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02nd JANUARY, 2025

"It is better to fail in originality than to succeed
in imitation." —Herman Melville



TATHASTU
Institute Of Civil Services



9560300770



www.tathastuics.com



support@tathastuics.com

HEAD OFFICE: 53/1, UPPER GROUND FLOOR, BADA BAZAR ROAD,
OLD RAJINDER NAGAR, NEW DELHI-110060

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SPADEX FIRST OF MANY AS ISRO PREPARES FOR CHANDRAYAAN-4

SpaDeX first of many as ISRO prepares for Chandrayaan-4

At various points during the moon mission, the modules will undergo a series of docking and undocking manoeuvres before finally transporting a canister of lunar soil back to the earth; docking is a crucial technology for India to master

T.S. Subramanian
CHENNAI

There will be a series of space-docking experiments before the Indian Space Research Organisation embarks on its Chandrayaan-4 mission to bring soil samples from the moon to earth, the ISRO has said.

On Monday, the C60 mission of the Polar Satellite Launch Vehicle (PSLV) placed two satellites, each weighing 220 kg, in orbit. They will rendezvous and dock with each other as part of the ISRO's first Space Docking Experiment (SpaDeX).

ISRO Chairman S. Somanath said "the nominal time" for the docking "will be approximately January 7". He added, "The two SpaDeX satellites have



Important steps: The ISRO launching the PSLV-C60 from the Satish Dhawan Space Centre in Sriharikota on Monday. ANI

moved one behind the other, so over a period of time, they will pick up further distance. The distance will increase by 20 km over the next few days and then the rendezvous and docking process will start."

For Chandrayaan-4, the ISRO will launch the mis-

sion's modules in two Launch Vehicle Mark-3 (LVM-3) rockets. At various points during the mission, the modules will undergo a series of docking and undocking manoeuvres before finally transporting a canister of lunar soil safely back to earth.

Mr. Somanath said on Tuesday, "2025 will be an exciting year as the ISRO will launch four GSLV rockets, three PSLV launches as well as an SSLV launch." (GSLV is short for Geosynchronous Satellite Launch Vehicle and SSLV for Small Satellite Launch Vehicle).

Key for future missions

Docking is a crucial technology for India to master for the Chandrayaan-4 as well as its forthcoming orbital Bharatiya Antariksh Station, expected to be ready by 2035, and for its goal to send an Indian astronaut to the moon.

Chandrayaan-4 Study Director P. Veeramuthuvel said, "Docking is important for all future missions of the ISRO because you cannot launch everything in one go. So you need

docking of modules in space. ... There will be five modules in BAS, all of which require docking. This technology is crucial for bringing back the lunar soil samples and for India's constant presence in space."

The two satellites in the current SpaDeX mission are in a circular orbit 475 km above the earth. "At that height, the two satellites will be moving at a speed of 28,000 km an hour," said former ISRO Associate Director B.R. Guruprasad. "You must establish the orbit of both the satellites. To bring them together, you have to match their speeds. It is not easy to match and adjust their speeds precisely, make them come close to each other and then dock. There lies the challenge."

Context

- ❖ On December 30, 2024, ISRO launched the Polar Satellite Launch Vehicle (PSLV-C60) from the Satish Dhawan Space Centre in Sriharikota, Andhra Pradesh. This mission deployed two 220 kg satellites into a 470 km circular orbit, marking the commencement of SpaDeX. The primary objective is to demonstrate in-space docking technology, a critical capability for upcoming missions like Chandrayaan-4 and the planned Bharatiya Antariksh Station (BAS).



Background

- ❖ Space docking involves the precise joining of two spacecraft in orbit, enabling the transfer of materials, crew, or modules. Historically, only the United States, Russia, and China have successfully demonstrated this capability. For India, achieving this feat is vital for complex missions requiring assembly or resource transfer in space, such as lunar sample return missions and the construction of space stations.

Significance of SpaDeX

- ❖ **Technological Advancement:** SpaDeX aims to validate autonomous rendezvous and docking procedures, including the transfer of electric power between docked spacecraft. This capability is essential for in-space robotics, composite spacecraft control, and payload operations post-undocking.
- ❖ **Foundation for Future Missions:** Success in SpaDeX will pave the way for Chandrayaan-4, ISRO's planned lunar sample return mission, and the development of BAS, targeted for completion by 2035. These projects necessitate reliable docking technology for assembling modules and transferring materials in space.

