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Gist of Essential Magazines

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GIST OF YOJANA

Topic

Skilling India's Workforce

SKILL INDIA MISSION : A DECADE OF TRANSFORMATION AND THE ROAD AHEAD

Over the past decade, India's skilling ecosystem has witnessed a transformative shift driven by policy reforms, digital innovations, and industry collaboration. The Skill India Mission launched in 2015 has empowered millions with future-ready skills, aligning training with emerging technologies and market demands. As India moves toward Viksit Bharat @2047, it aims to become a global hub for skilled talent.

Building a Robust Skilling Framework

- Emphasis on convergence between education and skilling—aligned with the National Education Policy (NEP) 2020 and National Credit Framework (NCrF).
- Ministry of skill Development and Entrepreneurship (MSDE) established to integrate 20 programmes scattered across various ministries.
- Over 33 NSTIs, 15,000+ ITIs, 1,000+ PMKKs, and 500+ JAN Shikshan Sansthans built a national skilling infrastructure.
- Skilling in areas like robotics, drones, electric vehicles, green energy, 3D printing, AI, etc.

Expanding Industry Linkages and Apprenticeships

- 42 lakhs candidates engaged under apprenticeship programme.
- Over 5,000 establishments onboarded under National Apprenticeship Promotion Scheme (NAPS).

Leveraging Technology and Digital Transformation

- Skill India Digital Hub (SID) platform launched in 2023 to offer a unified solution for learners, employers and training partners.
- Learners can access skill-based content, e-counselling, and video tutorials, and receive AI-powered career pathways.
- Employers can list job vacancies and access certified talent.
- Integration with DigiLocker, Aadhaar and other national digital stacks for seamless user experience.
- Use of AI/ML for real-time analytics and personalized learning.

The Future of Work and International Mobility

- Establishment of Skill India International Centres (SIICs) to prepare youth for overseas employment.
- Greater focus on green skills, Industry 4·0, soft skills and adaptability to evolving global demands.
- India leveraging its demographic dividend to emerge as a global talent hub.
- Supporting the gig economy and platform workers with portability and social security frameworks like e-SHRAM.

AI Mission and Skilling Strategy

- AI-led skilling to promote next-generation technologies like AI, ML, IoT, Blockchain and Cybersecurity.
- Introduction of AI curriculum in higher education and vocational institutions.
- Partnerships with tech companies to facilitate real-world, experiential learning and mentorship.
- Aim to make India a global leader in AI talent and innovation.

Budgetary Allocation and Convergence of Schemes

- Union Budget 2024-25 allocated ₹ 8,800 crore for skill India Programme.
- Upgradation of 1,000 ITIs under hub and spoke model.
- To established five National Centres of Excellence for skilling with training infrastructure aligned with industry needs.

Skill Financing : Unlocking Access to Quality Training

- Development of innovative financing mechanisms like :
  - Outcome-based funding
  - Skill vouchers
  - Social impact bonds.
- Public-private partnerships are promoted to ensure quality and accessibility.
- Digital finance and DBT systems streamlined fund flow and improved transparency.

Empowering Traditional Sectors and Rural Workforce

- **PM Vishwakarma Yojana :** Skill certification, financial support and toolkit incentives to traditional artisans in 18 artisanal trades.

- Craftsman Trading Scheme (CTS) for preserving and revitalising traditional heritage crafts.
- NSQF-compliant traditional courses in J&K for safeguarding rich artisanal legacy.
- PM-JANMAN and Van Dhan Yojana for skill training in tribal communities.

Challenges and the Road Ahead

- Need to expand reach in rural and remote areas.
- Improving the aspirational value of vocational training and addressing gender and digital divides.
- Aligning with emerging job markets, including green economy, gig work and international mobility.
- Strengthening the trainer ecosystem, enhancing quality assurance and incentivizing private sector involvement.

Conclusion

India's skill development landscape has undergone a structural transformation, aligning itself with future market demands, digital innovation and inclusive growth goals. With a strong foundation now in place, the road ahead lies in sustaining momentum, deepening public-private collaboration and empowering every citizen to contribute to Viksit Bharat @2047.

ENHANCING SKILLS FOR INDIA'S EXPORTS

India aims to become a major global export hub. Education, skilling and policy support are crucial for positioning India competitively in global manufacturing and trade.

Export-driven India is the Future

- Export-oriented sectors like electronics, chemicals and engineering products have shown significant growth.
- India's electronics exports surged from $ 11 billion (FY21) to $ 26 billion, aided by policy incentives and infrastructure development.
- The Production Linked Incentive (PLI) scheme is helping address underemployment by creating opportunities for youth.

