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Topic Operation SINDOOR

OPERATION SINDOOR : INDIA'S STRATEGIC CLARITY AND CALCULATED FORCE

The April 22, 2025 Pahalgam terror attack, executed by Pakistan-backed militants, marked a disturbing attempt to incite communal unrest in India. In response, India launched Operation SINDOOR—a decisive, multi-pronged strategy combining military retaliation, diplomatic measures and digital vigilance. This operation underscored India's evolving national security doctrine: strategic clarity with calibrated force.

1. Nature and Objectives of Operation SINDOOR

- Prompt response to the killing of 26 civilians in a communal-targeted terror attack.
- The operation aimed to destroy terror bases and deter future attacks without full-scale war.
- Demonstrated India's zero-tolerance policy towards terrorism.

2. Strategic Military Response

- Targeted strikes on terror camps in Pakistan-occupied territories.
- Radar and air defence facilities destroyed using Rafale jets, SCALP missiles, and HAMMER bombs.
- Cross-border incursions into deep Pakistani territory like Lahore and Gujranwala.
- Coordinated tri-service action involving the Army, Navy and Air Force.

3. Non-Military and Diplomatic Measures

- Visa revocation and deportation of all Pakistani nationals residing in India.
- India's termination of the Indus Water Treaty.
- India closed the Attari-Wagah Border and suspension of all bilateral trade.
- Cultural sanctions banning Pakistani artists and performances.
- Reduction in diplomatic presence : Pakistani military advisers declared Persons Non-Grata.
- International exposure of Pakistan's terror infrastructure.

4. Information Warfare and Digital Vigilance

- Maintained narrative control through accurate updates and public campaigns.
- Exposed disinformation networks and digital manipulation from Pakistani sources.
- Promoted media literacy to build a resilient digital public.

5. Global Messaging and Strategic Deterrence

- Sent a clear message : India will respond forcefully to cross-border terror, regardless of geography.
- India projected strength without escalation, winning global support.
- Delinked the Kashmir issue from a political dispute to a counter-terrorism challenge.

6. Leadership and Planning

- PM Narendra Modi's decisive role was pivotal in ensuring a balance between restraint and assertiveness.
- The strategy emphasized targeted precision and surprise to pre-empt retaliation.
- India's response was legal, proportionate, and diplomatically well-calibrated.

What Operation SINDOOR Achieved ?

1. Nine Terror Camps Eliminated : India neutralized nine major terror launchpads, killing over 100 terrorists.

2. Cross-Border Precision Strikes : Redefined the engagement zone, including strikes deep into Pakistani Punjab.

3. A New Strategic Red Line : Terror from Pakistani soil will meet decisive retaliation, irrespective of geography.

4. Equal Punishment for Terrorists and Sponsors : Simultaneous targeting of both terror groups and their state backers.

5. Exposure of Air Defence Weaknesses : The Indian Air Force bypassed and jammed Pakistan's Chinese-supplied air defence in just 23 minutes.

6. Showcased Indigenous Defence Technology : The Akashteer system successfully neutralized enemy drones and missiles.

7. Avoided Civilian Casualties : Displayed restraint by avoiding full-scale war while neutralizing threats.

8. High-Value Terror Commanders Eliminated : Neutralized individuals linked to IC-814 and Pulwama attacks.

9. Airstrikes on Military Installations : Destroyed 20% of Pakistan's air assets, including jets and bombers.

10. Tri-Service Synergy : Army, Navy and Air Force coordinated seamlessly, proving India's joint military prowess.

11. Asserted Global Right to Defence : India demonstrated it doesn't need permission to defend its citizens.

12. Widespread Global Support : Unlike previous instances, global leaders backed India's right to retaliate.

13. Kashmir Narrative Shifted : Focus moved from territorial conflict to terrorism, isolating Pakistan diplomatically.

Conclusion

Operation SINDOOR emerged as a landmark in India's defence and diplomatic history. It reinforced India's resolve to tackle terrorism through measured force, while gaining international credibility. The operation showcased not just military might, but also a sophisticated approach to modern warfare, combining information dominance, diplomatic assertiveness and strategic precision. India's response set a powerful precedent for future national security actions, demonstrating that restraint and strength can co-exist under resolute leadership.

RISE OF AATMANIRBHAR INNOVATION IN NATIONAL SECURITY

Operation SINDOOR, conducted in May 2025, represents a significant shift in India's national security approach—marking a decisive and technologically advanced response to asymmetric warfare. Triggered by a terror attack on civilians in Pahalgam, the operation demonstrated India's capability to conduct precise, strategic strikes without violating international borders, while showcasing the growing role of indigenous technology and defence innovation in modern warfare.

1. Background & Trigger

- Launched after a terrorist attack on tourists in Pahalgam, J&K.
- Targeted terrorist infrastructure within Pakistan without crossing the LoC or international borders.

2. Technological Self-Reliance in Defence

- Operation underscored India's Aatmanirbhar Bharat vision.
- Integrated indigenous systems in air defence, drone warfare and electronic warfare.

3. Defensive Measures

- On May 7–8, 2025, India neutralised multiple drone and missile threats from Pakistan targeting critical locations like Srinagar, Pathankot, Amritsar and Bhuj.
- Integrated Counter-UAS Grid and Air Defence Systems including : Pechora, OSA-AK, Low-level air defence guns (LLAD guns); Akash Missile System with multi-target capability and ECCM features; the Integrated Air Command and Control System (IACCS) for coordinated defence response

4. India's Offensive Actions

- Struck Pakistani airbases (Noor Khan, Rahim Yar Khan) with loitering munitions also known as Suicide drones.
- Suicide drones destroyed enemy radars and defence systems with zero loss of Indian assets.
- India jammed Chinese-origin radar systems, completed operation in 23 minutes.

5. Evidence of Neutralised Threats

- Recovered debris included : Chinese PL-15 missiles; Turkish UAVs ('Yiha'); Commercial drones and quadcopters.

6. Multi-Tier Defence Strategy

- Pakistan's expected retaliation (May 9–10) was countered using : Shoulder-fired weapons; Counter-Unmanned Aerial Systems; Legacy + Modern Air Defence Weapons
- Resulted in minimal damage to Indian civilian and military infrastructure.

7. Role of ISRO

- 10 satellites in operation for real-time surveillance and strategic monitoring of borders and coastline.
- Highlighted the crucial role of space-based assets in national security.

8. Indigenous Drone Power & Policy Support

- Supported by the Drone Federation of India (DFI) with 550+ companies and 5,500+ pilots.
- Backed by PLI scheme for drones (₹ 120 crore, 2021–2024).
- Vision : Make India a global drone hub by 2030 with AI-driven autonomous drones.

9. Defence Manufacturing Growth

- Indigenous production (FY 2023–24) : ₹ 1·27 lakh crore
- Defence exports (FY 2024–25) : ₹ 23,622 crore
- Major systems : LCA Tejas, Arjun MBT, Akash missile, ATAGS, ALH, LUH
- Boosted by SRIJAN, iDEX and Defence Corridors in UP & Tamil Nadu

Conclusion

Operation SINDOOR is not merely a tactical success but a paradigm shift in India's security doctrine, driven by indigenous innovation, policy support and inter-agency coordination. It reflects a confident and technologically empowered India, ready to confront modern threats with precision, restraint and self-reliance. As the nation moves toward becoming a global defence exporter by 2047, this operation exemplifies India's preparedness for the future of warfare.

SYNERGY OF INDIA'S ARMED FORCES

In the era of multi-domain warfare, India has adopted a joint and integrated approach to national security, exemplified by Operation SINDOOR. Initiated after a deadly terrorist attack in Pahalgam (April 2025), the operation reflected India's preparedness to conduct coordinated military action across land, air, and sea, powered by tri-service synergy, advanced technology, and strategic foresight.

1. Operation SINDOOR : A Tri-Service Response

- Initiated on May 7, 2025 after the Pahalgam terror attack.
- Targeted nine major terror camps across the LoC and inside Pakistan.
- Emphasized operational ethics, minimal collateral damage and restraint.
- Involved precision strikes using real-time intelligence from multiple agencies.

2. Seamless Joint Operations

- **Indian Air Force (IAF) :** Led precision airstrikes on Pakistani bases (*e.g.*, Noor Khan, Rahim Yar Khan). Deployed Akash missiles, Pechora, and OSA-AK for layered air defence. Used IACCS (Integrated Air Command & Control System) for net-centric warfare.
- **Indian Army :** Provided defensive and offensive air defence using MANPADS, LLAD guns and SAMs. Protected civilian and military infrastructure against Pakistani retaliation.
- **Indian Navy :** Deployed Carrier Battle Group (CBG) with MiG-29K and early-warning helicopters. Ensured maritime dominance, especially off the Makran coast. Denied Pakistani air elements operational space through continuous sorties.

3. Role of Other Forces and Agencies

- **Border Security Force (BSF) :** Foiled infiltration attempts in Samba, J&K during peak tensions. Successfully neutralised terrorists and recovered arms.
- **Government Coordination :** Strong policy, intelligence, and logistical support from various ministries and defence departments. Backing of modernisation and integration reforms.

4. Defence Reforms Enhancing Jointness

- **Chief of Defence Staff (CDS) :** Promotes integration in procurement, training and operations. Heads the Department of Military Affairs (DMA).
- **Integrated Theatre Commands (ITCs) :** Proposed for land, maritime and air domains. Focus on geographical and functional integration of services.
- **Inter-Services Organisations (Command, Control & Discipline) Act, 2023 :** Empowers commanders of tri-service formations. Lays the legal foundation for theatre commands.

5. Joint Logistics, Training & Exercises

- **Joint Logistic Nodes :** Operational in Mumbai, Guwahati, Port Blair since 2021.
- **Joint Training Courses :** Tri-Services Future Warfare Course. Defence Services Technical Staff Course
- **Joint Seminars and Conferences :** Parivartan Chintan Conference. Air-Naval Combat Seminar in IOR,
- **Joint Exercises :** Prachand Prahar 2025 (high-altitude tri-service exercise in Arunachal Pradesh). Desert Hunt 2025 (special forces drill involving the Army, Navy, and Air Force).

6. Technology Integration for Network-Centric Warfare

- **Defence Communication Network (DCN) :** Provides secure, integrated communication.
- **Integrated Air Command and Control System (IACCS) :** Enabled real-time coordination during Operation SINDOOR.
- **Satellite and drone surveillance** supported by ISRO and indigenous development.

7. Year of Defence Reforms – 2025

- Declared by the Ministry of Defence.
- Focus on : Establishment of Integrated Theatre Commands. Joint training and doctrine development. Adoption of multi-domain operational readiness.

Conclusion

Operation SINDOOR and the broader synergy of India's Armed Forces showcase a decisive transition towards integrated defence preparedness. With a robust framework involving the CDS, DMA, ITCs, and real-time coordination tools like IACCS and DCN, India is shaping a unified, technologically empowered, and agile military force. As security threats grow more complex and transnational, India's tri-services jointness and strategic reforms position it as a future-ready military power capable of projecting strength across domains.

RURAL PROSPERITY THROUGH WAREHOUSING

Background and Current Scenario

- Rural population forms ~69% of India's population, and over 58% of the rural workforce is engaged in agriculture.
- Despite record foodgrain production (354·64 MMT target for 2025-26), farmers often sell produce at low prices due to a lack of post-harvest storage and marketing infrastructure.
- Warehousing capacity (239·7 MMT) is significantly lower than total foodgrain production (328·85 MMT) as of March 2024 (NABARD).