Impact and Consequences

- ❖ **Enhanced Mission Capabilities:** Mastering docking technology will enable ISRO to undertake more complex missions, including human spaceflight and interplanetary exploration, by facilitating on-orbit assembly and resource transfer.
- ❖ **Global Standing:** Achieving successful in-space docking will position India among a select group of nations with this expertise, enhancing its reputation in the global space community.
- ❖ **Commercial Opportunities:** Developing indigenous docking technology opens avenues for ISRO to offer satellite servicing and other in-space operations, potentially attracting international collaborations and commercial ventures.

Challenges

- ❖ **Technical Complexity:** Achieving precise alignment and connection between two spacecraft traveling at high velocities in orbit presents significant engineering challenges.
- ❖ **Autonomous Operations:** Developing reliable autonomous systems for docking without human intervention requires advanced algorithms and robust testing.

Way Forward

- ❖ **Incremental Testing:** ISRO plans to conduct a series of docking experiments, with the initial docking of SpaDeX satellites expected around January 7, 2025. These tests will progressively validate the technology's reliability.
- ❖ **Integration into Future Missions:** Insights gained from SpaDeX will inform the design and execution of Chandrayaan-4 and BAS, ensuring these missions are equipped with proven docking capabilities.



EXCESSIVE NITRATES FOUND IN GROUNDWATER IN 440 DISTRICTS

'Excessive nitrates found in groundwater in 440 districts'

Report suggests that about 56% of India's districts face the problem largely due to subsidised synthetic nitrogenous fertilizer, a key input for farming; a level more than 45 mg per litre is high

Jacob Koshy
 NEW DELHI

Excessive nitrates have been found in groundwater in 440 districts as of 2023, an increase from 359 such districts in 2017, a report by the Central Groundwater Board (CGWB) said on Wednesday. This is a health hazard, particularly for young children, and a source of environmental toxicity.

The data suggest that about 56% of India's districts have excessive nitrates – defined as more than 45 mg per litre – in groundwater, largely due to the use of subsidised synthetic nitrogenous fertilizer, a key input for farming.

Of the 15,239 groundwater samples collected from across the country for testing, 19.8% had nitrates or nitrogen compounds above the safe limits. This proportion has not shifted much since 2017. In the 13,028 samples analysed in 2017, 21.6% had excessive nitrates.

Rajasthan, Karnataka, and Tamil Nadu reported the highest nitrate contamination problem, with



The Central Groundwater Board estimates that the stage of groundwater extraction is 60.4%, the same since 2009. FILE PHOTO

49%, 48%, and 37%, respectively, of their tested samples reporting numbers beyond the safe limit.

Rajasthan, Madhya Pradesh, and Gujarat have a long-standing nitrate problem with relative levels fairly constant since 2017, the report says. However, regions in central and southern India are reporting an increasing trend, provoking worry.

"Maharashtra (35.74%), Telangana (27.48%), Andhra Pradesh (23.5%) and Madhya Pradesh (22.58%) also show notable levels of nitrate contamination, pointing towards growing concern in central and

southern regions of India," the report notes.

The monsoon rain tends to increase nitrate levels, with 30.77% of samples contaminated in the pre-monsoon period compared with 32.66% after the rainy season.

Other major chemical contaminants affecting groundwater quality are fluoride and uranium. Fluoride concentrations exceeding the permissible limit are "a major concern" in Rajasthan, Haryana, Karnataka, Andhra Pradesh, and Telangana. Rajasthan and Punjab reported the highest number of samples with uranium con-

centration exceeding 100 ppb (parts per billion).

Anything over 30 ppb of uranium is considered unsafe and several of these samples were predominant in regions of Rajasthan, Gujarat, Haryana, Punjab, Tamil Nadu, Andhra Pradesh, and Karnataka, where groundwater is being over-exploited, with more water being drawn out than is being replenished by rain or other means.

In an accompanying report on the availability of groundwater across India, the CGWB estimates that on the whole, the stage of groundwater extraction across the country is 60.4%, roughly the same as it has been since 2009, when measurements began biennially (and annually since 2022).

About 73% of the blocks analysed for groundwater levels are in the "safe" zone, meaning that they are replenished enough to compensate for the water drawn out.

This is a sharp rise from the 67.4% in 2022. However, there were 343 fewer blocks analysed for the 2024 assessment, compared to 2022.

Context

- ❖ A recent report by the Central Groundwater Board (CGWB) indicates that as of 2023, excessive nitrate levels have been detected in groundwater across 440 districts in India, up from 359 districts in 2017. This means that approximately 56% of India's districts are affected by nitrate contamination, primarily due to the use of synthetic nitrogenous fertilizers in agriculture. Nitrate concentrations exceeding 45 mg per liter are considered unsafe.



