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Daily News Analysis

**The Hindu Important News Articles & Editorial For UPSC
CSE**

Monday, 22 Dec, 2025

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Page 01 : GS 2 : International Reactions

India has expressed strong concern over the killing of a Hindu youth, Dipu Chandra Das, in Bangladesh, describing the incident as a horrendous act and reiterating its commitment to the safety of minority communities in the neighbouring country. The statement by India comes amid heightened political instability in Bangladesh and growing regional sensitivity around minority protection, diplomatic security, and cross-border perceptions.

Watching crisis in Bangladesh closely: India

Centre expresses 'strong concern' about the safety of minorities in neighbouring country

Centre adds Bangladesh diplomats were not in any danger; protest at mission was quickly dispersed

Bangladesh is not the only place where such incidents take place, says Dhaka spokesman

Kallol Bhattacharjee
NEW DELHI

India on Sunday described the killing of a Hindu youth in Bangladesh as a "horrendous act", and expressed "strong concern" about the safety of minority communities in the neighbouring country.

External Affairs Ministry spokesperson Randhir Jaiswal dismissed media reports in Dhaka about threats to Bangladesh's diplomats in India, terming them "misleading propaganda".

The Ministry's remarks drew a quick response, with the Foreign Affairs Adviser of the interim Bangladesh government, Touhid Hossein, saying "such incidents occur in all countries" of the South Asian region and that Bangladesh had already arrested several suspects in the case.

Dipu Chandra Das, 25,

was lynched in Mymensingh city on Thursday amid the protests following the death of student leader Sharif Osman Hadi. The mob allegedly hanged the youth's body from a tree and set it on fire.

"India continues to keep a close watch on the evolving situation in Bangladesh. Our officials remain in touch with Bangladesh authorities and have conveyed to them our strong concerns at the attacks on minorities. We have also urged that the perpetrators of the barbaric killing of Das be brought to justice," Mr. Jaiswal said.

Responding to the reports published in multiple news outlets in Bangladesh about an incident outside the High Commission of Bangladesh here, Mr. Jaiswal said, "The fact is that about 20-25 youths gathered in front of the Bangladesh High Commission in New Delhi on December 20 and raised slogans in



Taking a stance: Students held a silent protest in Dhaka on Sunday to condemn the killing of a Hindu youth Dipu Chandra Das. AFP

protest against the horrendous killing of Dipu Chandra Das in Mymensingh, while also calling for the protection of all minorities in Bangladesh."

Earlier, *Amar Desh*, a newspaper edited by prominent journalist Mahmudur Rahman, had pu-

lished a report with the headline "Threat to kill High Commissioner in Delhi". The report said a group of men belonging to Akhand Hindu Sena had come to the main gate of the Bangladesh High Commission in Chanakypuri's Radhakrishnan Marg and

held an "aggressive" demonstration. The sharp exchanges took place when India announced that the Indian Visa Application Centre in Chittagong and the main Indian Visa Application Centre in Dhaka will remain shuttered indefinitely.

This follows "security incidents" near IVACs in Rajshahi, Chittagong, Khulna, and Dhaka. "It's difficult to operate our visa facilities in Bangladesh when people are unable to step out because of the prevailing security situation," said an official, explaining that Indian missions have been subjected to stone-throwing and frequent targeting by mobs in the past several days.

'Will ensure safety'

Responding to Bangladesh's concerns about the incident outside their mission in Delhi, Mr. Jaiswal said, "The police stationed at the spot dispersed the group after a few minutes. Visual evidence of these events is available publicly for all to see ... India is committed to ensure the safety of foreign missions/Posts in its territory in accordance with the Vienna Convention."

Responding to the In-

dian remarks, Mr. Hossein said, "One Bangladeshi citizen was brutally murdered. This incident should not be mixed with the minorities. The person who was killed was a Bangladeshi citizen and we took action on this without any delay and several individuals have been arrested in this case."

"Bangladesh is not the only country where such incidents take place. They take place in all countries of our region and every country should take appropriate action to deal with such cases and Bangladesh has already taken steps," Mr. Hossein said, addressing the media at the Ministry of Foreign Affairs in Dhaka.

Mr. Hossein's opinions were further amplified by a Ministry of Foreign Affairs statement, which said, "The intercommunal situation in Bangladesh is better than in many other parts in South Asia."

Background and Key Developments

Dipu Chandra Das was lynched in Mymensingh during protests linked to the death of a student leader. The brutality of the act—public lynching and burning—triggered widespread concern.

India's Ministry of External Affairs (MEA), through spokesperson Randhir Jaiswal, stated that India is closely monitoring the situation and is in regular contact with Bangladeshi authorities.

India urged Bangladesh to ensure swift justice and protection for minorities, while also dismissing reports in Bangladeshi media alleging threats to Bangladeshi diplomats in New Delhi as misleading.

In response, Bangladesh's interim government, through its Foreign Affairs Adviser Touhid Hossein, argued that the killing should not be framed as a minority issue and noted that arrests had already been made.

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Core Issues Involved

1. Minority Safety and Human Rights

India's concern reflects a long-standing position that the safety of minorities in neighbouring countries is a legitimate diplomatic issue, especially when incidents have cross-border emotional and political resonance.

Bangladesh, however, maintains that the incident was criminal rather than communal, highlighting the risk of securitising identity issues in bilateral relations.

2. Diplomatic Sensitivities and Vienna Convention

Reports of protests outside the Bangladesh High Commission in New Delhi raised questions about diplomatic security. India clarified that the protest was brief, peaceful, and quickly dispersed, reaffirming its obligations under the Vienna Convention on Diplomatic Relations.

This episode underscores how domestic protests can quickly escalate into diplomatic narratives if not managed carefully.

3. Internal Instability in Bangladesh and Regional Spillover

The killing occurred amid protests and political flux in Bangladesh, pointing to challenges of law and order during transitional phases.

India's decision to suspend operations of Indian Visa Application Centres in several Bangladeshi cities due to security concerns signals how internal instability can affect people-to-people ties and consular services.