Role and Benefits of Warehousing

- Warehouses reduce post-harvest losses and stabilize market prices.
- Through e-Negotiable Warehouse Receipts (e-NWRs), farmers can trade on e-NAM, avoid distress sales, and access credit.
- Post-harvest credit is only ₹ 0·35 lakh crore (~1·4% of agri-credit), indicating scope for improvement.

Economic Impact

- Delayed selling after harvest fetches higher prices (*e.g.*, for basmati, jeera, turmeric).
- **IIM Bangalore Study :** 1% increase in warehouse capacity reduces price volatility by 2% (wheat) and 2·7% (masur).
- Warehousing can reduce the price spread between wholesale and retail, benefiting both farmers and consumers.
- Stable food supply through warehousing helps in controlling CPI inflation, particularly for volatile items like onions and tomatoes.

Key Challenges

- **Credit hesitancy :** Banks are reluctant to lend against stored goods due to stock misappropriation risks.
- **Skewed distribution :** Many areas (especially the Gangetic belt) are underserved; 68% of warehouses <500 tonnes capacity.
- **Low farmer awareness** about storage-linked credit, price patterns and government schemes.
- **Regulatory gap :** WDRA registration is only mandatory for issuing e-NWRs, not for all warehouses.

Government Initiatives

1. Agriculture Infrastructure Fund (AIF) : ₹ 1 lakh crore for post-harvest infrastructure.

2. Credit Guarantee Scheme for e-NWR Pledge Finance (CGS-NPF) : ₹ 1,000 crore to incentivise banks to lend against e-NWRs.

3. e-Kisan Upaj Nidhi Portal – For quick in-principle loan approvals, integrated with databases.

4. Interest Subvention : 1·5% on loans against e-NWRs for small/marginal farmers.

5. PACS-level godowns under the world's largest cooperative grain storage plan.

6. PEG scheme, silos in PPP mode, and **Warehousing Infrastructure Fund** for storage expansion.

Way Forward

- **Regulatory overhaul :** Bring all warehouses under WDRA to improve fiduciary trust.
- **Boost credit linkage :** Encourage banks through policy and guarantee measures.
- **Awareness programmes :** Train farmers via agri-extension agencies on warehousing, pricing, and schemes.
- **Promote large, professionally managed warehouses** for efficiency and quality maintenance.

Conclusion

Creating a robust and regulated warehousing ecosystem linked with post-harvest credit is crucial for ensuring remunerative prices, rural savings and prosperity. This will transform India's rural economy and make it resilient to market shocks.

SAFE FOOD FOR A HEALTHY INDIA

Why Food Safety Matters ?

- Food safety is vital for public health, farmer livelihoods, economic stability and global reputation.
- India ranks 4th globally in pesticide use, resulting in high residue levels.
- Contamination risks exist throughout the supply chain–from farming to storage to street food.

Key Hazards in Food Safety

Hazard Type	Examples
Biological	Bacteria (E. coli, Salmonella), Fungi (aflatoxins), Viruses (Hepatitis A), and Parasites.
Chemical	Pesticide residues, heavy metals (lead, arsenic), food additives and Toxins
Physical	Glass, metal, or plastic fragments in food

Link Between Agriculture and Public Health

Category	Impact
Foodborne Diseases	Diarrhoea, Hepatitis, cancer, liver/kidney damage
Economic Losses	Billions lost due to export rejections (e.g., spices, rice, seafood)
Farmers	Rejected produce reduces incomes
Global Reputation	Export bans damage India's agro-export trust

Challenges in India's Food Safety Eco-system

- Widespread adulteration in milk, oils, sweets and spices.
- Poor post-harvest handling → fungal/bacterial contamination.

Case Studies

Initiative	Impact	Lesson Learned
Eat Right Movement	Safer food in 100+ cities	Regulation + awareness = impact
Sikkim Organic Mission	100% organic; higher incomes	Policy-driven organic shift is possible
Maharashtra's Grape Export Model	Reduced rejections in EU/US	Meeting global standards boosts exports

Regulatory Framework & Gaps

Law/Agency	Current Status
FSSAI	Sets standards, weak rural enforcement
APMCs	Market regulation, no safety checks
Food Safety & Standards Act (2006)	Strong on paper, weak in implementation
Insecticides Act (1968)	Fails to curb illegal pesticide use
BIS Standards	Not widely adopted in the informal food trade

- Fragmented supply chains & lack of cold storage and food testing labs.
- Only 2,000 food inspectors for 1·3 + billion people.
- Weak enforcement of FSSAI laws, especially in rural and informal markets.
- Adulterants like metanil yellow and argemone oil pose a cancer risk.

Solutions and Way Forward

1. Infrastructure & Investment : Invest in cold storage, modern processing units and food testing labs. Upgrade APMCs with safety check protocols.

2. Technology & Innovation : Use block-chain for farm-to-fork traceability. Promote AI-based pesticide advisory apps for farmers.

3. Policy & Enforcement : Expand FSSAI's reach in rural areas. Impose strict penalties for adulteration. Ensure faster inspections and legal action.

4. Consumer and Farmer Education : Promote 'Eat Right India' and mandatory food safety labels. Educate farmers on Good Agricultural Practices (GAP). Train vendors on hygiene and safe food handling.

Conclusion

Food safety is non-negotiable for a healthy India. It demands :

- Multi-level action – policy, tech, education, enforcement.
- A robust and transparent supply chain.
- Empowered farmers and aware consumers.

With sustained reforms and innovation, India can ensure safe food, protect lives, boost exports, and restore trust in its agricultural produce.

OPPORTUNITIES AND CHALLENGES IN INDIA'S FOOD EXPORT

Importance of Food Exports in India

- Agriculture is India's largest livelihood provider and food exports are a major source of foreign exchange.
- Exports reduce the trade deficit, generate rural employment and promote inclusive development.
- Food processing boosts shelf life, reduces post-harvest losses and encourages MSME growth.

India's Food Export Scenario : Challenges and Trends

Aspect	Status
Global Share	2·4% of global agricultural exports
2023–24 Exports	$ 48·8 billion (↓ from $ 53·2 billion in 2022–23)
AEP 2018 Target	$ 60 billion by 2022 (unmet)

Major Challenges

- **Frequent export bans** (*e.g.*, rice, sugar) damage reputation.
- Over-dependence on **staples** like rice and sugar.
- **Infrastructure gaps :** Cold storage, transport.
- **Quality compliance issues :** Safety, hygiene, pest control.
- **Global competition :** Brazil (sugar), Vietnam (rice), Thailand (processed food).

Government Initiatives

Scheme/Body	Focus
Agriculture Export Policy (AEP), 2018	Diversification, high-value exports, regional focus
TIES	Export infrastructure
MAI	Market access & development
FAS	Financial assistance for quality, infrastructure, markets
APEDA	Promotion, certification, market intelligence

Agriculture Export Policy (AEP) – 2018

Strategic Focus : Stable export policy (reduce bans); Cold storage and logistics; State-specific export action plans.

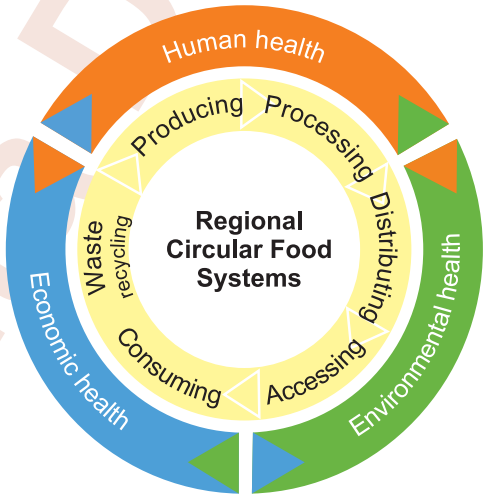
Operational Focus : Export clusters, branding of Indian produce; Promote processed, ethnic, organic products; Encourage private investment, R&D and certification.

Agricultural Exports Challenges

- Policy Instability
- Limited Product Diversification
- Infrastructure and Logistics Gaps
- Compliance with Global Standards
- Global Competition

Opportunities for Growth

Opportunity	Details
Processed Foods	Longer shelf life, higher margins, global appeal
Niche Products	Organic, pulses, oilseeds, ethnic food
Emerging Markets	Middle East, Africa (staples); EU (organic); East Asia (processed food)
Technology	Blockchain for traceability, digital platforms, precision farming



Advantages of Processed Food Exports

- Longer shelf life, better suited for exports.
- Higher profit margins and value addition.

Role of Circular Economy in Food Exports

Circular Economy Strategy	Impact
Sustainable Production	Promotes organic and regenerative farming
By-product Utilisation	Reduces waste, creates business avenues
Closed-loop Systems	Resource conservation, reduced cost
Eco-Friendly Packaging	Less plastic, biodegradable options
Supply Chain Optimisation	Reduced energy use and logistics cost
Stakeholder Collaboration	Brings farmers, processors, retailers together

- Enables by-product marketing and product branding.
- Supports MSMEs and rural employment.
- 2023–24 exports : USD 7·7 billion (*e.g.*, mango pulp, processed vegetables, cereal preparations).
- **Environmental Benefits :** Reduces carbon footprint, aligns with global sustainability norms.
- **Economic Benefits :** Cost-effective exports, opens green markets.
- Requires policy support, financial incentives and capacity building.

Conclusion

India's food export sector has immense untapped potential. By addressing existing challenges and aligning with global sustainability trends through processed food, tech integration and circular economy, India can :

- Increase foreign exchange earnings,
- Promote sustainable rural development, and
- Establish a resilient, globally competitive agro-export system.

INFRASTRUCTURE DEVELOPMENT AND URBANIZATION

India's Urban Transformation : Context & Urgency

- India is poised to become the 3rd largest economy by 2027.
- Rapid and sustainable infrastructure is key to supporting this growth.
- Urban population is expected to rise from 500 million to 820 million by 2047—requiring India to double its urban infrastructure.

Major Infrastructure Achievements

- **Landmark Projects :** New Pamban Railway Bridge (Rameshwaram); Z-Morh Tunnel (J&K); Chenab Bridge, Bogibeel Bridge, Atal Setu (Mumbai Trans Harbour Link).
- **Implementation Enabled By :** PRAGATI Platform (since 2015): Ensures timely execution using AI, Big Data, ML, Blockchain, GIS, GPS; Over 340 projects worth $ 205 billion completed.

Next-Gen Infrastructure Planning : PM Gati Shakti

- Unified National Master Plan with 5 year horizon (vs. outdated 20 year plans)
- Integrates ISRO and BiSAG tools for spatial and geo-intelligence planning
- Utilises 1200+ GIS layers from Central and 755 from States/UTs
- Platforms like Parivesh reduced environmental clearance time from 600 days to ~75 days.

Six Principles of PM Gatishakti

- Integrated Development
- Multimodal Infrastructure
- Last Mile Connectivity
- Reduced Ecological Impact
- Expedited Land Acquisition
- Minimised Clearances

Urbanisation Challenges

- More than half of Indian cities remain unplanned, with growing slums and unauthorised colonies.
- 80% of the workforce is in the informal sector, lacking job security and basic services.
- Rising urban heat islands, climate vulnerability, air pollution and traffic congestion.
- **Urban areas :** Consume 2/3rd of the energy; Generate 60%+ of GHGs; Emit 70% of global CO_2.