Mobile Exports Surge

- Mobile exports crossed $ 21 billion in the first 11 months of FY25, up from just $ 0·2 billion in FY14.
- This boom has led to employment growth and the inclusion of Indian companies in global value chains.
- Export-oriented manufacturing is driving industrialisation in Tier 2 and Tier 3 cities.

Export Growth and Regional Equity

- Growth in exports has increased manufacturing hubs in states like Tamil Nadu, Karnataka and Uttar Pradesh, aiding regional equity.
- Strengthening exports improves India's soft power and enhances global diplomatic and trade relationships, especially with ASEAN and the US.
- Export-led renewable energy and green tech can help India lead the global energy transition.

Challenges to Export Competitiveness

- Infrastructure and logistics inefficiencies (*e.g.*, 86 port congestion, high logistics costs) reduce export competitiveness.
- India's logistics cost-to-GDP ratio remains high; PM Gati Shakti aims to address this through multimodal transport infrastructure.
- Over-reliance on a few sectors like petroleum and IT makes India vulnerable.

Other Structural Barriers

- Global supply disruptions, stricter environmental norms and geopolitical tensions affect exports.
- SMEs face issues like lack of access to finance, complex rules and low awareness of global compliance standards.
- Non-tariff barriers in major markets like the US and EU increase rejection rates of Indian goods.

Governmental Initiatives for Boosting India's Exports

- An Export Promotion Mission with a budget of ₹ 2,250 crore was launched to improve market access, reduce trade barriers and simplify procedures.
- Proposed creation of BharatTradeNet, a digital network to ease documentation and trade finance.
- Upgradation of the Unified Logistics Interface Platform (ULIP) is expected to reduce transaction costs and boost transparency.

Measures to Enhance Export Growth and Competencies

- India must modernize logistics and port infrastructure.

- Digital technologies, including AI-driven risk management, can streamline customs and reduce delays.
- The development of new export hubs and supply chain enhancement is necessary for decongestion and efficiency.

Conclusion

Enhancing skills for exports is vital for India to sustain high growth, generate quality employment and deepen its integration into global value chains. While, India's export performance—especially in electronics and mobile manufacturing—has shown promise, overcoming infrastructural, logistical and regulatory hurdles remains key. Strategic investments in skilling, logistics, digital trade facilitation, and support for MSMEs can unlock India's potential as a global manufacturing and export powerhouse. With coordinated efforts, India can achieve inclusive and sustainable export-led growth in the coming decade.

THE DIGITAL PATH TO A DEVELOPED INDIA

Baramati, Maharashtra, is revolutionizing agriculture through Artificial Intelligence (AI), resulting in reduced use of fertilizers, efficient water use, and higher yields. This story represents India's broader AI-powered transformation, showcasing how digital technologies are reshaping lives and accelerating the journey towards *Viksit Bharat by 2047*.

Writing the Digital Destiny

- India is driving its digital future with a robust focus on :
  - Digital Public Infrastructure (DPI)
  - AI
  - Semiconductor and electronics manufacturing
- While, India has long been a global leader in software, it is now rapidly advancing in hardware.
- Construction of five semiconductor plants is strengthening India's global electronics position, with electronics becoming a top-three export.

Building AI—Compute, Data and Innovation

- India is launching its first *Make-in-India* chip this year.
- Key AI initiatives :
  - Launch of India's common compute facility with 18,000+ subsidised Graphics Processing Units (GPUs).
  - Democratization of AI through affordable access to computing power for researchers, startups and academia.
  - Development of large, anonymised datasets for training AI models—ensuring inclusivity and reliability.
  - AI-driven applications in agriculture, traffic management and weather forecasting.

India's DPI, a Blueprint for Digital Innovation

- India's DPI is globally acclaimed, influencing platforms like :
  - Aadhaar
  - UPI
  - DigiLocker
- DPI integrates AI and governance platforms to deliver intelligent solutions.
- Global attention :
  - Japan has adopted India's UPI framework.
  - Countries at the G20 summit expressed interest in replicating India's DPI model.

The Mahakumbh, a Sangam (confluence) of Tradition and Tech

- Mahakumbh 2025 used DPI and AI to manage massive crowds and transport.
- Real-time monitoring of railway movement improved crowd control.
- AI chatbot 'Bhashini' supported multilingual assistance and voice-based communication for issue resolution.
- Mahakumbh set a global example of inclusive, efficient and secure tech-enabled event management.