4. Narrative Contestation in South Asia

Bangladesh's assertion that "such incidents occur in all countries of the region" reflects a broader South Asian tendency to relativise internal violence, rather than address structural vulnerabilities of minorities.

Competing narratives—India framing the issue as minority protection, Bangladesh framing it as a general law-and-order issue—highlight diplomatic balancing acts in the neighbourhood.

Conclusion

The Dipu Chandra Das killing has become more than an isolated criminal incident; it has emerged as a diplomatic and normative issue in India–Bangladesh relations. While India's response reflects its concern for minority protection and regional stability, Bangladesh's rebuttal underscores sovereignty and internal accountability. For India, the challenge lies in maintaining principled advocacy without diplomatic overreach, while for Bangladesh, the credibility of its response will depend on transparent justice and effective law enforcement. The episode highlights how internal security issues in South Asia can rapidly acquire regional and diplomatic dimensions, demanding careful, calibrated statecraft.

UPSC Mains Practice Question

Ques : India's response to the recent killing of a Hindu youth in Bangladesh highlights the complex balance between minority protection, diplomatic sensitivity, and regional stability. Critically examine this statement in the context of India-Bangladesh relations. **(250 Words)**

Page 06 : GS 2 : Indian Polity / Prelims

The recent report highlighting prolonged delays in India's consumer courts underscores a critical gap between statutory promise and ground reality. Consumer dispute redressal mechanisms were envisaged as speedy, inexpensive, and accessible forums for ordinary citizens. However, mounting pendency, repeated adjournments, and infrastructural deficits have turned consumer litigation into a prolonged test of endurance, thereby weakening consumer confidence in the justice delivery system.

Speedy justice eludes consumers seeking redress against sellers

Long travel, repeated adjournments, and mounting backlogs are turning consumer courts into a test of endurance for litigants; vacancies in consumer commissions, limited courtrooms, and procedural hurdles further exacerbate their plight

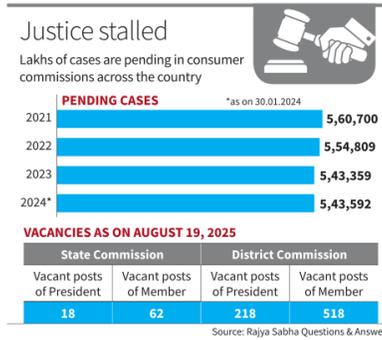
Soibam Rocky Singh
 NEW DELHI

For many wronged consumers across India, the promise of "speedy justice" enshrined in law remains distant. Consumer courts, conceived as accessible and inexpensive forums for ordinary citizens, have increasingly become arenas of prolonged litigation.

That reality unfolds in the life of 60-year-old Ashok (name changed), whose consumer dispute has been pending for nearly a decade. At 4 a.m., the small paint factory owner locks his home in Panchkula, Chandigarh, and takes the long road to Delhi.

His case relates to an insurance claim arising out of a fire that gutted his small paint factory in 2015. When the Bench rises for the day, his matter remains unheard. The court master announces the next date – six months later. "This has been happening for the past three years. For one reason or another, my case never comes up. I don't know what to do anymore," he says.

Twenty-eight-year-old Raju (name changed) from



a small district in Chhattisgarh had dreamt of setting up a paper cup manufacturing unit five years ago. He paid the full amount online for a paper cup-making machine and took loan from a local bank to fund the purchase. The machine never arrived.

Mr. Raju has since been embroiled in protracted litigation – first before the district consumer court, and later at the State forum. His case has now reached the National Consumer Court after the opposite party decided to challenge the order passed in his favour in the lower

forums. Each hearing requires him to undertake a 24-hour train journey to the national capital, with no assurance that his case will actually be heard. "The last date was November 24. My case did not come up because the court's time got exhausted with cases at the top of the list," he recalls.

Stories such as Mr. Ashok's and Mr. Raju's mirror a systemic crisis playing out across consumer courts nationwide.

A response by the Ministry of Consumer Affairs, Food and Public Distribution in Parliament shows

that as of January 30, 2024, a total of 5.43 lakh consumer complaints were pending before district, State and national consumer commissions.

In 2024, the commissions received 1.73 lakh fresh cases but disposed of only 1.58 lakh, leading to a net increase of nearly 14,900 cases. The trend continued in 2025. Up to July this year, 78,031 new complaints were filed, while 65,537 cases were disposed of. This backlog persists despite clear statutory timelines under the Consumer Protection Act, 2019. Section 38(7) of the Act mandates that complaints be decided within three months where no testing or analysis is required, and within five months where such examination is necessary.

The law also explicitly discourages delays, stating that adjournments should not ordinarily be granted unless sufficient cause is shown and reasons are recorded in writing.

Structural bottlenecks

Advocate Anand Prakash attributes the delays to deep-rooted structural issues. "Many consumer

commissions are burdened with thousands of pending matters and lack sufficient staff, modern facilities, or effective digital case management systems," he says. "Vacancies in judicial and non-judicial posts, limited courtrooms and logistical constraints continue to impede timely hearings."

The staffing crisis has intensified over time. As of August 19, 2025, 18 posts of President and 62 posts of Member were vacant in State Consumer Dispute Redressal Commissions. At the district level, 218 posts of President and 518 posts of Member remained vacant.

Another challenge, Mr. Prakash says, lies in the nature of disputes themselves. "Many commission Members are legally trained but lack subject-matter expertise in specialised areas."

This often necessitates expert opinions, laboratory reports, or technical clarifications, leading to repeated adjournments.

Delays are also caused by procedural hurdles – non-service of notices, late filing of affidavits, and requests for time to submit additional evidence.

Background and Key Facts

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Daily News Analysis

As per data placed before Parliament by the Ministry of Consumer Affairs, Food and Public Distribution, 5.43 lakh consumer complaints were pending as of January 30, 2024, across district, State, and national consumer commissions.

In 2024, new filings exceeded disposals, resulting in a net increase of nearly 14,900 cases. The trend continued in 2025, with disposals lagging behind fresh complaints.

This backlog persists despite clear timelines under the Consumer Protection Act, 2019, which mandates disposal within three to five months, depending on the need for testing or expert analysis.