Global Urban Concerns

- UN-Habitat 2024 : 2 billion people may face 0·5°C rise by 2040.
- Coastal cities at flood risk : 2,620 cities above 10 m sea level.
- UNEP estimates $ 2·5–5·5 trillion/year needed for climate-resilient infrastructure.
- Waste management investment needs : $ 252 billion.

Rethinking Urban Planning : Key Lessons

- Shift from technology-centric to people-centric smart cities.
- Prioritise greenery, mobility, jobs and infrastructure over gadgets.
- Replace 20 year Master Plan with 5 year Strategic Spatial Development Plan.
- Embrace local participation, equity, and sustainability.

Innovative Concepts and Global Inspirations

- **15-Minute City (Paris model) :** Walkable neighbourhoods for better quality of life.
- Move away from car-centric urban sprawl; invest in mass transit, cycling and walkability.

- **Adopt bio-morphic urbanism :** Planning rooted in local ecology and sustainability.

Components of the Spatial Development Plan (SDP)

A holistic, integrated and digital-first planning approach combining :

- **Sustainability Plans :** Climate resilience, air pollution control, heat mitigation.
- **Mobility Plans** : Transport nodes, TOD (Transit-Oriented Development).
- **Social Infrastructure :** Health, education, recreation, heritage conservation.
- **Housing Plans :** Slum regularisation, informal market redevelopment.
- **Water & Sanitation Plans :** Drainage, sewerage, water security
- **Energy & Land Use :** Renewable energy, land management
- **Implementation Plan :** Timelines, capacity building, governance, finance and regulations.

Key Digital Enablers

Platform	Function
PRAGATI	Monitors infrastructure implementation using AI/ML
Gati Shakti	Unified infrastructure planning across departments
Whole of Government Platform	1955+ GIS layers for integrated planning
Parivesh	Fast-tracks environmental clearances
Virtual Town Halls	Facilitates citizen participation

Conclusion

India must rewrite its urban planning script using innovative, inclusive and digital approaches. By focusing on strategic spatial development, leveraging platforms like PRAGATI and Gati Shakti and adopting climate-sensitive design, India can ensure a resilient, inclusive, and sustainable urban future.

YOGA FOR ONE EARTH ONE HEALTH – A DECADE OF INTERNATIONAL DAY OF YOGA

Yoga is a valuable gift of ancient Indian tradition, derived from the Sanskrit root 'yuj', meaning to unite—mind and body, thought and action, and human with nature. It promotes a holistic approach to health and well-being, known for preventing and managing lifestyle-related diseases.

Global Recognition

- On 11 December, 2014, the UN General Assembly (UNGA) adopted Resolution 69/131, declaring 21 June as the International Day of Yoga (IDY).
- This decision recognized yoga's universal appeal and its growing significance in public health.

India's Role and Initiatives

- India has played a pivotal role in promoting yoga worldwide.
- Prime Minister Narendra Modi, in the 120th episode of Mann Ki Baat, emphasized yoga's benefits for a healthier world.
- Yoga has become a significant public health movement, especially in India, due to its role in health policies and behavioural changes.

Theme for 2025 : Yoga for One Earth One Health

- The theme 'Yoga for One Earth One Health' underlines yoga's impact on physical, mental, and environmental well-being.
- Encourages global sustainability, unity and wellness.
- The upcoming IDY 2025 builds upon a decade of global celebrations and success since 2014.

Key Quote by PM Narendra Modi

"Yoga embodies unity of mind and body... It is not about exercise but to discover oneness with yourself, the world and nature. Changing our lifestyle and creating consciousness can help us deal with climate change."

Conclusion

Over the last decade, yoga has grown into a global wellness movement. As we approach IDY 2025, the focus is on using yoga as a tool for global health, sustainability and climate resilience.

COMMUNICATION MODELS IN THE NEW MEDIA AGE

New Media and the Shift in Communication

- New Media refers to interactive digital platforms like websites, blogs, social media, e-content, OTT platforms and online TV/radio.
- It has transformed communication by : Making audiences active content creators

rather than passive receivers. Enabling customisation, instant feedback and global connectivity. Supporting real-time sharing, rating, commenting and engagement.

Evolution of Communication Models

Traditional Models (Linear & One-way)

Model	Key Features	Limitations in Today's Context
Aristotle's Rhetoric (2300 yrs ago)	Focused on speaker, speech, listener	Lacked feedback and interactivity
Lasswell's Model (1948)	WHO says WHAT, in WHICH channel, to WHOM, with WHAT effect	Assumes message always has effect; no feedback
Shannon-Weaver Model (1949)	Introduced 'noise' in transmission process	Still linear, no feedback
Berlo's SMCR Model (1960)	Emphasizes sender-receiver similarity in skills, culture, etc.	Lacks feedback, noise, and effect analysis

New Media Features

- Interactivity and user participation
- Convergence of telecom, IT and media
- Two-way communication
- Global reach and instant delivery
- Enables mass customisation and personalisation
- Uses tools like Search Engine Optimization (SEO) for better discoverability

Rise of Active Audiences

- Audiences have become producers (prosumers) – sharing opinions, content and feedback online.
- Engaged in likes, shares, comments, ratings, and even cyberbullying.
- Children, youth, and older generations are all involved, making new media ubiquitous and essential.
- New Media is now inseparable from daily life, and vital for expression, learning, shopping, and communication.

Feedback and Customisation : The Core of New Media

- Unlike traditional media, new media allows instant, expressive feedback (comments, ratings, live responses).
- Users can customise content, skip ads, scroll, and personalise apps—giving them greater control.
- This results in highly selective and engaged communication.

Toward a New Communication Model (Post-Schramm–Osgood Inspired)

A practical model suited for the new media age must include :

- **Sender and Receiver :** Interchangeable roles
- **Platform :** Social media, websites, apps, OTT, etc.
- **Message :** Multimedia—text, audio, video, graphics
- **Feedback :** Expressive (comment, like) or non-expressive (views, silence)
- **Effect :** Behavioral, cognitive, emotional
- **Dynamic Nature** : Elements can evolve or be modified based on context and technology

Future Outlook

- Artificial Intelligence (AI) will further revolutionize new media communication.
- Audiences will interact with smart algorithms, receive tailored content, and even co-create content with machines.

Conclusion

Traditional communication models (Aristotle, Lasswell, Shannon-Weaver, Berlo) are limited in today's digital context. New media have redefined communication as an interactive, participatory and dynamic process. The audience is now empowered, selective, and expressive - making feedback, customisation and engagement central to any modern communication model. New communication models must be flexible, multi-directional and technology-integrated to remain relevant.

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Topic Inclusive Rural Growth

COOPERATIVES AND FOOD SECURITY : A GAME-CHANGER FOR INDIA

Context : Food Security and Storage Crisis in India

- India has 11% of global cultivable land but must feed 18% of the world's population.
- While 311 MMT of food grains are produced, storage capacity is only 145 MMT, leading to post-harvest losses of ₹ 90,000 crores annually.
- India lacks 47% of the required storage infrastructure.

World's Largest Grain Storage Plan (2023)

- Launched by the Ministry of Cooperation, aiming to create 700 lakh tonnes of storage over 5 years.
- Engages 67,000 PACS (Primary Agricultural Credit Societies).
- Investment of ₹ 1·25 lakh crore planned.
- Focuses on decentralized, community-level godowns to reduce losses and boost fair pricing.

Grain Storage Plan Ensuring Food Security

- Farmers will able to store their produce in godown constructed at PACS.
- They can also avail bridge finance for the next cycle of crop.
- Farmers can sell the produce at a time of their choice
- They can also choose to sell their whole crop to the PACS at MSP.
- Farmers can also get various agri inputs and services at the Panchayat/village level itself.

Role & Potential of Cooperatives

- India has 1·1 lakh PACS with 130 million farmer members.
- PACS supports small/marginal farmers via input services, credit, procurement and now storage.
- Examples : Amul, Mother Dairy and grain banks are successful cooperative models. Tamil Nadu : 94% of fair price shops run by cooperatives. NAFED maintains buffer stocks of pulses, onions.

Challenges in PACS Implementation

- Poor management of PACS godowns.
- Land availability, fund disbursal delays and lack of capacity-building.
- Need for simplified funding, training and computerisation.

Schemes Supporting PACS Storage Plan

Schemes	Support Provided
AIF (Agri Infra Fund)	₹ 1 lakh crore loan pool; 3% interest subvention
AMI, SMAM, PMFME	Subsidies for storage, mechanization, micro-enterprises
Grameen Bhandaran Yojana	Support for rural godowns
PM-KISAN, PMFBY, e-NAM	Income support, insurance, and transparent online trade

Governance and Monitoring Mechanism

- Computerization of 67,930 PACS (43,658 active).
- Monitoring through : Inter-Ministerial Committee (IMC); State & District Cooperative Development Committees
- Emphasis on : Digital dashboards, AI integration, transparency, smart procurement.

Key Focus Areas for Implementation

- **Capacity Building :** Training in inventory, digital tools, compliance.
- **Land Pooling :** Collective land for storage via panchayat support.
- **Awareness Campaigns :** Educating farmers on storage benefits.
- **Simplified Funding :** Streamlined credit, subvention and risk mitigation.

Expected Impacts

- Strengthened buffer stocks and PDS system.
- Reduced post-harvest losses and transport costs.
- Better price realization for farmers.
- Boosts rural income, community development, and achieves SDGs (food security, poverty reduction).

Conclusion

- The initiative marks a transformative shift in India's approach to food security.
- PACS are at the center of this strategy, transforming into multi-functional rural institutions.
- With effective coordination, digitization, and institutional support, this plan has the potential to : Revolutionize India's grain storage architecture; Empower farmers; Ensure food and nutritional security across the country.

BUILDING A RESILIENT COOPERATIVE SECTOR

Cooperatives have a dual mandate to act as business units and protect member interests. They bridge capitalist efficiency and socialist equity. To thrive, cooperatives need entrepreneurial, managerial, governance and technical skills.

Global Perspectives

- 12% of the world's population is involved in cooperatives; 10% of global jobs are linked to them.
- Organizations like the ILO, ICA and COPAC emphasize : Skill development; Green jobs; Social inclusion and decent work; Life-long learning and reskilling; Use of tools like OUR.COOP packages.

UN & SDG Linkage

Skill development aligns with SDGs :

- SDG 1 (No Poverty)
- SDG 4 (Quality Education)
- SDG 8 (Decent Work & Economic Growth)
- SDG 10 (Reduced Inequalities)
- SDG 12 (Responsible Consumption and Production)

Skill Challenges for Cooperatives

- Skill mismatch, technological disruptions, digital literacy gaps and lack of life-long learning infrastructure.
- Need for continuous upskilling, especially in Industry 4·0/5·0 environments.