Building a Future-ready Workforce

- India is adding one *Global Capability Centre (GCC)* every week, enhancing its global research and tech status. The growing digital workforce requires :
  - Continuous investment in education and skill development.
  - Job-ready curricula through revamped higher education policies like *NEP 2020*.

Pragmatic Approach Towards Regulating AI

- India is developing a forward-looking regulatory framework that :
  - ❑ Encourages innovation while ensuring responsibility
  - ❑ Balances innovation and governance
- The government is funding AI-driven university research and developing tools to safeguard data privacy, cybersecurity and fairness.

Conclusion

India is advancing towards inclusive growth by leveraging DPI, AI and a pragmatic regulatory approach. Its digital strategy is not just about technology and infrastructure, but about people. With continuous innovation, investment in education, and a strong regulatory foundation, India is confidently walking the digital path to becoming a developed nation.

INDIA'S TURF : A GLOBAL INVESTOR HAVEN

India, under the leadership of Prime Minister Narendra Modi, has transformed into a robust and competitive global investment destination. With a focus on policy reforms, infrastructure, and technology, the nation has become a key player in the global economic landscape, aligning with the vision of a 'Viksit Bharat @2047'.

What Have Been The Progressive Trends ?

- Focus on homegrown solutions over imports :
  - ❑ Prioritising domestic production.
  - ❑ Ensuring fair royalties for IP.
  - ❑ Promoting local manufacturing.
- India rose from ninth to fifth place globally as an investment destination (PwC 2024 CEO Survey).
- The survey involved 5000 CEOs from 105 countries.

Role of MSMEs

- MSMEs play a transformative role in India's economic growth.
- The government committed to nurturing and strengthening the sector.

Global Recognition & Leadership Support

- International leaders and global CEOs (e.g., Tim Cook, Borge Brende) recognize India's evolving investment opportunities.
- India has become a reliable and attractive destination for global capital.

Strategy & Approach

- Promote 'Make in India'
- Liberalise Sectoral Policies
- Introduce GST, tax reforms
- Implement single-window system; Reduced compliance burden; Decriminalised provisions

Outcomes

- Strong FDI inflows
- Booming IPO market
- Growing retail and SIP investor participation
- Companies from various sectors are raising capital successfully.

Service Sector : Fueling Growth Domestically and Globally

- Contribution to GVA rose from 50·6% (FY14) to 55·3% (FY25).
- The service sector grew at 8·3% (FY23 to FY25).
- India ranked 7th in global service exports with a 4·3% share in 2023.
- Export growth rose to 12·8% (April–November 2024) from 5·7% (FY24).
- Services cushioned GDP growth when manufacturing slowed.

Impact of FDI Liberalisation

- 119% rise in decadal cumulative FDI (2014–24).
- India received $991 billion in FDI from 2000–2024; 67% in the last decade.
- FDI in the manufacturing sector rose 69% from $ 98B (2004–14) to $165B (2014–24).

Impact of Ease of Doing Business Reforms

- IPO funds raised in the first half of FY25 were more than double that of FY24.
- Indicates a surge in market activity and investor confidence.

Conclusion

India's transformation into a global investment hub is a result of visionary leadership, policy reforms, strong investor confidence and a thriving domestic market. These trends reflect a sustainable growth trajectory and a promising future, positioning India as a key force in the global economy by 2047.

TRANSFORMING INDIA'S FINANCIAL LANDSCAPE

India's insurance and financial services sectors are undergoing transformative changes aimed at achieving the dual goals of economic expansion and financial inclusion by 2047.

1. Boost in Foreign Investment and Reforms

- The Foreign Direct Investment (FDI) cap in insurance was raised from 74% to 100%, in the Union Budget 2025-26.
- These reforms align with India's goal of becoming a $ 10 trillion economy by 2047 and IRDAI's vision of 'Insurance for All'.
- Full foreign ownership is expected to improve technology adoption, distribution channels and market reach.

2. Market Growth and Penetration

- Despite low insurance penetration in India (3·7% *Vs.* the global average of 7%), premium collections are growing :
  - Life insurance premiums up by 14%.
  - Total collections up by 19% in FY25.
- The industry is projected to reach US $ 222 billion by 2026, contributing to job creation, infrastructure development and long-term savings products like pensions.

3. Regulatory and Policy Support

- IRDAI may issue guidelines promoting investment in rural and underdeveloped areas while ensuring financial discipline.
- Simplification of tax regulations and offering incentives can promote long-term foreign investment.

4. GST Reforms for Insurance Products

- Current GST rate : 18% on life, health insurance and ULIPs.
- Lowering GST could make premiums more affordable, especially for low-income groups, boosting overall insurance uptake.