Core Issues Involved

1. Erosion of the Principle of Speedy Justice

Consumer courts were designed as an alternative to conventional civil courts. Prolonged litigation defeats this very objective.

Repeated adjournments and non-listing of cases, as illustrated by litigants travelling long distances without hearings, amount to justice delayed, which in effect becomes justice denied.

2. Structural and Administrative Bottlenecks

A major cause of delay is acute manpower shortage. As of August 2025, large numbers of posts of Presidents and Members remain vacant at both State and district levels.

Limited courtrooms, inadequate staff, and weak digital case management systems further constrain institutional capacity.

3. Procedural and Technical Challenges

Non-service of notices, delayed filing of affidavits, and frequent requests for additional time add to pendency.

Increasingly complex consumer disputes—such as insurance, medical negligence, and technical product defects—often require expert opinions, causing unavoidable adjournments.

4. Access to Justice and Economic Burden

Long travel, repeated hearings, and loss of wages impose disproportionate costs on ordinary consumers, particularly those from rural or economically weaker backgrounds.

Appeals from district to State and then to national commissions, while legally justified, often prolong disputes for years, discouraging genuine claimants.

Broader Implications

Rule of Law: Persistent delays undermine faith in quasi-judicial institutions and dilute the credibility of welfare-oriented legislation.

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Ease of Doing Business: Ineffective consumer redressal mechanisms can distort market discipline by allowing errant sellers and service providers to escape timely accountability.

Social Justice: Vulnerable consumers, for whom these forums were created, are the worst affected by systemic inefficiencies.

Way Forward

Time-bound filling of vacancies and creation of additional benches where pendency is high.

Strengthening digital infrastructure, including virtual hearings and e-service of notices, to reduce logistical delays.

Capacity building of Members, including domain-specific training for complex technical disputes.

Strict enforcement of adjournment rules and effective case-flow management to ensure adherence to statutory timelines.

Conclusion

The crisis in consumer courts reflects a wider challenge facing India's justice delivery system: good laws undermined by weak implementation. While the Consumer Protection Act, 2019 provides a robust legal framework, its objectives cannot be realised without adequate institutional capacity and administrative efficiency. Restoring the credibility of consumer courts is essential not only for protecting consumer rights but also for reinforcing trust in governance and the rule of law.

UPSC Prelims Practice Question

Ques : With reference to consumer dispute redressal in India, consider the following statements:

1. The Consumer Protection Act, 2019 prescribes a time limit for disposal of consumer complaints.
2. Adjournments in consumer courts can be granted as a matter of routine.
3. Consumer Commissions exist at the district, State, and national levels.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

Ans : (b)

UPSC Mains-Essay Practice Question

Ques : "Justice delayed is justice denied."

Page 07
Syllabus : GS 7 : Environment / Prelims

The recent discovery of a carbon "anomaly" in the Southern Ocean has important implications for climate science and policy. Contrary to long-standing climate model projections, the Southern Ocean has continued to absorb more carbon dioxide instead of releasing it, despite stronger westerly winds and rising greenhouse gas concentrations. This finding highlights both the strengths and limitations of climate models, and underscores the critical role of continuous observations in understanding Earth's complex climate system.

Southern Ocean carbon 'anomaly' reveals what models can still miss

For nearly two decades, computer models said stronger westerly winds and more greenhouse gases in the atmosphere would pump more carbon-rich deep water up towards the Southern Ocean's surface, which would release carbon dioxide into the air; yet new research has found the exact opposite has happened

Ashmita Gupta

The Southern Ocean plays an outsized role in regulating the earth's climate with its moody currents and its tremendous ability to absorb heat and carbon dioxide from the atmosphere.

It covers roughly 25-30% of the global ocean area and absorbs about 40% of all the human emitted carbon dioxide the oceans absorb.

This ability comes in large part from its cold and relatively fresh surface layers, which sit like a lid on top of the warmer, saltier, carbon-rich reservoirs. This arrangement allows the ocean to trap a lot more carbon dioxide than it emits. Even a small shift in this layering can, however, change whether the ocean continues to act as a buffer or if it becomes a new source of atmospheric carbon dioxide.

For nearly two decades, scientists have used computer models to understand the ocean's role in climate change, and the models have been saying the Southern Ocean could become less of a sink as the world warms. Specifically, the models said stronger westerly winds and more greenhouse gases in the atmosphere would pump more carbon-rich deep water up towards the surface, which would release carbon dioxide into the air.

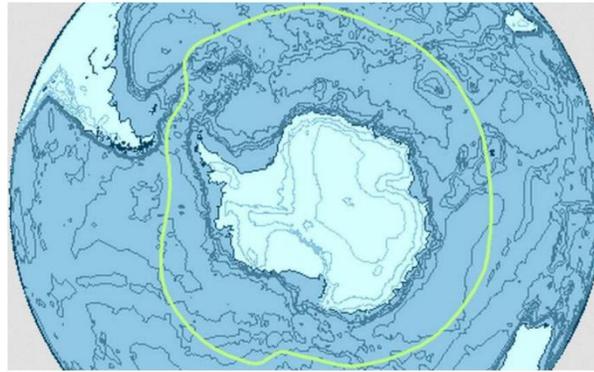
Yet new data has found the exact opposite has happened.

Since the early 2000s, scientists have found the Southern Ocean to be soaking up more carbon, not less. A new long-term analysis of ocean chemistry by researchers - from the Helmholtz Centre for Polar and Marine Research and the Ludwig Maximilian University of Munich, both in Germany - has offered a new explanation for this unexpected resilience. While climate models did get important parts of the physics right, the researchers said the models missed a surface process that temporarily masked the weakening they predicted. The nature's findings were published in *Nature Climate Change* in October.

The carbon sink

The models' reasoning was physically sound. As the concentration of greenhouse gases rose, westerly winds in the southern hemisphere were to strengthen and shift poleward. This shift would mean stronger upwelling in the Southern Ocean, i.e. more deep, carbon dioxide-laden waters rising towards the surface.

