crises such as the **Democratic Republic of the Congo, Colombia, Sudan,** and **Syria**. This is out of a global total of **128 million** forcibly displaced individuals.

Worst Affected Groups & Areas

- The number of people facing the most extreme form of hunger — classified as **IPC/CH Phase 5** (Catastrophe/Famine) — more than **doubled** from 2023, reaching **1.9 million** people in 2024. This is the **highest number on record** since the GRFC began in 2016.
- The report found that **nearly 38 million children under five** were **acutely malnourished** in 2024. Some of the most severe levels of malnutrition were reported in the **Gaza Strip, Mali, Sudan**, and **Yemen**. Catherine Russell, Executive Director of UNICEF, emphasised the urgency of the situation, stating:
  - "In a world of plenty, there is no excuse for children to go hungry or die of malnutrition. Hunger gnaws at the stomach of a child. It gnaws, too, at their dignity, their sense of safety, and their future."

Declining Humanitarian Funding Adds to the Crisis

- The outlook for 2025 appears bleak as the network anticipates "**the most significant reduction in humanitarian funding** for food and nutrition crises in the report's history."
- Humanitarian funding to food sectors may decline by up to **45 per cent**, due to substantial reductions by major donors and abrupt terminations of funding.
- This reduction has already **disrupted operations** in critical regions including **Afghanistan,** the **Democratic Republic of the Congo, Ethiopia, Haiti, South Sudan, Sudan**, and **Yemen**.
- The report warns that **nutrition services to at least 14 million children are at risk**, increasing their vulnerability to severe malnutrition and death.

Geopolitical Trends

- **Improvements** in 15 countries, including **Afghanistan, Kenya, and Ukraine**.
- However, these were outweighed by deterioration in **19 other countries**, mainly in conflict zones like: **Nigeria, Sudan**, and **Myanmar**, all of which are suffering from conflict-driven crises.

Prelims

Viksit Krishi Sankalp Abhiyan

Sub- Topic: E-technology in the aid of farmers.

Context:

Union Agriculture Minister Shivraj Singh Chouhan said that a **nationwide campaign, *Viksit Krishi Sankalp Abhiyan***, will be conducted from **May 29 to June 12** to raise awareness among farmers about modern technology and new seed varieties.

About Viksit Krishi Sankalp Abhiyan

- Elaborating on the **15-day campaign**, Mr. Chouhan stated that it will cover 700 districts across the country and aims to reach around 15 million farmers.
- Aimed at transforming Indian agriculture in alignment with **Prime Minister Narendra Modi's vision of a "Viksit Bharat" (Developed India)**.

Ministry's Six-Point Strategy

- To fulfil food security and farmer welfare goals for **1.45 billion citizens**, the ministry outlined a **six-point approach**:
  - **Increase agricultural production**.
  - **Reduce production costs**.
  - **Ensure fair pricing** for produce.
  - **Compensate losses** due to natural disasters.
  - **Promote crop diversification** with value addition and food processing.
  - **Encourage natural and organic farming**.

Nationwide Collaboration

- Involves **ICAR's 113 research institutes**, **731 Krishi Vigyan Kendras**, **agriculture universities**, **state departments**, **farmer-producer organisations (FPOs)**, and **innovative farmers**.
- **16,000+ agricultural scientists** will be part of the knowledge transfer.

Field-Level Implementation

- **2,170 expert teams** (4+ members each) to visit **65,000+ villages** across **723 districts**.
- Teams conduct **3 daily sessions** (morning, afternoon, evening) to directly engage with over **1.3 crore farmers** across the country.
- **Assessment parameters:** Agro-climatic conditions, Soil nutrients (via **Soil Health Cards**), Water & rainfall data.
- **Recommendations:** High-yield crop varieties, Ideal sowing methods, Balanced fertiliser use, Scientific, cost-effective practices.

A Two-Way Dialogue with Farmers

- The campaign is designed as a **two-way engagement**. Farmers will not only receive expert guidance but will also **share local challenges**, such as **pest infestations**, **soil degradation**, and **climate-related disruptions**.
- This feedback will **inform future agricultural research** and help tailor scientific efforts to field-level realities.

Revised SHAKTI Policy

Sub- Topic: Changes in Industrial Policy and their Effects on Industrial Growth.

Context:

The Cabinet Committee on Economic Affairs (CCEA), chaired by **Prime Minister Shri Narendra Modi**, has approved the **grant of fresh coal linkages** under the **Revised SHAKTI Policy**.

Objective

- To streamline and **simplify coal linkage allocation** to Thermal Power Plants (TPPs).
- Replace the existing **eight paras** of the SHAKTI Policy with **two clear linkage windows** under the **ease of doing business** principle.

Background

- The SHAKTI (Scheme for Harnessing and Allocating Koyla Transparently in India) Policy was launched in 2017.
- It marked a **paradigm shift in the coal allocation mechanism** from a **nomination-based system** to a more **transparent, auction or tariff-based bidding process**.
- This policy was introduced to ensure **fairness, competition, and transparency** in coal linkage allocation for power plants.
- Policy amended in **2019** and **2023** based on the Group of Ministers' recommendations.
- Originally, SHAKTI Policy had **eight different Paras**, each detailing the procedure for coal allocation to specific categories of power plants.

The Revised SHAKTI Policy

- **Window-I: Coal at Notified Price:**
  - The existing mechanism continues for Central Sector TPPs, Joint Ventures (JVs), and subsidiaries.
  - Coal linkage is earmarked to States or authorised State agencies based on Ministry of Power recommendations.
  - States may use the coal linkage for:
    - Own Gencos.
    - IPPs are identified through Tariff Based Competitive Bidding (TBCB).
    - Existing IPPs with PPA under Section 62 of the Electricity Act, 2003 for new/expansion units.
- **Window-II: Coal at Premium over Notified Price:**
  - Open to all domestic coal-based power producers (with or without PPA) and imported coal-based power plants.
  - Coal can be secured via auction for durations from **12 months to 25 years**.
  - No PPA is required; electricity can be sold freely in the market.

Major Impacts and Benefits

- **Simplification of Linkage Process**: By reducing the complexity of coal allocation from eight routes to two clear windows, the policy aligns with the government's "Ease of Doing Business" initiative.
- **Dynamic Planning for Coal Demand**: Enables power plants to plan both short-term and long-term coal requirements more effectively.
- **Support for Thermal Capacity Addition**: Flexibility in linkage allocation for new thermal units—with or without PPAs—will encourage capacity expansion by Independent Power Producers (IPPs).
- **No PPA Requirement under Window-II**: Allows generators to sell power freely in the market, enhancing liquidity and competition in the electricity market.
- **Reduction in Coal Imports**: Imported Coal Based (ICB) plants can use domestic coal under technical feasibility, reducing import dependency and passing savings to consumers.
- **Promotion of Pithead Projects**: Encourages setting up thermal plants near coal mines, reducing transportation costs and environmental impact.
- **Coal Source Rationalisation**: Aims to lower the landed cost of coal and decongest rail networks, contributing to lower power tariffs.
- **Empowered Committee for Policy Execution**: A high-level committee comprising the Secretaries of Power and Coal, and the Chairperson of the Central Electricity Authority, will oversee implementation and resolve operational issues.

- **Flexibility for Existing FSA Holders**: Existing Fuel Supply Agreement holders can participate beyond their contracted annual quantity under Window-II, and reapply under the revised policy once their older linkages expire.
- **Un-requisitioned Surplus Sale Allowed**: Enables sale of surplus power in the open market, optimising generation and boosting supply in power exchanges.

Small Savings Schemes

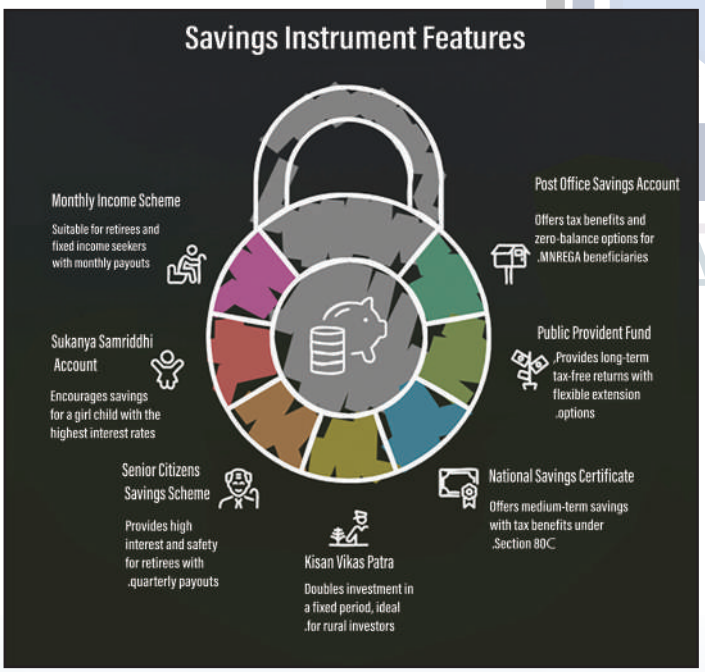
Sub-Topic: Indian Economy and issues relating to Planning, Mobilisation of Resources, Growth, Development and Employment.

Context:

Recently, the India Government **revised the quarterly Small Savings Scheme interest rates**. As per an old decision of the Government, the rate of interest on Small Savings Schemes will be aligned with Government Security (G-Sec) rates of similar maturity with a spread i.e. mark-up.

Policy Implications of the decision

- **Falling Repo Rate**: Now at **6.0%**, from 6.5% earlier.



- **G-Sec Yields Declining**:
  - 10-Year G-Sec: From 7.2% a year ago to **6.36% now**.
  - Lower yields mean lower reference points for future SSS rates.
- **Expected Impact**:
  - **Interest rates may be revised downward** from July to September 2025.
  - **Political considerations** may delay rate cuts due to **voter sensitivity**.
  - Sustaining current rates increases the **fiscal burden** due to the rising 'Z' component.

About Small Savings Schemes as a Pillar of Financial Inclusion

- **Small Savings Schemes (SSS)**, also known as **Post Office Savings Schemes**, are **government-backed financial instruments** designed to mobilise household savings from the public.
- These schemes are popular for their **security, accessibility, and attractive returns**, especially among **low- and middle-income groups**, senior citizens, and rural populations.
- With the **Reserve Bank of India (RBI)** cutting the **repo rate** and **G-Sec yields** falling, there is a possibility of a downward revision in SSS interest rates from July 2025. Hence, locking in at current rates by June is advisable.

Importance of Small Savings Schemes

- **Credit Quality**: SSS enjoy **sovereign guarantee**, making them virtually **risk-free investments**.
- **Interest Rate Competitiveness**: Interest rates are **periodically aligned with G-Sec yields**, ensuring reasonable returns.

Legal and Institutional Framework

- **Legal Acts Governing SSS**:
  - *Government Savings Bank Act, 1873* – governs PORD, POMIS, SCSS, SSA, etc.
  - *Savings Certificates Act, 1959* – governs NSC and KVP.
  - *Public Provident Fund Act, 1968* – governs PPF.
- **Key Administrative Institution**:
  - **National Savings Institute (NSI)**:
    - Collects data, conducts market research, and provides policy inputs.
    - Trains agents and conducts inspections under the **PMLA, 2002**

- **Financial Inclusion**: Offered via **1.56 lakh post offices**, **15,000+ bank branches**, and **agents**, these schemes **ensure access in remote areas**.
- **Liquidity**: Inbuilt features like **withdrawals, loans, and premature closures** enhance flexibility for investors.
- **Utility for Government Financing**: Mobilised savings are invested in **State Government securities** to support **developmental projects**.

Establishment and Objectives of NSSF (National Small Savings Fund)

- **Established on**: 1st April 1999, following recommendations of **R.V. Gupta Committee**.
- **Administered by**: Ministry of Finance (DEA) under the **National Small Savings Fund (Custody and Investment) Rules, 2001**.
- **Objectives**:
  - To **consolidate all SSS transactions** under a single umbrella.
  - To **enhance transparency** in income and expenditure reporting.
  - To **highlight asset-liability mismatches** and enable better fiscal management.
  - To assist the government in making **well-informed decisions** on modifying interest rates or terms of issuance.

RoDTEP Scheme

Sub-Topic: Effects of Liberalisation on the Economy

Context:

In a significant move aimed at enhancing India's export competitiveness, the government announced the **reinstatement of the Remission of Duties and Taxes on Exported Products (RoDTEP) scheme for Advance Authorisation (AA) holders, Export-Oriented Units (EOUs), and Special Economic Zone (SEZ) units.**

More on News

- **Launched in 2021,** the RoDTEP scheme is **designed to reimburse exporters for embedded taxes, duties, and levies that are not refunded through any other scheme.**
- Although the scheme was **available until February 5, 2025,** its **suspension had prompted strong advocacy from export industry stakeholders seeking its continuation.**


Welcome move

The 2021 scheme reimburses exporters for any embedded levies that are not reimbursed under any other existing scheme

- Restoration of the scheme is expected to go a long way in improving global competitiveness of Indian exporters
- Extension of benefits to AA, EOU, and SEZ units recognises their critical role in the export ecosystem, says FIEO chief
- Government urged to make benefits available with effect from February 7, 2025 for seamless transition

About RoDTEP Scheme

- **RoDTEP (Remission of Duties and Taxes on Exported Products)** is a flagship scheme of the Government of India, operational since January 1, 2021, **designed to boost the competitiveness of Indian exports by refunding previously non-recoverable embedded taxes and duties.**
- RoDTEP **replaced the earlier MEIS (Merchandise Exports from India Scheme) after the World Trade Organisation (WTO) ruled that India's previous export subsidy schemes violated global trade norms.**
- The scheme was introduced **to ensure India's compliance with WTO rules while continuing to support exporters.**

Key Features

- **Refund of Embedded Taxes:** RoDTEP reimburses exporters for central, state, and local duties and taxes that are not refunded under any other mechanism.
  - These include **taxes on fuel, electricity duties, mandi tax, VAT, coal cess, and other local levies that get embedded in the cost of exported goods.**
- **Digital Processing:** Claims and refunds are processed electronically through the **ICEGATE portal,** ensuring transparency and efficiency.
- **E-Scrips:** Exporters receive e-scrips as refunds, which are transferable and can be used to pay basic customs duty.
- **Wide Coverage:** The scheme covers a broad range of goods and sectors, including agriculture, textiles, and electronics.
- **WTO Compliance: RoDTEP** is designed to be WTO-compliant, focusing on remission rather than subsidy.

How the Scheme Works

- **Exporters must declare their intention to claim RoDTEP** in the shipping bill at the time of export.
- Once the export is completed and the **Export General Manifest (EGM)** is filed, customs processes the claim.
- **Eligible refunds are credited as e-scrips to the exporter's ledger account on ICEGATE,** which can be used or transferred.
- The **refund rates are notified by the government and vary by product and sector,** reflecting the embedded tax incidence.

Eligibility

- **All exporters registered with the Directorate General of Foreign Trade (DGFT)** are eligible, provided their products fall under the government-notified eligible list.
- **Exporters using e-commerce platforms are also eligible.**

Benefits

- **Reduces Export Costs:** By refunding hidden taxes, RoDTEP lowers the overall cost of Indian exports, making them more competitive globally.

- **Encourages Export Growth:** The scheme is a key part of India's strategy to increase export volumes and diversify export markets.
- **Supports a Range of Sectors:** Benefits are extended to various sectors, including small and medium enterprises.

Investment Friendliness Index

Sub- Topic: Growth, Development and Employment.

Context:

Government policy think tank NITI Aayog is set to launch a new Investment Friendliness Index during the April–June quarter of FY25, aimed at **ranking Indian states on their attractiveness to private investors.**

More on News

- The index **will evaluate both opportunities and risks,** offering a **comprehensive picture of each state's investment climate, according to sources familiar with the development.**
- The initiative, announced by Union Finance Minister Nirmala Sitharaman in the 2025–26 Union Budget, is **part of the Central government's broader strategy to deregulate and liberalise India's investment ecosystem.**
- The index is **expected to foster inter-state competition,** drive regulatory reforms, and help states identify and eliminate hurdles that deter private sector investment.

Index to Measure Opportunities, Risks, and Policy Support

- **Indicators:** The Investment Friendliness Index **will feature four or more sub-indicators** to allow a detailed assessment of each state's performance. These will include:
  - Policy environment and investment incentives
  - Infrastructure availability
  - Business climate and innovation
  - Resource accessibility
- **Ground Realities:** The index will capture the on-ground realities faced by investors and point out specific state-level regulations that may hinder investment.
  - Niti Aayog has reportedly concluded **stakeholder consultations involving state governments, industry associations, and policy experts to finalise the framework and methodology.**

Driving State-Level Reform Through Competition

- The core idea behind the index is to **incentivise states to enhance their investment-readiness by identifying bottlenecks, adopting best practices, and aligning with investor expectations.**
- This **aligns with the Centre's broader economic reform agenda,** which emphasises cooperative federalism and performance-based competition among states.
- By spotlighting both opportunity and risk dimensions, the index is expected to help states improve not just their marketing pitch, but also the actual regulatory conditions on the ground.

Experts Caution on Implementation

- Economists have welcomed the initiative but caution that **effective implementation and transparency will determine its impact.**
- Manoranjan Sharma, Chief Economist at Infomerics Valuation & Rating Ltd, noted, **"A comparative index could help improve regulations and investment flows.** But to maximise its effectiveness, it **should be broad-based and include dimensions like social justice, environmental sustainability, and balanced regional growth."**
- Sharma added that **aligning the index with long-term developmental goals would make it a powerful tool for inclusive and sustainable economic progress.**

Mains

Earth's Magnetic Field

Sub-Topic: Geomorphology, Interior of Earth

Context:

In **2022**, Scientists unveiled a soundtrack at **Solbjerg Square, Copenhagen**, converting Earth's magnetic signals from **32 locations** into sound to showcase the **planet's magnetic field** and its fluctuations over the past **100,000 years**.