Background

- ❖ Nitrates are compounds commonly found in fertilizers. When applied to agricultural fields, nitrates can leach into the soil and contaminate groundwater sources, especially when used in excess. This contamination poses significant health risks, particularly to infants and young children, and can lead to environmental degradation.

Impact

- ❖ **Health Risks:** High nitrate levels in drinking water can cause methemoglobinemia, commonly known as "blue baby syndrome," which reduces the blood's ability to carry oxygen in infants. Long-term exposure in adults has been linked to various health issues, including certain types of cancer.
- ❖ **Environmental Degradation:** Elevated nitrate levels contribute to eutrophication in aquatic ecosystems, leading to algal blooms that deplete oxygen in water bodies, harming aquatic life.
- ❖ **Agricultural Concerns:** While fertilizers boost crop yields, their excessive use can degrade soil health over time, affecting long-term agricultural productivity.

Way Forward

- ❖ **Implement Sustainable Farming Practices:** Encourage the use of organic fertilizers and integrated nutrient management to reduce reliance on synthetic nitrogenous fertilizers.
- ❖ **Strengthen Regulations:** Enforce stricter guidelines on fertilizer application rates and promote soil testing to ensure appropriate use.
- ❖ **Public Awareness Campaigns:** Educate farmers and communities about the risks of nitrate contamination and the importance of sustainable agricultural practices.
- ❖ **Regular Monitoring:** Establish comprehensive groundwater quality monitoring systems to detect and address contamination early.





FOUR UN ENVIRONMENTAL SUMMITS FELL SHORT IN 2024. WHAT HAPPENED?

Four UN environmental summits fell short in 2024. What happened?

At the heart of the breakdown lies a divergence in national priorities. Developing nations, grappling with developmental challenges, economic constraints, and the effects of climate change, have repeatedly demanded more technology and financial support from developed countries

Indu K. Murthy

The United Nations' efforts to address critical environmental challenges hit multiple roadblocks this year, with four key summits – in Colombia on biodiversity, Azerbaijan on climate, Saudi Arabia on land degradation, and South Korea on plastics – failing to deliver meaningful outcomes.

These meetings brought together governments, researchers, policymakers, industries, and civil society organisations to ensure their goals were aligned, build equitable accountability, and mobilise adequate finance for action. But all four summits achieved no or partial success on issues they had set to address. In fact, this is the fourth time UN discussions designed to push countries toward significant progress in addressing biodiversity loss, climate change, and plastic pollution have either ended without consensus or yielded unsatisfactory outcomes.

This is a significant setback in global efforts to address biodiversity loss and climate change, potentially leading to delayed action on critical issues such as climate finance, drought mitigation, and plastic pollution, with the most vulnerable countries potentially suffering the greatest impact.

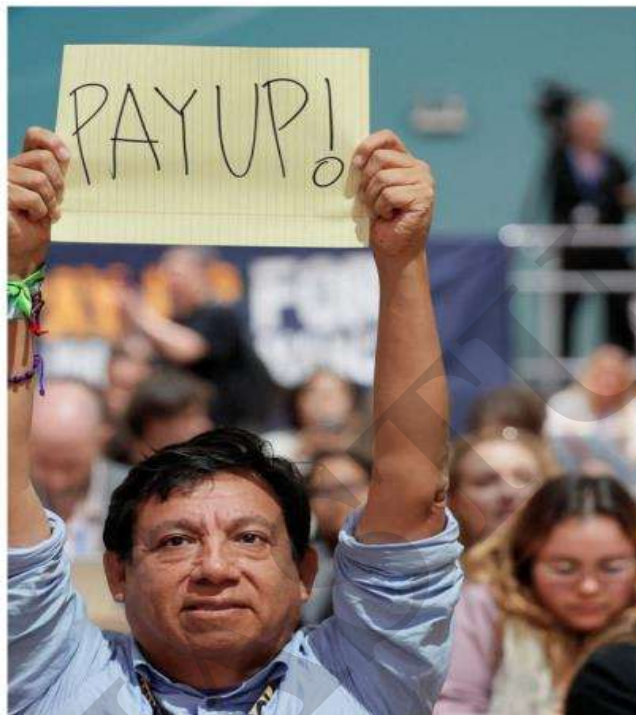
The partial or full failures of these talks raise pressing concerns about the global community's ability to combat biodiversity loss, climate change, and other urgent environmental crises. Understanding the reasons behind these setbacks and their implications for global cooperation is essential to charting a more effective path forward.