"The key assumption in earlier climate models is an intensification of the meridional overturning circulation of the Southern Ocean," Léa Olivier, the new study's coauthor and an oceanographer at the aforementioned institutions, said. "That would lead to more waters from the deep of the ocean ... being in contact with



A demarcation of the Southern Ocean. APFCB ICC BY-SA

the atmosphere, and therefore weakening the Southern Ocean carbon sink."

So models predicted that as the winds got stronger, the Southern Ocean would start emitting more carbon. Using decades of measurements across the Southern Ocean, the new analysis has reported that the deep waters are indeed rising. The circumpolar deep waters, which are naturally rich in dissolved inorganic carbon and warmer than the layers above, have moved up by around 40 metres since the 1990s.

This in turn has increased carbon dioxide pressure in the subsurface by about 10 microatmospheres, a shift consistent with model projections.

What the models missed

Even then the ocean wasn't emitting more carbon dioxide, and the team found why in a thin layer of freshwater at the surface.

Over the last few decades, the Southern Ocean has been becoming fresher (less salty) thanks to more rainfall and more meltwater from Antarctica's glaciers. Fresher water is lighter. When it accumulates at the surface, it strengthens stratification, i.e. the amount of layering that separates the cooler and more buoyant surface from the warmer and saltier waters below. This stratification prevented the carbon-rich water from the deep from being exposed to the atmosphere. Instead it seems to be trapped 100-200 m below the surface. According to Dr. Olivier, this is what



The key assumption in earlier models is an intensification of the meridional overturning circulation of the Southern Ocean

LEA OLIVIER
HELMHOLTZ CENTRE FOR POLAR AND MARINE RESEARCH AND THE LUDWIG MAXIMILIAN UNIVERSITY

models struggled to capture: "We have two competing mechanisms: the upwelling that brings the deep water up and the stratification that blocks the vertical exchanges."

Indeed capturing the presence of this layer is quite challenging. Stratification is governed by many processes that are happening at wildly different scales. Dr. Olivier said this is mainly due to the complex physics of eddies and ice-shelf cavities. Eddies are only a few kilometres wide while ice cavities are much larger.

"The lack of data also plays a role," she added.

Fleeting reprieve

The new study emphasised that the current situation may not last. Roughly in the first half of the 2000s, the stratified layer began to grow thinner. Recent observations have shown surface salinity rising again in parts of the Southern Ocean, suggesting the lid may be fading.

"We see a strong stratification, but it is getting more shallow," Dr. Olivier

explained. "Strong winds could more easily reach below the stratified layer and into the deep waters that are warm, saline and rich in carbon dioxide. Once these waters mix, it will be harder to re-stratify the upper layer."

In other words, the predicted weakening of the carbon sink could re-emerge, and perhaps sooner than (now) expected. The deep carbon dioxide reservoir is already closer to the surface than it used to be. So if the stratification erodes further, the carbon that models expected to see at the surface decades ago could suddenly appear.

But rather than discredit models, the researchers said their findings reinforce how essential they are. Their projections helped direct policy attention to the processes that scientists needed to observe, and which helped explain why the Southern Ocean behaved unexpectedly.

The lesson is simple: models reveal vulnerabilities; observations reveal exceptions. And the earth's climate system lies somewhere in between.

To know what comes next, scientists also need continuous, year-round observations. Whether it absorbs or releases carbon in the coming decades could profoundly alter the planet's future and tell us just how well our models can keep up with the evolution of a deceptively small ocean.

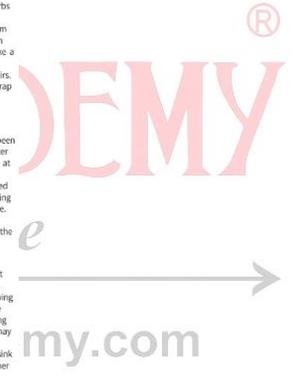
(Ashmita Gupta is a science writer. ashmitagupta32@gmail.com)

THE GIST

The Southern Ocean absorbs 40% of all carbon dioxide emissions. This derives from its cold and relatively fresh surface layers, which sit like a lid on top of the warmer, saltier, carbon-rich reservoirs. This allows the ocean to trap a lot more carbon dioxide than it emits

The Southern Ocean has been becoming fresher, this water is lighter and accumulates at the surface; it strengthens stratification. This prevented carbon-rich water from being exposed to the atmosphere. Instead, it seems to be trapped 100-200 m below the surface

The study emphasised that the situation may not last. The stratified layer is growing thinner. Observations have shown surface salinity rising again, suggesting the lid may be fading. The predicted weakening of the carbon sink could re-emerge, and sooner than expected



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Importance of the Southern Ocean

The Southern Ocean covers about 25–30% of the global ocean area.

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Daily News Analysis

It absorbs nearly 40% of the carbon dioxide taken up by all oceans, and a significant share of excess heat generated by human activities.

Its effectiveness as a carbon sink depends on vertical stratification: cold, fresh surface waters act as a lid over warmer, saltier, carbon-rich deep waters.

Even minor disruptions in this structure can determine whether the ocean remains a carbon sink or turns into a carbon source.

What Climate Models Predicted

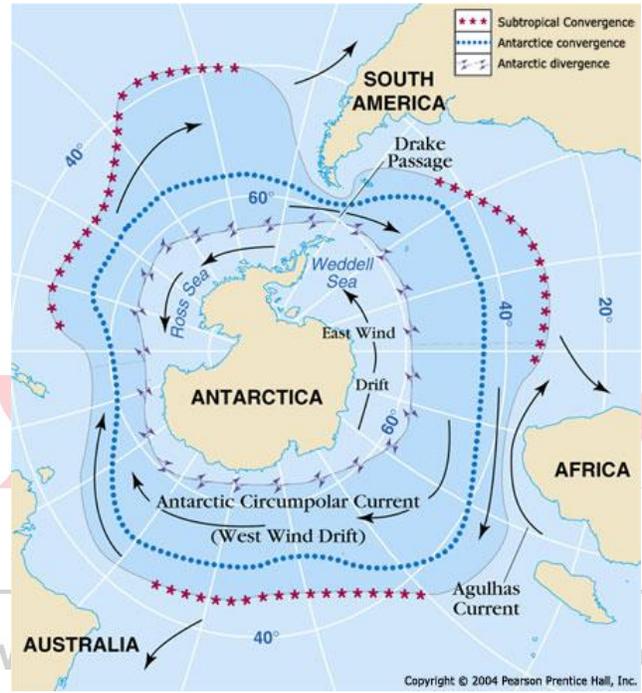
For nearly two decades, climate models suggested that:

Rising greenhouse gases would strengthen and shift winds poleward.