More on News

- In **2024**, a new soundtrack recreated the **Laschamps geomagnetic excursion** (41,000 years ago), when Earth's magnetic field weakened to **5%** of its current strength and poles temporarily switched.
  - Laschamps involved a **temporary reversal of magnetic poles** and had an **eerie, alien-like sound**.
  - Both soundtracks are based on research by **Sanja Panovska** (GFZ German Research Centre, Potsdam).
- A new composition on the **Brunhes-Matuyama reversal (780,000 years ago)** is expected later in 2025 and is predicted to **sound different** from Laschamps.

Historical Data

- In the past **83 million years**, Earth's magnetic poles have **reversed 183 times**.
- Excursions occur **10 times more often** than reversals.
- Since the **Brunhes-Matuyama reversal**, three major excursions occurred:
  - **Norwegian-Greenland Sea event** (~64,500 years ago)
  - **Laschamps** (~41,000 years ago)
  - **Mono Lake** (~34,500 years ago)
- Prediction is difficult due to **no clear periodicity**.

Nature and Origin of Earth's Magnetic Field

- Earth behaves like a **giant magnet** with field lines from the magnetic north to south.
- The magnetic field originates **2,900 km beneath the surface** in the **liquid outer core**, powered by **electric currents from molten iron movement**.
- It creates a **protective bubble** extending into space, deflecting harmful solar and cosmic radiation.

Reversals vs Excursions

- **Reversals**: Occur when the magnetic polarity change lasts **more than 100,000 years**.
- **Excursions**: Temporary shifts in polarity lasting less time.
- Magnetic field fluctuations are driven by **fluid motion in the outer core**, itself powered by **heat from the inner core** and **Earth's rotation**.
- Clockwise fluid flow = **normal polarity**; anticlockwise = **reversal**.

Field Strength and Future Predictions

- The magnetic field has **weakened by 10%** over the past **200 years**.
- At the current rate, it could decline to **zero in 1,500–1,600 years**, prompting questions about a potential reversal or excursion.

Impact on Climate and Life

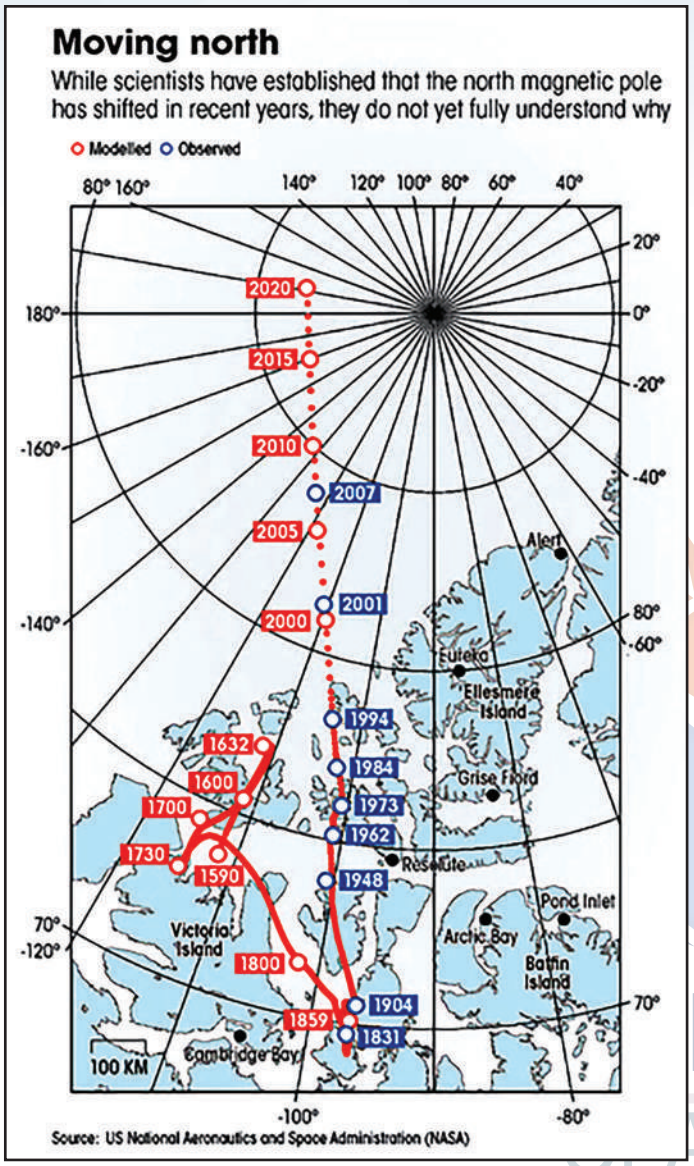
- A 2021 **Science** study linked Laschamps to **ozone changes** and **climate shifts** at mid-to-high latitudes.
- It also observed **overlapping extinction phases**, hinting at possible links.
- However, Panovska's unpublished study found **no impact** of Laschamps on **Neanderthal extinction**, citing **protection by Earth's atmosphere**.
- A **2019 Science Advances** study estimated the Brunhes-Matuyama reversal took **22,000 years**, allowing **generational adaptation** to future instability.

Drifting Magnetic Poles

- The **north magnetic pole** has moved **1,100+ km** from the **Canadian Arctic to Siberia** since **1831**.
- Speed increased from **16 km/year in the 1990s** to **35 km/year** today.
- **The south magnetic pole** is more stable, moving just **5 km/year**.
- Disparity is likely due to **turbulence in the outer core**, though not fully understood.

South Atlantic Anomaly (SAA)

- A region over **South America and South Africa** where the magnetic field is **weakest**.
- Allows harmful cosmic radiation to reach spacecraft in **low Earth orbit**.



- A **2018 PNAS** study found **no evidence linking SAA to magnetic reversals**.
- SAA-like features occurred **6–9 times** in the past 100,000 years, with the field **recovering each time**.
- Suggests a **reversal is not imminent**.

Weather Balloons

Sub-Topic: Climatology, Weather

Context:

In a significant shift driven by budget cuts, the United States' **National Oceanic and Atmospheric Administration (NOAA)** is **reducing its use of traditional weather balloons.**

More on News

- These balloons, **crucial for accurate weather forecasting,** are being **phased out in favor of AI-powered alternatives developed by a Silicon Valley startup**—a move aimed at cutting costs but raising concerns among meteorologists worldwide.

- Since March, **NOAA has slashed hundreds of daily weather balloon launches following a 25% budget reduction** by the **Department of Government Efficiency (DOGE).**

About Weather Balloons

- These are **indispensable tools for monitoring upper air conditions**—the **atmospheric layer above 5,000 feet** that drives weather systems including rainfall, wind patterns, droughts, and temperature fluctuations.
- Countries like **India, through its India Meteorological Department (IMD),** also rely on these balloons to collect critical weather data.

Why Satellites Can't Replace Weather Balloons?

- While **satellites offer a macro-level view** of Earth's weather systems and surface conditions, **weather balloons provide granular insights into the middle layer of the atmosphere, where most weather events originate.**
- Moreover, **radiosonde data is essential for calibrating satellite observations,** ensuring that satellite readings remain accurate and reliable.

India's Irrigation Crisis

Sub-Topic: Agriculture, Water Management, Irrigation

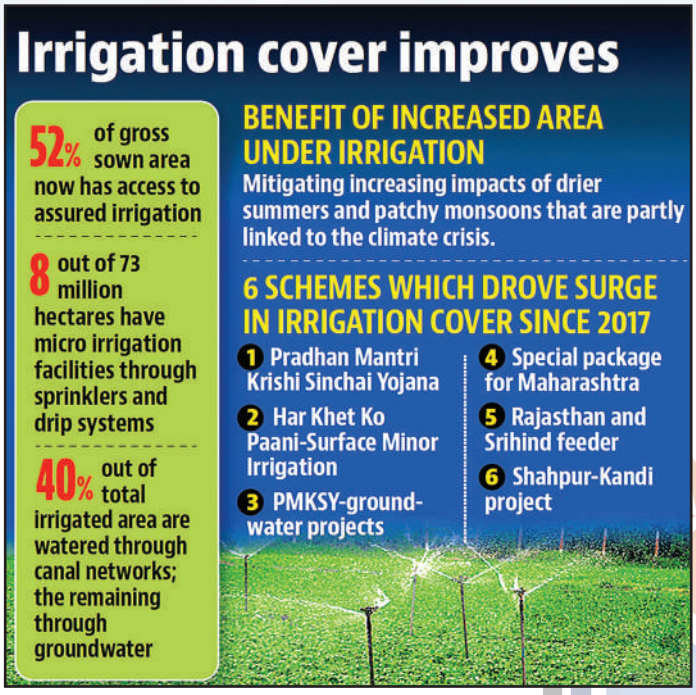
Context:

On March 13, 2025, Kailash Arjun Nagare, **a recipient of the 2020 Young Farmer Award from Maharashtra, died by suicide—citing long-standing irrigation issues as a key factor.**

More on News

- His tragic death has spotlighted a **growing crisis in India's agricultural sector:** the **deep-rooted inequities and unsustainable practices** in water access and irrigation.
- While India has the highest water usage in agriculture globally, access remains uneven, and water scarcity is as much a result of poor governance and social inequality as it is of physical shortage.

- The country's irrigation problem is thus not just environmental—it's **deeply structural.**



India's Unsustainable Dependence on Irrigation

- **Agriculture accounts for nearly 80% of India's total water withdrawal, consuming approximately 688 billion cubic metres annually,** the **highest in the world.**
  - Yet this **heavy reliance is not translating into sustainable growth.**
- **Much of the irrigated land is concentrated in water-stressed regions** like the north-west and sub-tropical belts, **where water-intensive crops such as rice, wheat, and sugarcane are dominant.**
- According to a 2024 study published in Nature Water, India alone contributed 36% of global unsustainable irrigation expansion from 2000 to 2015.
  - The result: worsening water stress, environmental degradation, and socio-economic disparity.

Irrigation Inequality: Social and Regional Gaps

- **Uneven Distribution:** While irrigation can boost agricultural productivity, its benefits are unevenly distributed.
  - **Groundwater**—India's primary source of irrigation—**is closely tied to land ownership,** electricity pricing, and regional water markets.
  - This has **created a situation where tube well irrigation systems are marked by growing inequality,** even as disparities in canal, tank, and well systems have declined.
- **Impact on Marginalised Groups: Marginalised communities,** especially women, face the **harshest consequences of groundwater depletion.**
  - As climate change accelerates water scarcity, these vulnerable groups are further pushed to the margins.

Groundwater Depletion and Environmental Costs

- **Over-Extraction's Consequences: Nearly 17% of India's groundwater blocks are categorised as 'over-exploited',** and **3.9% are considered critical.**
- **Energy Consumption:** The aggressive use of pumps for groundwater extraction is also fuellinghigh energy consumption.
- **Carbon Emissions:** It is estimated that **groundwater irrigation contributes 45.3–62.3 million metric tonnes (MMT) of carbon emissions annually**—8-11% of India's total emissions.
- **Lower Efficiency:** Moreover, India's irrigation systems operate at **just 38% efficiency,** far below the **global average of 55% in developed nations.**
- **Misaligned Cropping Patterns:** Cropping patterns are misaligned with regional water availability.
  - For example, **Punjab's rice productivity is high, but its irrigation water productivity (IWP) is one of the lowest.**
  - **Tamil Nadu, despite leading in sugarcane productivity, also records low IWP.**
- **Paddy:** Paddy rice, due to continuous flooding practices, has become the **single largest contributor to global cropland greenhouse gas emissions,** highlighting the environmental cost of current irrigation practices.

Solutions: A Shift Towards Water-Smart Farming

- **Advance Water-Saving Irrigation Technologies:** Promote micro-irrigation systems such as **drip and sprinkler irrigation**, especially for high water-demand crops like sugarcane and cotton.
- **Implement Sustainable Water Management Practices:** Introduce **alternate wetting and drying (AWD) techniques** in rice cultivation, which can significantly reduce water use and methane emissions.
- **Adopt Solar-Powered Irrigation with Regulation:** Deploy solar pumps in tandem with micro-irrigation, but avoid unregulated groundwater use.
- **Strengthen Rainwater Harvesting:** Encourage the construction of **rainwater harvesting structures and tailwater storage pits** as supplementary irrigation sources, especially in regions prone to seasonal droughts.
- **Reform Irrigation Governance: Move away from supply-driven systems to demand-based irrigation allocation** managed by **Participatory Irrigation Management (PIM) institutions.**

- **Promote Cropping Pattern Diversification:** Encourage crop diversification through policy and price signals to shift farmers away from water-intensive crops in water-scarce regions.

Urban India and Climate Change

Sub-Topic: Environment, Climate Change, Human Geography, Urbanisation

Context:

As summer heat intensifies across India, major cities are facing mounting pressure from water shortages, rising electricity demand, and increasing climate-related stress.

More on News

- Cities like Bengaluru and Hyderabad have seen a spike in water tanker bookings, while power outages loom due to surging air-conditioner usage.
- These recurring urban challenges raise a critical question: *Are Indian cities truly prepared for the dual threats of climate change and rapid urbanisation?*

Climate Stress and Urban Inequality

- **India's cities are hubs of opportunity,** contributing significantly to the economy.
  - Yet, **urbanisation brings with it congestion,** pollution, and unequal access to resources — challenges that often disproportionately affect low-income populations.
  - According to the **2025 report by the Sustainable Futures Collective,** titled ***"Is India Ready for a Warming World?",*** long-term planning for climate resilience in urban areas remains insufficient.
- The **Urban Heat Island (UHI) effect**, a growing concern frequently discussed in Parliament, **further highlights the vulnerability of cities.**
  - These issues are deeply tied to **India's progress on Sustainable Development Goal 11 (SDG-11): making cities inclusive, safe, resilient, and sustainable by 2030.**

Do Existing Urban Indices Reflect Reality?

- While **global frameworks for SDG-11 exist, India lacks a comprehensive city-level tool for tracking urban sustainability and resilience.**
- NITI Aayog's **SDG Urban Index** evaluates 56 cities using 77 indicators, but its **SDG-11 component is limited to only four parameters: Swachh Survekshan rankings, road accident deaths, PMAY-U housing, and waste treatment capacity.**
- Meanwhile, the **Ease of Living Index covers 111 cities** but lacks dedicated tracking of SDG-11 outcomes.
- **Global indices like Mercer's Quality of Living** and the **Economist's Resilient Cities Index** provide useful benchmarks but fail to capture the unique ground realities of Indian cities.
  - This **lack of localised assessment tools** hinders evidence-based urban policymaking.

New Research: Four Indices to Bridge the SDG-11 Gap

- To address this gap, new research has introduced a set of four city-specific indices aligned with the **four pillars of SDG-11: safety, inclusivity, resilience, and sustainability.**
- The study **evaluated 10 major Indian cities** — Delhi, Mumbai, Bengaluru, Hyderabad, Chennai, Pune, Kolkata, Ahmedabad, Jaipur, and Surat — **across a total of 58 indicators.**
- These indicators were developed using **United Nations-defined urban parameters and data from credible sources such as Census 2011,** National Crime Records Bureau, India Meteorological Department, NFHS-5, PLFS, and Ola Mobility Institute.
- The research employed the Shannon Entropy Weighting Technique, a method from **Multi-Criteria Decision-Making (MCDM)** models, to objectively assign weights to indicators.

Key Rankings and Insights

- **Inclusivity Index:** Ahmedabad ranked highest; Jaipur ranked lowest.
- **Safety Index:** Bengaluru emerged as the safest; Kolkata ranked lowest.
- **Sustainability Index:** Surat led in environmental performance; Kolkata lagged.
- **Resilience Index:** Chennai ranked first in climate resilience; Jaipur ranked last.
- Interestingly, cities marked as **"front-runners"** in NITI Aayog's SDG rankings did not always perform well in these new indices — indicating a need to rethink and refine existing evaluation frameworks.

What do these Rankings reveal?

- **Inclusivity gaps** show unequal access to housing, transportation, and jobs, especially for marginalised communities.
- **Safety disparities** highlight the need for stronger law enforcement and urban design that reduces crime and improves public safety.
- **Environmental sustainability** remains uneven, with many cities struggling in waste management, pollution control, and green infrastructure.
- **Resilience planning** is largely missing — a 2023 Janaagraha report found that only 16 cities have a sustainability plan, and just 17 have resilience strategies.
- These findings expose **critical shortfalls** in how Indian cities are preparing for climate challenges and delivering on SDG-11 commitments.

Ethanol Blending and Sugarcane Diversion in India

Sub-Topic: Environment, Clean Energy, Biofuels

Context:

India is aiming to raise the ethanol blending ratio in petrol to **30%** as part of its strategy to cut down on fossil fuel consumption.

More on News

- This ambitious goal follows the country's early achievement of its previous target of **20% ethanol blending** in 2025, met ahead of schedule in March this year.
- However, to meet the new target, a greater share of sugar—derived mainly from sugarcane—will have to be diverted towards ethanol production, raising concerns about its availability for direct consumption and the potential for further price hikes.

From 1.5% to 20% Blending—and Beyond

- Launched in the early 2000s, the EBP originally set a target of **20% ethanol blending by 2030**.
- Encouraged by progress—particularly a **15% blending ratio achieved by 2024**—the government advanced the target year to **2025**.
- As of **March 2025**, the target was officially met, prompting discussions around a new target of **30% ethanol blending** in the coming years.

Sugarcane Strains Under Ethanol Demand

- India's ethanol production has historically been dominated by **sugarcane-derived feedstocks** such as **juice, syrup, and B-heavy molasses**.
  - Government restrictions on these inputs were lifted over the last decade, enabling a rapid surge in ethanol supply—from **40 crore litres in FY14** to **nearly 670 crore litres in FY24**.
  - The ethanol blending ratio simultaneously grew from just **1.5% in FY14** to **20% in FY25**.
- However, **sugarcane production**, which had been steadily increasing and peaked at **490 crore tonnes in FY23**, has declined since then. It's projected to fall to **435 crore tonnes in FY25**, due to factors like: **Red rot disease** in major sugar-producing states, **Deficient rainfall**, and **Poor crop flowering**.
- To support farmers amid falling yields, the government recently approved a hike in the **Fair Remunerative Price (FRP)** for sugarcane. But the reduced output has **tightened sugar availability**, driving **retail sugar prices** up from **₹40 per kg in May 2023** to **₹45 per kg in May 2025**.
- Ethanol diversion is further compounding this shortage, intensifying the **food-versus-fuel dilemma**.