Significance of the YUVA Scheme

1. The scheme is designed to promote a reading and writing culture among young minds, aligning with the National Education Policy (NEP) 2020.
2. It aims to create a pool of young authors who can write in various genres, including fiction, non-fiction, poetry and research-based books.
3. The selected author's books are not only published in print but also made available as audiobooks and e-books to reach a wider audience.
4. A key goal of the scheme is to build a body of high-quality literature that can be used as reference material in educational institutions and beyond.
5. The scheme has led to the creation of a vibrant young literary community, fostering collaboration and networking opportunities among budding authors.

India's Skill Policy & Cooperative Support

- Key policies and missions : National Skill Development Policy (2009, 2015); Skill India Mission, PMKVY, SANKALP, STRIVE, PM-YUVA etc.; NEP 2020 promotes employability, entrepreneurship and economic growth.
- The Budget 2025 announced five National Centres of Excellence for Skilling, reinforcing commitment to skilling initiatives.

Institutional Innovation : Tribhuvan Sahkari University

- IRMA to be transformed into a National Cooperative University via the Tribhuvan Sahkari University Act, 2025.
- Aims to standardize cooperative education, promote cooperative entrepreneurship and train future leaders.
- Backed by the Ministry of Cooperation and Cooperative Education Fund.

Challenges and Opportunities

- Fragmented training infrastructure.
- Imbalance in cooperative growth across sectors (high in housing, dairy; low in industrial/agro-processing).
- Need for professional management and inclusion of youth.
- Sector-wise skilling for low-skill employment areas like trade, transport, hospitality, etc.
- New institutions like NCOL, NCEL, BBSSL, M-PACS aim to transform cooperatives.

Conclusion

- Skill development is a strategic driver of cooperative resilience and rural economic growth.
- A systemic, multi-stakeholder approach is required to : Align policies; Strengthen grassroots capacity; Foster a culture of lifelong learning.
- Investing in the right mix of skills will make cooperatives globally competitive, inclusive and sustainable.

WORLD ENVIRONMENT DAY 2025

One Nation, One Mission : End Plastic Pollution

Launched by the Union Ministry of Environment, Forest and Climate Change in the lead-up to WED 2025, and aligned with Mission LiFE (Lifestyle for Environment); Union Minister Bhupender Yadav emphasized shifting from awareness to collective action for sustainable living. Under the theme : "Say No to Single Use Plastic".

Key Thrust Areas of the Campaign :

- Awareness and Advocacy against plastic pollution.
- Reduction in generation and use of plastic waste, especially Single Use Plastic (SUP).
- Segregation, Collection, Disposal and Recycling of plastic waste.
- Promotion of Sustainable Alternatives to plastic.

Campaign Activities and Engagement

- Involvement from Central Ministries, States/UTs, educational institutions, industry, civil society. Clean-up drives at beaches, parks, riversides.
- Workshops/Webinars on sustainable practices and SUP alternatives. Educational activities: school exhibitions, recycled art, quizzes, hackathons.
- Community-led efforts in segregation and recycling, using platforms like 'Meri LiFE' portal.

Restoration of the Aravallis and Revival of Mangroves

Aravalli Landscape Restoration :

- National-level workshop held in Udaipur (21 May, 2025) with Ministers from MoEFCC and Rajasthan. 'Ek Ped Maa Ke Naam' initiative recalled. Focused on the Aravalli Green Wall Project to increase green cover and biodiversity.
- Emphasized the 'Whole of Government' and 'Whole of Society' approach. Innovative ideas include: Nurseries in panchayats (via MNREGA, CAMPA), Green Credit Programme, Mine restoration, eco-tourism, trekking, Linking Amrit Sarovars, eco-clubs, BSI/ZSI participation.
- Action Plan based on 5 Pillars: 1. Ecological Restoration 2. Community Participation 3. Policy and Governance 4. Sustainable Livelihoods 5. Research and Innovation

Where the Land Meets the Sea ?

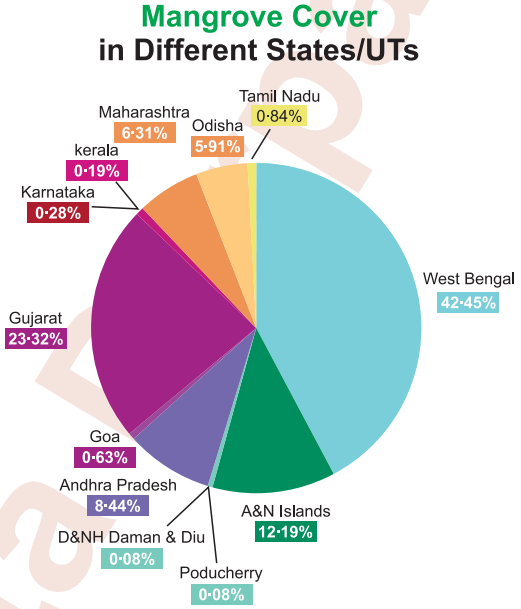
Mangroves as Guardians of Life and Livelihoods :

Case study of Navghar village, Maharashtra :

- The decline of mangroves led to reduced marine productivity.
- The government initiated a mangrove restoration programme with SHGs and local panchayats. Women-led crab farming groups like Healthy Harvest emerged.
- Benefits : year-round local employment, coastal protection, and livelihood security.

Mangrove Cover in Different States/UTs

- Total mangrove cover in India (2023) : 4,991·68 sq. km (0·15% of land).
- Largest shares : West Bengal – 42·45%, Gujarat – 23·32%, A&N Islands – 12·19%.
- Net increase since 2013 : +363·68 sq. km. Net increase since 2001 : +509·68 sq. km.



What is a Mangrove ?

Salt-tolerant, intertidal plant ecosystems. Found in high-rainfall (1,000–3,000 mm), tropical coastal regions. Serve as biodiversity refuges and climate buffers. Vital for biomass-based livelihoods in rural India.

India's Progress in Mangrove Conservation

Key Regulatory Measures :

- **CRZ Notification, 2019 :** Mangroves as Ecologically Sensitive Areas (ESAs). 50m buffer zone, compensatory afforestation at 3:1 ratio.
- **Legal backing from :** Wildlife (Protection) Act, 1972; Indian Forest Act, 1927; Biological Diversity Act, 2002.

Key Promotional Initiatives and Achievements :

1. **MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes) :** Launched on 5 June, 2023. Restoration in 540 sq.km across 9 coastal States + 4 UTs. FY 2024–25 : ₹ 17·96 crore allocated to AP, Gujarat, Kerala, Odisha, WB, Puducherry.
2. **National Coastal Mission :** Funds for 38 mangrove & 4 coral reef sites. Operates on 60:40 cost-sharing model.

3. **GCF-ECRICC Project :** In AP, Maharashtra, Odisha since 2019. 10,575 ha target, 3,114 ha restored by 2024.

Why Mangroves Matter ?

Mangroves provide critical habitat covering tropical coasts in more than 100 countries.

- Nursery for fish, crabs and other marine wildlife.
- Filter for sediments, protecting coral reefs
- Habitat for birds, bees, snakes and other terrestrial fauna.

Mangrove forests shield communities from extreme weather events and provide livelihood :

- Protect lives and property from storm surge and flooding.
- Prevent erosion and stabilize coasts.
- Support local fisheries, tourism, traditional medicine and crafts.

Mangroves : Nature's Carbon Vault : Hold 21 gigatons of carbon (87% in soil). Loss = 10% of global GHG emissions from deforestation. Restoring 1·6 million acres can absorb 1 gigaton CO_2.

A Tidal Shift Towards Sustainability : Navghar showcases community-led climate resilience. Integration of science, policy and local leadership. Women-led action restoring both nature and livelihoods. India leads by example in inclusive, eco-centric development.

CROP RESIDUE BURNING : CHALLENGES AND SUSTAINABLE SOLUTIONS

Crop residue burning is a major environmental issue in India, particularly in Punjab, Haryana and Uttar Pradesh. It involves the burning of leftover plant material post-harvest, mainly rice and wheat straw, and is practiced due to time, cost, and infrastructure constraints.

The Rise and Spread

- **Started** with mechanized farming post-1986.
- **Seasonal Pattern :** Rice residue is burned pre-winter; wheat during pre-monsoon.
- **Geographical Spread :** Originated in Punjab, now widespread in northern India.
- **Residue Generation :** India produces 686 million tonnes, with rice alone accounting for 34%.

Environmental Concerns

- **Loss of nutrients :** Up to 80% of nitrogen, phosphorus and sulphur lost.
- **Soil health decline :** Kills microbes, depletes organic carbon and nitrogen.
- **Emissions :** Releases CO_2, CH_4, N_2O, causing air pollution and respiratory diseases.
- **Pollution :** Particulate matter with carcinogens aggravates public health.

Global Practices in Residue Management

Practice	Countries
No-till farming	US, Canada, Brazil, Australia
Burning	India, China, Sub-Saharan Africa
Bioenergy use	EU, Russia, Bangladesh
Composting/ animal feed	Pakistan, Nepal, Mexico
Use as fertilizer	China

Crop Residue Management Options in India

In-Situ Methods :

- Mulching, No-Till, Strip-Till, Crop Rotation, Happy Seeder – conserve moisture, suppress weeds, retain nutrients.

Ex-Situ Methods :

- Biomass power generation, composting, animal feed, biochar and industrial reuse.
- Pusa Decomposer aids quick composting (< ₹ 1000/acre).

Crop Residue Management (CRM)

1. Implemented by the Department of Agriculture and Farmers Welfare from 2018-19.
2. The GOI's CRM Scheme tackles agricultural waste by offering financial aid, technical support and advanced machinery.
3. This initiative encourages sustainable practices such as soil incorporation and composting to enhance soil health.
4. The Government of India's Crop Residue Management Scheme was launched in 2018 to train farmers for crop residue management.
5. Government provides a stand-alone allocation of ₹ 235 crore in the Budget 2024-25 for KVKs.

Why Farmers Burn Residue ?

- Time constraint between rice harvesting and wheat sowing.
- High manual removal cost (~₹ 6,000–₹ 7,000/acre).
- Limited access to sustainable tech & infrastructure.
- Regulatory gaps and small landholdings restrict viable alternatives.

Government Interventions

- **Crop Residue Management Scheme (CRM) – 2018 :** Financial + technical support.
- **Restructured RKVY (2022–23) :** Promotes mechanization.
- **Custom Hiring Centres (CHCs)** : 40,000+ CHCs and 2·95 lakh machines.
- **ICAR Training :** 20,000 ha under CRM training.
- **Investment in biomass supply chains :** Strengthens infrastructure.

Major Innovations for Leveraging Crop Residue Management

- Developed by ICAR-PUSA : PUSA Decomposer
- Developed by Punjab Agriculture University : Happy Seeder
- Developed by G.B. Pant University of Agriculture : Zero Seed Drill
- Developed by Dept. of Farm Power and Machinery, PAU : Straw Chopper
- Introduced by Punjab Agriculture University : Straw Baler

Impact of CRM Scheme

- Avoids 20 million tonnes of CO_2 annually.
- Reduces fertilizer use by 20–30%.
- Farmers earn ₹ 3,000–₹ 5,000/acre from bioenergy.
- Improves soil carbon by 0·3–0·5%, boosting fertility.

Impact of Crop Residue Management Scheme on Farmers and Environment

- Using crop residue for bio-composting can reduce the need for chemical fertilizers by 20-30%.
- Farmers using residue for biofuel and power generation earn approx. an additional ₹ 3,000-5,000 per acre.
- 20 million tonnes of CO_2 emissions prevented annually by curbing stubble burning.
- Enhanced soil organic carbon levels by 0·3% to 0·5%, significantly improving soil health and fertility.

