ForumIAS

Mains Marathon

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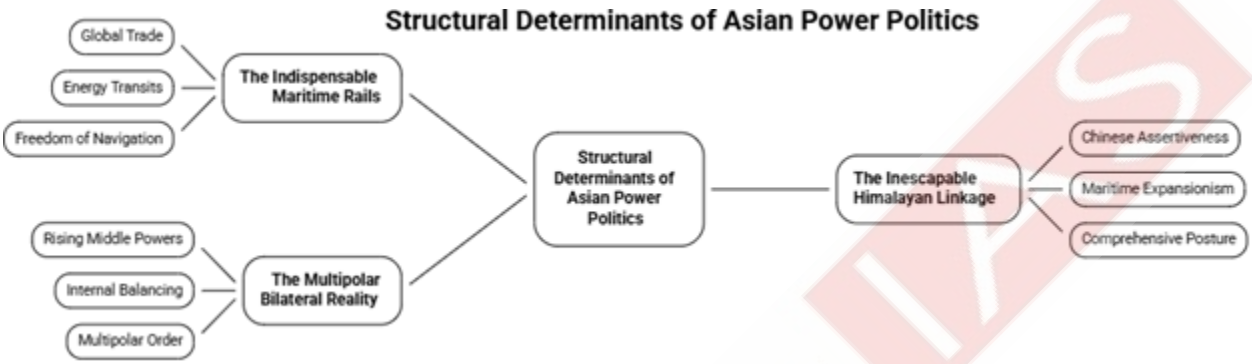
HISTORY
ECONOMICS
POLITY
SCIENCE AND TECHNOLOGY
GEOGRAPHY AND ENVIRONMENT

INDEX

Evaluate the proposition that the Indo-Pacific construct is defined by permanent Asian geography and power politics rather than shifting American foreign policy priorities.

Introduction

As the Economic Survey 2025–26 highlights resilient external engagement and Budget 2026–27 strengthens maritime connectivity and strategic infrastructure, the Indo-Pacific increasingly reflects enduring Asian geography and evolving regional power politics.



Why the Indo-Pacific is a Structural Reality

1. **Permanent Maritime Geography:** Indian and Pacific Oceans constitute an integrated maritime ecosystem. Over half of global seaborne trade and most East Asian energy imports traverse interconnected sea lanes. Chokepoints like Malacca, Sunda and Lombok Straits make both oceans strategically inseparable.
2. **Rise of Asian Power Politics:** China's maritime expansion has altered Asia's balance of power. India, Japan, ASEAN and Australia increasingly shape regional security architecture. Regional balancing is driven by resident powers rather than external actors. Example: Quad.
3. **Asian Origin of the Indo-Pacific Idea:** The modern articulation originated with Shinzo Abe's Confluence of the Two Seas (2007). India's Act East Policy, SAGAR, MAHASAGAR and Indo-Pacific Oceans Initiative (IPOI) institutionalised the concept independently. Demonstrates strong Asian strategic agency. Example: IPOI.
4. **Geoeconomic Centre of Gravity:** Asia dominates global manufacturing, supply chains and energy consumption. Indian Ocean has become indispensable for global commerce and critical minerals. Economic geography reinforces Indo-Pacific centrality. Example: Supply-chain resilience.
5. **China's Integrated Continental-Maritime Strategy:** China's Belt and Road Initiative, Djibouti base and sustained Indian Ocean deployment integrate both oceans. LAC tensions and maritime competition are strategically interconnected. India's security calculus naturally spans both theatres. Example: String of Pearls.
6. **Multipolar Regional Order:** ASEAN Centrality, IPEF, Quad, AUKUS and trilateral partnerships indicate diversified regional architecture. Security is increasingly network-based rather than alliance-based. Example: ASEAN Outlook on Indo-Pacific.

Why American Policy Alone Cannot Define the Indo-Pacific

Supporting Arguments:

1. US strategic priorities vary across administrations (TPP withdrawal, changing Indo-Pacific emphasis).
2. Military command renaming or diplomatic vocabulary does not alter maritime realities.

3. Asian economies continue strengthening regional institutions irrespective of US policy. Example: Japan's FOIP.

However, the US Still Matters

1. Largest forward-deployed naval presence.
2. Ensures freedom of navigation and deterrence.
3. Provides advanced defence technology and intelligence cooperation.
4. Supports rules-based maritime order under UNCLOS. Example: Malabar Exercise.
5. Thus, American policy acts as an important enabler not the defining foundation of the Indo-Pacific.

Implications for India

1. **Strategic:** Maintain strategic autonomy while strengthening partnerships and balance continental and maritime security. Example: Integrated deterrence.
2. **Economic:** Secure global value chains, blue economy and critical minerals. Expand resilient connectivity corridors. Example: IMEC.
3. **Technological:** Cooperate on semiconductors, AI and digital infrastructure. Strengthen trusted technology partnerships. Example: iCET.
4. **Geopolitical:** Position India as a net security provider in the Indian Ocean. Build issue-based minilateralism. Example: Colombo Security Conclave.

Way Forward

1. Strengthen Andaman & Nicobar Command as India's maritime pivot.
2. Expand IPOI, MAHASAGAR and SAGAR initiatives.
3. Deepen defence interoperability with Japan, Australia, France and ASEAN.
4. Enhance Maritime Domain Awareness through IFC-IOR.
5. Promote blue economy and resilient supply chains.
6. Invest in indigenous naval capability and shipbuilding.
7. Uphold UNCLOS and freedom of navigation.
8. Institutionalise flexible, issue-based regional coalitions instead of bloc politics.

Conclusion

The Indo-Pacific must remain "free, open and inclusive"; geography, shared prosperity and Asian agency not transient external priorities will sustain it.

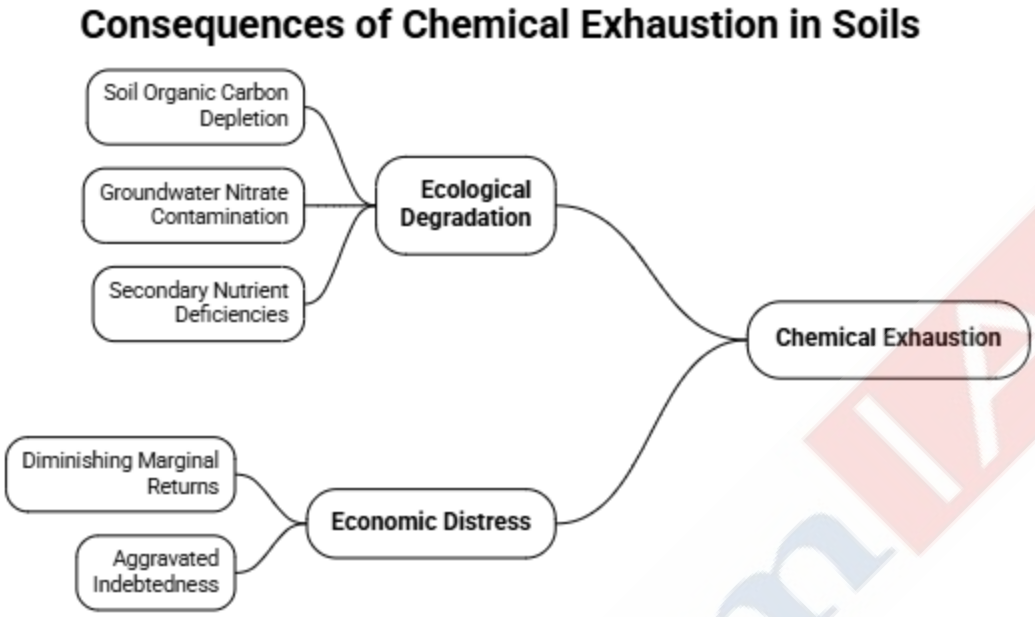
Examine the ecological and economic consequences of 'chemical exhaustion' in Punjab's agriculture. Evaluate how decentralised extension strategies like 'Khet Bachao Abhiyan' address this crisis.

Introduction

The Economic Survey 2025-26 highlights soil degradation as a key productivity constraint, while Budget 2026-27 strengthens sustainable agriculture. Punjab's chemical exhaustion exemplifies why restoring soil health has become an economic, ecological and food-security imperative.

What is Chemical Exhaustion?

Chemical exhaustion refers to the declining productive capacity of soils caused by prolonged, imbalanced use of synthetic fertilizers and pesticides, resulting in deteriorating soil biology, nutrient imbalance and rising dependence on external chemical inputs.



Ecological Consequences

1. **Declining Soil Organic Carbon (SOC):** Continuous wheat-paddy monoculture and excessive urea reduce soil microbial diversity. Punjab's organic matter is nearly 0.5% against the desirable minimum of 1% (PAU). Reduced water-holding capacity and nutrient cycling. Example: Punjab soils.
2. **Nutrient Imbalance and Micronutrient Deficiency:** Skewed NPK application encourages deficiencies of Zinc, Sulphur, Boron and Iron. Fertilizer Response Ratio declines over time. Example: Indo-Gangetic Plains.
3. **Groundwater Pollution:** Excess nitrogen leaches as nitrates into aquifers. Causes eutrophication and public health risks (Blue Baby Syndrome). Example: Malwa region.
4. **Biodiversity Loss:** Declining earthworms and beneficial microbes reduce natural soil fertility. Pollinator decline affects horticulture. Example: FAO Soil Biodiversity findings.
5. **Climate Vulnerability:** Degraded soils store less carbon and moisture. Higher emissions of nitrous oxide (GHG nearly 300 times stronger than CO_2). Example: IPCC Agriculture Report.
6. **Food Safety Concerns:** Chemical residues accumulate through biomagnification. Linked with long-term health concerns. Example: High pesticide belts of Punjab.