Maize: The New Biofuel Star

- As sugarcane availability declines, the government has increasingly turned to **grains like maize and rice** to fill the ethanol demand. Maize, in particular, has emerged as a preferred feedstock due to its **high starch content (68–72%)**, which is ideal for ethanol fermentation.
- Between **2022-23 and 2023-24**, ethanol production from maize skyrocketed.
- This diversion marks a fundamental shift. Until recently, India's **maize output (32–33 mt)** exceeded its **domestic demand (~28 mt)**. The latter included: **20 mt** for livestock feed (15 mt poultry, 5 mt cattle), **5 mt** for starch, **2 mt** for direct human use, **1 mt** for seeds and miscellaneous uses.
- However, biofuel demand has disrupted this balance. Maize prices have soared from **₹14,000–15,000/tonne** to **₹24,000–25,000/tonne** in just four years, largely due to the EBP.
  - "The diversion of maize for biofuel has completely upset the demand-supply balance," said **Divya Kumar Gulati**, Chairman of **CLFMA** (Compound Livestock Feed Manufacturers Association of India).

DDGS: A Boon for Feed, a Bane for Soyabean

- One byproduct of ethanol production from grains is **Distiller's Dried Grains with Solubles (DDGS)**—a protein-rich material used in livestock feed. As ethanol output grows, so does DDGS supply:
  - **From maize**: ~28–30% protein, priced at **₹16,000–17,000/tonne**.
  - **From rice**: ~45% protein, priced at **₹18,000–19,000/tonne**.
- In **2024-25**, ethanol from **12.7 mt of maize** and **4 mt of rice** is expected to yield **over 5 million tonnes** of DDGS. This abundance is pressuring traditional protein sources like **soyabean de-oiled cake (DOC)**, which is now selling at **₹31,000–32,000/tonne**, down by **30%** over two years.

Feed Industry Seeks Policy Support, Import Flexibility

- The disruption in maize supply has hit **poultry and dairy feed manufacturers** especially hard, given maize makes up **55–65% of broiler feed**, **50–60% of layer feed**, and **15–20% of cattle feed**. As domestic supply tightens, the industry is lobbying for **liberalisation of maize imports**.
- India currently permits **0.5 mt of maize imports annually at 15% duty**, while quantities beyond that attract **50% duty**.
  - Additionally, **genetically modified (GM) maize** is not allowed for import.

- Of the **0.94 mt imported between April and January 2024-25**, most came from **Myanmar (0.51 mt)** and **Ukraine (0.39 mt)**—countries that do not grow GM maize.

- This change would open up the Indian market to **top global GM maize exporters** like the **US, Brazil**, and **Argentina**, especially as China—formerly the biggest buyer—has scaled back its imports from them.

Finding a Sustainable Balance

- A source in the sugar industry emphasised the importance of a **balanced approach**: "The government may have to take a considered decision on permitting duty-free and GM maize imports. This might help poultry and dairy producers cope with rising feed costs, but the interests of our maize and soyabean farmers must also be protected."
- A long-term solution lies in **raising maize productivity** and **shifting acreage from water-guzzling rice to maize**. Given rice's surplus production and high water usage, diverting land from rice to maize could offer a more sustainable path to meet India's growing fuel and feed needs.

India's Heatwave Crisis & Workers

Sub-Topic: Geography, Human Geography, Urbanisation, Disaster Management, Heatwaves

Context:

In the first week of April 2025, Delhi recorded temperatures above 41°C — a dangerous threshold that signals more than just an early summer.

More on News

- This isn't a rare heatwave; it's the **beginning of a deadly new normal,** driven by the intensifying impacts of climate change.
- **Indian cities, dense and poorly ventilated, have become ground zero for extreme heat events.**
- While rising temperatures impact everyone, it is **urban informal workers** — street vendors, construction laborers, rickshaw pullers, waste pickers, and gig workers — **who are suffering the most.**
- In 2024, the **Reserve Bank of India (RBI) warned that extreme heat could cause a 4.5% hit to India's GDP,** mostly due to the health and productivity losses among these occupationally exposed groups.
- Despite their critical role in urban economies, these workers are still largely left out of urban heat preparedness plans.

WHAT MAKES FOR A HEATWAVE?

Places with normal maximum temperature	Heatwave if temperature higher by	Severe heatwave if temperature high
40 degree Celsius or less	5-6 degree Celsius	7 degree Celsius
More than 40 degree Celsius	3-4 degree Celsius	More than 5 degree
For any place	Maximum temperature remains above 45 degree Celsius for two consecutive days	

These criteria have to be met in at least two stations of a meteorological sub-division for at least two consecutive days. Source: Parliament question and IMD

India's Heat Action Plans Fall Short for Informal Workers

- **Action Plans:** Many Indian cities have developed **Heat Action Plans (HAPs)**, often **modelled after Ahmedabad's pioneering approach** and **guided by the National Disaster Management Authority (NDMA).**
  - However, more than a decade later, **most city HAPs are underfunded, fragmented, and fail to include informal workers meaningfully.**
- **A review of existing HAPs reveals several major flaws:**
  - **Informal workers are invisible:** Most plans mention "outdoor workers" vaguely but lack specific strategies for the diverse occupations in India's informal economy.
  - **Short-term focus:** Heat is treated as a seasonal issue, not a year-round threat linked to broader climate vulnerability.
  - **Lack of inter-agency coordination:** Ministries of Labour, Urban Affairs, Environment, and Health often work in silos, leading to disjointed protection frameworks.
  - **No worker protections:** Few plans mention protocols for hydration, shaded rest areas, adjusted work timings, or wage compensation for lost work.

Global and Local Models for Worker-Centric Heat Protections

Globally, several countries have made progress in protecting outdoor workers from rising temperatures:

- **California and Oregon (USA) mandate rest breaks, water access**, and shade at work sites.
- **France's "Plan Canicule"** enforces **work adjustments and opens public spaces** for cooling during heatwaves.
- **Qatar and Australia restrict outdoor labor during peak heat hours.**
- **India**, too, has some **promising examples:**
  - **Ahmedabad's HAP includes shaded rest zones and staggered work timings**.
  - **Odisha** mandates a **halt to outdoor work during the hottest hours of the day**.

Potential of Blue Carbon in India's Voluntary Carbon Market

Sub-Topic: Environment, Climate Change, Mitigation Strategies, Carbon Market

Context:

In the **global effort to combat climate change**, a crucial natural ally is being **overlooked — *blue ecosystems***.

What is Blue Carbon?

- **Definition:** Carbon stored in coastal and marine ecosystems — **mangroves, seagrass meadows, and tidal marshes**.
- **Carbon Storage:** These ecosystems store **33 billion metric tonnes of carbon**, which is **81% of global emissions from 2023**.
- **Term Origin:** Coined in **2009** to highlight degradation of marine ecosystems and their carbon storage potential.
- **Global Footprint:** Blue carbon projects are active in **29 countries**, covering **~1 million hectares**.

India's Untapped Opportunity

- **India's coastline spans over 7,500 KM**, with significant mangrove and seagrass coverage, yet blue carbon remains underutilised in India's **Voluntary Carbon Market (VCM)**.
- Scientific evidence strongly supports the value of blue ecosystems in climate mitigation. For instance, **1 sq. metre of seagrass removes 3x more carbon annually than tropical rainforests**—India has yet to tap into blue carbon's potential.
- Nearly **50%** of historical soft-sediment habitats have already been lost, and blue carbon credits remain overshadowed by land-based projects that are often more straightforward, cost-effective, and scalable.

Barriers to Blue Carbon Credit Adoption

- **Fragmented Institutional Framework:** A major obstacle is the lack of a coherent institutional environment.
  - Unlike land-based carbon projects, blue carbon initiatives fall under overlapping jurisdictions — including the **Ministry of Environment, Forest and Climate Change (MoEFCC), State Coastal Zone Management Authorities (SCZMAs), Forest Departments,** and **Fisheries Departments**.
    - The **absence of a unified governance model delays approvals** and creates ambiguity over carbon rights, particularly in ecosystems considered common property or protected areas.
  - Additionally, there are **no clear benefit-sharing frameworks to ensure local communities** — who play a critical role in conservation — receive fair compensation from carbon revenues.
  - Drawing lessons from **REDD+ (Reducing Emissions from Deforestation and Forest Degradation)**, it's evident that such mechanisms are essential for project longevity and community engagement.
- **Weak MRV Infrastructure: Measurement, Reporting, and Verification** (MRV) — essential for **ensuring the credibility of carbon credits** — remains underdeveloped for blue carbon.
  - Compared to land-based projects, **blue carbon MRV is costlier, slower, and demands niche expertise**.
  - **India currently lacks a standardised MRV system** for marine ecosystems, often relying on **international protocols such as Verra's Verified Carbon Standard (VCS)**, which **increases project costs and delays**.
  - Moreover, baseline data on the spatial extent and **ecological condition of mangroves, seagrass, and tidal marshes is limited**, leading to **scientific uncertainty** that deters investment.
- **Environmental Volatility:** Blue carbon ecosystems are highly dynamic and more vulnerable to climate-related threats than terrestrial forests. **Sea-level rise, ocean acidification,** and **extreme weather events** can all **undermine carbon permanence** — a critical parameter in the carbon market. These risks make investors hesitant, fearing credit devaluation if ecosystems degrade.

Pathways to Unlock Blue Carbon Potential

- Despite the challenges, several institutional and financial innovations can pave the way for scaling blue carbon projects in India:
- **Financing Through Blue Bonds:** India can follow the **example of the Seychelles Blue Bond**, which **raised $15 million** for **marine conservation** through a blended finance model supported by the World Bank and The Nature Conservancy.
  - With a successful precedent in green municipal bonds — such as **Vadodara's 2024 bond for sustainable water infrastructure** — states with rich coastal ecosystems could issue ***blue muni bonds*** linked to carbon credit revenues.
- **Strengthening MRV Through Innovation:** India can look to Indonesia, where the **Peat and Mangrove Restoration Agency (BRGM)** has partnered with academic institutions to refine baselines and standardise MRV protocols. Formalising similar practices under **India's Green Credit Programme** can provide legitimacy and cost efficiency for domestic projects.

- **Establishing a Central Blue Carbon Authority:** To address the problem of regulatory fragmentation, India should establish a centralised institution — akin to the **National Institutes of Wind, Solar, and Bioenergy** — dedicated to blue carbon. Such an entity could coordinate inter-agency collaboration, streamline project approvals, and act as a hub for research and MRV standardisation.
- **Building Climate-Resilient Frameworks:** Adopting adaptive management strategies, as done in Indonesia, can mitigate environmental volatility.
  - **Linking community-led conservation** with scientific monitoring ensures continuity even under climate stress.
  - **India could also explore *buffer credit mechanisms*** — risk reserves mandated by VCS in afforestation projects — to enhance investor confidence in blue carbon initiatives.
- **Exploring Climate Insurance Models:** Parametric insurance models like the **MAR Insurance Programme in the Caribbean** offer a way to safeguard blue carbon projects from climate-induced losses. Introducing similar frameworks in India could stabilise financial flows and make blue projects more appealing to private players.

Blue Foods

Sub-Topic: Disaster Management, Floods

Context:

As global populations rise and the pressure on terrestrial agriculture intensifies, **blue foods** are gaining recognition for their critical role in addressing global **food security, nutrition, and sustainability.**

What Are Blue Foods?

- **Blue foods** include all food sourced from **aquatic environments**: fish, shellfish, seaweed, etc.
- They are **nutrient-dense**, diverse, and can **alleviate pressure on land-based agriculture**, improving **global food security** and **sustainability**.
- Techniques like **seaweed and bivalve aquaculture** can help diversify the food supply.

Why Do Blue Foods Matter?

- **Nutritional and Environmental Benefits:** Blue foods are vital to the **livelihoods, economies, and cultural heritage** of millions of coastal and riparian communities and serve as a **nutritional lifeline** for billions of people worldwide.
  - These foods are rich in **micronutrients and essential fatty acids**, including **omega-3s and vitamin B12**, both of which are critical for human health.
  - By 2030, it's projected that blue foods could supply **27% of global omega-3s and 100% of vitamin B12 needs**.
  - This is especially critical for vulnerable groups, including **pregnant women, children, women of reproductive age, and elderly individuals**.
- **Economic and Cultural Importance:** Fishing and aquaculture employ **over 33 million people in wild capture fishing alone**, and an estimated **800 million people globally** rely on blue foods for employment and sustenance.
  - Blue foods align with numerous **Sustainable Development Goals (SDGs)**: **No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-being (SDG 3), Responsible Consumption and Production (SDG 12), Climate Action (SDG 13),** and **Life Below Water (SDG 14).**
- The **blue economy**, which emphasis sustainable use of ocean resources, requires **science-based management strategies** to maintain fish populations, protect marine biodiversity, and ensure regeneration of aquatic resources.

A Climate-Conscious Protein Source

- Blue foods present a **lower environmental footprint** compared to many land-based proteins.
- For example, **farmed salmon emits less than 5% of the carbon footprint** of boneless beef. **Unfed aquaculture systems**, such as those used to farm bivalves and seaweeds, require **minimal land and freshwater inputs**, and contribute almost negligible greenhouse gas emissions.
- These environmentally friendly systems not only relieve pressure on land-based agriculture but also **help restore marine habitats**. Shellfish like mussels and oysters, for instance, **naturally filter water**, removing contaminants and excess nutrients, thereby improving ocean health.
- **Canada's shellfish farming** model is a strong example of how aquaculture can simultaneously benefit local economies and coastal ecosystems.

Challenges to Blue Food Sustainability

- **Overfishing and IUU Fishing:** Roughly **34.2% of global fish stocks are overfished**, while nearly **60% are fished at their maximum sustainable limit**. Illegal, unreported, and unregulated (IUU) fishing continues to undermine efforts at responsible fisheries management.
  - These unsustainable practices threaten **marine biodiversity** and the food security of over **3.2 billion people** dependent on aquatic resources.
- **Pollution:** Land-based pollutants—**plastic waste, agricultural runoff, and industrial contaminants**—degrade aquatic ecosystems, endanger marine biodiversity, and compromise the safety of seafood for human consumption.

- **Climate Change:** Blue food systems are acutely vulnerable to **ocean warming, acidification, deoxygenation**, and **marine heatwaves**, which disrupt fish distribution, productivity, and the survival of coral reef and bivalve fisheries.
- **Technological and Infrastructure Gaps:** Current seafood processing methods are often **inefficient and environmentally unsustainable**. There is a growing need for innovative processing solutions like **freeze drying, high-pressure processing**, and **ultrasound-assisted extraction** to increase shelf-life and reduce waste.

Sustainable Practices and Solutions

- **Adopting Integrated Multi-Trophic Aquaculture (IMTA)** and **aquaponics** systems that mimic natural ecosystems to improve productivity and reduce waste.
- **Substituting fishmeal** in aquaculture feeds with **sustainable alternatives** such as plant-based proteins, agricultural by-products, and microbial proteins.
- **Investing in low-carbon fishing technologies** to reduce emissions from fishing vessels and promote climate-adaptive practices among fishing communities.
- **Enhancing governance and enforcement** at local, national, and international levels to combat IUU fishing and promote resource regeneration.
- **Supporting small-scale fishers** through fair trade, equitable access to resources, and capacity-building programmes to bolster local economies.

Prelims

Early Onset of the Southwest Monsoon

Sub-Topic: Geography, Indian Physical Geography, Monsoon

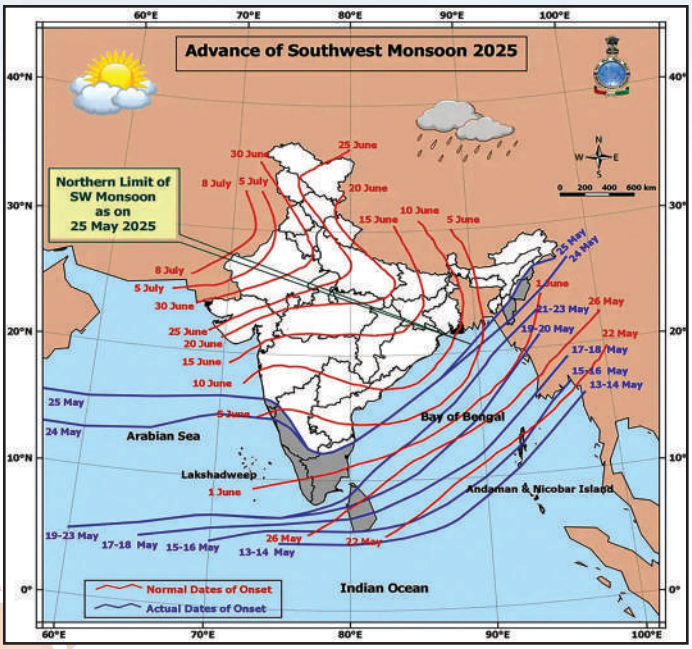
Context:

In a significant development for India's agricultural and economic calendar, the **India Meteorological Department (IMD) announced the early onset of the southwest monsoon over Kerala on May 24,** marking its **earliest arrival in 15 years.**

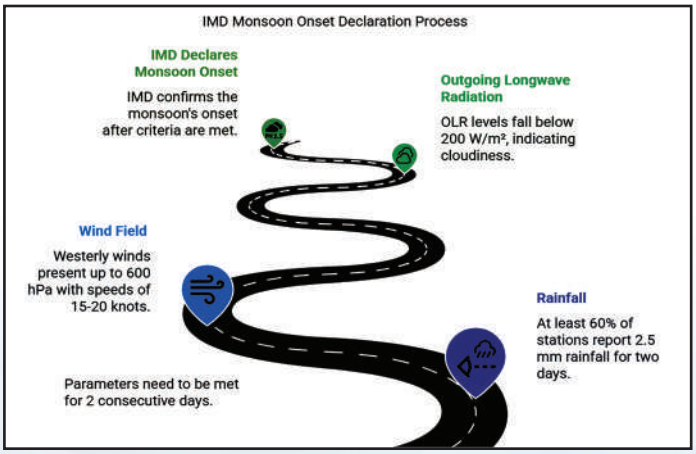
What Caused the Early Monsoon in 2025?