Conclusion

A mix of policy support, farmer training, infrastructure and bioeconomy incentives is key to ending crop residue burning. Sustainable residue management not only mitigates climate change but also enhances soil health and rural income.

SCALING UP ENTERPRISES BY INCUBATION

1. Background and Objective

- National Rural Economic Transformation Project (NRETP) under DAY-NRLM piloted India's first rural incubator programme to scale up women-led micro-enterprises.
- Aimed to incubate 100–150 growth-oriented enterprises per State, creating formal, revenue-generating, job-creating models for replication.
- Addressed demand-side (entrepreneur needs) and supply-side (lack of rural-focused incubators) gaps.

2. Scale and Outreach of DAY-NRLM

- Implemented in 7,139 blocks across 742 districts in 28 States and 6 UTs.
- Mobilized 10 crore rural women into SHGs and community institutions.
- Accessed ₹ 9·85 lakh crore bank credit and ₹ 49,000 crore capitalization support since 2013-14.

3. Challenge Fund Incubation Programme

- Target : Women entrepreneurs with minimum turnover of ₹ 12–20 lakh.
- Implemented in Assam, Bihar, Karnataka, and West Bengal via IIM-Calcutta Innovation Park and IIM-Bangalore NSCREL.
- Outreach via SMS, CBOs, media ads. Applications received : Assam – 9,774; Bihar – 26,469; Karnataka – 40,138; WB – 29,674.
- 150 enterprises per State selected : 18 received grants (₹ 15 lakh), 132 soft loans (₹ 5 lakh interest-free).
- Support included mentoring, training, credit, formalization, branding, and market linkages.

4. Support Offered by Incubators

- **Training :** Bookkeeping, product development, merchandising, export compliance.
- **Market Linkages :** Buyer-seller meets, e-commerce onboarding (*e.g.*, Meesho), fairs.
- **Formalization :** Udyam Aadhaar, GST, ITR, insurance.
- **Branding & Packaging :** Logo, catalog, QR-coded pricing, product shoots.
- **Mentorship :** 1 mentor for every 10 enterprises, tailored business guidance.

5. Case Study : Papiya Khatun (West Bengal)

- Enterprise : M/s Payle Koyel Kantha Stitch.
- Revenue doubled from ₹ 46·7 lakh (2022–23) to ₹ 95·3 lakh (2023–24).
- Employment rose from 500 to 750.

- Diversified business mix to include E-commerce (5%); customer base expanded across West Bengal, Karnataka, Maharashtra.

6. Key Learnings from the Programme

- SHG entrepreneurs showed strong participation, enthusiasm and growth potential.
- Mentoring, leadership engagement and structured incubation were critical to success.
- Entrepreneurs gained skills in compliance, packaging, branding, digital tools and finance.
- Delays in fund disbursement and unclear SRLM roles created some field-level distrust.
- Buyer-seller meetings proved highly effective for market access.

7. Best Practices Identified

1. E-application and tracking software.
2. Buddy system with experienced women entrepreneurs.
3. Digital training for SHG members.
4. Effective use of fairs and exhibitions.
5. Emphasis on branding and digital presence.

8. Recommendations and Way Forward

- Focus outreach on serious entrepreneurs seeking mentorship, not just funding.
- Avoid launching in weakly staffed districts.
- Target enterprise clusters instead of scattered efforts.
- Move toward sector-specific incubation for efficiency.
- Define SRLM staff roles clearly and build their capacity.
- Accelerator model needed for larger enterprises.
- Training should be long-term and intensive.
- Minimum education qualifications may be necessary.
- Need to rethink partnership models and address funding delays.

Conclusion

The rural incubator programme under DAY-NRLM has shown that with customized mentoring, structured support, and a community-based approach, rural women entrepreneurs can significantly scale up their enterprises. It sets a replicable model to achieve the goal of creating 3 crore Lakhpati Didis, contributing to women empowerment and India's vision for a developed nation by 2047.

INCLUSIVE RURAL GROWTH THROUGH COOPERATIVES

India's agriculture is dominated by small and marginal farmers facing low productivity, lack of market access and limited institutional support. To achieve equitable and inclusive rural development, cooperative-based models are critical. They foster empowerment, participation and inclusion.

Why Cooperatives are Important ?

- **Backbone of Rural Economy :** Indian agriculture is fragmented, and farmers lack access to credit, insurance, and markets.
- **Supply-Leading Approach Limitations :** Traditional top-down institutional support has failed to deliver due to a lack of grassroots collectives.
- **Holistic Development :** Cooperatives help build community-based models that promote organic farming, biodiversity, soil health and sustainability.

Why Cooperatives in Organic Market ?

- In India, there are 8·54 lakh cooperatives that are streamlining the life of a number of rural farmers.
- Cooperatives can lead to the development of organic clusters as well as its entire supply chain.

Potential and Transformative Role

- India has favourable agro-climatic diversity and large arable land.
- Cooperatives can boost food security, employment and poverty reduction.
- New models must emphasize 'holistic and inclusive' growth, blending innovation with traditional knowledge.

Structural Reforms and Suggestions

- **Village-Level Cooperatives :** Every village should have cooperatives managing agriculture, marketing, cattle, and food security.
- **Multi-Tier Cooperatives :** Linked digitally into a National Cooperative Food Network to reduce costs and improve efficiency.
- Farmers should have the 'choice, voice, and price' in cooperative decisions.

Government Interventions

- The Ministry of Cooperation (2021) was established to formalize this vision.
- Over 8·54 lakh cooperatives in India can be integrated for unified operations.
- Employment generation, cost rationalization and social capital creation are key outcomes.

Way Forward

- Restore the democratic character of cooperatives by empowering members.
- Encourage self-reliant village economies rooted in dignity and professional governance.
- Promote cooperative conscience to strengthen India's rural social fabric.

Conclusion

Cooperatives are not just economic tools but instruments for nation-building, enabling villagers to achieve prosperity with dignity. Their revival with professionalism, decentralization, and digital integration can transform rural India into a vibrant, inclusive and sustainable economy.

HOLISTIC VILLAGE TRANSFORMATION IN INDIA : A DECADE EMPOWERED BY YOGA

1. Yoga : From Ancient Wisdom to Modern Wellness

- Yoga, rooted in Indian tradition, promotes holistic health—physical, mental, and spiritual.
- Recognized globally with the UN declaring June 21 as International Day of Yoga (IDY) in 2014, following PM Narendra Modi's proposal.
- Described as a way of life promoting unity, balance, and wellness.

2. Key Success Stories from Indian Villages

(a) YogAndhra Abhiyan (Andhra Pradesh) : Ambition : Create 10 lakh yoga practitioners across the state. Over 2,500 yoga trainers deployed at village and ward levels. Inclusive outreach involving farmers, workers, students, women and professionals.

(b) Kunnamthanam Model (Kerala) : Launched the 'My Village, Healthy Village' campaign in 2017. Trained one member from each of 7,000 families; 28 yoga centres established. Health improvement led to reduced public healthcare costs.

(c) Papanashi (Karnataka) : Known as 'Yoga Gram' with 80% of its 2,000 residents practicing yoga. Started by Ayurvedic doctor in 2020; spread organically. Intergenerational participation led by youth. Embraced Ayurveda and natural remedies like jalaneti during COVID-19. Reported only 4 COVID cases during the pandemic.

4. Government & Community Initiatives

(a) Punjab's Drug-Free Campaign : Combines awareness campaigns with free yoga classes via 'CM di Yogshala'. Aims to combat drug addiction and pro-mote mental well-being.

(b) Andhra Pradesh Rural Health Centres (2022) : 70 naturopathy doctors trained 2,920 mid-level providers. Providers conduct daily yoga for elderly and pregnant women. Covers NCDs like diabetes, PCOD, thyroid, hypertension.

5. International Inspiration : Yugouliang (China)

- Remote village transformed via yoga since 2016.
- Resulted in poverty reduction; income rose by 1,100 yuan annually.
- Villagers sell high-value crops like quinoa, popular among yoga practitioners.
- Yoga became a lifestyle and mental support for elderly.

6. International Day of Yoga (IDY) Milestones

- IDY 2015–2024 witnessed growing participation and global outreach.
- Guinness World Records, global relays, digital apps, and space yoga events featured.
- IDY 2024 saw 24·53 crore participants; record pledge participation in Uttar Pradesh.

JUNE
2025

GIST
OF
DOWN TO EARTH

Topic

- ❖ Plan Bee (1-15 June)
- ❖ Nature Writes Back (16-31 May)

STOCKHOLM CONVENTION 2025 AND THE RISE OF EXEMPTIONS

- **Event :** The latest Conference of the Parties (COP) to the Stockholm Convention was held in Geneva (April 28–May 9, 2025) to address the regulation of Persistent Organic Pollutants (POPs).
- **Key Decision :** Despite a prior decision to ban UV-328, a toxic UV stabilizer found in paints and plastics, its use was allowed in the aerospace and defence sector, raising concerns over the weakening of the Convention.
- **What are POPs ?** Harmful chemicals that persist in the environment, bioaccumulate in tissues, travel long distances, and are toxic (*e.g.*, UV-328, MCCPs, LC-PFCAs, chlorpyrifos).
- **New Additions to Annex A (Elimination) :** Chlorpyrifos (linked to neurodevelopmental harm); Long-chain perfluorocarboxylic acids (LC-PFCAs) – known as 'forever chemicals'; Medium-chain chlorinated paraffins (MCCPs) – impact liver, kidney, thyroid.
- **Concerns Raised :** Exemptions were added without scientific review, undermining the treaty's credibility. Countries like India demanded more exemptions citing food security and economic needs. Trend of fewer chemicals being listed and more exemptions being granted in recent years.
- **India's Position :** India has not ratified most amendments to Annex A, B, or C. Officially, India accepts new additions only after domestic approval, limiting treaty enforcement.
- **Broader Implication :** Frequent exemptions dilute the Stockholm Convention's original purpose, showing a growing conflict between environmental safety and economic/political interests.

PERILOUS PROPOSAL—ECOTOURISM *VS.* HUMAN-WILDLIFE CONFLICT IN UTTARAKHAND

- **Incident Trigger :** In Jan 2025, a tiger attack killed a man in Kyari village near Jim Corbett Tiger Reserve, triggering public anxiety; 12 tiger attacks were reported in the area between March 2024–25.
- **Proposal :** The Terai West Forest Division proposed a new ecotourism zone in Chandani forest in October 2024, without consulting local communities.
- **Local Opposition** : Villagers from Kyari, Chhoi, and Dhela protested, fearing increased human-wildlife conflict. A Public Interest Petition led the Uttarakhand High Court to put the proposal on hold pending explanation.
- **Ecotourism Impact :** Officials claim only 1% of the proposed 10 sq km area will be used for safari. However, locals blame increased tourism for altering wildlife behaviour and increasing encounters. The region already has a very high tiger density—approx. 20 tigers per 100 sq km (national average : 8).
- **Ecological Concerns** : Wildlife corridors are disrupted by infrastructure and resorts. Wildlife (tigers, elephants, nilgai) now frequently enter villages, damaging 40% of crops in some areas.
- **Livelihood Concerns :** Forest access restrictions after attacks have impacted locals' daily survival needs (fodder, firewood). Tourism jobs are seasonal and not sufficient for a sustained livelihood.
- **Broader Message :** The proposal exposes the tension between conservation, ecotourism and community rights. Locals want inclusive planning that balances safety, sustainability and livelihood security.