Economic Consequences

1. **Diminishing Marginal Returns:** More fertilizer produces smaller yield gains, rising input-output imbalance. Example: Green Revolution belt.
2. **Rising Cost of Cultivation:** Farmers spend increasingly on fertilizers, pesticides and irrigation with declining profitability despite stable yields. Example: CACP estimates.
3. **Agrarian Debt Trap:** High production costs push small farmers towards indebtedness. Example: Punjab and Vidarbha.
4. **Fiscal Burden:** Fertilizer subsidy exceeds ₹2 lakh crore in recent years. Encourages excessive urea consumption. Example: Union Budget.

5. **Threat to Food Security:** Long-term productivity declines threaten cereal output. Example: Rice-Wheat System.
6. **Export Competitiveness:** Higher residue levels risk rejection in international markets. Example: EU food safety standards.

How Decentralised Extension Strategies like Khet Bachao Abhiyan Address the Crisis

1. **Soil-Test Based Nutrient Management:** Encourages "right fertilizer, right dose, right time." Promotes scientific nutrient application. Example: Soil Health Card.
2. **Integrated Nutrient Management (INM):** Combines chemical fertilizers with compost, biofertilizers and green manure. Restores soil biology while maintaining yields. Example: Sunnhemp cultivation.
3. **Village-Level Scientific Outreach:** Scientists directly engage farmers through demonstrations. Converts laboratory knowledge into field practices. Example: PAU-KVK Langroya.
4. **Community-Based Institutions:** Involves Panchayats, SHGs, FPOs and cooperative societies. Creates peer learning and behavioural change. Example: Sarpanch Sammelan.
5. **Capacity Building:** Farmers trained in seed production, composting and nutrient management. Enhances local self-reliance. Example: Green manure seed programme.
6. **Counterfeit Input Regulation:** Joint enforcement with Agriculture Department. Prevents fake fertilizers and pesticides. Example: Enforcement drives.
7. **Convergence with Government Schemes:** Links farmers with: PM-PRANAM, Soil Health Card Scheme, National Mission on Sustainable Agriculture (NMSA). Example: Scheme convergence.
8. **Public Health Awareness:** Educates rural households on links between soil quality and nutrition. Example: Home Science outreach.

Limitations of the Present Model

1. Awareness alone cannot overcome distorted fertilizer pricing.
2. Limited extension manpower.
3. Low adoption among tenant farmers.
4. Weak market incentives for diversified crops.
5. Fragmented advisory services.

Way Forward

1. **Reform Fertilizer Subsidy:** Shift gradually towards nutrient-neutral DBT and encourage balanced fertilizer consumption.
2. **Promote Crop Diversification:** MSP and procurement support for pulses, oilseeds and millets. Example: Millet Mission.
3. **Strengthen Digital Agriculture:** AI-enabled soil advisory through Digital Agriculture Mission and satellite-based nutrient mapping. Example: Agristack.
4. **Carbon Farming Incentives:** Reward farmers for improving Soil Organic Carbon. Example: Carbon credits.
5. **Expand Bio-input Ecosystem:** Support SHGs and FPOs producing biofertilizers and compost. Example: NABARD.
6. **Strengthen Extension System:** Increase KVK funding and farmer-scientist interface and promote climate-smart agriculture. Example: ICAR.
7. **Behavioural Change:** Transition from input-intensive to knowledge-intensive farming. Example: Farmer Field Schools.

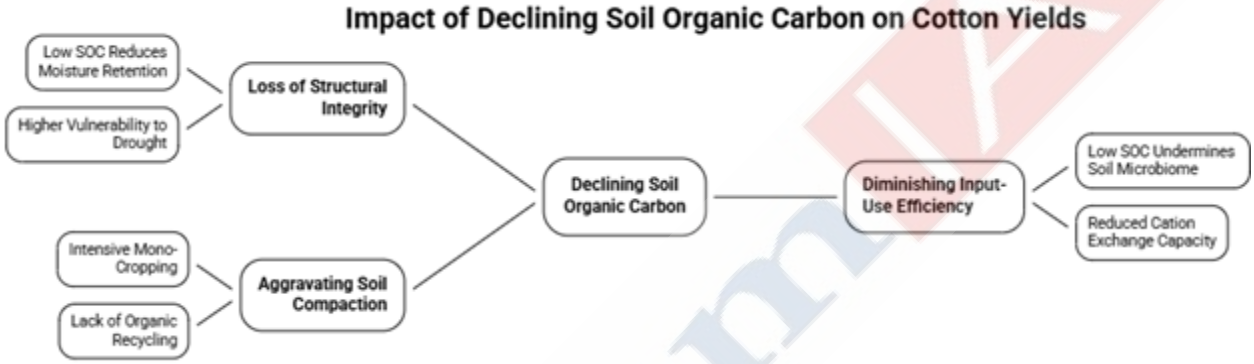
Conclusion

Echoing Dr. M.S. Swaminathan's vision of an "evergreen revolution," restoring soil through community-led scientific extension, balanced nutrition and institutional reforms is indispensable for resilient agriculture, farmer prosperity and long-term food security.

Examine the impact of declining Soil Organic Carbon on cotton productivity in India. Can Genetically Modified technologies succeed isolated from soil health restoration?

Introduction

With the ₹5,659-crore Mission for Cotton Productivity (2026–31) targeting 755 kg/ha lint yield, India confronts a deeper challenge: restoring depleted Soil Organic Carbon, the biological foundation of sustainable cotton productivity and resilience.



Why Soil Organic Carbon (SOC) is India's Real Cotton Constraint

1. **Declining Productivity despite Bt Adoption:** India has the world's largest cotton acreage but yields only ~440–460 kg/ha, far below China (~2300 kg/ha) and Brazil (~1900 kg/ha). (ICAC; Cotton Mission). Average SOC is only 0.3–0.6%, with <0.25% across cotton belts of Maharashtra, Gujarat, Rajasthan and Madhya Pradesh against the desirable 1–1.5%. (FAO estimates). Low SOC creates an agronomic ceiling where improved seeds cannot express genetic potential. Example: Vidarbha cotton belt.
2. **Ecological Consequences of SOC Decline:**
   - Reduced moisture retention increases drought stress during boll formation. Example: Rainfed Maharashtra.
   - Loss of soil biodiversity weakens microbial nutrient cycling. Example: Vertisols.
   - Lower cation exchange capacity (CEC) reduces fertilizer-use efficiency.
   - Micronutrient deficiencies (Zn, B, Mg) impair fibre quality.
   - Soil compaction restricts deep tap-root growth and carbon sequestration.
3. **Economic Consequences:** Higher fertilizer use with diminishing marginal returns. Rising cultivation costs reduce profitability of smallholders. Declining yields increase dependence on cotton imports despite large acreage. Weak fiber quality affects textile competitiveness and exports. Example: 5F Vision.
4. **Climate & Sustainability:** SOC is India's largest on-farm carbon reservoir. Low carbon soils emit more greenhouse gases and retain less water. Restoring SOC supports climate-resilient agriculture and India's Net Zero-2070 pathway.

Why GM Alone Cannot Succeed

1. **Soil Determines Genetic Expression:** Even superior genes require healthy soil, nutrients and moisture. Example: Nutrient-deficient soils limit Bt performance.
2. **Global Evidence:** China achieves very high yields using similar Bt technology through better agronomy, varieties and soil management. Turkey achieves high productivity without commercial GM cotton by emphasizing crop rotation, irrigation and soil restoration.
3. **Law of Diminishing Returns:** India's productivity peaked despite widespread Bt adoption because soil degradation offset technological gains.
4. **Integrated Farming is Essential:** Yield depends upon: soil health, Irrigation, balanced nutrition, pest management, plant density and climate-resilient varieties. GM is only one component.

Institutional & Policy Challenges

1. **Research:** Limited investment in public cotton breeding. Need faster GEAC approvals while maintaining biosafety.
2. **Economic:** Cotton Seed Price Control Order reduced incentives for private innovation. Simultaneously, inadequate investment in soil restoration.
3. **Environmental:** Excessive fertilizer dependence and poor residue recycling.
4. **Social:** Smallholders lack access to regenerative technologies.
5. **Technological:** Low adoption of precision agriculture and digital soil mapping.

Strategic Interventions for India's Cotton Sector

India need not reject next-generation GM technologies; however, policy focus under the Cotton Technology Mission must pivot toward a holistic, soil-first approach:

Strategic Pillar	Core Target Intervention	Structural Objective
Regenerative Agronomy	Mandatory deployment of Biochar-Compost matrices and mandatory leguminous crop rotations.	Systematically elevate SOC back toward the baseline threshold of 1% within major cotton clusters.
Breeding & Geometry Shift	Public sector development of climate-resilient, short-duration Bt Varieties optimized for High-Density Planting Systems (HDPS).	Transition smallholders away from costly, long-duration hybrids, lowering input risks and increasing yield per hectare.
Processing Efficiency	Upgrade industrial ginning setups to raise the Ginning Outturn (GOT) from 33% to the global benchmark of 39%.	Extract higher economic value from raw fiber output without demanding extra land or water inputs.