Several favorable weather systems and oceanic conditions led to the unusually early monsoon onset:

- **Madden-Julian Oscillation (MJO):** A dominant intra-seasonal atmospheric phenomenon, MJO's favorable phase this year enhanced convection and cloud formation over the Indian Ocean, boosting monsoon activity.



- **Mascarene High:** A high-pressure zone near the Mascarene Islands in the South Indian Ocean intensified, channeling moisture-laden winds towards the Indian subcontinent.
- **Strong Somali Jet:** The low-level Somali Jet Stream, a cross-equatorial wind current, brought strong westerly winds to the Arabian Sea, accelerating monsoon circulation.
- **Increased Convection:** A surge in convective activity—vertical transport of heat and moisture—helped in the formation of rain-bearing systems across southern India.
- **Heat-Low Formation:** A low-pressure area over Pakistan and adjoining regions acted as a suction zone, drawing in moist air from the Indian Ocean and strengthening the monsoon flow.
- **Monsoon Trough and Onset Vortex:** A well-established monsoon trough and favorable onset vortex over the Arabian Sea further supported the early rainfall over Kerala and adjoining regions.



Significance of Early Monsoon Onset for India

- An early and widespread monsoon onset has **major implications for agriculture, especially in southern and central India.**
- It **allows farmers to begin sowing operations early** and **boosts rural economic activity.**
- Additionally, early rainfall **replenishes reservoirs, improves groundwater levels, and reduces heat stress.**

Vembanad Lake

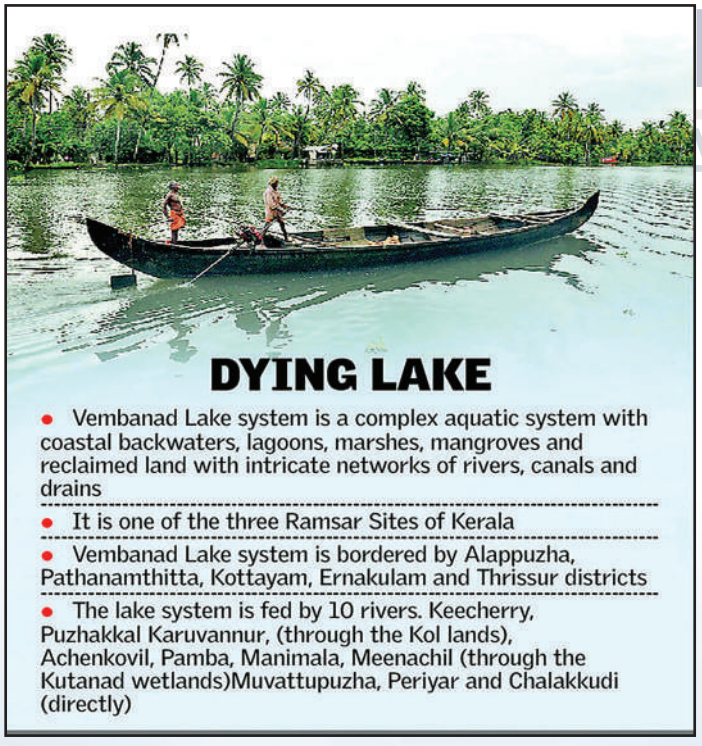
Sub-Topic: Geography, Indian Physical Geography, Lakes

Context:

Vembanad, **India's longest lake** and **Kerala's largest**, is facing a serious ecological crisis. Once a thriving ecosystem, the 96.5 km-long lake, part of the **Vembanad-Kol Ramsar wetland**, is now shrinking and choking under the weight of pollution, encroachment, and mismanagement.

More on News

- The lake is gasping for breath due to a century of unchecked **human interference, natural sedimentation,** and **destructive land reclamation**.
- Once an expansive water body, **Vembanad has shrunk dramatically in both area and depth**, severely compromising its ecological integrity and utility.



About Vembanad Lake

- **India's longest lake (96.5 km)** and **Kerala's largest**, spanning **Alappuzha, Kottayam, and Ernakulam** districts.
- Part of the **Vembanad-Kol wetland system**, designated a **Ramsar site** (internationally important wetland).
- Receives water from **six major rivers** and holds about **30% of Kerala's surface water resources**.

Natural Hydrogen

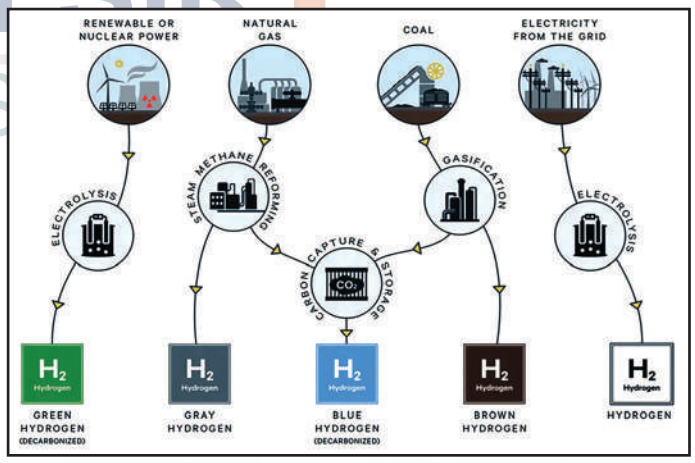
Sub-Topic: Environment, Clean Energy, Hydrogen Fuel

Context:

Hydrogen is increasingly being hailed as the clean energy solution that could decarbonise the global economy and help curb global warming. Among various hydrogen types, **natural hydrogen**, if harvested sustainably, offers a **clean, low-cost**, and **abundant** fuel source that could transform the energy landscape, including in India.

What Is Natural Hydrogen?

- Natural hydrogen, sometimes called **gold hydrogen** or **white hydrogen**, is **molecular hydrogen (H2)** that occurs naturally in the Earth's subsurface.
- Unlike **grey hydrogen** (produced from natural gas through polluting processes) and **green hydrogen** (made using renewable electricity, but still expensive), natural hydrogen is **formed through geological processes** and is potentially available in vast quantities.

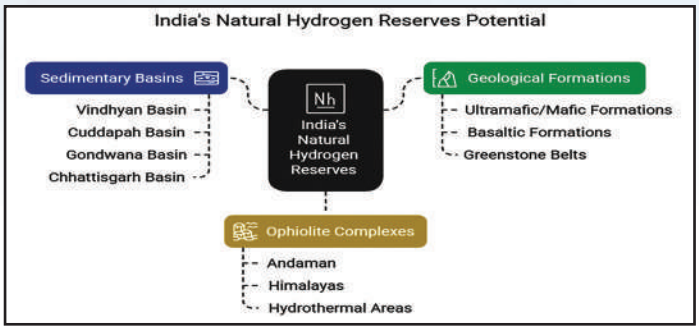


How Is Natural Hydrogen Formed?

- Natural hydrogen is produced through various geochemical processes, including:
  - **Serpentinisation** – a reaction between water and iron-containing rocks.

- **Radiolysis** – splitting of water molecules by radioactive rocks.
- **Organic decomposition** – deep-earth organic matter breaking down.

❖ These processes take place **deep underground** in specific geological environments, often associated with **active tectonic zones, ophiolite complexes, and ancient rock formations.**



Mains

Breakthrough in Brain-Computer Interface

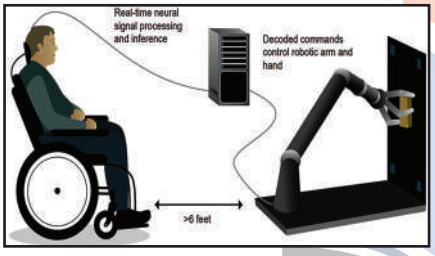
Sub-Topic: *Biotechnology, Information Technology*

Context:

Researchers at the **University of California, San Francisco (UCSF)** have developed a **groundbreaking Brain-Computer Interface (BCI)** that allows a **paralysed man to control a robotic arm** using only his thoughts.

How does the System Work?

- The participant, who was paralysed due to a **stroke**, had **tiny sensors implanted** on his brain's surface.
- These sensors **did not stimulate** the brain but instead **read signals** from areas related to **movement intention**.



Harnessing AI for Stability

- The participant imagined moving various body parts while the sensors captured his **brain's movement signals**.
- Although physically immobile, his brain still generated **distinct movement representations**.
- Using **AI and high-dimensional signal processing**, researchers found that while the **structure** of signals remained stable, their **location** in the neural space **shifted daily**.
- A machine learning algorithm was designed to **track and predict** these shifts, allowing the BCI to maintain stability **over several months**.

From Training to Real-World Use

- Training began with a **virtual robotic arm**, which provided **visual feedback** to improve the participant's control accuracy.
- The participant later transitioned to a **real robotic arm**, successfully performing tasks such as: Picking up, rotating, moving **blocks, opening a cabinet**, retrieving a **cup**, and using a **water dispenser.**
- These actions, though simple, are **life-changing** for individuals with severe paralysis.

Quantum Dots and the Rise of 2D Metals

Sub-Topic: *Physics, Quantum Physics*

Context:

In the ever-evolving world of materials science, few discoveries have had as profound an impact as the creation of **quantum dots** — tiny semiconductors only a few nanometres wide.

More on News

- These minuscule particles are used in LED lighting, medical diagnostics, semiconductor manufacturing, and solar panels, thanks to a peculiar quantum phenomenon called **quantum confinement**.
- Their small size belies their immense influence, earning the scientists who developed a quick and reliable method to produce them the **2023 Nobel Prize in Chemistry**.

The Science Behind the Dot

- **Quantum confinement** explains the **extraordinary properties of quantum dots**.
- In **conventional electrical systems** like the copper wires in your house, **electrons move freely**, spreading out and gaining energy smoothly. But inside a **quantum dot**, the spatial constraints are so tight that **electrons can't roam freely**.
  - While they are no longer confined to individual atoms, the limited space means they can only occupy **specific energy levels**, much like electrons in atoms.
- **Think of it this way:** in a copper wire, electrons can sit wherever they like — like choosing any seat in an empty theater. In a quantum dot, only specific rows and seats are available, and all the rest are blocked. Because of this behaviour, the entire quantum dot begins to behave like a **"giant atom"**.

Beyond the Dot: Enter 2D Materials

- Quantum dots are classified as **zero-dimensional materials** because their electrons are confined so tightly they essentially occupy a point in space.
  - This contrasts with **1D and 2D materials**, where electrons can move in one or two directions, respectively.
  - **Graphene**, for instance, is a 2D material composed of a single sheet of carbon atoms in a hexagonal pattern.

The electrons in graphene move only in two dimensions, and as a result, behave in strange ways — sometimes even as if they **don't have mass**.

- The unique behaviours arising from quantum confinement have massive real-world implications. That's why scientists have been striving for over a decade to create **2D metals**, materials that could offer exotic properties for futuristic technologies. Yet they've been hitting a wall.

The 2D Metal Challenge

- Creating 2D metals has proven notoriously difficult. That's because **metal atoms prefer to bond in three dimensions**. Unlike carbon, which can maintain strong bonds in a single layer, metals naturally form thick, bonded clusters.
- Researchers have tried numerous approaches — from vapour deposition to physically pressing and slicing metal layers — but the results have often been **only a few nanometres thick** and far from the atomic-level thinness they need.
- Another hurdle has been surface interactions. Metal atoms exposed to air easily oxidise, forming unwanted compounds. Moreover, most metal sheets produced so far have uneven surfaces and unstable structures. But the potential is too great to ignore.
- **2D metals like bismuth and tin are predicted to be topological insulators**, materials that conduct electricity only along their edges. Such materials could lead to **faster, more efficient computers and sensors** for medicine and defence.

A Breakthrough from China

- A new study published in *Nature* by a team from the **Beijing National Laboratory for Condensed Matter Physics**, **University of Chinese Academy of Sciences**, and **Songshan Lake Materials Laboratory** could represent a turning point.
- Their method for creating 2D sheets of metals like **bismuth, gallium, indium, tin, and lead** is surprisingly straightforward, though made possible by years of technological advancement. Here's how it works:
  - **Start with a pure metal powder** (e.g., bismuth).
  - **Place it on a sapphire plate** coated with a single layer of **molybdenum disulphide (MoS_2)** — the bottom "anvil."
  - **Heat the anvil** to melt the metal powder into a droplet.
  - **Cover the droplet with a second MoS_2-coated sapphire plate** — the top anvil.
  - **Twist the top anvil slightly** and **press both together** with a pressure of 200 million pascals (Pa), keeping the setup intact until it cools.
  - **Peel off the ultra-thin metal sheet** that has formed.
- The result? A bismuth sheet is just **6.3 Å thick**, or about two atoms deep — thin enough to **confine electrons to two dimensions**.

The choice of MoS_2 and sapphire was crucial. MoS_2 has a **Young's modulus** of 430 billion Pa and sapphire, 300 billion Pa — making them rigid enough to apply the intense pressure. Moreover, both materials have **smooth surfaces and chemically inert atoms**, which prevent unwanted bonding with the metal atoms.

Prelims

Nipah Virus Outbreak in Kerala (2024)

Sub-Topic: *Biotech, Disease, Nipah Virus*

Context:

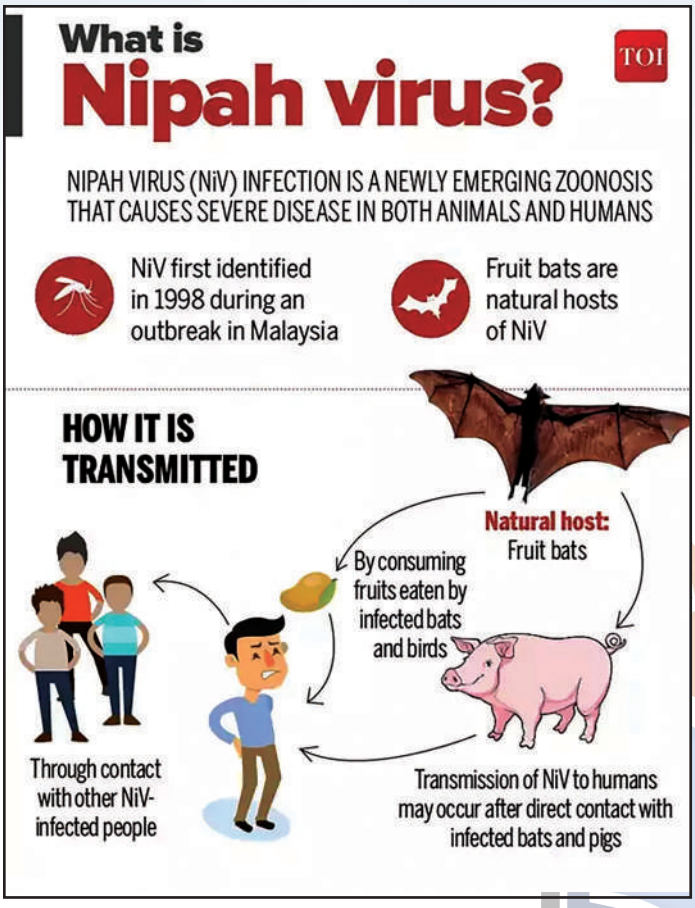
Health authorities in Kerala are once again on high alert as the deadly **Nipah virus** re-emerges in the northern districts, raising grave concerns about its elusive transmission pathway from animals to humans.

Seasonal and Geographic Patterns

- Historical data suggest Nipah cases often occur between **May and September**, previously linked to the **mating season of fruit bats**. However, some studies indicate that mating may start as early as **February**, potentially widening the risk window.
- In a significant study by NIV, **fruit bats in Wayanad (Manathavady)** tested positive for Nipah virus, and the **deceased child in 2024** was also from a nearby area, reinforcing concerns about recurring spillovers in bat-rich forest zones.

About Nipah Virus

- A **bat-borne zoonotic virus** that causes **Nipah virus infection** in **humans** and **other animals**, with a very high **mortality rate** of **40-75%.**
- First **discovered** in **Malaysia** and **Singapore** in **1998 and 1999.**
- It is **caused** by an **RNA** virus from the **Paramyxoviridae** family**, genus Henipavirus,** closely related to **Hendra virus,** which causes acute respiratory infections in horses and humans.
- **Transmission:** Through direct contact with **infected animals**, such as bats, pigs, and other domestic animals.
- **Humans can then become infected through:**
  - Direct contact with infected animals or their bodily fluids.
  - Consuming contaminated food, particularly raw or undercooked **pork products.**
  - Close contact with an infected person, although this is less common.



- **Symptoms:** Vary from none to fever, cough, headache, shortness of breath, and confusion. In severe cases, it can cause encephalitis, seizures, and death.
- **Diagnosis:** Diagnosis is based on symptoms and confirmed by laboratory testing.
- **Treatment:** There is no specific treatment but supportive care, such as intensive care and respiratory support, can help manage symptoms.
- **Prevention:** Include avoiding exposure to infected animals, wearing protective clothing, and practising good hygiene.
  - **Biosecurity measures:** Biosecurity practices are important on **pig farms** to prevent incidences of **bat-to-animal transmission**.
- **Outbreaks:** Nipah virus outbreaks have been reported in **Malaysia, Singapore, Bangladesh,** and **India.**
  - The **highest mortality** due to Nipah virus infection has occurred in **Bangladesh**, where outbreaks are typically seen in winter.
- **Future Threat:** The virus has been classified by the **Centres for Disease Control and Prevention** as a **Category C agent**, indicating a high potential for future epidemics.