Divergent national interests

At the heart of the talks' breakdown lies a stark and growing divergence in national priorities. Developing nations, grappling with developmental challenges, economic constraints, and the impacts of climate change, have repeatedly demanded more technology transfer and financial support from developed countries. But developed nations are reluctant to commit additional resources, citing domestic political pressures and economic challenges of their own.

For example, the Colombia talks on biodiversity conservation faltered as countries failed to agree on financing mechanisms to support sustainable land-use practices. Financing conservation at scale came to a gridlock with countries lagging in ambition, being nowhere close to delivering the \$700 billion-a-year requirement. In Azerbaijan, developing nations demanded \$1.3 trillion a year from developed nations, and the talks ended with the latter loosely agreeing to raise the amount from a wide range of sources, including private investment.

Also in Azerbaijan, countries were divided over the pledge to transition away from fossil fuels, a decision made during the last UN climate summit. The plastic pollution talks in South Korea also brought to the fore a significant divide among participating nations. The meeting concluded without reaching an agreement primarily because countries that rely on economies dependent on ongoing demand for plastics opposed a legally binding treaty. Instead, they



An activist at the 'People's Plenary' of the COP29 United Nations climate change conference in Baku, Azerbaijan, in November. REUTERS

pushed for proper usage and recycling of plastic waste.

Consensus and crises

Several talks stumbled on disagreements over the frameworks needed to monitor and enforce environmental goals. In Azerbaijan, discussions on implementing the global stocktake under the Paris Agreement saw divisions over the accountability mechanisms for emission reductions, particularly for high-emission nations.

In Saudi Arabia, industrialised nations clashed with African countries over the establishment of a legally binding drought protocol. While the former wanted a broad operational framework, the African nations demanded a concrete plan with economic commitments.

Global crises, including the COVID-19 pandemic, economic instability, and geopolitical conflicts, have created significant challenges for environmental action. They have diverted attention and resources away from pressing environmental priorities as governments grapple with urgent domestic concerns such as public health, economic recovery, and social stability.

For many countries, particularly those with limited institutional and/or financial capacity, the challenge to balance economic recovery efforts with long-term sustainability goals has weakened their negotiating positions. This has further reduced their willingness or ability to commit to ambitious environmental targets.

Developing economies, in particular, face heightened difficulties as they navigate inflation, debt burdens, and overall developmental challenges alongside climate vulnerabilities, leading to calls for greater financial and technological support from wealthier nations.

Growing divide, lack of consensus

These setbacks in global negotiations complicate the already daunting task of addressing global environmental challenges.

Delayed action: The inability and failure to agree on frameworks and commit to concrete actions by nations postpone critical measures required to fight global issues such as biodiversity loss, climate change, land degradation, and plastic pollution. This delay increases the likelihood of pushing global systems closer to irreversible tipping points, with severe consequences for communities and economies worldwide.

Incoherent, fragmented efforts: As multilateral processes falter, there is a growing risk of countries turning to unilateral regional action. While these initiatives are well-meaning and can make progress, they would lack the global coherence necessary to address environmental issues comprehensively and equitably and could trigger new problems because of a lack of coordination among nations.

Erosion of trust: Repeated failures in negotiations risk undermining confidence among nations, making future

In Azerbaijan, countries were divided over fossil fuels. The plastic pollution talks in South Korea also concluded without agreement because countries that rely on an ongoing demand for plastics opposed a legally binding treaty

cooperation even more difficult.

Pressure on future summits: The failure of multiple global negotiations on the environment further forces upcoming meetings to deliver meaningful outcomes.

Rebuilding momentum

To advance global environmental goals, several key strategies must be prioritised. Climate finance is key to this. Wealthier nations must honour their commitments to provide financial and technological support to developing nations. This would create a more equitable foundation for negotiations and help bridge trust gaps between developed and developing economies.

Equally critical is the need to enhance transparency and accountability by establishing robust mechanisms to track progress and hold nations accountable for their commitments. This would play a vital role in restoring confidence in multilateral processes.

Inclusive diplomacy is also essential to address geopolitical tensions and ensure all voices, particularly those of vulnerable nations, are heard in negotiations. By promoting equitable participation, global cooperation can become more effective and resilient.

Further, there must be a strong focus on implementation – shifting the emphasis from ambitious pledges to tangible action – backed by measurable outcomes. This pragmatic approach ensures progress even in the face of broader disagreements.