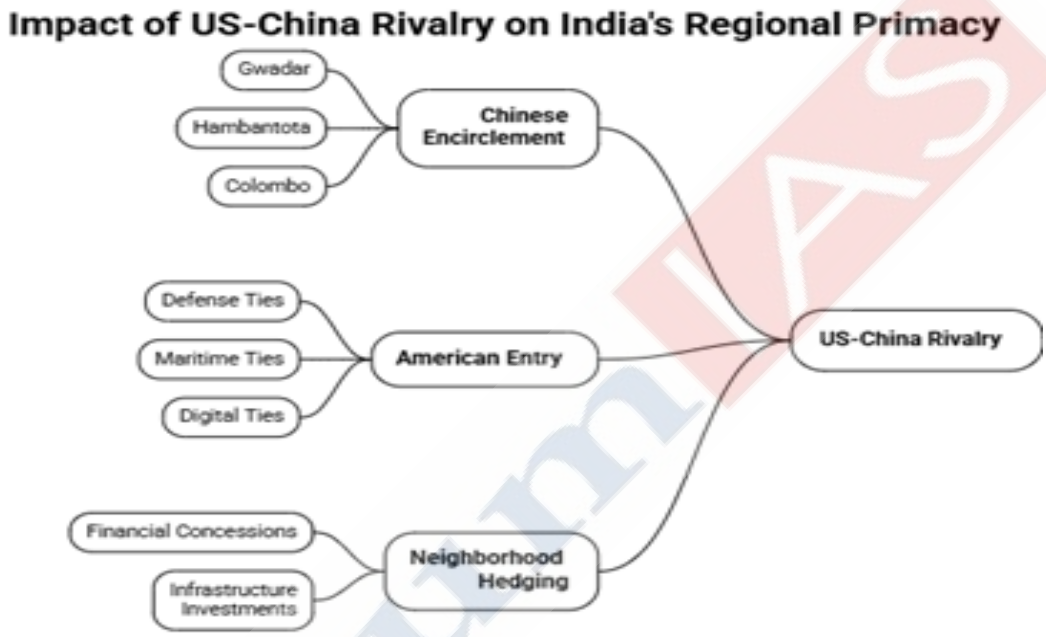
Conclusion

As M. S. Swaminathan reminded, sustainable productivity rests on ecological foundations. India's cotton future requires combining scientific biotechnology with regenerated soils, ensuring prosperity for farmers, industry and future generations alike.

Examine how intensifying US-China rivalry in South Asia impacts India's regional primacy. Evaluate the viability of a transactional diplomatic approach to preserve strategic autonomy.

Introduction

The Economic Survey 2025–26 identifies geopolitical fragmentation as a major external risk to India's growth. Simultaneously, South Asia has become the principal arena of US-China strategic competition, challenging India's traditional regional primacy.



How US-China rivalry impacts India's regional primacy

1. **Erosion of India's Traditional Sphere of Influence:** China's BRI and String of Pearls have institutionalised long-term strategic presence. Simultaneously, the US is expanding defence, maritime and digital partnerships with Bangladesh, Sri Lanka and Maldives. Neighbourhood is becoming multi-aligned rather than India-centric. Example: Hambantota Port, CPEC.
2. **Strategic hedging by neighbouring states:** Smaller states increasingly leverage competition between India, China and the US to maximise economic and political gains. Reduces India's bargaining power and monopoly over regional public goods. Example: Maldives' balancing diplomacy.
3. **Maritime security challenges:** Chinese naval deployments, dual-use ports and surveillance facilities challenge India's dominance in the Indian Ocean. Increased US naval presence further internationalises India's maritime neighbourhood. Example: Djibouti base; Colombo Port City.
4. **Economic competition:** China finances large infrastructure projects while the US promotes alternative supply-chain and connectivity initiatives. India faces pressure to compete in infrastructure delivery rather than diplomatic goodwill. Example: BRI vs IMEC.
5. **Strategic relevance of Pakistan:** China continues deep investments through CPEC. The US maintains engagement owing to counterterrorism and West Asian considerations. Pakistan remains strategically valuable despite internal instability. Example: Gwadar Port.

6. **Technological competition:** Digital infrastructure, AI, cybersecurity and telecom have become new arenas of influence. Competition extends beyond military power into standards and digital governance. Example: Undersea cable projects.

Why a transactional diplomatic approach is viable

1. **Strengthens Strategic Autonomy:** India evaluates partnerships issue-by-issue rather than bloc politics. Consistent with India's tradition of multi-alignment. Example: Russia oil imports.
2. **Maximises technology gains:** Cooperate with the US on emerging technologies while retaining independent foreign policy. Example: iCET, semiconductor cooperation.
3. **Functional engagement with China:** Border disputes should not eliminate dialogue on climate, BRICS, SCO and trade. Reduces escalation risks while preserving national interests. Example: BRICS cooperation.
4. **Prevents overdependence:** Avoids excessive reliance on either Washington or Beijing. Enhances diplomatic flexibility amid changing global alignments. Example: G20 diplomacy.
5. **Supports neighbourhood-first policy:** India can offer demand-driven development instead of debt-driven projects. Focus on Digital Public Infrastructure, healthcare, energy connectivity and capacity building. Example: UPI linkage with Nepal.

Limitations of a purely transactional approach

1. Trust deficit may reduce long-term strategic partnerships.
2. China's structural economic leverage cannot be countered solely through diplomacy.
3. US expectations on technology, sanctions and defence interoperability may constrain policy space.
4. Neighbouring countries may continue balancing multiple powers irrespective of India's approach.

Way Forward

1. Accelerate delivery under Neighbourhood First, SAGAR and MAHASAGAR initiatives.
2. Strengthen BIMSTEC, Colombo Security Conclave and IORA instead of relying on SAARC.
3. Expand cross-border energy grids, digital payments, rail connectivity and disaster-resilient infrastructure.
4. Build domestic strength in manufacturing, semiconductors, AI and defence under Atmanirbhar Bharat.
5. Institutionalise regular political engagement with neighbourhood governments through development partnerships.

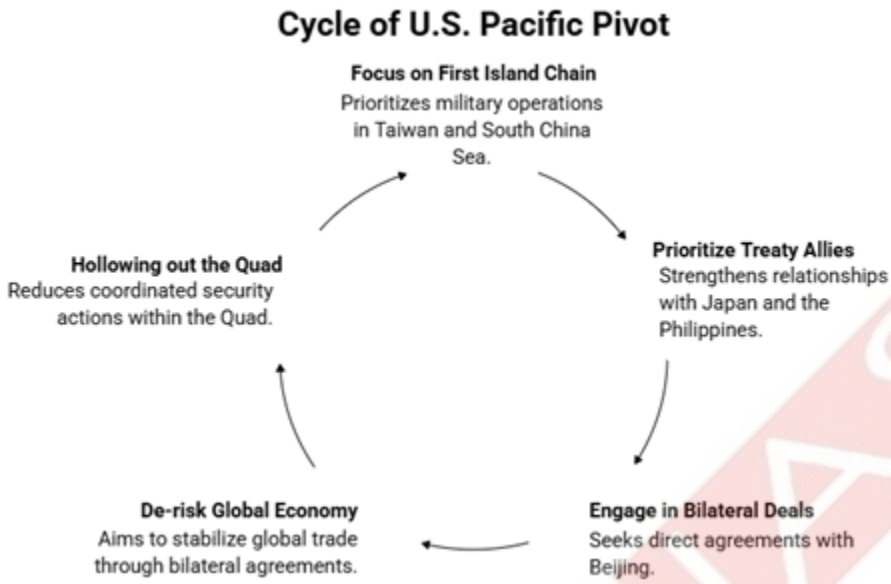
Conclusion

Strategic autonomy rests on national capability, not alignment. India must combine regional delivery, economic strength and calibrated diplomacy to remain South Asia's indispensable stabilising power.

Analyze the geopolitical fallout of Washington's strategic retreat from the Indo-Pacific construct. Can a revised regional trilateral fill the ensuing institutional vacuum?

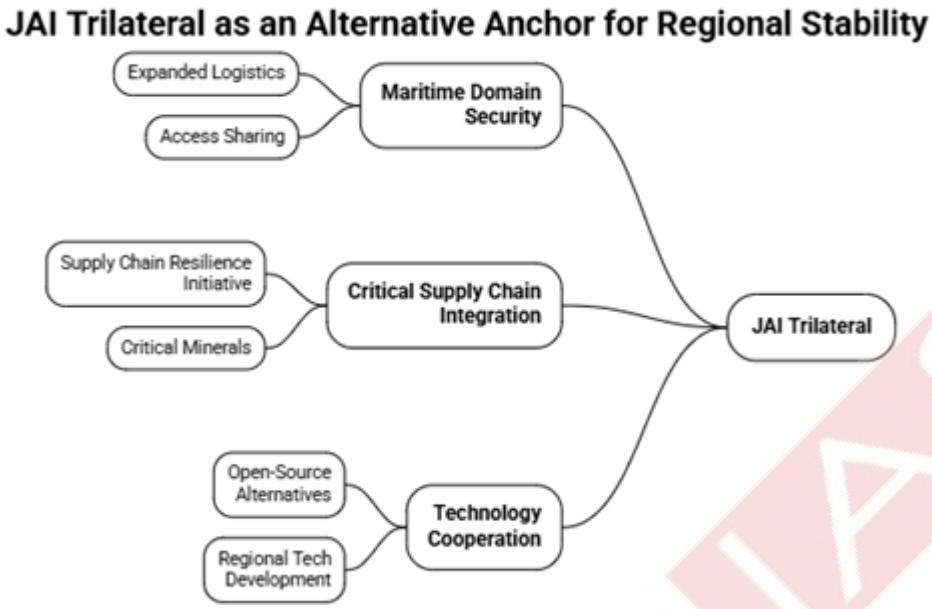
Introduction

The Economic Survey 2025–26 identifies geopolitical fragmentation as a major global risk. Amid reports of Washington recalibrating its Indo-Pacific strategy, regional middle powers increasingly shoulder responsibility for preserving a rules-based maritime order.