5. Technology-Driven Insurance Services

- Establishment of a Centre of Excellence in AI for Education with ₹ 500 crore investment.
- AI to provide personalised learning and advisory services in insurance.
- AI-powered chatbots, automated services and customised insurance plans will enhance customer experience and policy adoption.

6. Digitalisation and Cybersecurity

- Focus on reducing misselling, delayed settlements and improving data security.
- Emphasis on building a digitally skilled workforce to support the evolving insurance ecosystem.

7. Financial Inclusion via India Post Payment Bank (IPPB)

- Expansion of IPPB services in rural areas ensures banking access for underserved populations.
- IPPB network : More than 2 lakh postmen and Gramin Dak Sevaks, 1·36 lakh post offices, 22,251 Head and Sub Post Offices. RBI's Financial Inclusion Index rose from 53·9 (2021) to 64·2 (2024).
- IPPB caters to retired seniors, small business owners, farmers and homemakers, offering services like savings, insurance and credit access.

ENHANCING INDIA'S MANUFACTURING AND TRADE

India is strategically reforming its manufacturing and trade sectors to boost GDP growth, self-reliance and global competitiveness. Through targeted initiatives like the National Manufacturing Mission (NMM), Production-Linked Incentives (PLI), MSME support, digital trade facilitation, and export promotion, the government envisions India as a global manufacturing and export hub by 2030.

1. National Manufacturing Mission (NMM)

- Aims to raise the manufacturing sector's GDP share to 25% by 2030 (currently ~16-17%).
- Focus areas : Ease of Doing Business (EoDB); Clean tech manufacturing; Local production of high-demand goods (*e.g.*, semiconductors, EV components); Upskilling the workforce for in-demand jobs.
- Supports small, medium and large industries with execution roadmaps and coordination across ministries.

2. Trade Deficit Reduction

- India faces a trade deficit of over $ 250 billion, primarily due to heavy imports of electronics, machinery and petroleum.
- NMM aims to reduce dependency by encouraging local production and export-

oriented industries to boost foreign exchange.

3. Customs Duty Reforms

- Basic Customs Duty (BCD) exemptions granted for key raw materials (lithium, cobalt, zinc, etc.) to reduce input costs and support local manufacturing.
- Import duty eliminated on specific smartphone components (camera modules, PCBs, USB cables) to boost domestic electronics manufacturing.

4. Production-Linked Incentive (PLI) Scheme

- Launched in 2020 for electronics and IT hardware, now expanded to 14 key sectors, including food, pharma, automobiles and textiles.
- India is now the second-largest mobile phone producer globally.
- ₹ 8,885 crore allocated in Budget 2025-26 for PLI in electronics & IT—highest among all sectors.
- Focused PLI initiatives to strengthen EVs, auto components and sustainable mobility solutions.

5. Micro, Small, and Medium Enterprises (MSME) Empowerment

- 5·93 crore MSMEs contribute 35% of India's manufacturing output and 30% to GDP.
- New credit guarantee limit raised to ₹ 10 crore.
- Focus on labour-intensive sectors like textiles, leather and footwear.
- Enhanced financial access, reduced compliance burden and incentives for women, SC/ST entrepreneurs.

6. Scheme to Make India a Global Toy Hub

- Focuses on the development of sustainable, high-quality toys by building clusters and skilling initiatives under the 'Make in India' vision.

7. Measures for Labour-Intensive Sectors

- The leather and footwear sectors receive support through : Lower export duties; Product-specific schemes; Full BCD exemption on Blue Leather; Infrastructure development to support job creation (22 lakh new jobs expected).

8. Export Promotion Mission

- Aims to increase India's global export share through : Better marketing and branding support; Infrastructure upgrades; Trade fairs and product-specific strategies; Mission aligns with the vision to make India an export powerhouse.

9. Bharat Trade Net – Digitalising Trade

- A one-stop digital trade facilitation portal.
- Will integrate various export-import processes (licensing, logistics, compliance).
- Streamlines trade documentation and improves transparency, especially for MSMEs and startups.

10. Infrastructure Development for Trade

- Dedicated investment in port connectivity, logistics parks and multi-modal transport to improve last-mile trade connectivity.
- Emphasis on reducing turnaround time, logistics costs and improving supply chain efficiency.

Conclusion

With a coordinated push across policy reforms, digital initiatives and strategic investments, India is set to transform into a globally competitive manufacturing and trade hub. These initiatives will not only drive economic growth but also ensure job creation, technological advancement and sustainable development.