Stronger winds would intensify upwelling of deep, rich waters.

This would expose carbon dioxide to the atmosphere, weakening the Southern Ocean carbon sink.

These projections were grounded in sound physical related to the meridional overturning circulation.



westerly

carbon-

reasoning

Research

What Observations Revealed

New long-term ocean chemistry data analysed by researchers from the Helmholtz Centre for Polar and Marine and Ludwig Maximilian University of Munich, published in Nature Climate Change, found that:

Deep circumpolar waters have indeed risen by about 40 metres since the 1990s, in line with model predictions.

Subsurface carbon dioxide pressure has increased, also matching model expectations.

However, the Southern Ocean has not released more carbon dioxide into the atmosphere.

What Models Missed: Freshwater Stratification

The key missing element was a thin but crucial freshwater layer at the surface:

Increased rainfall and melting of Antarctic glaciers have made surface waters fresher and lighter.

This enhanced stratification, preventing deep carbon-rich waters from reaching the surface.

As a result, carbon dioxide remains trapped 100–200 metres below the surface, sustaining the ocean's role as a carbon sink.

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This process is difficult to capture in models because it depends

on:

- Small-scale ocean eddies,
- Complex ice-shelf cavity dynamics, and
- Sparse observational data from remote polar regions.

Why This Is Only a Temporary Relief

The study warns that this resilience may be short-lived:

Since the early 2010s, the freshwater layer has started to thin.

Surface salinity is rising again in parts of the Southern Ocean.

If strong winds penetrate below the stratified layer, rapid mixing could occur, exposing deep carbon to the atmosphere.

Thus, the model-predicted weakening of the carbon sink may re-emerge sooner than expected.

Conclusion

The Southern Ocean carbon anomaly does not invalidate climate models; instead, it refines our understanding of their limitations. Models correctly identified vulnerabilities, while observations revealed temporary stabilising processes. The episode reinforces a crucial lesson for climate governance: models and observations must work together. As stratification weakens and deep carbon reservoirs rise closer to the surface, the future behaviour of the Southern Ocean could decisively influence global climate trajectories. Sustained, year-round monitoring will therefore be essential to anticipate tipping points in Earth's climate system.

UPSC Prelims Practice Question

Ques: Why is freshwater-driven stratification in the Southern Ocean difficult to capture accurately in climate models?

- (a) Dependence on atmospheric circulation only
- (b) Involvement of small-scale eddies, ice-shelf cavity dynamics, and sparse polar observations
- (c) Absence of satellite-based ocean monitoring
- (d) Dominance of biological carbon pumps over physical processes

Ans : b)

UPSC Mains Practice Question

Ques: Continuous observations are as crucial as climate models for effective climate governance. Discuss this statement with reference to the Southern Ocean and its role in the global carbon cycle.

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Page 07 : Prelims

Recent astronomical research has drawn attention to a rare and potentially transformative cosmic phenomenon termed a superkilonova. Reported by an international research team involving scientists from Indian Institute of Astrophysics and IIT Bombay, this event combines features of both a supernova and a kilonova. Observed at a distance of about 1.3 billion light-years, the finding challenges existing models of stellar explosions and enriches our understanding of heavy-element formation in the universe.

WHAT IS IT?

Superkilonova: double whammy



This artist's concept shows a hypothetical superkilonova, from a supernova (left), to two neutron stars circling each other (centre), to finally merging in a kilonova (right). CALTECH/K. MILLER AND R. HURT (IPAC)

Vasudevan Mukunth

A superkilonova is a rare kind of cosmic explosion. When two neutron stars smash into each other, the material tossed into space includes heavy, radioactive elements like gold, platinum, and neodymium. Over time the elements decay and the emissions in the optical and infrared parts of the spectrum are called a kilonova.

A superkilonova has an additional energy source. In one version, after the merger, some ejected matter may fall back towards the merged object and become hotter. This heat can heat up the surrounding ejecta, making it brighter and bluer than a kilonova alone, and perhaps for longer too.

In a study published on December 15, an international research team -- including from IIT-Bombay and the Indian Institute of Astrophysics, Bengaluru -- reported a possible second version. They zeroed in on a source of

bright light 1.3 billion lightyears away. The team found its brightness and light 'fingerprint' could be explained by a superkilonova where a supernova blows up a massive star into two neutron stars, which then merge to produce a kilonova.

"At first, for about three days, the eruption looked" like a kilonova, director of Caltech's Palomar Observatory Mansi Kasliwal, said in a statement. "Everybody was intensely trying to observe and analyse it, but then it started to look more like a supernova, and some astronomers lost interest. Not us." The team has said astronomers will need more data about such events before being sure, "but the event nevertheless is eye opening".

For feedback and suggestions

for 'Science', please write to science@thehindu.co.in with the subject 'Daily page'

Background: Supernova, Kilonova, and the New Concept

Supernova: A massive star's explosive death, dispersing lighter and intermediate elements and leaving behind compact remnants such as neutron stars or black holes.

Kilonova: Occurs when two neutron stars merge, ejecting neutron-rich matter that undergoes rapid radioactive decay (r-process nucleosynthesis), producing heavy elements like gold, platinum, and neodymium.

Superkilonova: A hypothesised "double explosion" where a supernova first creates a pair of neutron stars, which then merge shortly thereafter to generate a kilonova. The combined energy sources make the event brighter, bluer, and longer-lasting than a conventional kilonova.

Key Findings of the Study

Dual Energy Source:

Initial light resembles a kilonova for a few days.

Subsequently, characteristics similar to a supernova emerge, indicating sustained or additional heating of the ejecta.

Element Formation:

Reinforces the role of neutron star mergers in producing heavy elements via r-process nucleosynthesis.