Geopolitical fallout of Washington's strategic retreat

1. **Weakening of Indo-Pacific institutional architecture:** Reduced emphasis on the Indo-Pacific dilutes the strategic coherence of FOIP and weakens confidence in long-term American commitment. Quad risks shifting from a strategic platform to a functional consultative mechanism. Example: Fewer leader-level Quad engagements.
2. **Expanded Chinese strategic space:** Beijing gains greater operational freedom across the South China Sea and the Indian Ocean Region (IOR). Reinforces the String of Pearls through ports, logistics hubs and dual-use infrastructure. Example: Hambantota; Djibouti.
3. **Increased strategic uncertainty for middle powers:** Japan, Australia, ASEAN and India face greater pressure to strengthen indigenous deterrence. Smaller states pursue hedging strategies instead of exclusive alignments. Example: ASEAN Outlook on Indo-Pacific.
4. **Fragmentation of regional security governance:** US-centric alliance architecture may gradually give way to flexible minilateral arrangements. Security cooperation becomes issue-specific rather than alliance-driven. Example: AUKUS; Quad.
5. **Geo-economic repercussions:** Supply-chain diversification, critical minerals and maritime connectivity become regional rather than US-led priorities. Countries accelerate resilient trade corridors. Example: Supply Chain Resilience Initiative (SCRI).
6. **Technological competition intensifies:** Digital infrastructure, AI standards, submarine cables and cyber security emerge as principal theatres of strategic competition. Regional powers seek technological sovereignty. Example: Open RAN.



Can a revised India-Japan-Australia (JAI) trilateral fill the institutional vacuum?

Yes, to a significant extent

1. **Maritime security cooperation:** Expand reciprocal logistics agreements, coordinated patrols and Maritime Domain Awareness. Integrate Andaman & Nicobar, Cocos Islands and Djibouti logistics network. Example: MALABAR Exercise.
2. **Supply-chain resilience:** Operationalise the SCRI by combining Australian critical minerals, Japanese technology and Indian manufacturing. Reduces excessive dependence on China. Example: Rare earth partnerships.
3. **Technology partnership:** Develop trusted ecosystems in semiconductors, AI, quantum technologies, cyber security and 6G. Complements India's Digital Public Infrastructure. Example: India–Japan semiconductor cooperation.
4. **Infrastructure diplomacy:** Offer transparent, sustainable alternatives to debt-intensive connectivity models. Focus on ports, renewable energy and digital corridors. Example: Asia-Africa Growth Corridor.
5. **Capacity-building for the Global South:** Support ASEAN and Indian Ocean states through disaster relief, HADR, climate resilience and maritime training. Builds influence without bloc politics. Example: SAGAR initiative.

Limitations of the revised trilateral

1. Cannot fully substitute America's military power and nuclear deterrence.
2. Resource asymmetry vis-a-vis China remains substantial.
3. Divergent economic dependence on China may constrain coordinated responses.
4. Absence of formal collective defence commitments limits deterrence credibility.
5. ASEAN members may resist exclusive strategic blocs.

Way Forward

1. Institutionalise annual India-Japan-Australia Leaders Summit and a permanent trilateral secretariat.

2. Expand defence-industrial collaboration under reciprocal logistics agreements.
3. Deepen cooperation in semiconductors, critical minerals, AI and resilient digital infrastructure.
4. Strengthen Quad, BIMSTEC, IPOI, IORA and ASEAN Centrality through complementary not competing frameworks.
5. Accelerate India's naval modernisation, blue economy initiatives and indigenous defence manufacturing under Atmanirbhar Bharat.

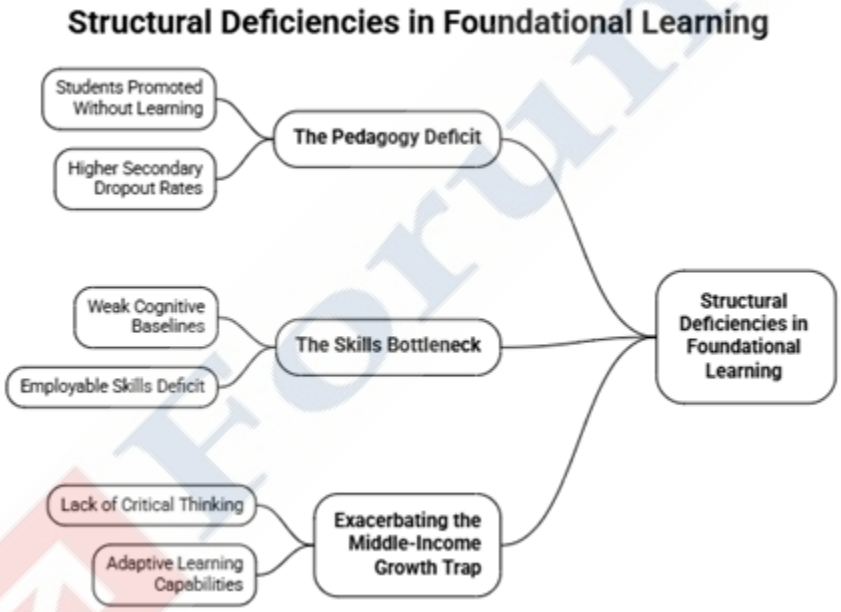
Conclusion

As Shinzo Abe envisioned in Confluence of the Two Seas, enduring Indo-Pacific stability depends less on external guarantees than on capable regional democracies exercising collective leadership and strategic resilience.

Examine how structural deficiencies in foundational learning undermine India's human capital. Evaluate the role of the NIPUN Bharat Mission in achieving Viksit Bharat.

Introduction

The Economic Survey 2025–26 identifies human capital as the cornerstone of Viksit Bharat @2047. With NEP 2020 prioritising Foundational Literacy and Numeracy (FLN), early learning has become India's foremost developmental investment.



How structural deficiencies in foundational learning undermine India's human capital

1. **Learning deficit weakens cognitive capital:** Promotion without mastery creates cumulative learning gaps, reducing reading comprehension and numeracy in higher grades. Weak FLN permanently lowers learning capacity. Example: ASER 2024.
2. **Lower returns on public investment:** Weak foundational skills reduce productivity of expenditure on secondary education, higher education and skilling programmes. Results in diminishing returns on public investment. Example: Skill India.

3. **Employability and productivity constraints:** Workers lacking basic literacy, numeracy and problem-solving struggle in modern manufacturing and services. Restricts India's transition towards a knowledge economy. Example: Digital economy.
4. **Demographic dividend at risk:** India's youthful population may become a demographic burden if foundational competencies remain weak. Limits innovation and entrepreneurship. Example: Viksit Bharat @2047.
5. **Social inequality and exclusion:** Learning poverty disproportionately affects rural, tribal and first-generation learners. Reinforces intergenerational inequality. Example: Aspirational Districts.
6. **Constitutional and governance concerns:** Weak learning outcomes dilute the spirit of Article 21(a) and Right to Education Act, 2009. Quality education becomes as important as school access. Example: NEP 2020.
7. **Technological adaptability declines:** AI, Industry 4.0 and Digital Public Infrastructure require analytical and language competencies built during foundational years. Weak FLN widens the digital divide. Example: AI-enabled classrooms.

Role of NIPUN Bharat Mission in achieving Viksit Bharat

1. **Universal Foundational Literacy and Numeracy:** Targets achievement of FLN for every child by Grade III through mission-mode implementation. Converts enrolment into learning. Example: NIPUN Bharat.
2. **Child-centric pedagogy:** Promotes play-based, activity-based and mother-tongue instruction under NCF-FS 2022. Improves conceptual understanding over rote learning. Example: Balvatika.
3. **Continuous assessment:** Uses competency-based assessments and Holistic Progress Card instead of annual rote examinations. Enables early identification of learning gaps. Example: PARAKH.
4. **Teaching at the Right Level (TaRL):** Groups students according to learning level rather than age for focused remediation. Evidence-backed by J-PAL and Pratham. Example: Zambia model.
5. **Teacher capacity enhancement:** Strengthens teacher competencies through NISHTHA and continuous professional development. Improves classroom effectiveness. Example: NISHTHA-ECCE.
6. **Evidence-based governance:** Progress monitored through ASER, PARAKH and state learning assessments. Encourages data-driven policy corrections. Example: Learning dashboards.
7. **Human capital formation:** Creates the cognitive foundation for innovation, higher education, entrepreneurship and productive employment. Supports India's long-term competitiveness. Example: Amrit Kaal.