Finally, it is crucial to acknowledge and address connections between biodiversity loss, land degradation, plastic pollution, and climate change – a complex web of environmental crises that amplify one another. Climate change accelerates habitat destruction, ultimately leading to biodiversity loss, while degraded ecosystems such as deforested lands, desertification and land degradation or overexploited soils release carbon, exacerbating global warming.

Similarly, plastic pollution harms marine and terrestrial ecosystems and contributes to greenhouse gas emissions during its production and degradation. Addressing these issues in isolation has proven insufficient. Global environmental talks must therefore prioritise these interconnections, foster integrated strategies that protect ecosystems, restore degraded landscapes, and reduce pollution while tackling climate change.

The challenges are immense, but so are the stakes. As environmental crises intensify, the world can't afford further stalemates. It is imperative for nations to move beyond short-term interests and embrace a shared vision for a sustainable future.

(Indu K. Murthy leads the Climate, Environment, and Sustainability sector at the Center for Study of Science, Technology, and Policy (CSTEP), a research-based think tank. indukmurthy@cstep.in)





Context

- ❖ The failure of four major United Nations (UN) environmental summits in 2024—focused on biodiversity (Colombia), climate change (Azerbaijan), land degradation (Saudi Arabia), and plastic pollution (South Korea)—has raised serious concerns about global environmental governance. These summits were expected to establish actionable frameworks to address pressing environmental issues but ended with no or partial success, largely due to conflicting national priorities and inadequate consensus.

Background

- ❖ **Recurring Failures:** This is the fourth consecutive year where UN summits on critical environmental issues have ended in unsatisfactory outcomes.
- ❖ **Key Objectives of Summits:**
 - **Colombia:** Address financing for biodiversity conservation and sustainable land use.
 - **Azerbaijan:** Implement the Paris Agreement's global stocktake and increase climate finance.
 - **Saudi Arabia:** Develop a legally binding protocol for drought mitigation.
 - **South Korea:** Establish a treaty to combat plastic pollution.
- ❖ **Underlying Challenges:** Divergent national interests, limited financial commitments from developed nations, and competing domestic priorities have been at the core of these failures.

Meaning and Impact

- ❖ The inability to achieve consensus at these summits signals a lack of global unity and ambition in tackling environmental challenges. This divergence threatens to delay meaningful action, risking irreversible damage to ecosystems and vulnerable communities worldwide.
- ❖ **Impacts**
 - 1. On Global Environmental Goals:**
 - Delayed progress in addressing biodiversity loss, climate change, and pollution.
 - Increased risk of crossing critical environmental tipping points.
 - 2. On Developing Nations:**
 - Greater vulnerability to climate impacts due to insufficient financial and technological support.
 - Widening inequity in addressing global environmental crises.
 - 3. On Global Cooperation:**
 - Erosion of trust among nations.
 - Increased likelihood of fragmented, unilateral actions, which lack global coherence.
 - 4. On Future Summits:**
 - Heightened pressure to deliver tangible outcomes, creating a high-stakes environment for future negotiations.





Consequences

- **Environmental:**
 - Accelerated biodiversity loss and habitat destruction.
 - Rising plastic pollution and its impact on marine and terrestrial ecosystems.
 - Aggravated effects of climate change due to delayed mitigation and adaptation efforts.
- **Economic:**
 - Increased economic losses for vulnerable countries facing climate-induced disasters.
 - Strained financial resources due to delayed global agreements.
- **Social:**
 - Heightened climate-related displacement and social unrest in affected regions.
 - Reduced public trust in global governance institutions.

Way Forward

- 1. Honouring Commitments:**
 - Developed nations must fulfill their financial pledges for climate action and biodiversity conservation.
 - Increased focus on transparent and accountable mechanisms to track progress.
- 2. Promoting Inclusive Diplomacy:**
 - Ensure equal representation of vulnerable nations in negotiations.
 - Bridge trust gaps by addressing the concerns of all stakeholders.
- 3. Integrated Solutions:**
 - Develop strategies that address biodiversity loss, climate change, and pollution simultaneously.
 - Prioritize ecosystem restoration and pollution control as part of climate mitigation plans.
- 4. Shift to Tangible Actions:**
 - Focus on implementation rather than ambitious but vague commitments.
 - Establish clear, measurable targets with enforcement mechanisms.
- 5. Building Resilience in Developing Nations:**
 - Provide technological and institutional support to enhance adaptive capacities.
 - Address economic disparities that limit participation in global efforts.