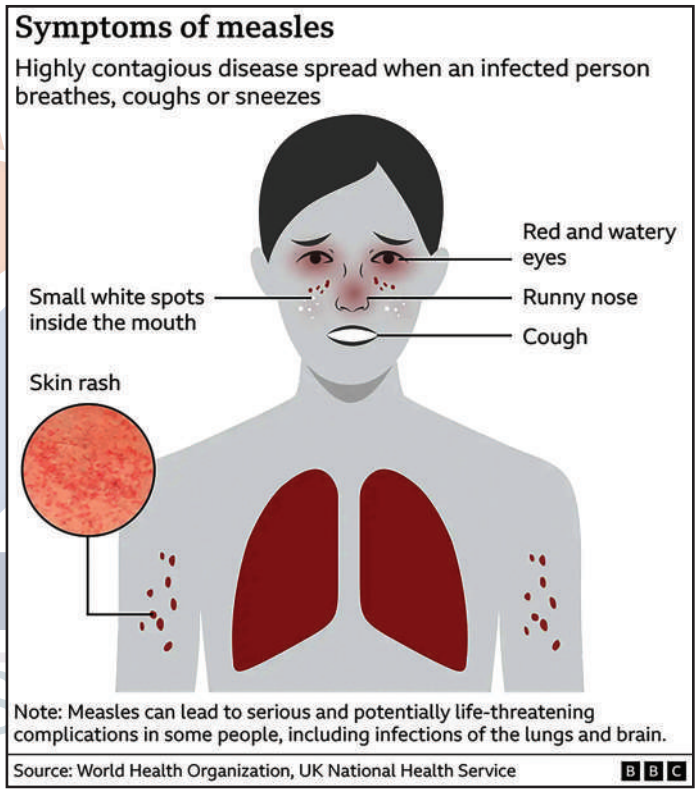
Measles

Sub-Topic: *Biotech, Disease, Measles*

Context:

Over the past 60 years, measles vaccination has transformed global child health, saving **over 9 crore lives worldwide**. Once a near-universal childhood disease with high rates of complications and death, measles is now largely preventable thanks to widespread immunisation efforts.

What Is Measles?



- Measles is caused by the **measles virus,** also known as the **rubeola virus.**
- Measles is a **highly contagious viral disease** that can lead to **serious health complications**, especially in **children under 5 years old**.
- Symptoms generally appear **7 to 14 days** after exposure to the virus.
- Measles can lead to serious complications, especially in young children:
  - **Ear infections** and **diarrhoea** are common mild complications.
  - **Pneumonia** (lung infection) and **encephalitis** (brain inflammation) are more severe and can be life-threatening.

- **Pregnant women** who get measles may also face complications, such as preterm labour.

❖ **Two-Dose Immunisation:** WHO recommends **2 doses of measles vaccine** for all children. The vaccine can be administered as:

- Measles-only vaccine
- **Measles-Rubella (MR)**
- **Measles-Mumps-Rubella (MMR)**
- **Measles-Mumps-Rubella-Varicella (MMRV)**
  - Universal two-dose coverage should be the **standard in all national immunisation programmes**.

Shingles Vaccines

Sub-Topic: *Biotech, Disease, Vaccine*

Context:

New research from **South Korea and Wales** suggests that the **Shingles vaccine** not only reduces the risk of **cardiovascular conditions** but may also **significantly lower the risk of dementia**, a devastating neurodegenerative disorder with limited treatment options.

More on News

❖ A **recent South Korean study** found that individuals vaccinated against shingles had a **23% lower risk** of developing cardiovascular conditions.

❖ While this is a notable discovery on its own, even more compelling is the growing evidence linking the shingles vaccine to a **reduced risk of dementia**.

What Is Shingles?

❖ **Shingles** is a viral infection caused by the **varicella-zoster virus**—the same virus responsible for **chickenpox**.

❖ **Reactivation**: After a person recovers from chickenpox, the virus lies dormant in the body's nerve cells and can reactivate later in life, particularly when the immune system is weakened.

❖ **Symptoms**: The result is often a **painful rash**, typically appearing as a stripe of blisters along one side of the torso. In severe cases, it can lead to **vision loss**, **facial paralysis**, or even **brain inflammation**.

❖ The infection can also cause **postherpetic neuralgia**, a condition where pain persists long after the rash disappears.

❖ To prevent reactivation of the virus, shingles vaccines are recommended primarily for **adults over 50** and for **younger adults with weakened immune systems**, such as those living with HIV.

WHO to Back Use of Weight-Loss Drugs for Adults Globally

Sub-Topic: *International Organisation, Health*

Context:

In a landmark move, the **World Health Organisation (WHO) is set to officially recommend the use of weight-loss drugs to treat adult obesity**, signaling a **major policy shift in addressing one of the world's most pressing health challenges.**

WHO to Back GLP-1 Weight Loss Medications

❖ The drugs under consideration — ***Wegovy by Novo Nordisk and Zepbound by Eli Lilly*** — belong to a **class of medications known as GLP-1 receptor agonists.**

❖ These drugs **mimic a gut hormone that suppresses appetite by slowing digestion, leading to significant weight loss.**

- Clinical trials have shown that **patients can lose 15% to 20% of their body weight, depending on the drug used.**

❖ **Originally launched in the United States**, these medications **come with a hefty price tag, often exceeding $1,000 per month in high-income nations.**

❖ While **highly effective,** studies indicate that **long-term usage may be necessary to maintain weight loss, raising concerns over cost and access, particularly in lower-income settings.**

Global Obesity Epidemic

❖ **More than one billion people worldwide now live with obesity,** according to WHO estimates.

❖ Alarmingly, **nearly 70% of them are in low- and middle-income countries (LMICs),** as per data from the World Bank.

❖ WHO's upcoming guidelines aim to address this disparity by recommending ways to improve global access to obesity treatments, especially in resource-constrained regions.

Essential Medicines List (EML)

The WHO Model List of Essential Medicines (EML) is a **curated list of medicines considered most effective and safe to address the priority health needs of populations. Published every two years** by the World Health Organisation, the EML serves as a global reference to help countries develop their own national essential medicines lists and guide procurement and supply within health systems. The EML is **updated biennially, with the latest 23rd edition published in July 2023, containing 591 drugs and 103 therapeutic equivalents. Over 150 countries use the WHO EML** to guide their national lists and purchasing decisions. The 25th meeting of the WHO Expert Committee on Selection and Use of Essential Medicines will be held in **May 2025 to review and update the list.**

Semaglutide Shows Promise in Treating Liver Disease

Sub-Topic: Biotech, Disease, Treatment

Context:

Semaglutide, a drug originally developed for **diabetes** and now widely used for **weight loss** (in drugs like **Ozempic** and **Wegovy**), shows potential for treating **Metabolic Dysfunction-Associated Steatohepatitis (MASH)**, a serious fatty liver disease.

Clinical Trial Details

- In a groundbreaking **Phase 3 clinical trial** involving **800 participants** across **37 countries** and lasting **72 weeks**, researchers discovered that a **weekly dose of semaglutide** was effective in treating MASH in nearly **two-thirds of patients**.
- The findings, published on **April 30** in **The New England Journal of Medicine**, mark a major milestone in the treatment of liver disease.

Disease Overview

- MASH, according to **Yale Medicine**, refers to a spectrum of liver conditions characterised by fat buildup in the liver **unrelated to alcohol consumption**.
- Often linked to **overnutrition**, MASH is a metabolic condition that can cause **inflammation** and **scarring of the liver**.
- It is frequently associated with **obesity**, **insulin resistance**, and other components of **metabolic syndrome**.

Significance of Findings

- Semaglutide helps by **improving liver function** and tackling **underlying metabolic dysfunction**.
- If approved for MASH treatment, semaglutide would provide a **new therapeutic option** for a condition with **limited current treatments**.
- Given its **multi-organ benefits**, semaglutide could play a key role in **comprehensive metabolic disease management**.
- This is critical due to MASH's link with **cardiovascular, metabolic, and renal conditions**—areas where semaglutide has already demonstrated **proven benefits**.

India's First Gene-Edited Sheep

Sub-Topic: *Biotechnology, Gene Editing*

Context:

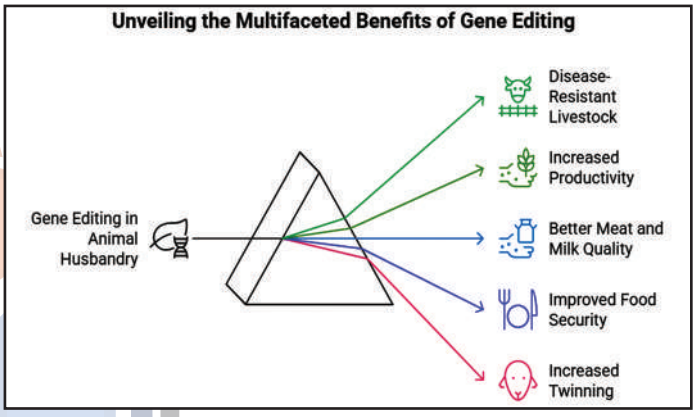
A groundbreaking scientific achievement has been made by researchers at **Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST),** Srinagar, with the **creation of India's first gene-edited sheep.**

More on News

- After four years of intensive research, the SKUAST team successfully **enhanced the muscle mass of sheep by 30%,** marking a significant milestone in Indian livestock genetics.
- The project was **sponsored by the Indian Council of Agricultural Research (ICAR)** and **followed strict international biosafety protocols.**

Gene-Editing Breakthrough with CRISPR-Cas9

- The team of five scientists **utilised advanced CRISPR-Cas9 gene-editing technology to modify the myostatin gene in sheep.**



- The **myostatin gene naturally regulates muscle growth,** and its **disruption resulted in a notable 30% increase in muscle mass**—a trait typically found in European breeds like the Texel but absent in Indian sheep.
- This precise gene-editing technique allows for improvements without traditional crossbreeding or the introduction of foreign DNA.

Breakthrough in Energy Storage with Aminated Graphene Supercapacitors

Sub-Topic: *Physics, Semiconductors, Graphene*

Context:

Researchers from **Nagaland University**, along with collaborators from **Visvesvaraya Technological University** and **Nagarjuna College of Engineering and Technology**, have introduced a revolutionary **aminated graphene-based supercapacitor** material with the potential to **outperform lithium-ion batteries** and reshape global energy storage.

More on News

- Their findings have been published in the prestigious international journal **iScience**, signalling global recognition of the discovery's significance.

- Further testing and optimisation efforts are currently in progress, aimed at scaling the production process for commercial deployment.
- Industry experts suggest that, if successfully commercialised, this innovation could **drastically reduce electric vehicle costs** and unlock new opportunities in the global energy storage market.

Key Technological Advancements

- Unlike conventional supercapacitor electrodes, which rely on expensive rare-earth elements and complex manufacturing processes, the Indian team's innovation introduces a **streamlined, single-step conversion process**.
- This technique transforms ordinary graphite into high-performance aminated graphene under **standard temperature and pressure conditions**, significantly reducing energy inputs and fabrication complexity.

Superior Performance Metrics

- Laboratory tests of the new supercapacitor material have revealed **remarkable electrochemical properties**:
  - **Higher Electrochemical window** than typical carbon-based supercapacitors.
  - **Energy density** exceeding **five times greater** than comparable non-aminated materials.
  - **Cycle life** shows **over 98% capacity retention** after **10,000 full charge-discharge cycles**.

Wide-Ranging Applications

- The new technology's exceptional performance and durability make it well-suited for a broad spectrum of uses:
  - **Electric vehicle power systems**, where ultra-fast charging is essential.
  - **Grid-scale renewable energy storage**, especially for managing intermittent solar and wind power.
  - **Public transportation systems**, including regenerative braking in metro and bus networks.
  - **Backup power supplies** for critical infrastructure like **telecommunications**.
- By delivering both speed and reliability, this innovation could reduce the time required to charge electric vehicles to levels comparable to conventional refuelling, removing one of the key barriers to EV adoption.

India's First Sovereign LLM Sarvam

Sub-Topic: *Emerging Technology, Artificial Intelligence*

Context:

The Government of India has appointed **Bengaluru-based AI startup Sarvam** to build the country's **first sovereign large language model (LLM)**.

The LLM Revolution: Generative AI Emerges

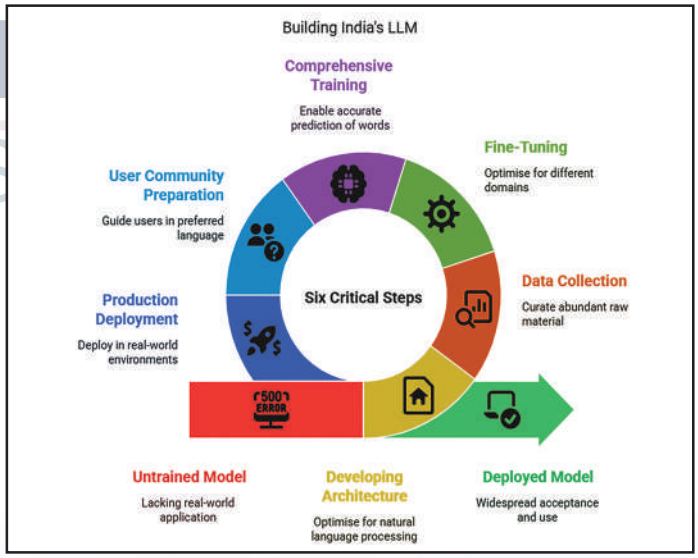
- In **2017**, Google's paper **"Attention is All You Need"** introduced the **Transformer architecture**, significantly advancing natural language processing and laying the groundwork for modern LLMs.
- The transformer's **attention mechanism** enhanced the model's ability to focus on relevant text parts, catalysing the **generative AI revolution**.
- While models like **ChatGPT** dominated the scene, **China's DeepSeek** introduced more nimble and distilled reasoning capabilities.

India's LLM Mission: Vision and Requirements

- The mission aims to create a **foundational AI model** that supports:
  - Multiple Indian languages and dialects.
  - Applications across **villages, cities, corporations, and individuals**.
- India's LLM must combine:
  - **High computing and learning power** akin to Nvidia-enabled ChatGPT.
  - **Efficient, reasoning-driven models** similar to DeepSeek.

Government & Institutional Support

- The Government has committed to providing **computational resources**.
- Ties with **GPU-as-a-service providers** ensure **no quality compromise** in development.
- Collaboration with **IIT Madras** will support Sarvam with deep academic research.



- Opportunity to build a new generation of **AI talent and products** through youth participation.

The Realistic Vision

- India isn't aiming to **overtake the US or China** in AI immediately.

- Instead, the focus is on **building competent, Indian-context LLMs** to serve national needs.
- The $300-billion Indian IT industry and groups like:
  - **NASSCOM (National Association of Software and Service Companies)**,
  - **iSPIRT (Indian Software Product Industry Roundtable)** must be **strategically engaged**.
- At the same time, the **entrepreneurial spirit of young Indians** must be **nurtured and unleashed**.

PSLV-C61 / EOS-09 Mission

Sub-Topic: *Space Technology, Launch Vehicles, PSLV*

Context:

The **Indian Space Research Organisation (ISRO)** launched its 101st **space launch** from the **Satish Dhawan Space Centre** in Sriharikota. The mission, titled **PSLV-C61 / EOS-09**, marks another significant step in India's expanding space capabilities.

More on News

ISRO confirmed on Thursday (May 15) that the **Polar Satellite Launch Vehicle (PSLV)** had been moved from the **Payload Integration Facility** to the **Mobile Service Tower** at the Sriharikota spaceport for final integration activities.

EOS-09: Enhancing All-Weather Surveillance

- The primary payload of the mission, **EOS-09 (1,710-kg satellite)**, is an **earth observation satellite** equipped with **C-band synthetic aperture radar (SAR)**.
- This technology will allow the satellite to capture **high-resolution images of Earth's surface** under **all weather conditions**, day and night.
- The satellite will be inserted into a **sun-synchronous orbit**, which allows it to maintain consistent lighting conditions for imaging across the globe—ideal for monitoring dynamic changes on Earth's surface.

Mission Applications and Strategic Importance

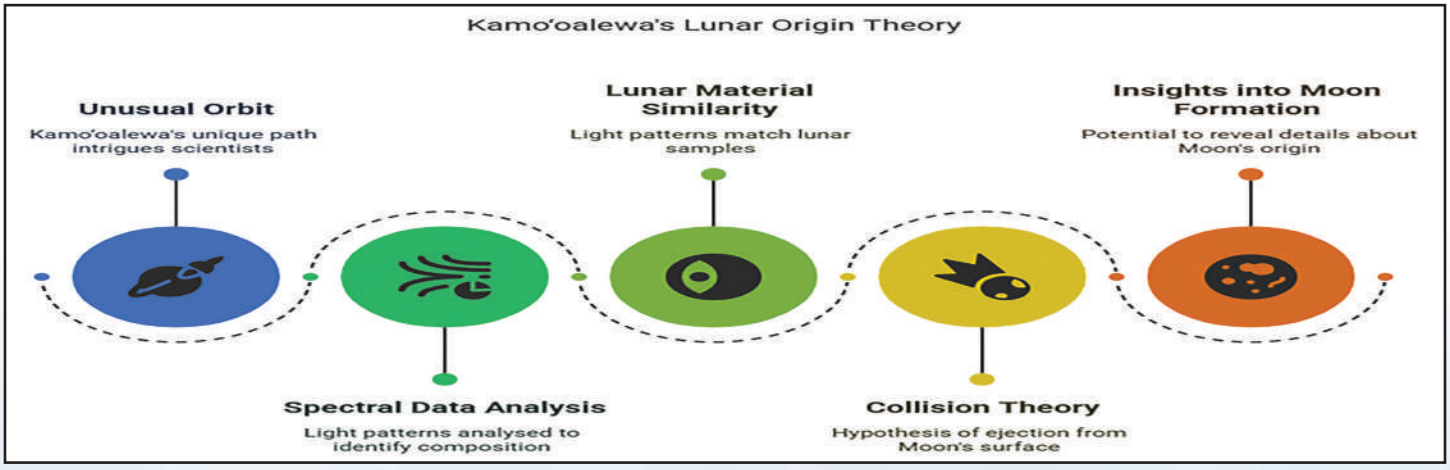
- EOS-09 brings with it **five distinct imaging modes**, ranging from ultra-high-resolution scanning for small object detection to wide-area surveillance for macro-level observations.
- This versatility positions it as a **critical asset** across multiple domains:
  - **Border surveillance and national security**
  - **Agriculture and crop monitoring**
  - **Forestry and wildlife tracking**
  - **Urban planning and infrastructure monitoring**
  - **Flood and disaster management**
- Given heightened security sensitivities along India's borders with **Pakistan and China**, the satellite's advanced capabilities will significantly enhance India's **intelligence gathering, disaster response, and strategic readiness**.
- EOS-09 is a successor to **RISAT-1** and a key addition to India's constellation of Earth observation satellites such as **Resourcesat**, **Cartosat**, and **RISAT-2B**. Together, these platforms will provide **comprehensive, near-real-time coverage** of India and its surroundings, enabling smarter, data-driven governance.