Limitations

1. Learning gaps persist beyond Grade III, especially in Grades IV–V.
2. Teacher vacancies and multi-grade classrooms affect implementation.
3. Digital and regional disparities remain significant.
4. ECCE integration with Anganwadis remains uneven.
5. Outcome monitoring varies across states.

Way Forward

1. Extend NIPUN Bharat mission support up to Grade V with structured remediation.
2. Universalise high-quality Early Childhood Care and Education (ECCE) through Balvatikas and Anganwadis.
3. Institutionalise AI-enabled personalised learning and adaptive assessments.
4. Strengthen teacher mentoring, school leadership and foundational assessment systems.
5. Link FLN outcomes with district-level educational planning under Samagra Shiksha.

6. Promote parental and community participation through School Management Committees.
7. Increase public investment in foundational education, consistent with NEP 2020's 6% of GDP vision.

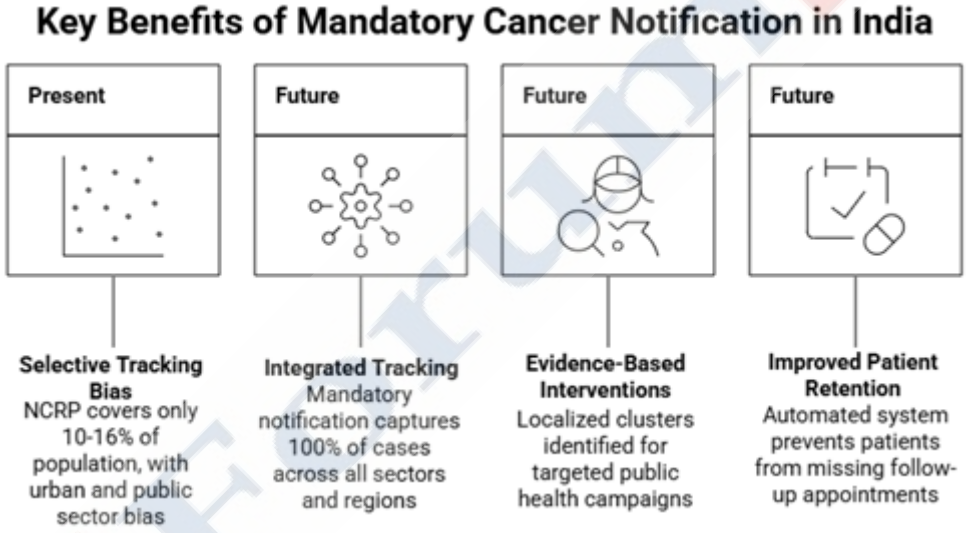
Conclusion

As Dr. A.P.J. Abdul Kalam observed, Learning gives creativity, creativity leads to thinking. Achieving Viksit Bharat demands classrooms that build foundational competencies before cultivating advanced knowledge and innovation.

Examine the public health rationale for making cancer a nationally notifiable disease in India. Evaluate the administrative bottlenecks in implementing mandatory reporting frameworks.

Introduction

With the Global Cancer Observatory projecting a 74% rise in India's cancer burden by 2045 and the Economic Survey 2025–26 emphasizing preventive healthcare, comprehensive cancer surveillance has become a national public-health imperative.



Why National Cancer Notification is a Public Health Imperative

1. **Enables Accurate Disease Surveillance:** Present National Cancer Registry Programme covers only 10–16% of India's population, leading to underestimation of disease burden. Mandatory reporting integrates public, private hospitals and diagnostic laboratories. Example: Telangana notification.
2. **Evidence-based Resource Allocation:** Reliable data guides establishment of Regional Cancer Centres, radiotherapy units and oncology workforce. Supports targeted allocation under Ayushman Bharat and National Health Mission. Example: Aspirational districts.
3. **Strengthens Preventive Healthcare:** Identifies geographical cancer clusters and associated risk factors. Enables focused interventions:
   - Anti-tobacco campaigns → Oral cancer.
   - HPV vaccination → Cervical cancer.
   - Occupational screening → Asbestos exposure.

- Example: North-East oral cancers.

4. **Improves Continuum of Care:** Central registry facilitates patient tracking from diagnosis to treatment. Reduces treatment abandonment and delayed referrals. Supports follow-up through Ayushman Bharat Digital Mission (ABDM). Example: Digital health IDs.
5. **Supports Research and Policy:** High-quality epidemiological datasets improve: AI-driven cancer prediction, precision medicine, clinical trials and environmental health research. Example: ICMR studies.
6. **Economic & Developmental Rationale:** Early diagnosis substantially reduces treatment costs and productivity losses. Economic Survey 2025–26 highlights rising burden of Non-Communicable Diseases (NCDs) and preventive health as essential for sustained growth.

Administrative Bottlenecks

1. **Legal**: Notification traditionally limited to communicable diseases; ambiguity over NCD inclusion. Example: MoHFW position.
2. **Institutional:** Weak coordination among Centre, States, ICMR and private hospitals. Example: Federal health system.
3. **Private Sector**: Thousands of hospitals and laboratories remain outside reporting ecosystem. Example: Corporate hospitals.
4. **Digital**: Non-interoperable hospital information systems.
5. **Privacy :** Risk of disclosure of sensitive medical information under the Digital Personal Data Protection Act.
6. **Human Resources:** Shortage of trained cancer registrars and epidemiologists.
7. **Infrastructure:** Sudden rise in recorded cases may strain oncology facilities.
8. **Social**: Cancer-related stigma discourages reporting and follow-up.

Way Forward

1. Adopt Documentable Disease classification to legally mandate reporting while distinguishing cancer from communicable diseases. Example: Tata Memorial suggestion.
2. Integrate automatic reporting through ABDM and ICMR-NCDIR using standardized electronic records. Example: Digital health stack.
3. Mandate reporting by all accredited hospitals and laboratories through licensing norms. Example: NABH linkage.
4. Ensure DPDP-compliant encrypted, de-identified databases with role-based access. Example: Privacy by design.
5. Use AI-enabled surveillance dashboards for hotspot detection and policy planning. Example: Predictive analytics.
6. Strengthen NCRP coverage to achieve nationwide surveillance. Example: Universal registry.
7. Expand screening under Ayushman Bharat Health & Wellness Centres, complementing Budget 2026–27 measures such as reduced duties on several cancer medicines and higher health-sector allocation.

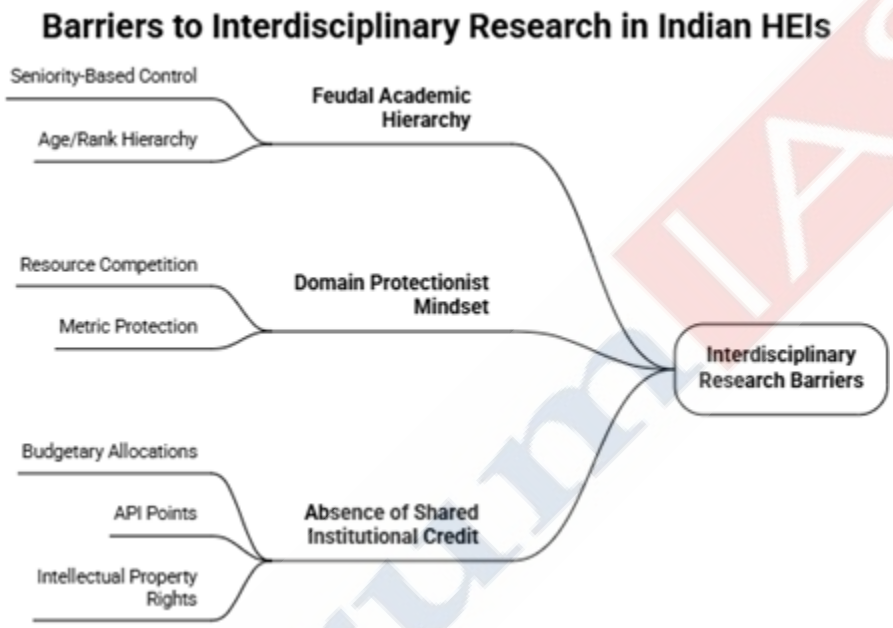
Conclusion

Echoing Dr. A. P. J. Abdul Kalam's vision that national strength rests on healthy citizens, robust cancer surveillance can transform India's oncology response from reactive treatment to preventive, evidence-driven public health governance.

Examine how academic tribalism and institutional hierarchies impede interdisciplinary research in Indian higher education. Suggest structural reforms to foster collaborative innovation.

Introduction

Recognising multidisciplinary education as the cornerstone of a knowledge economy, NEP 2020 and Budget 2026–27 (₹55,727 crore for Higher Education) seek research transformation, yet academic tribalism continues to obstruct collaborative innovation.