Conclusion

- ❖ The repeated failures of UN environmental summits in 2024 underscore the urgent need for renewed global solidarity and commitment. Nations must transcend short-term interests and focus on a shared vision for sustainable development.





TACKLING DELIMITATION BY REVERSING POPULATION CONTROL

Tackling delimitation by reversing population control

Recently, the Chief Ministers of Andhra Pradesh and Tamil Nadu, N. Chandrababu Naidu and M.K. Stalin, respectively, were quite peeved about the question of the proposed delimitation exercise and the possibility, subsequently, of the loss of parliamentary seats. This is very likely as the two States, along with the other southern States, are ahead of the rest of India in terms of fertility transition – implying a reduced share of the population when compared with the northern region. What is galling to people in general, and not necessarily just the politicians in south India, is that success in “family planning” will surely reduce the number of seats of the less populated States in Parliament.

“The state government [Andhra Pradesh] is thinking of enacting a law that would make only those with more than two children eligible to contest local body elections,” Mr. Naidu had said. Earlier, Andhra Pradesh had passed a piece of legislation barring people with more than two children from contesting local polls. Mr. Naidu said, “We have repealed that law, and we are now considering reversing it.... Government may provide more benefits to families with more children.”

Mr. Stalin's response was, “Today, as there is a scenario of decreasing Lok Sabha constituencies, it raises the question why should we restrict ourselves to having fewer children?” Mr. Stalin added in jest, “Why not aim for 16 children?”

The example of China

The question that arises in the light of the reactions and the responses of the Chief Ministers is: would it be possible to arrest fertility decline and, moreover, reverse it by attempting to increase it? It is evident that the attainment of low fertility in the course of fertility transition is hardly reversible by intervention, but in the natural course of events, there might be a minor



S. Irudaya Rajan

Chair at the
International Institute
of Migration and
Development (IIMAD),
Kerala



M.A. Kalam

Visiting Professor at
the International
Institute of Migration
and Development
(IIMAD), Kerala

It is too
simplistic a
solution that is
being put forth
by some
politicians in the
southern States

reversal as suggested by experience worldwide. Despite this understanding, there are attempts being made in some countries to reverse the fertility trend through incentivisation, but to no effect. China's one-child policy was one of the desperate measures to realise population control. The consequences confronting the Chinese state on varied fronts include problems in the marriage market, a dependency burden and, above all, extreme low fertility beyond the scope for reversal.

Quick and forced regulatory measures to restrict reproduction have never paid dividends beyond restricting population counts. In fact, an emphasis on limiting population counts without caring for its composition that sustains the population may well be considered unplanned. China's case is an example wherein the state is facing numerous crises at this point over the familial transitions underway and the consequential burden of social security provisioning on the state.

An imbalanced population composition reached by intruding into the natural course of transition will pose problems that would only be remedied through promoting migration. Efforts at incentivising reproduction and adoption of a pro-natal population policy may not be an alternative as seen in countries such as Japan and South Korea. Hence, the response of the southern States to the emerging threat may well be considered premature and ineffective in the long run.

Varied population counts

The course of fertility decline in India's States does show signs of a convergence across space and characteristics but a population momentum keeps the demographic divide wider between regions. Given this circumstance, population counts between provinces may not be the appropriate criterion to have political

representation that will defy the federal structure of our nation. ‘One person one vote’ may well be ideal but the difference in numbers of political representation in one region will be skewed beyond proportions. Unless these counts are weighed with some characteristics in terms of appropriating political representation, it will be unfair, for example, to a region that ushered in development with population control. This brings in a recognition of demographic divide apparent with education, coupled with the number of children being the criteria for shaping political outcomes.

Impact on women

Encouraging women to have more children may be easier said than done. In the current circumstances, a woman's personal loss in engaging in reproduction is much greater than imagined given the state's approach in facilitating the same. When the state celebrates the fertility decline and its dividend has benefited the larger cause, its implication in a woman's life has been less than expected. Therefore, thinking about fertility reversal needs to be preceded by measures of guaranteeing the state's social support for the additional children on the one hand and compensation for women's engagement in reproduction on the other.

Reversing fertility could well be ideal in terms of maintaining a sustainable population but the regional population imbalance can perhaps be addressed through migration in immediate terms. What needs to be answered is the ensuing disadvantage of a lower population count and political representation that can only be resolved provided the count gets an equivalence in valuation in terms of capability characteristics. Therefore, the ultimate solution lies not in reversing fertility but in revising count-based political representation in the delimitation exercise.