April
2025

GIST
OF
KURUKSHETRA

Topic

Panchayati Raj

THE PANCHAYATI RAJ SYSTEM : EMPOWERING WOMEN'S LEADERSHIP IN RURAL INDIA

The Ministry of Panchayati Raj has undertaken consistent efforts to enhance the leadership capabilities of women representatives in Panchayati Raj Institutions (PRIs). Over the years, various initiatives, legal reforms, and capacity-building programs have empowered women in rural governance, improving decision-making and administrative efficiency.

1. Historical and Cultural Legacy of Women's Leadership

- **Vedic Era :** Women like Gargi and Maitreyi actively participated in education, debates and governance.
- **Medieval Period :** Icons like Rani Lakshmibai, Maharani Ahilyabai Holkar demonstrated administrative and military leadership.
- **Cultural Ethos :** Indian traditions have long upheld respect and empowerment of women, laying the foundation for their role in governance.

2. Constitutional Provisions & Representation

- **73rd Constitutional Amendment Act, 1993 :** Gave constitutional status to the three-tier Panchayati Raj system. Reserved 1/3rd seats for women in PRIs; around 46% of 31·5 lakh elected representatives today are women.
- 21 States & 2 UTs have increased women's reservation to 50%.

3. Ministry-Led Capacity Building Initiatives

- **Training under RGSA (2022-23 to 2024-25) :** Trained 23·14 lakh elected women Panchayat representatives to improve skills and governance roles.
- **Sashakt Panchayat-Netri Abhiyan :** Launched during International Women's Day (March 4–5, 2024). Focuses on leadership, decision-making and effective role-playing. A training module with games and activities was introduced.

4. Women-Friendly Panchayat Initiatives

- **Model Women-Friendly Panchayats** to be established in every district.
- **Hitashi Gram Panchayat Initiative :** Aims for at least one such model Panchayat per district; Focus on marginalized, disabled, elderly and SHG women's participation.
- **Gram Panchayat Development Plans (GPDPs) :** Only 1% incorporated women-friendly themes in 2023-24. Increased to 4.57% in 2024-25, targeted to reach 5% in 2025-26.

5. Legal & Social Safeguards

- **A primer released by the Ministry addresses :** Legal tools against gender-based violence (GBV); Tools to empower elected women to address issues in their communities.

6. Recognition & Encouragement

- **National Panchayat Awards 2024 :** 45 Panchayats honoured, 40% were women-led. Highlighted themes included : health, sanitation, poverty-free Panchayats and child-friendly governance.

Conclusion

The Indian Panchayati Raj system has become a powerful medium for promoting gender-inclusive governance in rural India. While remarkable progress has been made through legal reforms, capacity building, and strategic initiatives; challenges like low representation in development plans and social interference still persist. Continued efforts towards training, sensitization and policy implementation are essential to achieve sustainable empowerment of women in grassroots governance.

CONTOURS OF DEVOLUTION TO PANCHAYATS : A FRESH LOOK – PANCHAYAT DEVOLUTION INDEX 2024

The Panchayat Devolution Index (PDI) is a tool designed to assess the health of local governance by evaluating the extent to which states devolve functions, finances and functionaries to Panchayati Raj Institutions (PRIs). It serves not just as a ranking mechanism but also promotes transparency, accountability and inclusive governance.

Key Constitutional Basis

- Part IX of the Constitution (73rd Amendment Act, 1993) mandates devolution of power to Panchayats.
- Article 243G empowers State Legislatures to devolve powers relating to 29 subjects (Eleventh Schedule) such as agriculture,

rural housing, drinking water and education.

Why the Index Matters ?

- Highlights area where reforms are needed and where states are excelling.
- Helps create targeted policies for effective decentralization.
- Provides a framework for transparency in local governance.

Evolution of the Devolution Index

- **Early years :** Focused on the '3F' framework – **Functions, Finances, Functionaries**.
- **2008** : Added 'Framework' dimension to assess compliance with constitutional mandates (*e.g.*, State Election Commissions, SFCs).
- **2009 onwards :** Shifted to a two-stage methodology :
  - ❑ **First stage :** Identifying States meeting mandatory framework dimensions.
  - ❑ **Second stage :** Calculating scores across six dimensions with 20+ indicators.