Suggests that some supernovae may indirectly contribute to heavy-element synthesis by creating neutron star binaries that merge rapidly.

Observational Significance:

The unusual light curve and spectral "fingerprint" do not fit neatly into existing categories.

As highlighted by researchers at Caltech, sustained observation is essential, since early loss of interest could mean missing critical transitions in such events.

Scientific and Strategic Relevance (UPSC Perspective)

Science & Technology: Advances astrophysical models of stellar evolution, compact objects, and cosmic explosions.

Interdisciplinary Impact: Links astronomy, nuclear physics (r-process), and observational technology (multi-wavelength astronomy).

India's Role in Global Science: Participation of Indian institutions underscores India's growing footprint in frontier research and international collaborations.

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Future Research: Necessitates better transient surveys, long-duration monitoring, and improved gravitational-wave–electromagnetic synergy.

Conclusion

The possible identification of a superkilonova is an eye-opening development in modern astrophysics. While further observations are required for confirmation, the event expands the conceptual framework of cosmic explosions and deepens insight into the origin of heavy elements. For UPSC relevance, it exemplifies how cutting-edge scientific discoveries emerge from global collaboration and why sustained investment in basic science and observational infrastructure is critical for advancing human knowledge of the universe.

UPSC Prelims Practice Question

Ques : The term “superkilonova”, recently seen in news, is best described as:

- (a) A more energetic form of a supernova caused by black hole accretion
- (b) A neutron star–black hole merger producing only gravitational waves
- (c) A combined event involving a supernova followed by a neutron star merger
- (d) A hypothetical explosion occurring at the centre of active galaxies

Ans : c)

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Air pollution has emerged as one of the gravest public health and governance challenges for rapidly urbanising economies. Both Beijing and Delhi once symbolised extreme urban smog. However, over the past decade, their trajectories have diverged sharply. While Beijing reduced its annual PM2.5 concentration by more than 50% between 2013 and 2021, Delhi continues to remain among the world's most polluted cities.

Lessons from China on tackling pollution

China and India have long grappled with severe air pollution. Yet their trajectories over the past decade have diverged sharply. Once a global symbol of smog, Beijing managed to cut its annual PM2.5 levels by more than 50% between 2013 and 2021, while Delhi continues to rank among the world's most polluted cities. How is Beijing breathing easier?



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Clean-air transformation
Beijing's transformation was neither accidental nor incremental. It stemmed from a multifaceted approach enabled by two major policy drives: the Air Pollution Prevention and Control Action Plan and the Blue Sky Protection Campaign. These measures focussed on sweeping, top-down interventions across energy, transport, and industry. Beijing's strategy was anchored on three features: coherent policy, strict enforcement, and regional coordination. The government expanded electric mobility, shut down or relocated hundreds of polluting industries, replaced thousands of coal-fired boilers with natural gas, imposed stringent China VI vehicular emission standards, built one of the world's densest PM2.5 real-time air quality monitoring systems, and imposed substantial penalties for non-compliance. Most importantly, Beijing didn't act alone. Its coordination with the neighbouring Tianjin-Hebei provinces through a unified 'airshed' strategy ensured regulation of transboundary air pollution. The turnaround was remarkable – PM2.5 levels dropped from the average 102 µg/m³ in 2013 to 31 µg/m³ in 2024.

India does not lack environmental laws, but from the shortage of coherence in implementing them. A strong statutory framework – the Air (Prevention and Control of Pollution) Act of 1981, the Environment Protection Act, 1986, and rules governing waste, construction, and emissions –

exists alongside courts, tribunals, and pollution-control boards. Indirectly, various laws such as the Factories Act, 1948 and the Motor Vehicles Act, 1988 also shape air-quality outcomes. Yet regulatory fragmentation undermines their impact. Over the years, India has rolled out many initiatives: the National Clean Air Programme, the Graded Response Action Plan, odd-even rationing, construction bans, dust-control rules, crop-residue measures, work-from-home advisories, and Delhi's Air Pollution Mitigation Plan 2025. The Centre has also established the Commission for Air Quality Management (CAQM). These interventions, however, are largely reactive and activated during pollution peaks rather than embedded in long-term planning; and agencies function in silos.

The core difference between the two approaches lies in governance, enforcement, and coordination. China's Environmental Vertical Reform created a clear hierarchy for realising local governments' environmental protection responsibilities. This top-down structure ensured uniform actions, strict enforcement, and rapid implementation. Delhi, however, operates within a fragmented governance system involving the Union government, the Delhi government, pollution control boards, and multiple municipal bodies. As a result, decision-making becomes slower, enforcement weaker, and accountability more diffused. Beijing's regulatory agencies also possess sweeping authority and substantial resources. On the other hand, India's pollution control boards remain chronically understaffed and underfunded. Also, Beijing modelled inter-provincial alignment through the airshed strategy whereas the CAQM's directives to address stubble burning from adjoining States remain unauthoritative.

China has made large sustained investments in clean energy, electric mobility, and industrial

relocation. Delhi's own industrial relocation attempts, such as the Bawana project, have faltered due to inadequate infrastructure and poor service delivery. Even 'sustainable' alternatives such as waste-to-energy plants have failed to meet air-quality norms. Delhi's pollution load is further intensified by industrial and vehicular emissions, corrupted Pollution Under Control (PUC) checks, construction dust, open waste burning, and meteorological inversions that trap winter pollutants. Public transport expansion has lagged behind the city's growth. Odd-even rationing has shown negligible long-term impact. Behavioural change too, has been slower in India.

What India can borrow
India need not emulate China's political system to achieve a turnaround, but it can draw on the principles that made China's progress possible. First, governance must shift from episodic responses to a long-term sustained, mission-oriented strategy and treat air pollution as a national public health emergency. Second, India must accelerate its transition to clean energy. Beijing's move away from coal drove major PM2.5 reductions; Delhi similarly needs to expand and adopt energy-efficient standards suitable for all sectors. Third, transport reforms must be enforced, not merely announced. BS-VI norms require credible PUC systems, modern testing centres, a robust vehicle-scrappage policy, and congestion management. Expanding EV charging infrastructure, incentivising electric mobility, and dramatically strengthening public transport are essential. Fourth, industrial policy must shift from relocation on paper to functional industrial zones with full utilities, transport access, and real-time emissions monitoring. Finally, air pollution must be governed as a regional problem. A Beijing-Tianjin-Hebei style airshed model should guide Delhi-NCR.