How Academic Tribalism Impedes Interdisciplinary Research

1. **Departmental Silos and Knowledge Fragmentation:** Academic departments function as isolated domains competing for funds, faculty and prestige. Restricts integration of STEM, humanities and social sciences required for complex policy challenges. Example: Climate change research.
2. **Hierarchical Institutional Culture:** Seniority-driven decision-making discourages junior faculty from initiating cross-disciplinary projects. Collaboration across rank is often viewed as challenging departmental authority and suppresses innovation and risk-taking. Example: Young faculty initiatives.
3. **Epistemological and Methodological Divide:** Disciplines differ on concepts such as truth, evidence, experiment and data. Quantitative sciences often undervalue qualitative approaches, limiting mixed-methods research. Example: Migration studies.
4. **Incentive and Evaluation Trap:** UGC Career Advancement Scheme (CAS), API scores and promotion metrics remain discipline-centric. Interdisciplinary publications receive uncertain recognition and patents, grants and IPR lack shared ownership norms. Example: Joint publications.
5. **Institutional Funding Constraints:** Department-wise budget allocation discourages pooling of resources. Dedicated interdisciplinary grants remain limited despite NEP vision. Example: Shared laboratories.
6. **Weak Research Ecosystem:** Few high-impact interdisciplinary journals and peer-review mechanisms. Global university rankings increasingly reward collaborative citations and international research. India's research output remains fragmented. Example: QS Rankings.

7. **National Innovation Deficit:** Limits solutions for AI ethics, public health, urbanisation, semiconductor ecosystems and climate resilience. NITI Aayog's innovation vision requires convergence of technology, governance and social sciences. Example: Digital Public Infrastructure.

Socio-Economic Consequences

Dimension	Impact	Example
Economic	Lower innovation productivity	Deep-tech ecosystem
Technological	Slower commercialization of research	AI applications
Social	Weak evidence-based policymaking	Education reforms
Environmental	Poor integrated climate solutions	Heat Action Plans
Governance	Fragmented public policy design	Urban planning
Global	Reduced international competitiveness	Top 100 universities

Structural Reforms for Collaborative Innovation

1. **Institutionalise Joint Faculty Appointments:** Allow faculty to hold appointments across multiple departments. Shared teaching load, funding and promotions. Example: MIT model.
2. **Reform UGC Evaluation Framework:** Introduce premium API weightage for interdisciplinary publications, patents and collaborative grants. Recognise equal contribution irrespective of seniority. Example: CAS reforms.
3. **Establish Mission-Oriented Research Centres:** Create autonomous centres on AI, Climate, Health, Water and Urban Futures rather than department-based structures. Align with Anusandhan National Research Foundation (ANRF) priorities. Example: AI CoEs.
4. **Dedicated Collaborative Funding:** Earmark competitive interdisciplinary grants under ANRF, PM Research Chairs and PM-ONOS. Budget 2026–27 introduced dedicated research support and AI Centres of Excellence.
5. **Build Common Research Infrastructure:** Shared laboratories, datasets, digital repositories, high-performance computing facilities and promote Open Science. Example: National Research Infrastructure.
6. **Academic Governance Reforms:** Flexible curriculum under NEP 2020, credit transfer through Academic Bank of Credits (ABC). Promote multidisciplinary universities under PM-USHA. Example: ABC ecosystem.
7. **Foster Collaborative Academic Culture:** Leadership training, interdisciplinary doctoral programmes and faculty mobility. International partnerships with industry. Example: Industry-academia clusters.

Way Forward

1. Operationalise NEP 2020's multidisciplinary university vision.
2. Strengthen ANRF–Industry–Academia collaboration.

3. Expand AI-enabled research platforms and digital knowledge repositories.
4. Encourage problem-driven rather than discipline-driven research.
5. Promote collaboration among IITs, Central Universities and State Universities to diffuse excellence across the higher education ecosystem.

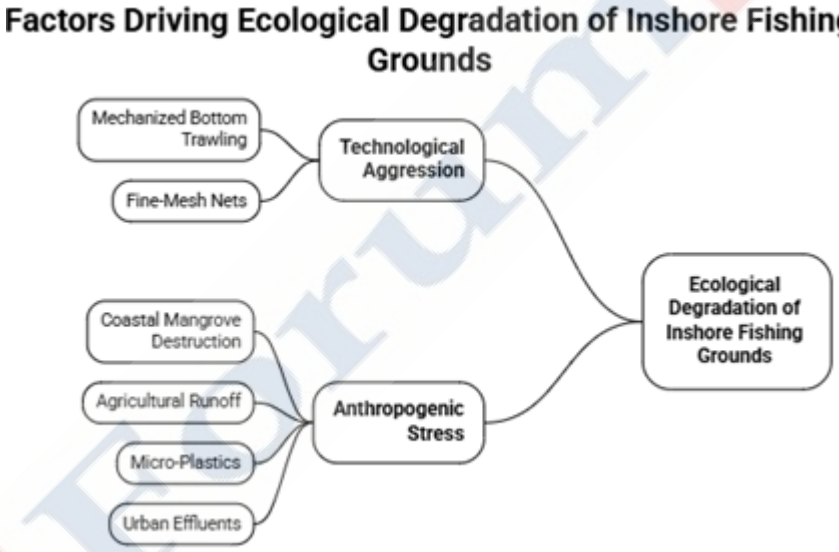
Conclusion

As Dr. S. Radhakrishnan observed, universities must cultivate wisdom, not merely specialization. Breaking academic silos will enable Indian higher education to become an engine of innovation, societal transformation and Viksit Bharat.

Examine the factors driving the ecological degradation of India's inshore fishing grounds. Evaluate the governance reforms needed for sustainable marine fisheries management.

Introduction

Despite CMFRI claiming 91% sustainable stocks (2022), inshore degradation persists due to overcapacity and trawling on narrow shelves. Economic Survey 2025-26 highlights blue economy potential; Budget 2026-27 boosts PMMSY. NITI Aayog stresses ecosystem-based management amid FAO concerns.



Factors Driving Ecological Degradation of Inshore Fishing Grounds

1. **Unsustainable Mechanised Bottom Trawling:** Over 64,000 mechanised vessels intensively exploit India's narrow continental shelf. Bottom trawling destroys benthic habitats, damages coral ecosystems and captures juvenile fish through fine-mesh nets. Results in biodiversity loss and declining fish recruitment. Example: Palk Bay.
2. **Excessive Fishing Capacity:** Open-access fisheries have created severe fleet overcapacity, particularly of small and medium trawlers. Intense competition depletes nearshore resources and marginalises artisanal fishers. FAO notes most major marine stocks are already fully exploited. Example: Tamil Nadu coast.
3. **Coastal Habitat Destruction:** Loss of mangroves, estuaries, seagrass beds and coral reefs eliminates breeding and nursery grounds. Port expansion, coastal infrastructure and reclamation accelerate degradation. Example: Mangrove loss.

4. **Land-Based Pollution:** Untreated sewage, industrial discharge, fertilizer runoff and microplastics reduce dissolved oxygen. Eutrophication triggers fish mortality and habitat degradation. Example: Coastal dead zones.
5. **Climate Change Impacts:** Ocean warming, acidification and cyclones alter fish migration and spawning cycles. Coastal erosion threatens fishing settlements. Example: Arabian Sea warming.
6. **River Regulation:** Dams reduce nutrient-rich freshwater inflows essential for productive coastal ecosystems. Estuarine fisheries suffer declining productivity. Example: East coast deltas.
7. **Geopolitical Pressure:** Resource depletion pushes Indian mechanised vessels into neighbouring waters. Generates recurring conflicts with Sri Lanka and maritime security concerns. Example: Palk Strait.

Governance Gaps

1. **Institutional Fragmentation:** Marine Fisheries Regulation Acts (MFRAs) differ across States and weak Centre-State coordination.
2. **Poor Enforcement:** Inadequate patrol vessels, manpower and surveillance enable illegal inshore trawling. Seasonal fishing bans alone cannot restore ecosystems.
3. **Weak Community Participation:** Traditional fishing communities remain excluded from decision-making and top-down regulation lacks local legitimacy.
4. **Science Deficit:** Fisheries assessments rely largely on landing data rather than ecosystem-based stock assessments. Limited monitoring of benthic ecosystem health.

Governance Reforms for Sustainable Fisheries

1. **Phase-out Destructive Bottom Trawling:** Introduce PMMSY-supported buyback and conversion of trawlers into deep-sea longliners. Ban fine-mesh nets in ecologically sensitive zones. Example: Gear transition.
2. **Promote Deep-Sea Fishing:** Shift fishing pressure towards offshore EEZ resources using modern vessels. Align with NITI Aayog's Blue Economy Strategy. Example: Andaman EEZ.
3. **Community-Based Co-management:** Legally empower fisher cooperatives and traditional fishing panchayats. Territorial Use Rights in Fisheries (TURFs) for shared stewardship. Example: Japan model.
4. **Technology-Driven Monitoring:** Mandatory Vessel Monitoring Systems (VMS), AIS, satellite surveillance and drones. AI-enabled catch reporting for real-time compliance. Example: Digital fisheries.
5. **Restore Coastal Ecosystems:** Large-scale mangrove restoration, artificial reefs, sea-ranching and blue carbon projects. Integrate with MISHTI and Coastal Regulation Zone norms. Example: Artificial reefs.
6. **Ecosystem-Based Fisheries Management:** Shift from production targets to ecosystem health indicators. Adopt scientific stock assessments, marine protected areas and adaptive catch limits. Example: Ecosystem approach.
7. **Institutional Reforms:** Harmonise State MFRAs with the Indian Marine Fisheries Bill. Integrate ICAR-CMFRI, INCOIS, Coast Guard and State Fisheries Departments under a unified marine governance platform. Example: Whole-of-government approach.