Six Key Dimensions in 2024 Index

1. Functions
2. Finances
3. Functionaries
4. Framework
5. Capacity Enhancement
6. Accountability

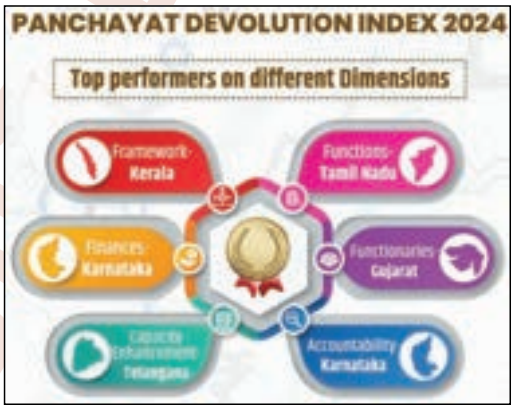
These dimensions reflect the breadth and depth of decentralization and highlight regional disparities.

Recent Developments and Achievements (2022-23)

- Increase in overall devolution: From 39·9% to 43·9% (2013-14 to 2022-23).
- 'Capacity enhancement' increased from 34·6% to 44·6%.
- 'Functionaries' dimension rose from 39·6% to 50·9%.
- Financial devolution improved from 32·05 to 37·04.
- Over 4600+ Gram Panchayat offices sanctioned.
- Over 31,000+ computers provided to PRIs under the RGSA scheme.

Top States as per PDI Rankings

2015-16	2022-23
Kerala	Karnataka
Maharashtra	Kerala
Karnataka	Tamil Nadu
Tamil Nadu	Maharashtra
Gujarat	Uttar Pradesh
Sikkim	Gujarat
West Bengal	Tripura
Telangana, Haryana	Rajasthan
Madhya Pradesh	West Bengal
Rajasthan	Chhattisgarh



Conclusion

The Panchayat Devolution Index 2024 reflects a significant move toward strengthening local self-governance in India. By highlighting gaps and progress, it has become a vital tool for policymakers, ensuring democratic decentralization, effective service delivery and responsive governance at the grassroots level.

THE DECADE OF EMPOWERING PANCHAYATI RAJ INSTITUTIONS (PRIs)

Historical Background

- **April 24, 1993 :** The 73rd Constitutional Amendment was passed, granting constitutional status to PRIs.
- Introduced Part IX (Article 243) in the Constitution and created a three-tier system of Panchayats.
- Mandated devolution of powers and responsibilities to Panchayats, especially in areas of economic development and social justice (Article 243G).
- Ensured representation of SCs, STs, OBCs, and women (about 46% of elected representatives today are women).

Role in Rural Transformation

- Over 6·5 lakh villages and 2·7 lakh Gram Panchayats govern ~64% of India's population.

- PRIs have emerged as powerful mechanisms for inclusive development, empowerment of marginalized communities and democratic decentralization.
- Gram Panchayats are now central to rural development and local governance.

Key Initiatives and Innovations

1. Shashakt Panchayat Netri Abhiyan :

- Dedicated programme to empower elected women representatives of Panchayats.
- Focus on capacity building, leadership development and enhanced participation.

2. Effective Implementation of PESA :

- Ensures self-governance in Scheduled Areas under the Panchayats (Extension to Scheduled Areas) Act, 1996.
- Promotes local traditions, rights over natural resources and tribal autonomy.
- States are being supported to align their laws and rules in line with PESA provisions.

3. Thematic Gram Panchayat Development Plan (GPDP) :

- A structured planning model covering 9 thematic areas : Poverty-free and enhanced livelihoods; Healthy village; Child-friendly village; Water-sufficient village; Clean and green village; Self-sufficient infrastructure; Socially secured village; Village with good governance and Women-friendly village.

4. Provision of Basic Services :

- **PRIs play a key role in :** Rural infrastructure (roads, water, electricity); Health, education, and sanitation; Women & Child Development; Social welfare and PDS; Fisheries, agriculture, housing and local industries

5. E-Governance & ICT Initiatives :

- Use of e-Gram Swaraj Portal, mobile apps, and MIS systems for : Online GPDP planning and budgeting; Asset management; Financial transparency; Panchayat-level weather forecasting system for timely local climate information to help farmers and administration.

6. Transparency through Use of Technology :

- Initiatives such as the Citizen Charter Campaign promote accountability.
- Digitally enabled monitoring and geo-tagging of assets ensure transparency.
- Promotes social audits, grievance redressal and people-centric governance.

Recognition and Capacity Building

National Panchayat Awards :

- Annual recognition under categories like Deen Dayal Upadhyay Panchayat Sashaktikaran Puraskar for the best performing Panchayats.
- Incentivizes innovation, transparency and efficiency in governance.

Capacity Building through Rashtriya Gram Swaraj Abhiyan (RGSA) :

- **Since 2022-23 :** 1·11 crore participants (ERs and functionaries) trained. ₹ 2,116·97 crore allocated for capacity building up to 2024-25.