Beijing's Clean-Air Transformation

Beijing's turnaround was driven by a coherent, top-down, and sustained policy approach, primarily through the Air Pollution Prevention and Control Action Plan and the Blue Sky Protection Campaign. Key features included:

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Strong Governance and Enforcement

Clear hierarchy and accountability through China's Environmental Vertical Reform.

Strict enforcement with substantial penalties ensured compliance.

Structural Energy and Industrial Reforms

Phasing out coal-fired boilers and shifting to cleaner fuels.

Closure or relocation of polluting industries.

Large-scale investment in clean energy and electric mobility.

Transport and Monitoring Reforms

Implementation of stringent China VI emission standards.

Development of one of the world's densest real-time PM_{2.5} monitoring networks.

Regional 'Airshed' Coordination

Integrated pollution control across Beijing–Tianjin–Hebei, recognising air pollution as a transboundary problem.

As a result, Beijing's PM_{2.5} levels fell dramatically from about 102 µg/m³ in 2013 to nearly 31 µg/m³ by the mid-2020s.

India's Approach: Strengths and Gaps

India possesses a **robust legal and institutional framework**, including the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, and multiple sectoral regulations. Policy initiatives such as the National Clean Air Programme (NCAP), Graded Response Action Plan (GRAP), and the Commission for Air Quality Management (CAQM) indicate intent.

However, persistent challenges remain:

Regulatory Fragmentation: Multiple authorities at the Union, State, and municipal levels dilute accountability.

Reactive Governance: Measures are often activated during pollution peaks rather than embedded in long-term planning.

Weak Enforcement Capacity: Pollution control boards suffer from chronic understaffing and inadequate resources.

Limited Regional Coordination: CAQM lacks the authority and compliance mechanisms seen in China's airshed governance.

Behavioural and Infrastructure Constraints: Slow public transport expansion, ineffective vehicle checks, construction dust, waste burning, and stubble burning exacerbate pollution, especially during winter inversions.

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What India Can Borrow from China (Without Copying Its Political

System)

Mission-Oriented Governance: Treat air pollution as a sustained national public health emergency, not a seasonal crisis.

Energy Transition at Scale: Accelerate the shift away from coal and adopt energy-efficiency standards across sectors.

Credible Transport Enforcement: Strengthen BS-VI compliance through reliable PUC systems, vehicle scrappage, congestion pricing, and rapid public transport expansion.

Effective Industrial Policy: Develop functional industrial zones with full infrastructure and real-time emissions monitoring, rather than symbolic relocation.

Regional Airshed Management: Implement a Beijing-style airshed approach for the Delhi-NCR region to manage transboundary pollution.

Conclusion

The Beijing–Delhi contrast underscores that laws and schemes alone are insufficient without coherent governance, strict enforcement, and regional coordination. China's success demonstrates the impact of sustained political commitment, institutional capacity, and long-term planning. For India, the lesson is not to replicate China's political model, but to internalise its governance principles—clarity of responsibility, enforcement credibility, and cooperative regional action. Adopting these lessons can significantly improve air quality, public health outcomes, and environmental sustainability, aligning with India's constitutional commitment to a clean and healthy environment.

UPSC Mains Practice Question

Ques : Air pollution is increasingly being recognised as a public health emergency rather than merely an environmental issue. In this context, discuss how a mission-oriented and long-term strategy, as seen in Beijing, can be adapted to the Indian context. **(250 Words)**

Unlocking the potential of India-Africa economic ties

Prime Minister Narendra Modi's visits to Namibia and Ghana, as part of a five-nation tour (including Trinidad and Tobago, Argentina and Brazil) in July 2025, focused the spotlight again on India-Africa economic relations – just as his recent visit to Ethiopia (December 16-17, 2025) did. The recent decade has witnessed a fresh momentum in India's relations with various African countries. A testament to this is the entry of the African Union as a full-time member of the G-20 during India's presidency term in 2023. India and Africa share a long history of cultural affinity and political solidarity, but their relationship has increasingly been shaped by economics in recent decades.

Uncertainties in western markets

In FY24, India's exports to the United States and the European Union constituted around 40% of its total exports. Given the rising unpredictability of these markets and the threat of a potential slowdown, it is essential that India looks to other markets, particularly African economies.

India is Africa's fourth-largest trading partner, with bilateral trade reaching nearly \$100 billion. In FY24, India exported goods worth \$38.17 billion to African countries – the key destinations included Nigeria, South Africa and Tanzania. Petroleum products, engineering goods, pharmaceuticals, rice and textiles were some of the major goods exported. In 2024, Africa's imports from India were around 6% of its total imports. To put this in perspective, in addition to being one of the largest investors, China is also Africa's largest trading partner, with bilateral trade exceeding \$200 billion. Around 21% of imports to Africa in 2024 came from China. Interestingly around 33% of imports from China fell under the HSN 84 and 85 product categories, demonstrating China's industrial prowess. These product categories comprise machinery, boilers, electrical machinery, and semiconductor devices.

Recognising the need to catch up, India has already set a target of doubling its trade with



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India's engagement with the continent must move towards developing long-term and sustainable partnerships

Africa by 2030. Here is a five-point strategy that may enable India to fulfil its target.

The first strategic pillar should focus on removing trade barriers and engaging in negotiations for preferential trade agreements and comprehensive economic partnership agreements with regional economic communities and the major African economies.

The second pillar should aim to move from low-value commodity exports to two-way value-added and cross-border joint venture manufacturing. Currently, Indian firms lag in utilising the incentives offered by multiple African governments to enable firms to set up manufacturing units. For Indian enterprises, setting up manufacturing facilities across Africa presents a strategic dual advantage. It enables them to maintain preferential access to the U.S. market through favourable tariff regimes, while simultaneously capitalising on Africa's growing consumer base and industrial demand. Moving beyond petroleum and traditional exports is critical in transitioning to a new phase of India's ties with African economies. Deepening engagement with African regional groupings such as the African Continental Free Trade Area (AfCFTA) can open greater opportunities for Indian exporters.