Way Forward

1. Operationalise the Blue Economy Strategy through sustainable deep-sea fisheries.
2. Expand PMMSY support for green fishing technologies.

3. Strengthen regional cooperation with Sri Lanka, Maldives and BIMSTEC on marine conservation.
4. Balance livelihood security with biodiversity conservation under SDG-14 (Life Below Water).

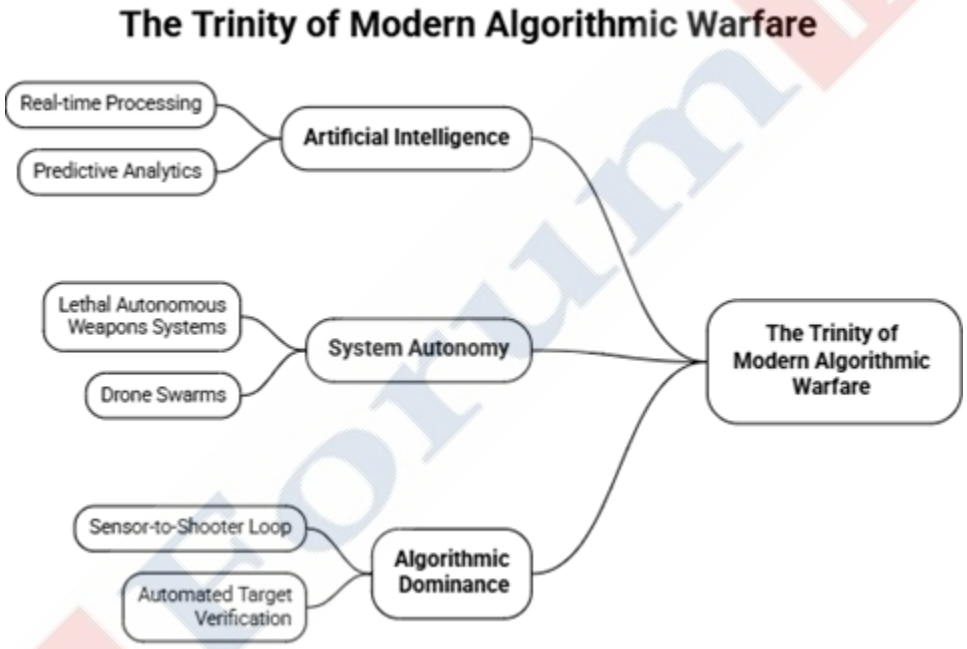
Conclusion

India's Blue Economy must protect marine ecosystems alongside livelihoods, ensuring ecological security, resilient coastal communities and prosperity for future generations.

Examine how the trinity of AI, autonomy, and algorithmic warfare is redefining modern conflict. How can India build sovereign pathways for strategic autonomy?

Introduction

With Budget 2026–27 raising defence allocation to ₹7.85 lakh crore and Economic Survey 2025–26 advocating application-led AI, algorithmic warfare has become indispensable for India's strategic autonomy and deterrence.



How AI, Autonomy and Algorithmic Warfare are Redefining Modern Conflict

1. **AI: Cognitive Superiority in Decision-Making:** AI processes massive ISR (Intelligence, Surveillance and Reconnaissance) data from satellites, radars, UAVs and SIGINT in real time. Enables predictive analytics, target recognition and battlefield decision support. Shortens the Observe–Orient–Decide–Act (OODA) loop. Example: RAND study, AI predictive maintenance saved the US Air Force nearly $25 million/month.
2. **Autonomy: Expanding Unmanned Combat:** Transition from remotely piloted platforms to autonomous drones, loitering munitions and robotic combat systems. Edge computing enables operations even under GPS denial or electronic warfare. Reduces human casualties in high-risk missions. Example: AI-enabled drone swarms-Ukraine conflict.
3. **Algorithmic Warfare: Machine-Speed Combat:** Integrates AI with command-and-control (C2), cyber, space and kinetic systems. Compresses the sensor-to-shooter cycle from minutes to seconds.

Enables dynamic target prioritisation and automated logistics. Example: DARPA's SCEPTER programme.

4. **Multi-Domain Operations:** AI synchronises operations across land, sea, air, cyber and space domains. Enhances network-centric warfare into intelligentised warfare. Example: China's PLA doctrine.
5. **Cyber and Information Warfare:** AI detects malware, automates cyber defence and counters misinformation campaigns. Enables offensive cyber operations against adversary networks. Example: AI-driven cyber defence.
6. **Logistics and Maintenance:** Predictive maintenance, inventory optimisation and route planning improve operational readiness. Reduces lifecycle costs. Example: Smart logistics.

Challenges and Risks

1. **Strategic Risks:** Dependence on foreign AI software and cloud infrastructure may permit operational denial during crises. Proprietary "black-box" algorithms risk hidden backdoors and data leakage. Example: Foreign cloud dependency.
2. **Ethical and Legal Concerns:** Autonomous lethal systems raise accountability concerns under International Humanitarian Law (IHL). Human oversight over lethal decisions remains essential. Example: Israel's reported use of the Lavender AI targeting system.
3. **Cyber Vulnerability:** AI systems are susceptible to adversarial attacks, data poisoning and spoofing. Example: Algorithm manipulation.

Building Sovereign Pathways for Strategic Autonomy

1. **Sovereign Defence AI Infrastructure:** Establish an air-gapped National Defence Secure Cloud with indigenous supercomputing. Reduce dependence on foreign hyperscalers. Example: Secure military cloud.
2. **Indigenous AI Models and Datasets:** Build classified repositories of satellite imagery, terrain, battlefield signatures and regional languages. Strengthen Defence AI Project Agency (DAIPA). Example: Himalayan datasets.
3. **Trusted AI Frameworks:** Operationalise Evaluating Trustworthy AI (ETAI) standards for transparency, explainability and resilience. Mandatory red-teaming of defence AI. Example: Bias audit.
4. **Deep-Tech Innovation Ecosystem:** Expand iDEX, DRDO–industry partnerships and defence startups for AI chips, counter-drone systems and autonomous platforms. Encourage dual-use technologies. Example: iDEX challenges.
5. **Semiconductor and Compute Sovereignty:** Promote indigenous processors, GPUs and secure communication hardware under semiconductor initiatives. Align with Atmanirbhar Bharat. Example: Indigenous chips.
6. **Human Capital:** Integrate AI, robotics, cyber warfare and quantum technologies into military training. Promote civil-military-academia collaboration. Example: IIT–DRDO partnerships.
7. **International Leadership:** Lead global discussions on Responsible Military AI through the UN, QUAD and G20. Balance innovation with ethical norms. Example: Responsible AI.

Way Forward

1. Shift from platform-centric procurement to software-defined defence.
2. Strengthen indigenous AI, semiconductors and secure digital infrastructure.
3. Develop integrated multi-domain command architecture.
4. Synchronise DRDO, armed forces, startups and academia through mission-mode innovation aligned with Atmanirbhar Bharat and the IndiaAI Mission.

Conclusion

Technological self-reliance underpins national security; sovereign AI capabilities will determine India's deterrence, strategic autonomy and leadership in future warfare.

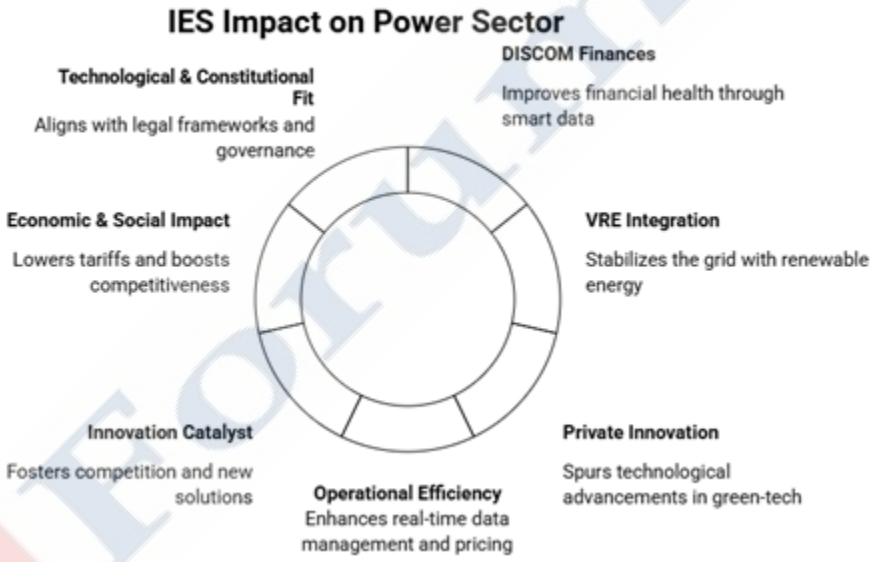
Evaluate the role of the India Energy Stack as Digital Public Infrastructure. Discuss its challenges in driving cross-ministerial integration across multi-fuel regimes.

Introduction

Recognising energy as the backbone of economic competitiveness, the Economic Survey 2025–26 identifies the India Energy Stack (IES) as Digital Public Infrastructure to unlock interoperable, consumer-centric and investment-friendly energy markets.