POLLINATION CRISIS AND THE RISE OF ASSISTED POLLINATION IN INDIA

1. Pollination Crisis in Himachal Pradesh

- Farmers in Janjehli valley, Mandi (Himachal Pradesh) now rent honeybee boxes due to a sharp decline in wild pollinators (bees, butterflies).
- Over 400,000 beehive boxes are rented annually across the state.
- Causes : Climate change, pesticide use, habitat loss and intensive farming.

- Apple, a pollinator-dependent crop, is under serious threat if pollination during the short blooming period fails.

2. Global and National Decline of Pollinators

- Pollinators like bees, birds, bats, and insects pollinate ~1/3rd of global food crops.
- FAO & UN reports : 71% pollinators in decline. 3·4% of species extinct in 20 years. 16·5% vertebrate pollinators are at risk globally.
- In India, multiple studies (Odisha, Bengaluru, Western Ghats) confirm 70–90% decline in native bee populations.

3. Shift Toward Commercial Pollination

- Beekeepers now earn more from renting bees for pollination than honey production. Example : One beekeeper in Una makes ₹ 1·5 lakh in 20 days during flowering season.
- Bee rental has become a profitable business, with a box fetching ₹ 1,200 for 15–20 days.

4. Manual Pollination : A Last Resort

- In Kodagu (Karnataka) and other Western Ghats regions, manual pollination (with cotton buds or brushes) is used for coffee, spices, chillies and fruits due to absence of pollinators.
- Labour-intensive, expensive (₹ 800–850/day per worker) and yields are lower than bee pollination.

5. Risks of Hand Pollination

- High labour and material costs.
- Can discourage natural pollinator conservation.
- Studies warn of over-pollination, poor-quality yields and labour exploitation risks.

6. Efforts to Revive Natural Pollinators

- Institutions like UAS Bengaluru, IIHR, and YSP University (Himachal) promote : Bumblebee rearing (400 × more efficient than honeybees). Companion planting, pollinator gardens and bee community transfer.

Conclusion

While assisted and manual pollination offer short-term fixes, only restoring natural pollinator habitats can ensure long-term sustainability.

SEED SAVIOURS – COMMUNITY SEED BANKS IN INDIA

1. The Concept and Origin

- Community seed banks are grassroots initiatives where farmers store, share, and save indigenous seeds.
- Sangham Seed Bank in Machnoor village, Telangana, started in 1995 with help from Deccan Development Society, to overcome poor seed quality and availability.
- Women across 75 villages now store over 80 traditional food crop varieties including millets, pulses and oilseeds.

2. Storage and Sharing Methods

- **Traditional storage methods :** Palm-leaf baskets, neem leaves, ash and clay—preserve seeds for 2–3 years.
- **Seeds are shared via :** Seed loan systems–farmers return double the borrowed seeds. Free distribution–common in tribal regions.
- Storage also happens in glass jars with ash (*e.g.*, Neemuch, MP) to prevent moisture.

3. Diversity and Resilience

- **A survey by the Centre for Science and Environment (2025) revealed :** 887 climate-resilient seed varieties. Spread across 71 crops, held by 22 community seed banks and 20 non-profits.
- **Benefits :** lower farming costs, better taste, resilience to climate and biodiversity preservation.

4. Challenges

- **Financial sustainability :** Most seed banks operate independently with limited funding.
- **Storage risks :** Moisture, pests and fungal infections due to a lack of modern infrastructure.
- **Lack of expertise :** Inadequate training on germination testing, viability and genetic purity.
- **Policy vacuum :** While the PPV&FR Act, 2001 allows farmers to save and sell seeds (non-branded), implementation remains weak. Complex registration processes discourage farmers. No clear national policy to support community seed banks. The Seed Bill 2019 is still under review.

5. The Way Forward

- **Government support needed :** storage infrastructure, technical training and easier legal processes.
- Policy recognition for farmer-managed seed systems is essential for long-term food security.
- Community seed banks are key to climate adaptation, biodiversity conservation and farmers' seed sovereignty in the age of industrial agriculture.

INDIA'S CRISPR FEAT WITH BORROWED TOOLS

1. Breakthrough by ICAR

- Indian Council of Agricultural Research (ICAR) announced India's first genome-edited (GE) rice varieties : DRR Dhan 100 (Kamala); Pusa DST Rice 1.
- These are climate-resilient varieties—drought-tolerant, fast-maturing, water-efficient and nitrogen-saving.
- GE rice is exempt from stringent biosafety norms as it contains no foreign DNA.

2. CRISPR-Cas Technology Used

- Developed using CRISPR-Cas9 gene-editing technology, discovered by Jennifer Doudna and Emmanuelle Charpentier in 2012.
- CRISPR acts like molecular scissors to precisely edit DNA.
- Technology is patented, with ERS Genomics (Charpentier's firm) holding the Indian patent since 2022.

3. IPR and Licensing Hurdles

- While academic use of CRISPR is allowed, commercialisation requires a licence, often at high costs.
- ICAR used patented CRISPR tools without securing licences, raising serious intellectual property (IP) issues.
- A government committee has now been formed to negotiate licence terms.

4. Policy & Regulatory Landscape

- In 2022, India exempted SDN-1 and SDN-2-based GE crops from strict GM regulations, promoting simplified approval.
- ICAR was allocated ₹ 500 crore to promote GE research.
- However, no domestic CRISPR toolkit for agriculture exists yet (unlike in the medical domain via CSIR).
- Activists (*e.g.*, Coalition for GM-Free India) oppose GE rice, calling the move "illegal and unscientific".

5. Comparison with Monsanto's Bt Cotton

- The situation echoes India's past over-reliance on Monsanto for Bt cotton and the ₹ 1,500 crore in trait fees paid in early years.
- Again, India lacks indigenous technology for agricultural gene editing, unlike China, which leads globally.

6. Suggestions & Way Forward

- Experts like Anurag Chaurasia advocate a 'One Nation, One Licence' policy to centrally manage access and cost of gene-editing tools.
- India must invest in domestic R&D for CRISPR technologies, reduce dependence on foreign patents and ensure legal clarity for commercialisation.

Conclusion

While ICAR's GE rice is a significant scientific milestone, it exposes India's over-reliance on foreign biotech patents, mirroring past mistakes. A proactive IP policy, indigenous innovation, and clear regulation are urgently needed to avoid a repeat of the Monsanto episode.

WHO IS REALLY DEVELOPED ?

1. Greenwashing by Corporates

- Apple claimed its Apple Watches were carbon-neutral in 2023.
- A lawsuit alleges that Apple's carbon offset projects lacked 'additionality'—they preserved forests that were already protected, thus offering no real environmental benefit.
- This reflects a global trend of greenwashing, where being 'less unsustainable' is falsely equated with being sustainable.

2. Flawed Global Development Metrics

- Indices like the Human Development Index (HDI) and its updated version Planetary Pressures-adjusted HDI (PHDI) are relative in nature, comparing countries to one another—not to absolute planetary boundaries.
- This misrepresents true sustainability, as high-ranking countries like Norway or Denmark consume resources far beyond sustainable levels.

3. Ecological Limits *Vs.* Relative Ranking

- If all nations adopted the high-resource lifestyles of the Global North, we would need multiple Earths to survive.
- The aspirational benchmark of Western lifestyles is inherently unsustainable and should not guide global development.

4. Introducing E-HDI : A New Sustainability Metric

- **Researchers propose a new metric :** E-HDI (Environmental Pressures-adjusted HDI).
- It is based on decent living standards that are scalable globally within ecological limits.

- **Top performers on E-HDI :** Panama, Costa Rica, Sri Lanka, Peru – moderate-income countries with strong social indicators and low ecological impact.

5. Key Findings of E-HDI

- No country with HDI > 0·85 ranks in the top 20 of E-HDI.
- All countries with HDI > 0·9 are outside the top 50 in E-HDI due to high environmental pressure.
- India and Indonesia are the only G20 countries whose development trajectories could remain within planetary boun-daries—mainly due to lower HDI levels (0·65–0·72).

6. Rethinking 'Development'

- True development is dignified life for all within ecological limits.
- Wealth alone should not define development.
- Social well-being and ecological balance must be integrated in policy-making.

Conclusion

The E-HDI offers a more honest and planet-friendly framework to judge progress, advocating scalable, sustainable, and dignified living standards over mere economic or industrial superiority.

BROKEN LIFELINE – LIFE EXPECTANCY DECLINE IN INDIA

- India's life expectancy rose steadily from 49·7 (1970–75) to 69·0 years (2013–17) but dipped to 69·8 years (2017–21)—the first decline in decades.
- The COVID-19 pandemic is the likely cause, with death rate rising from 6·0 (2020) to 7·9 (2021) and total deaths jumping from 8·1 million to 10·2 million.
- Underreported COVID toll suspected; excess deaths from respiratory and circula-tory diseases raise concerns.
- IIPS estimates India lost 1·6 years of life expectancy in 2021; gender gap widened to 2013 levels.
- UN report : Life expectancy in India fell from 69·7 (2019) to 67·2 (2021); 70% of countries saw similar trends.
- The data signals fragile health systems and highlights the need for stronger pandemic preparedness.

Nature Writes Back (16-31 May)

RESURRECTION OF A METAPHOR : NATURE IN CONTEMPORARY LITERATURE

- Literature is witnessing renewed focus on nature due to the global environmental crisis.
- Earlier, nature served as a metaphor for human life; now, it is central to real-world concerns, especially environmental degradation.
- Modern writers like Vinod Kumar Shukla, Udayan Vajpeyi, Mangalesh Dabral and others reflect eco-consciousness in their works.
- While Indian traditions respected nature, this connection is rapidly eroding under modern development narratives.
- Literature is now responding by expressing anger, awareness and resistance to environmental destruction.
- Though the term 'environment' is new, the sentiment of nature reverence existed in earlier Indian literature (*e.g.*, Tagore, Chhayavad poets).
- In a time of misuse of tradition and misinformation, literature must uphold truth and document environmental loss with courage.
- Its humanitarian role lies in raising awareness and alerting society to ecological crises.

THE PENS HAVE NOT TIRED – NATURE IN INDIAN LITERARY TRADITION

- Nature and environment have been deeply embedded in Indian literature since the Vedic era, where natural forces were personified and praised.
- Sanskrit poets like Kalidasa and Bhavabhuti depicted nature's beauty and power, while Tulsidas carried this tradition forward in Ramacharitmanas.

- The Chhayavadi movement and poets like Sumitranandan Pant revived nature's prominence in Hindi poetry.
- Modern writers such as Agyeya began to reflect nature not just as metaphor but as a lived experience, although earlier poets were unaware of ecological degradation.
- Contemporary poets and authors are more alert to issues like deforestation, pollution, climate change, and speak of nature's destruction and resistance.
- Adivasi writers (*e.g.*, Anuj Lugun, Jacinta Kerketta) provide a unique worldview, seeing all living beings as equal citizens of Earth, opposing exploitative development.
- Ecofeminism finds echoes in both women-led environmental movements and works by writers like Anupam Mishra, who promoted traditional water conservation.
- Despite increasing corporatisation, literature remains a beacon of resistance, awareness, and hope for ecological justice.