SVAMITVA Scheme :

- Survey of Villages and Mapping with Improvised Technology in Village Areas.
- Empowers villagers by issuing property cards through drone surveying.
- Enhances revenue collection, reduces property disputes and improves land governance.

Conclusion

Panchayati Raj Institutions have evolved into engines of grassroots democracy and development, especially in the last decade. With strategic initiatives like PESA, Thematic GPDP, SVAMITVA, and ICT tools, India is paving the way for Viksit Panchayats, thus strengthening the foundation for a Viksit Bharat.

REVISITING STATE PRI ACTS : A NECESSITY FOR MAKING PRIs MORE EFFECTIVE

Recent findings by the Ministry of Panchayati Raj (2024) reveal serious concerns regarding the fiscal health of GPs, raising questions about the effectiveness of existing State PRI Acts.

- Gram Panchayats (GPs) have been legally empowered to levy taxes and user charges under the State Panchayat Raj Acts for delivering public services.
- As per the Ministry of Panchayati Raj (MoPR) Report 2024, the fiscal health of PRIs, especially GPs, is in critical condition.
- The 73rd Constitutional Amendment Act (1992) aimed to make PRIs strong local self-governance institutions, with financial autonomy to support development programs.
- Despite legal empowerment, revenue generation remains poor, mainly due to :
  - Low collection of Own Source Revenue (OSR).
  - Limited taxation powers at the district and block-level Panchayats.
- The urgent need is to revisit and reform State PRI Acts to :
  - Enhance the fiscal powers of PRIs.
  - Enable sustainable local-level governance.
  - Ensure effective service delivery and decentralized development.

Conclusion

To ensure that PRIs, especially Gram Panchayats, function as robust and self-sustaining institutions, there is an urgent need to revisit and strengthen State PRI Acts. Enhancing their financial autonomy and capacity to generate own-source revenue (OSR) is essential for empowering grassroots governance and achieving inclusive rural development.

UNTAPPING THE ECONOMIC POTENTIAL OF RURAL INDIA THROUGH SVAMITVA PROPERTY CARDS

The SVAMITVA Scheme (Survey of Villages and Mapping with Improvised Technology in Village Areas) was launched to provide property cards to rural households for inhabited (Abadi) lands. It aims to ensure financial inclusion, legal ownership and sustainable rural development by issuing formal documentation backed by state revenue or Panchayati Raj Acts.

Key Highlights :

- **Problem Addressed :** Abadi lands in rural India traditionally lacked formal ownership records, leading to :
  - Presumptive property rights.
  - Unresolved land disputes.
  - Ineligibility for bank loans due to a lack of collateral.
- **Solution :** The SVAMITVA Scheme issues legal property cards to empower rural families, offering them :
  - Recognized ownership documentation.
  - Access to institutional credit and banking Security for economic transactions.
- **Launch :**
  - Introduced on 24th April, 2020 (National Panchayati Raj Day) by PM Narendra Modi
  - Objective : Provide 'Record of Rights' to every rural household.
- **Implementation Strategy :**
  - Collaboration with the Survey of India and states through MoUs.
  - Use of drone-based technology for high-resolution maps and accurate surveys.
  - Emphasis on scientific land surveys and data-driven governance.
- **Progress So Far :**
  - Over 2·41 crore property cards generated.
  - Coverage of more than 1·61 lakh villages.
  - Enhanced transparency, governance, and rural economic empowerment.

Impact

The SVAMITVA scheme strengthens the role of Panchayati Raj Institutions in governance and creates a foundation for :

- Better land management.
- Efficient implementation of rural development schemes.
- Data-driven decision-making and inclusive financial systems.

MERI PANCHAYAT APPLICATION – A WATCHDOG OF RURAL DEMOCRACY

The Ministry of Panchayati Raj has introduced the Meri Panchayat mobile application to bridge the digital divide in rural governance. Designed to empower Gram Panchayats and improve participatory democracy, the app aims to make Panchayat-related information and services accessible, transparent and user-friendly for citizens, elected representatives and officials alike.

The Meri Panchayat app centralizes various services and information previously scattered across different platforms. This initiative supports the holistic development of rural areas by enhancing public access to data related to governance, development works, financial transactions and social audits.

Key Features & Functions

1. Unified Access to Panchayat Information : Comprehensive details on Panchayat profiles, elected representatives and officials. Real-time updates on development projects, fund utilization and financial records.

2. Citizen Participation & Governance : Empowers citizens to actively engage in the Panchayat's development planning. Allows uploading of geo-tagged photographs to support project suggestions. Facilitates reviews and ratings for ongoing projects to ensure transparency and accountability.