An opportunity for MSMEs

The third pillar must prioritise the scaling-up of the Lines of Credit and improve accessibility to trade finance. The African market offers a great opportunity for the micro, small and medium enterprises (MSME) segment, unlike the European and American markets where MSMEs find it difficult to gain a foothold. There is a considerable lack of policy attention in enabling MSMEs to gain access to the African markets.

Ensuring easy access to trade finance is critical in achieving a sustainable trade relationship with the continent. Other measures may include adopting trade in local currencies, and forming a joint insurance pool to cover political and

commercial risks for medium-term projects which may reduce the perceived risk for small and medium enterprises and banks.

The fourth strategic pillar should focus on lowering freight and logistics costs by investing in port modernisation, hinterland connectivity and in developing India-Africa maritime corridors.

The final strategic pillar involves the scaling up of services, digital trade, and people-to-people links. It is essential that India leverages its strength in Information Technology, health care, professional services and skill development to boost services exports and stimulate goods trade. Services enable high-value exports and facilitate greater two-way trade. Current policy measures fall short in enabling services trade with African economies. There needs to be a considerable improvement in this regard.

A role for the Indian public sector

Strengthening investments by Indian firms in African manufacturing, agro-processing, infrastructure, renewable energy and critical and emerging technologies may lend further strength to India's relations with African economies. Currently, India's investments in Africa are inflated by investments in Mauritius which are often done with an intent to evade taxes. Multiple factors, including bureaucratic hurdles, political instability and financing costs act as barriers for Indian firms to invest in Africa. Indian firms, particularly the public sector units must take the lead in investing in the African continent, particularly in mining and mineral exploration.

Ultimately, India's engagement with Africa must go beyond transactional trade and move towards building long-term, sustainable partnerships. As global supply chains undergo restructuring and the world shifts towards a multipolar economic order, Africa will remain central to India's aspirations of becoming a global economic power. The time is ripe for India to recalibrate, innovate, and deepen its economic footprint across the African continent.

GS Paper 2 : International Relations

UPSC Mains Practice Question : India's engagement with Africa must move beyond historical solidarity to a long-term economic partnership. Critically examine how trade diversification, services, MSME participation, and regional integration initiatives such as the African Continental Free Trade Area can strengthen India-Africa relations in a multipolar world. (150 words)

Context :

India–Africa relations have entered a phase of renewed strategic and economic significance. Prime Minister Narendra Modi's recent visits to African countries, alongside Africa's elevation through the African Union's permanent membership in the G20 during India's presidency (2023), underline this momentum. As global economic uncertainty grows in traditional Western markets, Africa is emerging as a critical pillar of India's external economic strategy. The article highlights both the existing asymmetries in India–Africa trade and the roadmap required to unlock its untapped potential—an issue of direct relevance to UPSC themes such as foreign policy, economic diplomacy, South–South cooperation, and multipolarity.

Context and Significance

Africa is one of the world's fastest-growing regions, with a young population, expanding consumer markets, and abundant natural resources.

India is Africa's fourth-largest trading partner, with bilateral trade nearing \$100 billion, but remains far behind China, whose trade with Africa exceeds \$200 billion.

India's export basket to Africa is still dominated by petroleum products, pharmaceuticals, rice, textiles, and engineering goods, whereas China exports high-value manufactured goods (HSN 84 & 85), reflecting deeper industrial integration.

This gap highlights the need for India to shift from a commodity-led trade relationship to a value-added, manufacturing- and services-driven partnership.

Key Challenges in India–Africa Economic Engagement

Overdependence on Western Markets: Nearly 40% of India's exports are directed towards the U.S. and EU, exposing India to external shocks and slowdowns. Africa offers diversification but remains underutilised.

Limited Manufacturing Presence: Indian firms have not fully leveraged African incentives for local manufacturing, unlike Chinese enterprises.

Trade Finance and MSME Constraints: Indian MSMEs face difficulties in accessing finance, insurance, and risk mitigation mechanisms for African markets.

High Logistics and Connectivity Costs: Weak maritime corridors, port inefficiencies, and hinterland connectivity raise transaction costs.

Underdeveloped Services Trade: Despite India's strengths in IT, healthcare, and professional services, policy facilitation for services trade with Africa remains inadequate.

Strategic Pillars for Deepening India–Africa Ties

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Trade Liberalisation and Agreements

Negotiating preferential trade agreements and comprehensive economic partnership agreements with African regional blocs.

Deepening engagement with African Continental Free Trade Area (AfCFTA).

Shift to Value-Added Manufacturing

Promoting joint ventures and cross-border manufacturing in Africa.

Leveraging Africa as a production base to access global markets while tapping into local demand.

Empowering MSMEs through Trade Finance

Scaling up Lines of Credit.

Exploring local currency trade, joint insurance pools, and political risk coverage to encourage MSME participation.

Reducing Logistics and Freight Costs

Investing in port modernisation, maritime corridors, and connectivity between Indian and African ports.

Expanding Services, Digital Trade, and People-to-People Links

Leveraging India's comparative advantage in IT, healthcare, skilling, and digital public infrastructure to boost services exports.

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Role of the Indian Public Sector

Public Sector Undertakings (PSUs) can play a catalytic role in **mining, mineral exploration, renewable energy, infrastructure, and critical technologies.**

Genuine productive investments need to replace tax-driven routing through Mauritius.

PSU-led investments can also reduce risk perception and crowd in private capital.

Conclusion

India–Africa economic ties are at a critical inflection point. While historical solidarity provides a strong foundation, the future of the relationship lies in deep economic integration, manufacturing partnerships, services trade, and regional connectivity. As global supply chains realign and the world moves towards a multipolar economic order, Africa will be central to India's ambition of becoming a global economic power. A shift from transactional trade to long-term, development-oriented partnerships will not only strengthen India–Africa relations but also reinforce India's strategic autonomy and global standing—making this engagement a key pillar of India's 21st-century foreign policy.

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