Context

- ❖ The southern states of India, including Andhra Pradesh and Tamil Nadu, have effectively implemented family planning policies, leading to fertility rates below the replacement level. This demographic shift has raised concerns about potential reductions in their representation in the Indian Parliament following the upcoming delimitation exercise. In response, political leaders in these states are contemplating measures to encourage higher fertility rates.

Background

- ❖ **Delimitation Exercise:** This process involves redrawing the boundaries of electoral constituencies based on the latest census data to ensure equal representation. The upcoming exercise, scheduled for 2026, has prompted apprehensions among southern states about losing parliamentary seats due to their declining populations.
- ❖ **Fertility Rates:** Southern states have achieved fertility rates below the replacement level of 2.1 children per woman, a significant demographic milestone. For instance, Kerala reached this level in 1988, followed by Tamil Nadu in 1993, Andhra Pradesh in 2001, and Karnataka in 2005.





Meaning and Impact

- ❖ The southern states' success in family planning has led to a demographic transition characterized by lower fertility rates and an aging population. While this transition has economic benefits, such as a potential demographic dividend, it also poses challenges, including reduced political representation and increased dependency ratios.
- ❖ **Impact**
 - **Political Representation:** A decline in population could result in a reduced number of parliamentary seats for southern states, affecting their political influence at the national level.
 - **Economic Challenges:** An aging population may strain social security systems and healthcare services, potentially leading to increased economic burdens.

Consequences

- ❖ **Policy Reversals:** In response to these challenges, some southern states are considering reversing their family planning policies to encourage higher fertility rates. For example, Andhra Pradesh is contemplating legislation to make individuals with more than two children eligible to contest local body elections.
- ❖ **Social Implications:** Encouraging higher fertility rates may have social implications, including increased economic burdens on families and potential impacts on women's participation in the workforce.

Way Forward/Conclusion

- ❖ Addressing the demographic challenges faced by southern states requires a balanced approach:
 - **Policy Revisions:** Revising the criteria for political representation to account for demographic changes, ensuring fair representation without solely relying on population numbers.
 - **Supportive Measures:** Implementing policies that support families, such as improved healthcare, education, and economic incentives, to encourage higher fertility rates without coercion.
 - **Migration Strategies:** Encouraging internal migration from regions with higher fertility rates to southern states could help balance demographic disparities.





SOLVE MCQ

Q.1 With reference to the impact of the delimitation exercise on southern states in India, consider the following statements:

1. The delimitation exercise redraws electoral constituency boundaries based on the latest census data to ensure proportional representation.
2. Southern states, due to their lower fertility rates, risk losing parliamentary seats in the upcoming delimitation exercise.
3. The replacement level fertility rate is defined as 2.5 children per woman.
4. Some southern states are considering policy measures to encourage higher fertility rates, such as incentivizing candidates with more than two children for local body elections.

Which of the above statements are correct?

- (a) 1, 2 and 4 only
- (b) 1, 3 and 4 only
- (c) 2 and 3 only
- (d) All of the above

Answer: (a) 1, 2 and 4 only

Explanation:

- ❖ **Statement 1:** Correct. The delimitation exercise is conducted to redraw constituency boundaries based on census data for proportional representation.
- ❖ **Statement 2:** Correct. Southern states fear losing parliamentary representation due to their declining population.
- ❖ **Statement 3:** **Incorrect.** The replacement level fertility rate is 2.1 children per woman, not 2.5.
- ❖ **Statement 4:** **Correct.** Some states, like Andhra Pradesh, are exploring measures such as allowing candidates with more than two children to contest local elections to encourage higher fertility.





TIGER RELEASED BACK INTO ODISHA'S SIMILIPAL RESERVE

Tiger released back into Odisha's Similipal reserve

The Hindu Bureau
BHUBANESWAR

Zeenat, the three-year-old tiger that had been wandering for three weeks near the boundaries of three States before being brought to Odisha's Similipal Tiger Reserve, was released into a soft enclosure in the reserve's southern division on Wednesday, marking a new home for the big cat as the New Year begins.

Zeenat was translocated from the Tadoba-Andhari Tiger Reserve in Maharashtra to the Similipal Tiger Reserve on November 14 as part of a strategy to boost the genetic diversity of the reserve's big cat population.