India Energy Stack (IES)

1. IES mirrors Aadhaar, UPI and ONDC by creating open APIs, digital registries, consent-based data exchange and interoperable standards, rather than a centralized platform.
2. It enables secure interaction among GENCOs, TRANSCOs, DISCOMs, regulators, consumers and innovators, preserving data ownership while facilitating seamless exchange.



Role of India Energy Stack as Digital Public Infrastructure

1. **Operational Efficiency in Power Sector:** Eliminates fragmented utility databases through interoperable architecture. Enables real-time data exchange across generation, transmission and distribution, reduces vendor lock-ins and costly custom integrations. Example: Standardized utility APIs.
2. **Financial Strengthening of DISCOMs:** Integrates RDSS smart meters for real-time billing and energy accounting. Narrows ACS-ARR gap, reduces AT&C losses improves revenue realization and enables dynamic tariff design. Example: Smart metering.
3. **Renewable Energy Integration:** Coordinates rooftop solar, Battery Energy Storage Systems (BESS), EV charging and Virtual Power Plants (VPPs). Facilitates peer-to-peer energy trading and

demand-response mechanisms. Supports India's 500 GW non-fossil capacity target by 2030. Example: Distributed solar.

4. **Consumer-Centric Energy Markets:** Enables portability of consumer identity, service providers and green-energy choices. Creates "energy agency" by allowing consumers to monetize distributed assets. Example: Prosumer economy.
5. **Innovation and Private Investment:** Open digital rails encourage startups in predictive maintenance, AI-based load forecasting and energy analytics. Lowers entry barriers for green-tech innovators. Example: EnergyTech startups.
6. **Better Regulatory Governance:** Improves transparency in power markets. Enables AI-driven forecasting, congestion management, grid balancing and supports evidence-based regulation. Example: Real-time market.

Challenges in Cross-Ministerial Multi-Fuel Integration

1. **Institutional Fragmentation:** Energy governance spans Power, Coal, Petroleum & Natural Gas, MNRE, multiple regulators and legacy databases remain incompatible. Example: Ministry silos.
2. **Regulatory Diversity:** CERC, SERCs and PNGRB follow different tariff structures, pricing mechanisms, compliance frameworks and harmonisation requires statutory reforms. Example: Regulatory overlap.
3. **Multi-Fuel Data Complexity:** Coal, electricity, natural gas, LNG, hydrogen and biofuels use different measurement units, logistics and contracts. Standardised machine-readable protocols remain challenging. Example: Energy-unit conversion.
4. **Federal Challenges:** Electricity is a Concurrent List subject. State utilities differ widely in digital maturity. Example: DISCOM diversity.
5. **Cybersecurity and Data Privacy:** National energy infrastructure is critical infrastructure. DPI expansion increases cyberattack surface. Requires secure identity management and zero-trust architecture. Example: Grid cyber resilience.
6. **Capacity Constraints:** Utilities face shortages of digital talent and AI capabilities. Legacy IT systems slow adoption. Example: Skill deficit.

Way Forward

1. **Institutional:** Establish a statutory National Energy Data Authority (NEDA) for unified governance, create an Integrated National Energy Data Policy. Example: Whole-of-government approach.
2. **Technological:** Develop common semantic standards across electricity, coal, oil, gas and hydrogen, promote "Policy-as-Code" through programmable APIs. Example: Open protocols.
3. **Regulatory:** Harmonise CERC, PNGRB and State regulations. Create interoperable digital compliance frameworks.
4. **Economic:** Expand AI-enabled demand forecasting and carbon accounting. Enable cross-sector energy markets. Example: Green hydrogen integration.
5. **Innovation:** Launch cross-vector regulatory sandboxes linking electricity, mobility, hydrogen ecosystems and encourage startups through open APIs. Example: Energy sandbox.
6. **Security:** Adopt sovereign cloud architecture, encryption and indigenous cybersecurity standards. Integrate CERT-In with critical energy infrastructure. Example: Secure DPI.

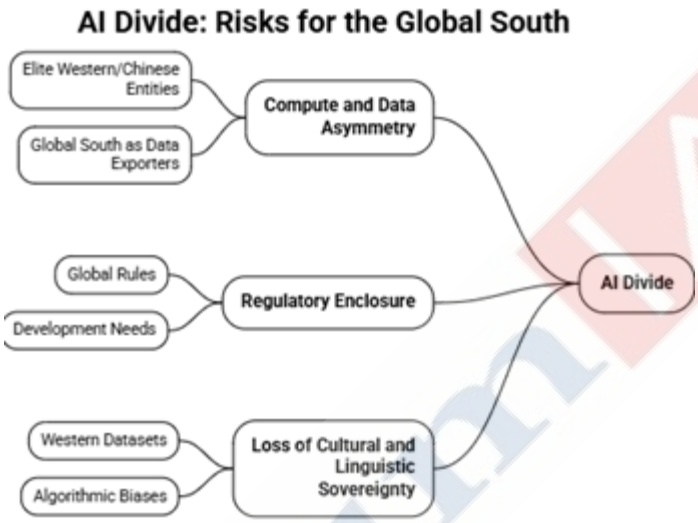
Conclusion

By establishing robust cross-ministerial data standards and unifying regulatory frameworks, India can maximize the productivity of its entire energy network, helping anchor its long-term development objectives.

Analyze how the global alignment on Artificial Intelligence risks creating a 'digital divide' for the Global South. How can India leverage its model of Digital Public Infrastructure to champion equitable global AI governance?

Introduction

With the India AI Impact Summit 2026 adopting the New Delhi Declaration and the Economic Survey 2025–26 emphasizing AI-led productivity, India seeks to democratize AI through inclusive Digital Public Infrastructure (DPI).



Global AI Alignment and the Emerging Digital Divide

1. Global AI governance is increasingly shaped by three dominant models EU's regulation-first approach, U.S. market-led innovation, and China's state-driven AI ecosystem.
2. This concentration of compute, data and standards risks creating digital neo-colonialism, where the Global South becomes a technology consumer rather than a technology creator.

How Global AI Alignment Risks a Digital Divide

1. **Compute & Infrastructure Monopoly:** Frontier AI development is concentrated among a few corporations controlling GPUs, cloud infrastructure and foundation models. Developing nations remain dependent on imported AI services. Example: GPU concentration.
2. **Data Colonialism:** Global South supplies valuable linguistic and behavioural data while value creation occurs abroad. Domestic innovation and economic gains remain limited. Example: Data extraction.
3. **Regulatory Exclusion:** Global frameworks focus largely on existential AI risks rather than developmental priorities. High compliance costs disadvantage startups in developing countries. Example: Bletchley process.
4. **Linguistic & Cultural Bias:** Large Language Models predominantly reflect English-centric datasets. Indigenous languages and local knowledge systems remain underrepresented. Example: Low-resource languages.
5. **Strategic Dependence:** Dependence on foreign AI ecosystems exposes countries to export controls, sanctions, technology restrictions. Limits strategic autonomy. Example: Semiconductor controls.

6. **Innovation Inequality:** Brain drain, inadequate R&D and limited compute widen the technology gap, countries become perpetual AI consumers. Example: Startup ecosystem.

India's Digital Public Infrastructure (DPI)

1. **Democratising AI Infrastructure:** Extend India's successful DPI model (Aadhaar, UPI, DigiLocker, ONDC, Bhashini) into AI. Promote open APIs, interoperability and affordable AI access. Example: India Stack.
2. **Open-Source Foundational Models:** Support multilingual indigenous models through the IndiaAI Mission and BharatGen. Reduce dependence on proprietary AI platforms. Example: BharatGen.
3. **Trusted Data Commons:** Build privacy-preserving public datasets for agriculture, healthcare and education. Enable innovation while ensuring data sovereignty. Example: Bhashini datasets.
4. **Affordable Compute for Global South:** Expand sovereign GPU infrastructure under the ₹10,000-crore IndiaAI Mission. Offer subsidised compute partnerships for developing nations. Example: IndiaAI Compute.
5. **Inclusive AI Governance:** Champion principle-based governance balancing innovation, safety and inclusion. Operationalise India's AI Governance Guidelines and AI Safety initiatives. Example: Responsible AI.
6. **Global South Digital Diplomacy:** Use G20, GPAI, BRICS, BIMSTEC and the UN to promote interoperable standards, shared datasets and capacity-building. Example: South-South cooperation.

Way Forward

1. **Institutional:** Establish a Global AI Commons under India's leadership for shared datasets, benchmarks and open models. Example: Trusted AI Commons.
2. **Technological:** Scale open-source multilingual AI and Digital Public Infrastructure exports. Example: Bhashini.
3. **Economic:** Promote AI financing, digital skilling and sovereign cloud partnerships for developing countries. Example: Digital capacity.
4. **Legal:** Advocate transparent, development-oriented global AI norms aligned with SDGs while protecting data sovereignty. Example: UN AI dialogue.
5. **Geopolitical:** Build a Global South AI Alliance for compute sharing, interoperable standards and ethical AI. Example: India–Africa partnership.
6. **Innovation:** Expand AI sandboxes for healthcare, agriculture and education using open-source DPI. Example: Kisan AI.

Conclusion

Echoing Mahatma Gandhi's principle that "the world has enough for everyone's need," India can transform AI into a Global Public Good, ensuring innovation advances equity, sovereignty and shared prosperity.