POETRY OF EARTH–TELUGU LITERATURE AND NATURE

- Ancient Telugu literature reflected deep reverence for nature, where animals, rivers, and forests were spiritually significant—*e.g.*, Dhurjati's Kalahastishwara Mahatmyam.
- Temples on mountains, rituals like Van Mahotsav and sacred river baths were ways to preserve ecosystems.
- Every element of nature was treated as divine and personified in poetry, showing emotional and spiritual connections.
- Modern Telugu poets initially distanced themselves from nature, focusing on personal frustrations amid industrialisation, urbanisation and globalisation.
- This shift reflected the loss of collective sensitivity, with poetry divided by caste, gender and religion.
- However, a revival is underway—modern poets are now using their voice to raise awareness about environmental degradation and pollution.
- Poets like Bengal Saidachari, Jandhyala Papayya Sastry, Papineni Sivasankar, and Mohammad Sharif highlight trees as teachers, polluted rivers, and calls to protect nature.
- Sircilla Gafoor Shikshak warns against human ego and selfishness, linking it to ecological collapse.
- Overall, Telugu literature is re-emerging as a tool for environmental consciousness, promoting eco-spiritual values and ecological justice.

FEELINGS DIE WITH LANGUAGE

- 197 mature Indian languages are on the verge of extinction, largely due to modern education policies that focus on only one or two dominant languages.
- Languages like Awadhi, Braj, and Rajasthani are rich and culturally significant but are wrongly classified as dialects under Hindi and not given independent status.
- Government neglect and a lack of representation in education, the judiciary and administration have marginalized many languages.
- Oral literature, which forms the backbone of these languages, is socially inclusive and captures all aspects of life—joy, sorrow, rituals and daily experiences.
- Oral traditions blend poetry, song, dance and prose as one holistic unit, deeply connected to society's ideology and worldview.
- Mother tongue education is essential for children's expression and intellectual development. Of India's 1,369 mother tongues, around 800 exist only in oral form.
- It is a misconception that languages without a script are inferior. Oral languages are resilient and carry forward knowledge and expression across generations.
- Global indexes like UNESCO and Ethnologue don't account for India's linguistic context; thus, India needs its own standards for evaluating language vitality.
- The death of a language leads to loss of environmental knowledge, as seen in the Great Andamanese language, which had numerous words for smells, birds and parts of the seashore—now forgotten.
- Similar losses are seen in Koraput (Odisha), where 1,800 rice varieties and their associated names and tastes have vanished.
- The imposition of uniformity erases rich linguistic and cultural diversity, ultimately killing human emotions, perceptions, and heritage along with the languages.

FARM FOLKLORE

- Folk literature is rooted in agricultural life, reflecting the knowledge and culture of rural communities, where 60–70% of the population still depends on farming.
- While a city dweller uses 10–12 words to buy grain, a farmer uses over 250 terms in the process of cultivating it—highlighting the rich vocabulary in so-called dialects.
- Folk literature evolved from experiential knowledge, often passed down orally, encapsulated in proverbs, songs, and sayings related to agriculture and environmental conservation.

Water Conservation in Proverbs

- Proverbs like 'Gohun bha kahe ? Asadh ke dui bahe' and 'Saman bahe. Gohun gahe' highlight the importance of timely ploughing during monsoon months to conserve moisture for future crops.
- Such sayings were developed to preserve traditional ecological knowledge in the absence of written records.

Crop Rotation and Mixed Farming

- Proverbs guided sowing distances and crop combinations for maximum yield and sustainable : farming : "Kadam-kadam par bajra, dadur kudni jwar. Je jan aisa boihain, unke bharen kothar."

Sustainable Harvesting Practices

- There were seasonal taboos on consuming fruits/herbs (*e.g.*, kaitha, amla, chiraunji) before their proper ripening to ensure natural regeneration.
- Traditional practices included ritualistic permission before harvesting herbs, reflecting deep ecological sensitivity.

Respect for Nature in Rural Traditions

- Actions like touching the base of a tree before climbing or harvesting herbs at midnight with care showed reverence for nature.
- Bagheli folk traditions promoted non-destructive, sustainable resource use, embedding environmental ethics in daily life.

Overall, folk literature acts as a repository of environmental knowledge, offering guidance on sustainable living through oral traditions, sayings, and rituals that align closely with natural cycles and biodiversity.

CONSERVATION AS A LITERARY LEITMOTIF

- Arup Kumar Dutta's 1979 novel The Kaziranga Trail is regarded as a pioneering Indian English juvenile novel with an Indian setting, Indian characters and a central theme of wildlife conservation.
- The story revolves around three village boys—Dhanai, Bubul and Jonti—who uncover rhino poaching in Kaziranga Wildlife Sanctuary and assist a forest ranger in identifying and catching the poachers.
- The book was ahead of its time in promoting environmental awareness among children, long before such issues gained mainstream attention. It was a bestseller, translated into several languages, and even adapted into the feature film 'Rhino'.
- Literature as an awareness tool : Dutta realized the power of storytelling to shape young minds during their most impressionable years. This led him to write more children's adventure novels around environmental conservation.

Follow-up Novellas–Conservation Themes :

1. Save the Pool : Focuses on the illegal poisoning of Kaziranga's beels (wetlands) by fish poachers. Highlights how such activities harm aquatic ecosystems, wildlife and humans who consume poisoned fish.

2. The Baby Elephant : Addresses human-wildlife conflict, where villagers repel elephants raiding crops. A baby elephant is trapped and captured for sale, but the protagonists rescue and reunite it with its mother.

- These stories emphasize realistic settings and educational messages without being moralistic, making them impactful for children.
- Dutta also explored conservation themes in adult literature and journalism, but found the most joy and purpose in shaping environmental consciousness through children's fiction. Overall, the conservation as a literary leitmotif—a recurring theme essential to instilling ecological awareness and responsibility in young readers, using engaging adventure narratives rooted in Indian settings.

LANGUAGE OF HUNGER, ECO-COLONISATION

- **Critique of Modern Odia Literature :** Early post-Independence literature in Odia was alienated from local realities—detached, westernised and elitist.
- **Contrast with Traditional Literature :** Ancient Odia literature was rooted in nature, tribal ethos, spirituality, and resistance to colonial/feudal injustice (*e.g.*, Fakir Mohan Senapati, Bhima Bhoi).
- **Rise of Protest & Environmental Literature (1990s Onward) :** Writers from mass movements began expressing realities of displacement, tribal struggles and ecological destruction. Mass resistance against mining projects in Gandhamardan, POSCO project, Vedanta in Niyamgiri, and Chilika Lake degradation inspired this wave.
- **Themes Explored :** Eco-colonialism : Corporate-state nexus harming environment and displacing communities. Climate change: Novels like Samudra Manisha and Jambudweep by Bhima Prusty depicted coastal erosion and climate victims. Gender & Caste justice: Rise of Dalit and women writers in Odia literature.
- **Two Literary Camps Today :** Pro-establishment : Writers seeking awards/patronage, often silent on social issues. Anti-establishment : Fiercely political writers advocating for human and environmental rights.

REBIRTH OF COEXISTENCE (CINEMA AND ENVIRONMENT)

- **Nature in Cinema :** Traditionally, nature was shown as a decorative background, not as a central character. 'My Octopus Teacher' (2020) redefined this by making nature the focus and encouraging mindful observation.
- **Environmental Films :** Notable global films : *Dreams*, *Erin Brockovich*, *Avatar* – depict ecological destruction, corporate greed, and indigenous resistance. Indian films like *Sherni* (2021), *Boomika*, *Kadvi Hawa* highlight ecofeminism, environmental degradation and systemic issues.
- **Rise of Eco-Conscious Cinema :** A shift is visible in Indian films addressing climate change, gender, rural livelihood and conservation. *Sherni* represents ecofeminism, linking the struggles of a woman forest officer and a tigress under patriarchal systems.
- **Hope for the Future :** These new films encourage coexistence and environmental responsibility. Aim to awaken awareness in the next generation through sensitive storytelling and strong visual narratives.

Natural Epics

- **Ancient Wisdom and Environmental Harmony :** Ancient Indian societies, especially Tamil culture, were deeply nature-conscious, leading to development with minimal ecological harm. Modern pursuit of materialism has disconnected society from nature, accelerating environmental degradation.
- **Eco-Literature as Warning :** Literature has long been a mirror to ecological awareness, offering both celebration and caution.
- Sangam literature (like *Tholkappiyam*, *Silappadhikaram*) reflects deep ecological sensitivity through poetic traditions.
- **Thinai Concept – Ecological Zoning :** Tamil classical literature divides landscapes into five ecological zones (thinai) : *Kurinji* (mountains), *Mullai* (pastoral), *Marutham* (agricultural), *Neidhal* (coastal), *Palai* (arid). Each thinai had associated flora, fauna, deity, and human behaviour, showing nature-culture integration.
- **Water as a Sacred Resource :** Texts like *Tirukkural*, *Akanaanuru* and *Silappadhikaram* emphasize rain, waterbodies and their societal role. Thiruvalluvar said: *"Neer indri amaiyathu ulagu"* – There is no world without water.
- **Tree Worship & Biodiversity Conservation :** Sthalavrikshas (sacred trees) symbollized biodiversity preservation and spiritual reverence. Tree worship and lake construction were seen as acts of ecological and social responsibility.
- **Philosophy of Coexistence :** Ancient Tamil kings and poets viewed environmental conservation as central to governance and prosperity. Nature was treated as divine; disturbing it was believed to invite retribution.
- **Modern Disconnect :** Today's faith in technology over harmony with nature contrasts sharply with ancient ecological ethos. Reorienting science and technology to align with nature is the need of the hour.

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GIST
OF
SCIENCE REPORTER

Topic Remembering the Legacy of Prof. K. Kasturirangan

INDIA BIDS FAREWELL TO LEGENDS OF SCIENCE

India recently mourned the loss of four eminent scientists who made remarkable contributions to science and national development :

- **Dr. K. Kasturirangan :** Renowned space scientist and former ISRO Chairman; key figure behind India's satellite launch and remote sensing programs.
- **Dr. Saroj Ghose :** Veteran museologist and science communicator; instrumental in popularizing science through interactive museums like the Science City in Kolkata.
- **Dr. M.R. Srinivasan :** Nuclear scientist and former Chairman of the Atomic Energy Commission; played a pivotal role in India's nuclear energy programme.
- **Dr. Jayant Narlikar :** Distinguished astrophysicist and cosmologist; known for alternative theories to the Big Bang and promoting scientific temper.

Legacy : These stalwarts shaped India's scientific institutions, policy and public understanding of science. Their passing marks the end of an era but their work continues to inspire future generations.

TRIBUTE TO PROF. K. KASTURIRANGAN

Prof. Krishnaswamy Kasturirangan (1940–2024), a visionary leader in Indian space science, is remembered for his pivotal role in advancing India's space capabilities.