It has been a matter of concern that a significant number of tigers in Similipal displayed pseudo-melanism, characterised by black stripes that are much more pronounced than the typical colouration of a Royal Bengal Tiger. This is



Zeenat had been keeping forest officials on their toes for over three weeks.

largely a result of inbreeding.

Under the supervision of the National Tiger Conservation Authority, Zeenat, and another tiger Jamuna, were released into the Similipal Tiger Reserve.

Zeenat was released into the wild following 10 days of acclimatisation in the core area of Similipal's northern division. The dispersing female tiger, in process of establishing her territory, strayed into Jharkhand and then West Bengal in the first week of December. After weeks of hide and seek, Zeenat was captured in West Bengal on December 29.

Context

- ❖ A three-year-old tigress named Zeenat was translocated from Maharashtra's Tadoba-Andhari Tiger Reserve (TATR) to Odisha's Similipal Tiger Reserve (STR) on November 14, 2024. This initiative aimed to enhance the genetic diversity of Similipal's tiger population, which has been experiencing inbreeding issues, particularly with pseudo-melanistic tigers.
- ❖ Pseudo-melanistic tigers, often referred to as "black tigers," are a rare genetic variant of Bengal tigers (*Panthera tigris tigris*).

Tadoba-Andhari Tiger Reserve (TATR):

- ❖ **Location:** Chandrapur, Maharashtra
- ❖ **Established:** National Park in 1955; Tiger Reserve in 1995
- ❖ **Area:**
 - Core: 625.4 sq km
 - Buffer: 1,101.77 sq km





Key Features

- ❖ **Geography:** Dry deciduous forests, hilly terrain, and lakes like Tadoba Lake.
- ❖ **Flora:** Teak, Bamboo, Ain, and grasslands.
- ❖ **Fauna:**
 - **Tigers** (flagship species), Indian Leopard, Sloth Bear, Dhole.
 - **Birds:** Grey-headed Fish Eagle, Serpent Eagle.
 - **Reptiles:** Indian Python, Monitor Lizard.

Simlipal Tiger Reserve: Overview

- ❖ Simlipal Tiger Reserve, located in **Mayurbhanj district, Odisha**, is one of India's largest tiger reserves and part of the Simlipal Biosphere Reserve.

Key Highlights:

1. **Area:** Covers **2,750 sq. km** (Core: 845.70 sq. km, Buffer: 1,904.30 sq. km).
2. **Flora:** Predominantly **tropical moist deciduous** and **semi-evergreen forests** with rich sal vegetation and medicinal plants.
3. **Fauna:** Home to **Royal Bengal Tigers, Asian elephants, leopards**, and over 200 bird species including **hornbills** and **peafowls**.
4. **Water Features:** Rivers like **Budhabalanga** and waterfalls such as **Barehipani** (India's 2nd highest) and **Joranda**.
5. **Conservation:**
 - Declared a **tiger reserve in 1973** under Project Tiger.
 - Recognized as a **UNESCO Biosphere Reserve in 1994**.
6. **Tribal Culture:** Inhabited by tribes like the **Santhal** and **Ho**, living in harmony with nature.

SOLVE MCQ

Q.2 With reference to the recent tiger translocation in India, consider the following statements:

1. The translocation of a tigress from Tadoba-Andhari Tiger Reserve (TATR) to Simlipal Tiger Reserve (STR) was primarily aimed at addressing inbreeding issues in Simlipal's tiger population.
2. Tadoba-Andhari Tiger Reserve is known for its dry deciduous forests and supports a flagship population of tigers and Indian leopards.





3. Simlipal Tiger Reserve, located in Odisha, is part of the Simlipal Biosphere Reserve and is recognized as a UNESCO Biosphere Reserve.
4. Simlipal Tiger Reserve features India's second-highest waterfall, Barehipani.

Which of the above statements are correct?

- (a) 1, 2 and 3 only
- (b) 2, 3 and 4 only
- (c) 1 and 4 only
- (d) All of the above

Answer: (d) All of the Above **Explanation:**

- ❖ **Statement 1: Correct.** The translocation aimed to enhance genetic diversity and address inbreeding issues, particularly with pseudo-melanistic tigers in Simlipal.
- ❖ **Statement 2: Correct.** TATR, located in Maharashtra, is known for its dry deciduous forests and is home to flagship species such as tigers and Indian leopards.
- ❖ **Statement 3: Correct.** Simlipal is part of the Simlipal Biosphere Reserve and was recognized as a UNESCO Biosphere Reserve in 1994.
- ❖ **Statement 4: Correct.** Simlipal is home to the Barehipani waterfall, India's second-highest