Tianwen-2

Sub-Topic: *Space Missions*

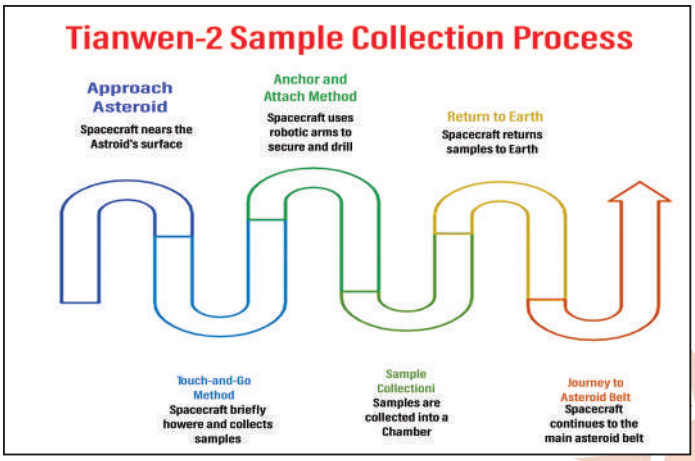
Context:

China is set to launch its first mission to survey and sample a near-Earth asteroid this week, marking a significant milestone in its rapidly advancing space programmes. Named **Tianwen-2**, this mission aims to explore the asteroid **469219 Kamo'oalewa**, a celestial object with a uniquely close and mysterious relationship with Earth. If successful, the mission will place China among an elite group of nations—including the **U.S. (OSIRIS-REx)** and **Japan (Hayabusa2)**—that have achieved the formidable task of sampling asteroids and returning those samples to Earth.



What Is the Kamo'oalewa Asteroid?

- Discovered in 2016 by the **Pan-STARRS 1** asteroid survey telescope located on **Haleakalā** in Hawaii, Kamo'oalewa is part of a rare and poorly understood class of objects called **quasi-satellites**.



- These bodies orbit the Sun, but due to their close proximity to Earth, they are significantly influenced by Earth's gravitational pull.
- To observers on Earth, Kamo'oalewa appears to trace a looping path—sometimes leading, sometimes trailing Earth in its orbit—creating the **illusion** that it is orbiting our planet. In reality, it follows a **highly elliptical solar orbit**.
- Scientists estimate that Kamo'oalewa has maintained its current orbital pattern for around 100 years and will likely continue to do so for another 300 years. Yet, its **origin and composition** remain largely unknown, making it a compelling target for investigation.

E-Hansa

Sub-Topic: *Fuel Technology, Green Fuels*

Context:

India has taken a significant step towards achieving its green aviation and indigenous technology goals with the announcement of the **Electric Hansa (E-HANSA)** project.

More on News

- The project was officially announced by **Dr. Jitendra Singh**, Union Minister of State (Independent Charge) for Science & Technology.
- He disclosed this while chairing a high-level monthly review meeting with secretaries of all major science departments at the Science Centre.

E-Hansa: A Green Leap in Aviation

- India has initiated the development of **Electric Hansa (E-Hansa)**, a next-generation **two-seater electric trainer aircraft**.
- The project is led by **CSIR-National Aerospace Laboratories (NAL), Bengaluru**.
- **Cost**: Expected around **Rs 2 crore**, nearly half the price of comparable imported aircraft.
- Part of the **HANSA-3 (NG) trainer aircraft programmes** aimed at cost-effective, indigenous pilot training.
- Supports **green aviation** and the use of **clean energy fuels** in aircraft operations.

Science & Technology Ecosystem Reforms

- **Meeting Objectives**: The review meeting included discussions on **performance assessment**, **implementation status of prior decisions**, and the **path forward for transformative reforms** in India's science ecosystem.
- **Public-Private Partnerships (PPP)**: Emphasis on commercialisation of indigenous technologies.
  - National Research Development Corporation (NRDC) instructed to follow the **DBT-BIRAC** and **IN-SPACe** models.
  - Advocated for a **hub-and-spoke PPP model**, using **AI-driven tech/IP exchange platforms** and **regional NTTOs**.

Policy Priorities:

- Standardised tech transfer protocols.
- Promoting Indian R&D aligned with "**Vasudhaiva Kutumbakam**".
- Enhancing **ease of doing business**.

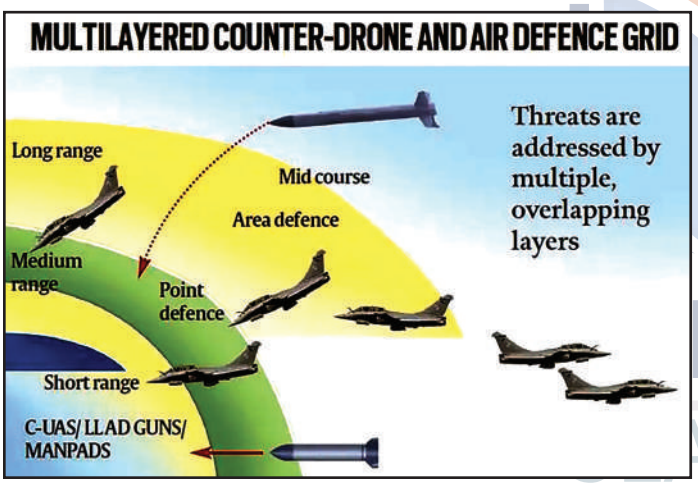
Mains

Integrated Air Command and Control System (IACCS)

Sub-Topic: *Security challenges and their management in border areas - linkages of organised crime with terrorism.*

Context:

At the recent media briefing on **Operation Sindoor,** Indian military officials unveiled a **powerful visual of the Integrated Air Command and Control System (IACCS)** node operated by the Indian Air Force (IAF).



More on News

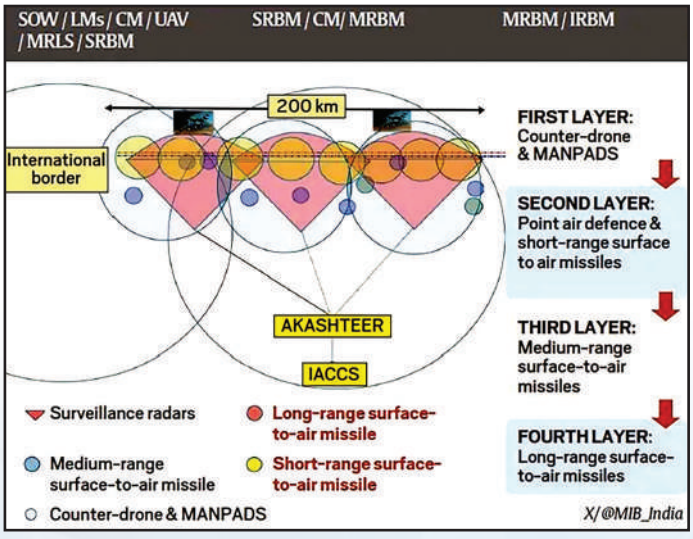
- The image depicted over two dozen IAF personnel monitoring a massive digital screen displaying a real-time, consolidated air threat feed, generated by India's networked air defence systems.
- This integrated display was a live demonstration of how India successfully deployed a multi-layered aerial shield to counter potential threats from Pakistan during last week's military standoff.

What Is IACCS?

- Developed by **Bharat Electronics Limited (BEL),** a leading public sector aerospace and defence electronics company, the IACCS is **an automated, real-time command and control system.**
- It **synthesises data from diverse sources**—including ground-based and airborne radars, civilian aviation radars, communication nodes, and the IAF's command centres—into a unified operational picture.
- This holistic view **empowers commanders at all levels with situational awareness** and faster decision-making to counter threats ranging from enemy aircraft to missiles and drones.
- By enabling **centralised control with decentralised execution,** IACCS significantly **reduces response time, allowing quick threat identification, risk assessment, and deployment of air defence assets to neutralise incoming aerial attacks.**
- Its overlapping radar and communication coverage ensures **seamless airspace management** and eliminates redundancy in tracking and response.

Indian Army's Akashteer: A Complementary System

- The Indian Army is also **building its own version of an integrated air defence management system, called Akashteer.**
- Also **developed by BEL** under a ₹1,982 crore contract signed in March 2023, Akashteer is **designed to monitor low-level airspace and coordinate ground-based air defence weapons across battle zones.**
- While still operating at a relatively smaller scale, **Akashteer is currently being integrated with IACCS to improve interoperability** between the Army and the Air Force in joint air defence operations.



A Multi-Layered Defence Grid

India's air defence system operates on a multi-layered architecture, offering both point and area defence capabilities:

- **Layer 1: Counter-drone systems and MANPADS** (Man-Portable Air Defence Systems).
- **Layer 2 & 3:** Point air defence with **short- and medium-range surface-to-air missiles.**
- **Layer 4: Long-range missile systems** for extended coverage.
- **Radars:** This framework is supported by a suite of modern surveillance radars including **ground-based systems, AWACS** (Airborne Warning and Control Systems), and **AEW&C** (Airborne Early Warning & Control) aircraft, all fully integrated into the IACCS grid.
  - These assets are crucial for the early detection, tracking, and interception of hostile airborne intrusions.

Digital Information Warfare Threatens National Security Stability

Sub-Topic: *Security challenges and their management in border areas - linkages of organised crime with terrorism.*

Context:

The **Pahalgam terror attack** on 22 April 2025, which killed 26 civilians in Jammu and Kashmir (J&K), marked not only a tragic act of violence but also the onset of a **coordinated disinformation campaign**.

Methods for Weaponising Social Media

- **Coordinated Hashtag Propaganda**
  - Within hours of the attack, hashtags such as **#IndianFalseFlag, #PahalgamDramaExposed, and #ModiExposed** trended on X (formerly Twitter).
  - **Open-Source Intelligence (OSINT)** revealed that over **75% of posts** originated from **Pakistani accounts**, often linked to **pro-military narratives**.
  - The objective was to **discredit India**, shift blame from **Pakistan-based terror outfits** like **Lashkar-e-Taiba (LeT)** and **The Resistance Front (TRF)**, and suggest **India orchestrated the attack**.
- **Deepfakes and AI-Generated Content**
  - AI tools were used to create **distorted videos and images**, including a **grieving woman morphed into a dance video** and **fake statements from senior Indian Army officials**.
  - These were designed to **ridicule victims**, **inflame emotions**, and **portray the Indian state as deceptive**.
  - Forensic analysis by I4C confirmed **pixel anomalies** and **pre-dated metadata**, indicating **synthetic image creation using GANs**.
- **Targeting the Armed Forces and Fabricated Military Dissent**
  - A wave of disinformation aimed at portraying **internal rebellion among Sikh soldiers** of the Indian Army.
  - AI-generated deepfakes claimed that soldiers were demanding a **Khalistan referendum** and refusing to operate in Kashmir.
  - Videos were doctored to show **soldiers demanding secession**, amplified by **pro-Khalistani and Pakistani troll networks**.
- **Fake Cyber Breach Claims**
  - Pakistani cyber actors claimed to have **breached Indian defence networks**, although **Indian authorities denied any data compromise**.
  - Such claims aimed to **create psychological insecurity** and project Indian vulnerability.

Socio-Economic Fallout of Digital Information Warfare

Geopolitical Ramifications and Strategic Calculations

- The crisis reflects the **stability-instability paradox**—limited conflict under the nuclear umbrella between India and Pakistan.
- Both nations took **tit-for-tat measures**, with **Pakistan suspending the Simla Agreement** and **imposing trade restrictions**.
- **China's involvement** via CPEC and India's position in the **Quad alliance** adds **strategic complexity** to the situation.
- The **international community's silence** risks **emboldening propaganda warfare** and undermines democratic resilience.

- **Economic Disruption in J&K**
  - The attack led to a **massive drop in tourism**:
    - **Hotel bookings** in Pahalgam and Anantnag dropped by **over 60%**.
    - **Amarnath Yatra** registrations declined by **35%**.
  - Local businesses (transport, handicrafts, hospitality) saw **revenue losses of 40–50%**.
  - Thousands in the **informal sector became unemployed or underemployed**, reflecting **J&K's economic fragility** under terror threats.
- **Communal Polarisation and Social Unrest**
  - The propaganda campaign attempted to **polarise communities** by linking the attack to **Muslim identity**, escalating **religious tensions**.
  - Allegations of **internal betrayal** and **selective targeting of Muslim homes** contributed to **scapegoating and vigilantism**.

- This **erodes national unity** and provides fodder for **jihadist recruitment narratives**, both domestically and globally.

❖ **Damage to International Perception**

- Propaganda targeting **global platforms** could:
  - **Distort international understanding** of the incident.
  - Complicate **diplomatic efforts** to isolate terrorist sponsors.
  - Undermine India's **image as a stable and secure democracy**.

India's Multi-Dimensional Response to the Information War

❖ **Digital and Media Regulation: Press Information Bureau (PIB)** and independent **fact-checkers** actively debunked viral falsehoods.

- The **Ministry of Information and Broadcasting** issued advisories urging **media restraint** and **public verification**.
- India **banned several Pakistani YouTube channels and social media handles** that were disseminating propaganda.

❖ **Public Engagement and Awareness**

- Citizens were urged to report misinformation via **PIB's WhatsApp number and email ID**.
- Public advisories emphasised **scrutinising viral content**, especially concerning the armed forces.

❖ **Diplomatic and Strategic Countermeasures**

- India initiated **retaliatory strikes under Operation Sindoor** on terrorist camps in **PoK and Pakistan**, targeting 9 sites.
- **The Indus Waters Treaty was suspended**, and the **Attari-Wagah border closed**.
- Diplomatic ties were curtailed; **Pakistani diplomats were sent back**, and **global partners were briefed** to highlight India's stance.

IOS SAGAR

Sub-Topic: *Security challenges and their management in border areas - linkages of organised crime with terrorism.*

Context:

The Indian Ocean Region (IOR) is emerging as a theatre of geopolitical contestation and strategic partnerships. In response to evolving maritime challenges and increasing competition, India has launched **IOS SAGAR**, an innovative naval cooperation initiative.

What is IOS SAGAR?

❖ **Launched:** May 2025

❖ **Led by:** Indian Navy

❖ **Vessel Deployed:** INS Sunayna

❖ **Duration:** One-month deployment

❖ **Participating Countries (10):**

- **African Littorals:** Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Tanzania.
- **South Asian Neighbours:** Maldives, Sri Lanka.

❖ **Crew Composition:** Naval and Coast Guard personnel from all participant nations.

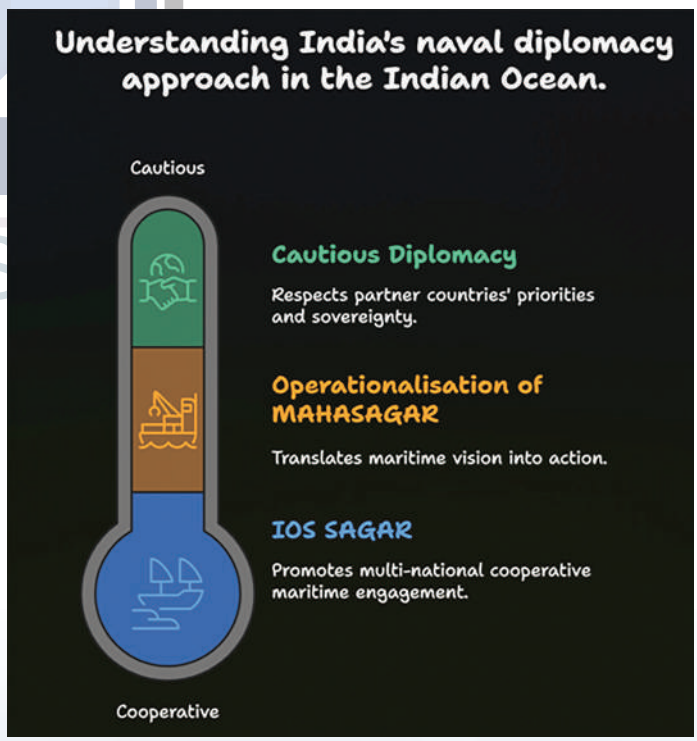
❖ It represents a deeper **strategic commitment** to regional maritime security and multilateral engagement in the South-West Indian Ocean.

❖ IOS SAGAR aligns with India's evolving maritime strategy, particularly the vision of **SAGAR (Security and Growth for All in the Region)** and its expansion into **MAHASAGAR**.

Objectives of IOS SAGAR

❖ **Strengthening Maritime Cooperation:** Facilitates joint training, operational drills, and exchange of best practices among participating navies.

❖ **Enhancing Interoperability:** Builds operational synergy crucial for addressing transnational maritime threats.



❖ **Advancing Naval Diplomacy:** A unique model showcasing India's naval diplomacy to promote mutual trust and regional stability.

Strategic Context: India's Role in the Indian Ocean Region (IOR)

- India is recognised as the **principal maritime security actor in the IOR**, with a responsibility to maintain peace and stability.
- IOS SAGAR complements India's broader strategy of **naval diplomacy** to engage with **like-minded regional partners**.
- The initiative reflects India's intention to be seen as the **"Preferred Security Partner"** and **"First Responder"** in the region.