- **Tenure as ISRO Chairman (1994–2003) :** He steered the Indian space programme through a transformative phase.
- **Key Achievements :** Spearheaded successful launches of PSLV and GSLV, boosting India's self-reliance in space technology. Led the development and deployment of advanced civilian remote sensing satellites like IRS-1C and IRS-1D. Oversaw the launch of INSAT series of communication satellites and ocean observation satellites IRS-P3/P4.

Legacy : Prof. Kasturirangan's work laid the foundation for India's global leadership in space applications and his vision continues to guide future missions.

PLASTIC FOOTPRINTS : LEAVING A LEGACY WE NEVER WANTED

Plastic has become an inseparable part of modern life, offering convenience in countless ways—from food packaging to carry bags. However, the ease of single-use plastic use often masks its devastating environmental consequences. Small daily decisions, such as choosing plastic over reusable alternatives, contribute to a much larger global problem.

- **Widespread Use of Single-Use Plastics :** Items like food containers, cutlery, bottles, and carry bags are often used once and discarded.
- **Improper Disposal :** Most plastics are thrown into garbage bins without segregation, eventually reaching landfills or natural ecosystems.
- **Long-Term Environmental Impact :** Plastic takes hundreds of years to degrade, polluting soil, rivers and oceans in the process.
- **Harm to Wildlife and Human Health :** Animals often ingest plastic waste, while microplastics enter the human food chain, affecting health.
- **Consumer Behaviour :** Everyday convenience-based choices significantly amplify the plastic pollution crisis.
- **Lack of Awareness and Responsibility :** Many are unaware of the lasting impact of a single plastic item, leading to careless consumption.

Need for Change : Adopting habits like carrying reusable bags, refusing plastic cutlery and segregating waste is essential.

Conclusion : Plastic pollution is a man-made crisis and its resolution begins with individual action. By adopting sustainable practices and becoming conscious of our consumption, we can reduce our plastic footprint. It is our responsibility to ensure that the legacy we leave behind is one of environmental care, not irreversible damage.

THE BEGINNING OF THE END

Global temperatures have increased by approximately 1°C (2°F) since the pre-industrial era (1850–1900) due to excessive Greenhouse Gas (GHG) emissions. While the number may appear small, it marks the onset of serious and widespread climate change.

- **Accelerated Warming :** Since 1981, the rate of warming has doubled, rising by about 0·32°F (0·18°C) per decade.
- **Anthropocene Epoch :** Scientists term the current era the Anthropocene Epoch—a period where human activities are the dominant force shaping the Earth's climate and ecosystems.
- **Human-Induced Crisis :** Industrialization, unsustainable development and over-consumption have led to breaches in both national and planetary ecological boundaries.
- **Consequences of Progress :** While human progress has enhanced wealth and well-being, it has also triggered environmental degradation, biodiversity loss and climate instability.

Conclusion : The rise in global temperatures signifies more than just a climatic shift—it marks the 'beginning of the end' of ecological stability. Immediate and transformative action is essential to reverse or mitigate the damage. The fate of the planet now rests in human hands.

GLOBAL WARMING INCREASES ARSENIC IN RICE

The Paris Agreement (2015) aims to limit global warming to below 2°C, ideally below 1·5°C, through net-zero emissions by 2050. However, current trends indicate that the Earth is rapidly approaching and may soon exceed these thresholds, with severe environmental consequences.

- **Rising Global Temperatures :** The World Meteorological Organization (WMO) warns that we are close to crossing the 1·5°C limit, with the 2°C barrier likely to be breached before century's end.
- **Visible Impacts of Climate Change :** Increase in extreme weather events like heatwaves, floods, droughts and storms. Sea level rise threatening coastal communities and marine ecosystems. Disruption of ecosystems, leading to biodiversity loss and habitat destruction.
- **Effect on Agriculture and Food Safety :** Global warming intensifies arsenic contamination in rice, a staple food for billions. Higher temperatures and changing water dynamics increase arsenic uptake by paddy plants, posing serious health risks.

Conclusion : Unchecked global warming is not only altering ecosystems but also endangering food security and human health. The arsenic risk in rice is a stark example of how climate change impacts go beyond weather to directly affect our daily lives and nutrition. Urgent, collective action is needed to meet climate goals and safeguard both the planet and public health.

BLOSSOMING HORIZONS : CSIR-IHBT'S TULIP GARDEN PIONEERS SELF-RELIANCE AND SCIENTIFIC TOURISM

The CSIR-Institute of Himalayan Bioresource Technology (IHBT), located in Palampur, Himachal Pradesh, is revolutionizing India's floriculture sector through the creation of an innovative tulip garden under the CSIR-Floriculture Mission.

- **Sustainable Cultivation :** Promotes sustainable tulip farming practices suited to Indian agro-climatic conditions.
- **Self-Reliance in Bulb Production :** Encourages domestic tulip bulb production, reducing dependency on imports and supporting Atmanirbhar Bharat.
- **Scientific Tourism :** Positions CSIR-IHBT as a hub for scientific and eco-tourism, attracting visitors and researchers alike.
- **Farmer Empowerment :** Offers training and support to local farmers, boosting livelihoods and promoting floriculture entrepreneurship.
- **Regional and Economic Growth :** Stimulates economic development in the Himalayan region by integrating science, tourism and agriculture.

Conclusion : CSIR-IHBT's tulip garden is not just a display of floral beauty—it is a symbol

of innovation, self-reliance and sustainable development. Through this initiative, India is taking confident strides toward becoming a global leader in floriculture, while uplifting rural communities and promoting scientific engagement.

THE CLIMATE BITES : A TALE OF A WARMER, SICKER WORLD

As the planet warms due to climate change, the world is becoming increasingly vulnerable not only to extreme weather events but also to the spread of infectious diseases. This growing threat is exemplified by the expanding reach of *Aedes* mosquitoes, known carriers of illnesses such as dengue, Zika and chikungunya. Rising temperatures and changing climate conditions are enabling these disease vectors to survive and thrive in regions that were previously inhospitable to them.

- **Climate Change and Disease Spread :** Rising global temperatures and humidity are making non-tropical regions more hospitable for tropical disease vectors like *Aedes* mosquitoes.
- **Human-Mediated Dispersal :** Global travel and trade allow insects like mosquitoes to cross borders, often unintentionally, as shown in the fictional story of Dr. Mithi and the mosquito in her luggage.
- **Increased Health Risks :** Warmer climates expand mosquito breeding grounds, increasing outbreak risks in regions previously unaffected. This creates new public health challenges in areas unprepared for vector-borne diseases.
- **Symbol of a Changing World :** Aedes' humorous complaints reflect the mosquito's adaptability, hinting at how fast-changing climates benefit some species while threat-ening human health and ecological balance.

Conclusion : The tale of Aedes the mosquito is a creative but cautionary metaphor for how climate change is fuelling the global spread of diseases. A warmer world may be more comfortable for disease carriers, but it poses serious risks to human health, demanding urgent action in climate policy, surveillance and global cooperation.

BIRD MIGRATION AND RELATED STUDIES IN INDIA

Bird migration is a remarkable natural phenomenon where birds travel between their breeding grounds in the northern hemisphere and wintering grounds in the southern hemisphere to escape extreme weather. In India, migrations include both long-distance and short-distance (altitudinal) movements.

- **Types of Migration in India :** Long-distance migration across continents. Short-distance or altitudinal migration, such as movements from the Himalayas to central plains or from higher altitudes to lower plains.
- **Navigation Mechanisms :** Birds use Earth's magnetic field, celestial cues like stars and the moon, and geographical landmarks (mountains, rivers, coastlines) to navigate.
- Some species cover vast distances non-stop, while others stop periodically to rest and feed.
- **Research Gaps :** Despite many studies, several aspects of migration remain unresolved, such as how birds maintain direction over long journeys and how environmental changes affect their routes.

Conclusion : Bird migration reflects nature's incredible adaptability and precision. Continued scientific research, especially in India's diverse ecological zones, is essential to fully understand and conserve these avian travelers and their migratory pathways in the face of climate change and habitat loss.

HYDROGEN HEROES : THE RISE OF COMPOSITE PRESSURE VESSELS AS NEXT-GENERATION HYDROGEN STORAGE SOLUTIONS

With the global transition towards clean energy, hydrogen is gaining prominence as a sustainable fuel due to its high energy density and environmental friendliness. However,

efficient and safe hydrogen storage remains a key technological challenge.

- **Limitations of Earlier Storage Technologies :** Type 1 (metal) and Type 2 (metal-lined composite) vessels were heavy, had low pressure limits, and were prone to corrosion. These issues led to lower fuel efficiency and limited utility in mobile applications.
- **Advancements with Type 4 Pressure Vessels :** Made with non-metallic liners fully wrapped in composite materials. Lightweight design significantly reduces overall system weight—ideal for transport and fuel cell vehicles. Capable of withstanding high pressures, increasing storage capacity and efficiency.
- Highly corrosion-resistant, enhancing safety and durability.
- **Applications :** Suitable for automotive, aerospace, and renewable energy sectors where lightweight, high-pressure storage is critical.

Conclusion : Type 4 composite pressure vessels are transforming the future of hydrogen storage, offering a safe, efficient, and lightweight solution to one of the biggest hurdles in hydrogen energy adoption. Their development marks a significant stride towards a cleaner, mobile, and energy-secure future.

FROM PIXEL TO PETAL : PLANT IDENTIFICATION IN THE DIGITAL AGE

In today's technology-driven world, smartphones dominate daily life, especially among youth. While digital literacy and virtual engagement are at an all-time high, there is a growing disconnect from the natural world, particularly with plants that silently contribute to our well-being.

- **Digital Immersion *Vs.* Nature Disconnect :** Despite technological prowess, many people lack awareness or appreciation of plant life around them. Plants serve as silent guardians, offering shelter, medicine and oxygen, yet remain unnoticed.
- **Role of Technology in Reconnecting :** Digital tools and plant identification apps are now bridging this gap by making botanical knowledge accessible. These apps encourage users to explore their surroundings, identify flora and foster ecological awareness.
- **Educational and Environmental Impact :** Promotes environmental responsibility, particularly among the younger generation. Merges technology with sustainability, encouraging curiosity about biodiversity.

Conclusion : In an era dominated by screens and code, there is an urgent need to reconnect with the living world. Using digital tools to understand and appreciate plants can turn smartphones into gateways for environmental awareness, helping people grow from passive users to active stewards of nature.

WEAVER ANTS : GUARDIANS OF THE CANOPY

Weaver ants (*Oecophylla smaragdina*), native to Southeast Asia and Australia, are known for their complex social behaviour, ingenious nest-building, and ecological importance. These ants play a vital role in natural ecosystems and sustainable agriculture.

- **Unique Nest Construction :** Use silk produced by larvae to weave leaves together and build suspended nests high in tree canopies.
- **Advanced Social Structure :** Exhibit highly organized colony behaviour, including division of labour, cooperation and communication.
- **Ecological Role :** Act as natural pest controllers by preying on harmful insects, thus benefiting crops and reducing the need for chemical pesticides.
- **Agricultural Benefits :** Increasing interest in using weaver ants in biological pest management, especially in sustainable farming systems.

Conclusion : Weaver ants are more than just insect curiosities—they are ecological guardians of the canopy. Their behaviours highlight nature's sophistication, while their role in pest control and sustainable agriculture positions them as valuable allies in maintaining ecological balance and promoting eco-friendly farming.