Key Significance of IOS SAGAR :

- **Alignment with India's Maritime Vision**
  - **SAGAR Vision (2015):** Introduced by PM Modi, aimed at enhancing regional security, cooperation, and prosperity in the IOR.
  - **MAHASAGAR (2025):** Recently expanded version of SAGAR, focusing on **Mutual and Holistic Advancement of Security and Growth for All in the Region**.
    - Emphasis on **Global South**.
    - IOS SAGAR is the **first concrete operationalisation** of this vision.
- **Addressing Non-Traditional Maritime Threats**
  - IOS SAGAR reflects India's recognition of **non-traditional security challenges**:
    - **Piracy**
    - **Illegal, Unreported and Unregulated (IUU) Fishing**
    - **Natural Disasters**
    - **Climate change-induced maritime risks**
  - Enhancing coordination in **Humanitarian Assistance and Disaster Relief (HADR)** is a key priority under this initiative.

AIKEYME: India's New Africa-Centric Maritime Platform

- **Africa-India Key Maritime Engagement (AIKEYME)** is a multilateral mechanism to foster regional security.
- IOS SAGAR's participation in AIKEYME, alongside **INS Chennai** and **INS Kesari**, highlights India's intent to:
  - Strengthen ties with **African littoral states**
  - Build an inclusive, multilateral security architecture involving both African and South Asian partners

- **Inclusion of African Littoral States: Expanding the Indo-Pacific Vision**
  - African nations comprise a significant part of the participant group, indicating a **strategic shift** in India's maritime engagement.
  - Contrasts the traditional **East-centric focus** of the Indo-Pacific with a **Westward strategic expansion**.
  - Reinforces Africa's place in India's **cartographic imagination** of the Indo-Pacific.

Three Key Takeaways from IOS SAGAR

- **Emerging Models of Naval Diplomacy:** IOS SAGAR represents a shift towards **multi-national, cooperative frameworks** for maritime engagement.
- **Operationalisation of MAHASAGAR:** With emphasis on **African engagement**, India has begun translating vision documents into action-oriented maritime initiatives.
- **Cautious and Context-Sensitive Diplomacy:** India's approach remains sensitive to the **compulsions, priorities, and sovereignty concerns** of partner countries in the IOR.

Challenges and the Road Ahead

- **Geographic Scope Limitation:** The inaugural edition focused on the South-West Indian Ocean; future expansions must include **eastern and central IOR** regions.
- **Geopolitical Competition:** Growing **Chinese influence**, particularly through naval bases and debt diplomacy, poses strategic challenges.
- **Need for Institutionalisation:** IOS SAGAR and AIKEYME must be **institutionalised as recurring forums** for sustained engagement.

India and the Arctic

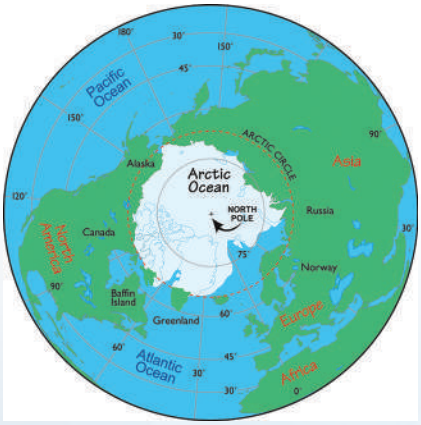
Sub-Topic: *Bilateral, regional and global groupings and agreements involving India and/or affecting India's interests.*

Context:

As global flashpoints expand, the **Arctic** — once viewed as a zone of peace and scientific cooperation — **is fast becoming a critical theatre for military and geopolitical competition.**

More on News

- **Climate change,** once a scientific concern, **has inadvertently transformed the Arctic into a contested frontier.**
- With **Russia asserting dominance, China expanding its presence,** and the **United States eyeing strategic**



interests in Greenland, the Arctic is no longer peripheral to global politics — it's at the centre of it.

Climate Change and Arctic Geopolitics

- **North Sea Route:** The rapid **melting of polar ice due to global warming has opened up the Northern Sea Route (NSR),** which was previously navigable only during brief summer periods.
  - Today, the **NSR is emerging as a key maritime corridor,** significantly **reducing transit times between Europe and Asia.**
  - This has **triggered a surge in traffic and the potential realignment** of global trade routes, **posing a strategic challenge to traditional chokepoints like the Suez Canal and even the Indian Ocean.**
- **Militarisation:** But alongside commercial promise lies a troubling trend: the growing militarisation of the Arctic.
  - **Countries are reviving old military bases, deploying submarines, and asserting territorial claims** through visible military posturing.
  - This isn't entirely new — **Arctic states have long used their polar presence for broader strategic purposes.**
  - The U.S. President Donald **Trump's proposal to purchase Greenland,** while mocked at the time, underscored a strategic truth — the Arctic is central to great power rivalry.

India's Limited Arctic Footprint

- India, a non-Arctic power, has **significant stakes in this evolving landscape** but remains surprisingly detached.
- Despite publishing a **well-crafted Arctic Policy in 2022** — which **emphasises climate science, sustainable development, and environmental protection** — New Delhi's **approach is largely apolitical and scientific.**
- While India **recognises the Arctic's impact on South Asia's Himalayan glaciers,** monsoon systems, and water security, it underestimates the region's emerging security and strategic dynamics.
- India does maintain a **scientific presence in the Arctic,** notably through its **research station in Svalbard,** and holds **observer status in the Arctic Council.**
- However, **these mechanisms were built for a cooperative, consensus-based era** — a model now breaking down under geopolitical strain.
- India's current Arctic engagement risks becoming obsolete unless recalibrated to match new realities.

Strategic Risks of Ignoring the Arctic

Ignoring the Arctic's changing geopolitical tides could carry serious consequences for India:

- **Trade Diversion:** As Arctic shipping lanes become more viable, **global trade flows may bypass traditional routes through the Indian Ocean**, undercutting India's aspirations as a regional connectivity hub under frameworks like **SAGAR (Security and Growth for All in the Region) and the Indo-Pacific Oceans Initiative (IPOI).**
- **China-Russia Arctic Nexus:** The deepening strategic cooperation between Russia and China in the Arctic mirrors China's growing presence in the Indian Ocean, blurring regional boundaries and challenging India's maritime focus.
- **Nordic Perception:** India's historical ties with Russia, especially amid Moscow's aggression in Ukraine, are creating discomfort among Arctic democracies.
  - India needs to reassure these partners that its policy of strategic autonomy remains constructive and collaborative.

Recalibrating India's Arctic Strategy

To maintain relevance and enhance its Arctic presence, India must adopt a sharper strategic approach, without abandoning its environmental and scientific ethos. Here's how:

- **Institutionalise Arctic Policy:** Establish dedicated Arctic desks in the Ministries of External Affairs and Defence, and encourage inter-agency collaboration, policy dialogues, and research partnerships with strategic think tanks.
- **Forge Strategic Partnerships:** Collaborate with like-minded Arctic nations on dual-use projects such as polar logistics, maritime domain awareness, satellite monitoring, and disaster response.
  - These initiatives boost India's credibility without triggering concerns of militarisation.
- **Secure a Governance Role:** Proactively seek inclusion in emerging Arctic forums related to infrastructure development, digital regulation, sustainable shipping, and the blue economy. Engage local and Indigenous Arctic communities with sensitivity to avoid an extractive or intrusive approach.

Prelims

WHO Pandemic Agreement

Sub-Topic: *Important International institutions, agencies and fora - their structure, mandate.*

Context:

In a significant step toward ensuring a more unified and equitable global response to future health crises, the **World Health Organisation (WHO)** member states on Tuesday (20 May) **unanimously adopted the world's first Pandemic Agreement**.

More on News

- The landmark decision marks the culmination of **over three years of negotiations**, initiated in the aftermath of the COVID-19 pandemic.
- The **WHO Pandemic Agreement** was officially adopted during a plenary session of the **78th World Health Assembly**, the organisation's highest decision-making body. The move follows **Monday's committee vote**, where 124 countries voted in favour, none opposed, and 11 abstained.

Background

- The WHO has been **working** on the **Pandemic Agreement since 2021**, intending **to create** a **legally binding instrument** to strengthen international cooperation and **prevent future pandemics**.
- The World Health Assembly (**WHA**) **acknowledged** the **progress** made **by Member States** in developing a pandemic agreement and **strengthening** the International Health Regulations (**IHR, 2005**).

Key Highlights

- **Purpose:** To ensure **collective international readiness** for future pandemics.
- **Scope:** Enhances global coordination for:
  - **Equitable access** to vaccines, diagnostics, and therapeutics
  - **Transparent data sharing** and early outbreak detection
  - **Stronger health systems**, supply chains, and communication networks
- **Focus on equity:** Addressing disparities faced by lower-income nations during the COVID-19 response.

Core Features of the Agreement

- The agreement lays the groundwork for improved **international coordination** in areas crucial for pandemic prevention, preparedness, and response.
- It sets out key **principles, approaches, and tools** that member states will adhere to, with the goal of strengthening the global health architecture.

Why This Matters?

- The agreement is a **direct response to lessons learned** from the COVID-19 crisis.
- It aims to prevent the **global disparities and vulnerabilities** seen during the pandemic.
- Emphasises **equity**, **solidarity**, and **shared responsibility** in future health emergencies.

Next Steps

- The agreement serves as a **foundational global framework** for managing pandemics.
- Governments, health agencies, and global partners are expected to **align policies and investments** with the new pact.
- This represents a **renewed commitment** to ensure no country is left behind in future pandemic responses.

US Funding Withdrawal from Gavi

Sub-Topic: *Bilateral, regional and global groupings and agreements involving India and/or affecting India's interests.*

Context:

The U.S. had pledged **$2.6 billion** to Gavi for 2026–2030—around **13%** of the alliance's total budget for that period. However, ongoing cuts to U.S. foreign aid, including the near-total dismantling of USAID contracts, suggest the country may renege on this commitment.

More on News

- If confirmed, this could result in over **one million additional child deaths** in the next five years, especially in countries where out-of-pocket medical expenses are prohibitive.
- Gavi has played a **central role in global immunisation**, preventing **154 million deaths since 1974**.
- The US contributed **$4 billion** for Covid-19 vaccine procurement via COVAX in 2021.

Gavi's Co-Financing Model

- Countries co-finance vaccines in stages:
  - **Initial Self-Financing** (e.g., Uganda, Afghanistan)
  - **Preparatory Transition** (e.g., Nepal, Pakistan)
  - **Accelerated Transition** (e.g., Kenya, Nigeria)
  - **Fully Self-Financing** (e.g., India, Indonesia)
- Transition involves a **15% annual increase** in national contributions until full independence.

Gavi's Role in Global Health

- **Founded in 2000**, Gavi supports vaccine access in **low- and middle-income countries (LMICs)** through a **public-private partnership** with WHO, UNICEF, the World Bank, and the Gates Foundation.
- The alliance also helps reduce the number of **"zero-dose" children**—those with no access to routine immunisation—and supports global initiatives like the **Immunisation Agenda 2030** and **SDG3 GAP**.

- **Gavi's goals:**
  - Support **vaccine equity**
  - Promote **national ownership** through co-financing
- Gavi has vaccinated **over 1 billion children** and funded **$23 billion** in immunisation efforts.
- It provides vaccines against **20 diseases**, including measles, Ebola, cholera, HPV, and malaria.
- For every $1 invested in Gavi, there's an estimated **$54 return** in economic benefit.

Potential Impact of U.S. Disengagement

- **Disrupt immunisation campaigns**, leading to resurgences of Measles, whooping cough, rotavirus, Diphtheria, cholera, and polio.
  - **Vaccine hesitancy** in HICs + **funding shortfalls** in LMICs = global **herd immunity erosion**
- **Reduce vaccine stockpiles**, affecting emergency responses to outbreaks, such as the April 2025 meningitis outbreak in Nigeria. **Rabies elimination ('Zero by 30')** and **cholera control efforts** may stall.
- **Undermine malaria control**, delaying the rollout of the R21/Matrix-M and RTS,S vaccines in Africa, where **94% of global malaria deaths** occur.
- **Jeopardise Africa's vaccine autonomy**, including Gavi's **$1 billion African Vaccine Manufacturing Accelerator (AVMA)** initiative. The initiative requires **$1 billion**, now under threat due to US cuts.
- Gavi is also a key player in the global rabies elimination strategy and was pivotal in responding to cholera and mpox (formerly known as monkey pox) outbreaks.

India's Strategic Position

- **Vaccine Supply Hub:** India supplies **60% of Gavi's vaccines**. Received **$1.7 billion in Gavi support**, became a **donor in 2014**, and **fully self-financing in 2022**.
- **Pandemic Leadership:** Developed **eVIN** (vaccine supply tracking). **Serum Institute of India (SII)** partnered with Gavi and Gates Foundation to manufacture **COVISHIELD** under COVAX.
- **Current Vulnerabilities:** Ongoing Gavi agreements (e.g., **10 million annual doses of PCV** by SII) may be disrupted. Immunisation strengthening and **HPV and typhoid vaccine rollout** depend on Gavi ties.

Geopolitical Implications

- U.S. withdrawal from Gavi opens the door for **China** to expand its influence. With over **$1 billion** already invested in health aid across Belt and Road Initiative (BRI) countries, China is poised to become a dominant player in global immunisation efforts.
- Meanwhile, India can leverage its biotechnology strength and partnerships through **BRICS, Quad, and Indo-Pacific Health Security networks** to assert its role as a **health security provider**.

Reimagining Global Health Partnerships

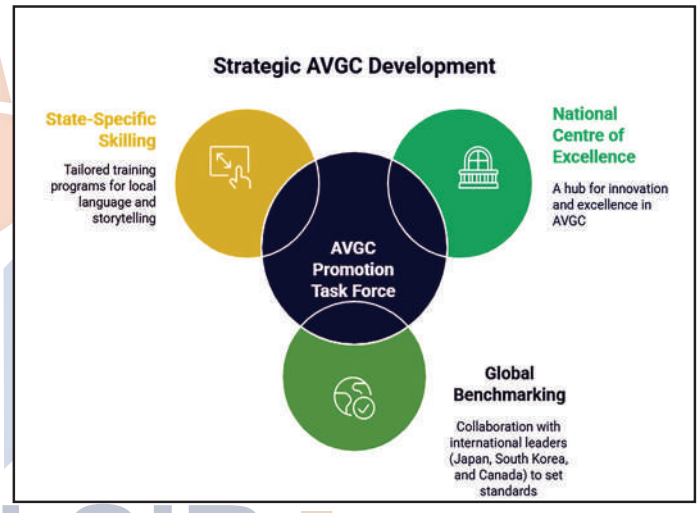
- The Gavi model remains a successful proof-of-concept for PPPs in global health. However, concerns around **accountability, transparency, and donor conditionalities** must be addressed.
- Insights from COVAX—including its ability to deliver **2 billion COVID-19 doses to 146 countries**—can inform future strategies.
- Yet, challenges like **vaccine nationalism**, donor biases, and health infrastructure gaps underscore the need for resilient and equitable systems.

WAVES

The first World Audio Visual and Entertainment Summit (WAVES) was held in Mumbai, inviting stakeholders from the relevant domains to enhance the ecosystem in the country. It is a platform that **nurtures creative entrepreneurs**, **promotes digital content creators**, and **supports innovation in cultural industries**. The Summit reflected the essence of India's rich cultural heritage and literature, along with the talent pool that can grow this industry.

By connecting local human resources with global markets, WAVES amplifies voices nationwide and helps foster sustainable livelihoods. Thus, the industry can influence the international media and entertainment (M&E) space and play a pivotal role in driving the ***orange economy***[1]. The **M&E sector** is a **sunrise sector** in India. Even the United Nations Conference on Trade and Development (UNCTAD) notes that the Cultural and Creative Industries (CCIs) generate annual revenues of more than **USD 2 trillion**, surpassing the GDP of many economies, and account for approximately 30 million jobs worldwide.

When it comes to the Animation, Visual Effects, Gaming, and Comics (AVGC) sector, India enjoys a **natural demographic dividend**. This is because **65% of the country's population** is under **35**, and India can become a global supplier of creative professionals, including **animators**, **VFX specialists**, **game designers**, **motion graphic artists**, and **creative coders**. For this, the **AVGC Promotion Task Force** was also constituted in 2022 under the **Ministry of Information & Broadcasting**. Apart from this, **Skill India** & **Pradhanmantri Kaushal Vikas Yojana** has included dedicated courses in the media and entertainment industry, where over 5.5 lakhs trainings have already been conducted under the MESC framework. Even the **WAVES Summit** paved the way for ***CreatoSphere*** (a talent hunt activity), a democratic access to the creator economy, enabling a new generation of storytellers and innovators to emerge from India's heartland.



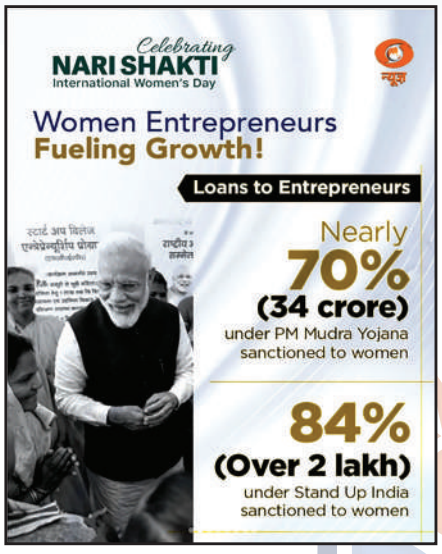
The Ministry of Information & Broadcasting has allocated funds to establish, on the lines of **IITs** & **IIMs**, the **Indian Institute of Creative Technologies** (**IICT**) in **Mumbai**. The Ministry was also at the forefront with the Ministry of External Affairs to make the event truly global by ensuring the outreach of the Summit to go beyond 100 countries. The Summit proved to be effective in establishing a fund worth $ 1 billion that can be used to provide creators with **access to capital**, **enhance their skills**, and enable them to tap into global markets, **scale up production**, **upgrade technology**, and **expand the reach of Indian creators worldwide**. Complementing this is the **WAVEXcelerator**, an initiative that connects startups with investors and mentors through live pitching, sessions, fostering innovation, and funding in this sector.

In a nutshell, the WAVES summit is a way to nudge the domestic orange economy that can tackle challenges associated with a **lack of Intellectual Property (IP) ownership**, **inconsistent quality standards**, **skill gaps**, **limited funds**, and **lack of global market access**.

1. The orange economy, also known as the creative economy, refers to economic activities that are rooted in individual creativity, skill, talent, and intellectual property. It encompasses sectors such as **arts**, **music**, **film**, **design**, **fashion**, **publishing**, **advertising**, **software development**, **gaming**, and **media**. This sector is significant not only for its contribution to economic growth and job creation—accounting for around **3% of global GDP** and **30 million jobs worldwide**—but also for its role in fostering innovation, promoting cultural heritage, and supporting sustainable development goals.

Rewriting Financial Futures of Indian Women

The financial position of women has been improving, which can be assessed through credit growth to women. In a joint study by **NITI Aayog** and **TransUnion Cibil Study**, credit demand has increased **threefold** in the **last five years** (between **2019** and **2024**) for women. This depicts growing financial participation and independence.



The study also showcased that **two-thirds of the women borrowers** hail from non-metro areas, highlighting **financial inclusion beyond urban centres**. This goes further as women in non-metro regions have been found to be more proactive in tracking their credit than their metro counterparts, thus reflecting **better financial literacy** and **responsibility**, and thorough credit management among women in smaller cities. But this financial literacy is higher in southern states, thus depicting a **positive correlation** between financial literacy and overall literacy.

Then the question arises about the impact of such credit disbursement. ***Firstly***, expanding the scope of the industrial base. Programmes like **Stand-Up India** and **PM Mudra Yojana** have played a pivotal role in promoting women-led MSMEs. These enterprises are diversifying the industrial ecosystem by encouraging participation in sectors like textiles, food processing, handicrafts, and services. As a result, there is greater scope for economies of scale, increased value addition, and enhanced export potential, all of which contribute to a more balanced industrial growth model.

Secondly, **entrepreneurial growth**. Creation of new ventures further manifests innovation and job creation, which further results in **income** and **employment generation**. Access to credit enables women, thereby fostering a culture of innovation and risk-taking. It also leads to a multiplier effect in local economies. This grassroots entrepreneurship makes a significant contribution to **poverty alleviation**, **social mobility**, and **regional development**.

Thirdly, **policy evolution**. The success of women in financial sectors influences policymakers to design more inclusive policies, further enhancing opportunities for marginalised sections. Recognising the transformative impact of financial inclusion, policymakers are now designing more gender-sensitive credit schemes, improving access to formal finance, and reducing structural barriers for women. Initiatives such as **Jan Dhan Yojana**, **Mahila e-Haat**, and **Mahila Coir Yojana** aim to deepen financial access and offer tailored support to women entrepreneurs. The positive outcomes from these interventions are prompting a rethink of mainstream financial policy to be more inclusive and equitable.

Fourthly, **global competitiveness**. A nation that leverages the full potential of its female population enhances its competitiveness on the global stage, attracting investments and fostering international collaboration.

MSMEs in India

Micro, Small, and Medium Enterprises (MSMEs) in India are the backbone of the Indian economy. By combining it with **cooperatives**, i.e., community-based MSMEs, the Indian economy has grown significantly, as evidenced by the **post-independence period** (**Amul**, **IFFCO**, **NAFED**, etc.). MSMEs have not just been the growth engine but also a tool for **inclusive growth**.

Since the post-independence era, small-scale industries have been integral to policy-making efforts aimed at creating jobs and reducing rural-urban disparities through the establishment of the **Small Industries Development Organisation** (**SIDO**) in the 1960s. This was further formalised through access to financing mechanisms, including the establishment of the **National Small Scale Industries Corporation**, **the Small Industries Development Bank of India** (**SIDBI**), and district industries. In the context of better recognition, the **MSMED Act** (Micro, Small and Medium Enterprises Development Act) was enacted in 2006 to categorise different sectors based on **investment in plant and machinery**, **the inclusion of turnover-based criteria**, the removal of distinctions between manufacturing and services, and a focus on boosting competitiveness and global integration. As of April 2025, there are approximately **6.25 Crore registered firms**, employing around **26 Crore People** (approximately **four people per unit**). So, what has helped these ventures to survive and grow to date? The answer lies in fruitful and impactful government policies and programmes that have been aimed towards modernising the processes of **MSME clusters**.

One of the significant initiatives behind this has been the **PM Vishwakarma Scheme**. The scheme has identified various artisans, including **carpenters**, **blacksmiths**, **goldsmiths**, **masons**, **potters**, **barbers**, **tailors**, **cobblers**, **sculptors**, and other skilled professionals. The programme provides comprehensive support to traditional artisans and craftspeople across India. The scheme offers extensive support in the form of **financial assistance**, **skill upgradation**, and **market access** to **enhance the livelihoods of artisans**. This initiative further aligns with the concept of community MSMEs, as artisans can **collectively invest in resources**, **infrastructure**, and **marketing**, **thereby reducing individual financial burdens** and **maximising returns**.

To bolster innovation, research, and development, schemes like the **Common Research and Technology Development Hub** (**CRTDH**) help address intellectual property rights issues, accelerate technological development, encourage collaboration among

various stakeholders, and provide scientific solutions to micro and small enterprises (MSEs). The programme involves setting up facilities or centres in different academic and research institutions, where multiple organisations collaborate on research and technology development activities. Under this, grants are provided by the **Department of Scientific and Industrial Research** for various needs, such as **analytical testing facilities**, **design centres**, **pilot plant production facilities**, **design engineering and prototype development**, **demonstration units**, and **product exhibition centres**.

Additionally, the **NIDHI**[2] **Technology Business Incubator Programme** and the **NIDHI Inclusive Technology Business Incubator** have enhanced a safe and motivating environment for those MSME startups which are working in **high-risk** and **high-potential technological areas**. **NIDHI** support is also provided for **proof of concept** (**PoC**), **prototype capacity building** and **early-stage seed funds** that help in **starting new ventures or startups**.

For furthering rural industrialisation, **Centre for Rural Enterprise Acceleration through Technology** (**CREATE**) was launched in **Leh,** which focuses towards the development of **production facilities for pashmina wool binding**, **essential oil collection** from roses and flowers. The machinery required for pashmina wool roving is also being operated at this centre.

The government has also resorted to public-private partnership in the form of building **MSME Technology Centres** on the "***Build, Operate, and Transfer***" (**BOT**) **model** at **14 locations**. Similarly, to enhance the quality of products developed by these **MSME units**, the **MSME Sustainable** (**ZED**[3]) **Certification Scheme** was started, which has helped in reducing the certification cost by one-fifth. New criteria, such as **energy management**, **measurement and analysis**, have been added at the **Bronze level**[4]. Regular assessment is being done at the **Silver** and **Gold levels** in line with industry standards.

Similarly, access to **formal credit facilities** has been a major hurdle for the MSME sector. This has been resolved with programmes like the **Credit Guarantee Scheme for Micro and Small Enterprises** and the **PM Mudra Yojana**. This was further extended to the **Self-Reliant India Fund** of **INR 10,000 Crore** as the government of India's contribution and **INR 50,000 Crore** as **private equity**.

Creating a Database - Disaster Management (Amendment) Act

The **Disaster Management Act**, enacted in 2005 in the aftermath of the 2004 Tsunami, marked a pivotal shift in India's approach to **building resilience and enhancing deterrence against disasters**. This act has been recently amended to include key provisions for establishing the **Urban Disaster Management Authority** (**UDMA**) and creating a disaster database at both the **union** and **state levels**. These amendments signify a move towards institutionalising data-driven decision-making in disaster preparedness and response.

The scope of such a database suggests that it will extend beyond **enumerating damage details**, loss assessment, or fund allocation, and utilise these data for measures such as developing a **preparedness and mitigation plan** or a risk register based on type and severity. This is not a new initiative, but was launched at the international level during the 1970s. The **Emergency Events Database** (**EM-DAT**), maintained by the **Centre for Research and Epidemiology of Disasters** (**CRED**), Brussels, is one of the earliest international databases that compile global disaster data. Similarly, **DesInventar** is another database that originated in Latin American countries in 1994 and has been adapted by the **United Nations** (**UN**) agencies for monitoring progress of the **Sendai Framework** and **Sustainable Development Goals** (**SDGs**). This methodology was also adopted by several states in India, like Odisha.

The idea of having a national disaster database has been under discussion since the early 2000s. A **National Natural Disaster Knowledge Network** (**NanadiskNet**) was conceived by a high-powered committee established by the Union Government to act as a network of networks, facilitating interactive dialogue among various stakeholders, including individuals.

Around the same time, two disaster databases were launched in India, the **India Disaster Knowledge Network** (**IDKN**) and the **India Disaster Resource Network** (**IDRN**). The first aimed to provide disaster management knowledge and services for improved mitigation and response. The IDRN, in contrast, was primarily oriented towards response activities, enabling decision-makers to know the availability of resources and equipment required to combat any emergency (**National Institute of Disaster Management**).

The **National Disaster Management Information System** (**NDMIS**), which was launched in 2016 as part of the **Prime Minister's 10-point agenda for DRR**, envisages four key functions for itself, which are related to expenditure for the disaster response fund and disaster mitigation fund, monitoring progress towards Sendai Framework targets, and compiling a daily situation report at the country level.

Outcome of Women's Reservations in Panchayati Raj Institutions - A Case Study of Bihar

Despite the implementation of the **73rd Constitutional Amendment Act in 1992**, which mandated the creation of Panchayati Raj Institutions (PRIs) and provided for one-third reservation for women, the state of **Bihar** took around 8 years to conduct local body elections, after a 23-year gap. The conditions were so dire that the women fell short of their mandated share of 33%, especially since fewer than 1% of women were elected as ***mukhiyas*** (**village heads**). To address this issue, the **Bihar Panchayati Raj Act** was enacted in **2006**, introducing 50% reservation for women in PRIs, exceeding the quota stipulated by the **73rd Constitutional Amendment Act**.

2. National Initiative for Developing and Harnessing Innovations
3. Zero Defect Zero Effect
4. There are three levels: Bronze, Silver, and Gold. Bronze is the entry level, while Silver and Gold represent higher levels of certification.

Women's reservations were embedded within the **caste-based reservations** (for **SCs**, **ST**, and **OBC categories**) as well as **general category seats**, ensuring that the total number of reserved seats for women did ***not*** **exceed 50%**. This has undoubtedly led to a change in dynamics when it comes to women's empowerment. But how?

Firstly, **enhanced decision-making powers have expanded women's rights and visibility in the public sphere**. Studies by **UN Women** and **various NGOs** in Bihar show a positive correlation between women's political participation and their inclusion on **land titles**, with **more women asserting claims over inherited property**. This has led to a measurable increase in the registration of land jointly in the names of husbands and wives, and a wider recognition of women's property rights, thereby bolstering their autonomy in both economic and familial contexts.

Secondly, decision-making powers in the hands of women transformed the traditional role of women. A study in the **state of West Bengal**[5] showed that the **absence of women** in **local leadership** influences **parental aspirations for their daughters**. In areas where no woman had previously held a leadership position, a significant 85% of parents expressed a preference for their daughters to pursue traditional roles, such as becoming housewives or adhering to decisions made by their future in-laws. Areas with continuous women leadership witnessed a 15–20% higher enrollment rate of girls in secondary schools, reflecting a cultural shift in gender norms and ambitions.

Thirdly, the decision-making powers of women in panchayats have trickled down to the household level. However, there is a contrast when it comes to paid work, which has declined. This contradictory trend suggests that political empowerment alone does not directly translate into economic empowerment. Education, mobility, access to jobs, and societal attitudes remain critical factors that need parallel attention to enable comprehensive empowerment.

Fourthly, a **decline in spousal violence**. Though spousal violence is a critical concern in the **state of Bihar**, as reported by the **National Criminal Records Bureau**, there has been a decline in such instances. **Any form of spousal violence** is viewed as a sign of **women's disempowerment within a relationship**, reflecting a lack of autonomy and the capacity to assert their rights and choices.

Fifthly, a **rise in the adoption of hygiene**. Hygienic methods of protection during the menstrual period have increased during the last two decades. However, the state of Bihar still lags behind other regions to a great extent. This also depicts the **lack of literacy** in the state despite its making effective strides. NFHS-5 data indicates that around **60% of women in Bihar** now use **hygienic methods of menstrual protection**, though still significantly below the national average of **77%**. The improvement, while notable, underscores the persistent gaps in awareness, access, and affordability of sanitary products, which are often linked to broader issues of education and infrastructure in rural areas.

5. Centre for Policy Research (CPR)

Analysing Migration - A Case Study of Jharkhand

The state of **Jharkhand** has been a significant contributor to the migration of workers to **industrial** and **service-rich regions**, as reported in the **Economic Survey 2017-18 and further reinforced by recent data from the Periodic Labour Force Survey (PLFS) 2022–23**. The recent study on migration offers in-depth insights into demographic and social profiles, economic activities, reasons for migration, and the quality of remittance usage.

In the context of **demographic and social profiles**, labour migration from Jharkhand has been **male-dominated** (males comprising 90% of the total migrant population). Among these, the major age bracket has been the 20-24 year group, followed by the 25-29 year group. This youth-centric trend indicates a lack of local employment opportunities and inadequate skilling programmes for young people, prompting early entry into the migrant workforce. The study also highlights the decline **in working capacity** with age, indicating that only one-fifth of the migrants are above 40. Furthermore, the migration patterns are also influenced by caste and tribal identities, with a significant number of **Scheduled Tribes** (**STs**) and **Other Backward Classes** (**OBCs**) forming the bulk of the migrant workforce, particularly from economically backwards districts such as **Gumla**, **Simdega**, and **West Singhbhum**.

Another crucial insight that can be assessed is that less than one-fifth of the overall migrants have completed middle school, and the **dropout rate remains high**, especially among Adivasi youth. Thus, the **lack of education** also forces such migrants to join the informal sector in the country or low-skilled jobs like **construction**, **manufacturing**, **agriculture**, **automobile**, **brick kiln** and **domestic work**.

When it comes to reasons for **labour migration**, the **Economic Survey 2017-18** provided a holistic account of the same and cited **lack of employment opportunities**, **deprivation**, and **loss of livelihood**. Another reason has been pressure to **repay loans or debts**, **poverty**, **lack of sufficient means of subsistence**, and **unequal distribution of landholding** to meet the household expenditure. Amongst all, lack of employment opportunities has been the major reason, as locals are unable to find jobs in their home districts.

Regarding remittances, the money sent by migrant workers to their families is mainly utilised for **constructing basic amenities** and **procuring consumer durable goods**. This clearly indicates the rise in purchasing power of individuals, which has led to the increased affordability of consumer durables.

Seed Saviours

Before the 1990s, farmers used to struggle to get good-quality seeds and had to **borrow seeds from landlords**, which were often **delivered late or were of poor quality**. To solve this problem, the women started saving and sharing their seeds[6]. In 1995, with the help of the **Deccan Development Society**, they established the **Sangham Seed Bank**. Now, women from around 75 villages are part of this initiative.

The **Sangham Seed Bank** stores about **80 types of traditional food crops**, mainly **millets**, **pulses**, and **oilseeds**. These crops are well-suited to **dry** and **challenging conditions**, and there are also varieties of rice and wheat that require less water and can tolerate high temperatures. The seeds are stored using traditional methods, such as **palm-leaf baskets** lined with **neem leaves**, **ash**, and **clay**, to protect them from moisture and pests, keeping them safe for two to three years. However, there is little official data on how many seeds these groups store, as most are informal.

Another intriguing thing is how seeds are shared according to local customs. The most common method is a **seed-loan system**, where farmers borrow seeds at the start of **the season** and **return twice as much after harvest**. In some tribal areas, seeds are given for free. These systems help keep traditional seeds in active use.

However, there are challenges. **Financial sustainability** is a significant issue because most seed banks operate independently. To address this, some have partnered with **research institutions** and **non-profits**. Another problem is that **traditional storage methods** don't always protect seeds from moisture, pests, or fungi. Government help with better storage containers and facilities could make a difference. There is also a lack of **technical expertise**; without proper training, farmers sometimes receive poor-quality seeds, which undermines trust in community seed banks.

Supportive government policies are also lacking. The **Protection of Plant Varieties and Farmers' Rights Act**, passed in **2001**, recognised **farmers' rights to save**, **exchange**, and **sell seeds** (*except* **branded ones**) and allowed communities to claim benefits if their seeds were used commercially. However, registering traditional seed varieties is still complicated, and there is no clear policy for managing community seed banks. The **Seeds Act of 1966** and the **proposed Seed Bill of 2019** do not provide specific guidelines for these banks. Efforts are ongoing to develop policies that support farmer-managed seed systems; however, more needs to be done to simplify the process for farming communities.

Recent developments highlight the growing recognition of community seed banks. In April 2025, several seed keepers from 31 village sangams showcased over 90 seed varieties—including monsoon and winter crops, as well as vegetables—during a seed festival. This event underscored the rich biodiversity preserved by these women and the critical role of community seed banks in sustaining agricultural heritage.

Furthermore, initiatives like the "***Distribution of Quality Seeds from the Agricultural University to Every Village***" programme launched by **Professor Jayashankar Telangana State Agricultural University**, aim to distribute quality seed kits to farmers across the state. Such programmes, in collaboration with community seed banks, can enhance seed diversity and resilience in agriculture.

6. **Telangana's Zaheerabad region** initiated a community-driven solution by saving and sharing their own seeds.

Everyone on Telegram
can scan this code
to join your group

NITIN SIR
CLASSES

Nitin Sir Classes

99991 54587

https://www.facebook.com/Nitin Kumar

https://www.youtube.com/@nitinsirclasses8314

https://instagram.com/k.nitinca

https://t.me/NITIN KUMAR (PSIR)