3. Social Audits and Transparency : Encourages citizens to monitor physical and financial progress of development works. Holds Panchayat bodies accountable through public oversight.

4. User-Friendly and Accessible : Available in multiple Indian languages. Simple OTP-based registration using mobile numbers. Location-based services for personalized data, like weather forecasts and area-specific updates.

5. Promoting Good Governance :

- **Accountability :** Displays fund utilization and project progress publicly.
- **Public Participation :** Enables involvement in planning and monitoring.
- **Transparency :** Makes the Panchayat's functioning visible to residents.

6. App Availability : The app is downloadable on both Android and iOS platforms. Once registered, users can access all services in their preferred language, promoting inclusivity.

Conclusion

By enhancing transparency, encouraging community participation, and enabling real-time access to vital Panchayat data, the app serves as a digital watchdog of grassroots democracy. It is a crucial tool in strengthening the principles of accountability, transparency and inclusive rural development, aligning with the vision of sustainable governance by 2030.

GRAM MANCHITRA AIDING IN VILLAGE PLANNING

The soul of India is Gram. Viksit Bharat aims to empower local governance at the Gram Panchayat level through effective Gram Panchayats. Gram Manchitra (Geo-spatial Visualization and Planning Tool) plays a pivotal role in this vision. The geospatial technologies provide a substantial value addition to rural planning and development, addressing the differences between rural and urban planning to enhance it. Using spatial planning in local self-governance can ensure openness and accountability in the functioning of GPs.

Gram Manchitra Application

A Geographic Information System Application to Encourage Spatial Planning by the Gram Panchayat : The Gram Manchitra Application is a visualization and planning tool developed to enhance village-level self-sustainability. It helps in making the planning of Panchayat Development Plans (PDP) data-driven, inclusive and participatory.

Functionalities : Unified Geo-Spatial Platform. Decision Support System for Asset Tracking, Cost Estimation, Impact Assessment & Identification of Potential Sites

This platform utilizes advanced GIS technologies to : Allow faster and more accurate assessment of local needs. Optimize the use of amenities and resources. Support planning for essential services like health centers, schools, veterinary hospitals and training centers.

Gram Manchitra for Viksit Bharat : Viksit Bharat is a comprehensive vision by the Government of India to transform the country into a developed nation by 2047. Gram Manchitra contributes to this by :

- Empowering local bodies to develop initiatives for economic and social development.
- Integrating digital tools with the Digital India initiative for greater transparency and public service delivery.

By strengthening Gram Panchayats, this initiative ensures : Local development based on real-time, ground-level data. Transparent and accountable execution of development projects. Active participation of citizens in governance.

Village Planning : Panchayats are mandated to prepare Panchayat Development Plans (PDPs) for economic growth and social justice using available resources. These plans must be :

- Comprehensive and participatory, involving full convergence with schemes of Central Ministries and Line Departments across 29 subjects listed in the 11th Schedule of the Constitution.

- Rooted in local issues, perceptions and resource availability.
- Supported by data collection and GIS surveys to inform decisions.

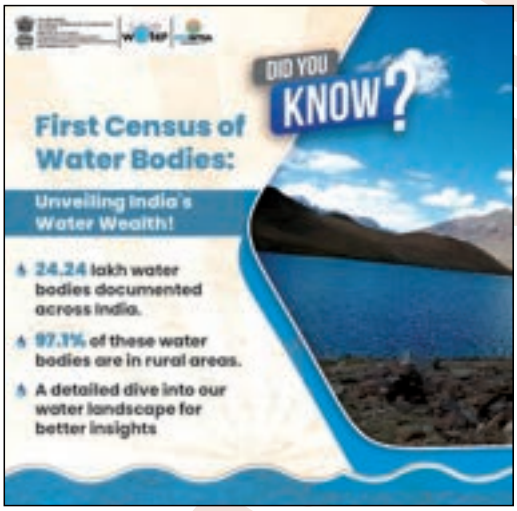
Under Article 243G, Gram Panchayats are recognized as local self-governments responsible for delivering basic services and addressing the needs of the poor and marginalized. GP development plans must reflect people's priorities and utilize spatial tools for effective implementation.

Recent efforts by the NIC include the development of a multi-layer framework for planning called Bharatmaps, which integrates :

- Administrative boundaries up to the GP and Village levels.
- 3·5 million asset infrastructure layers at 1:10k scale.

WATER MANAGEMENT THROUGH PANCHAYATI RAJ INSTITUTIONS

Water, the inevitable component of any development activity, is best managed at the local level. Recognizing this, India's visionary leadership institutionalized Panchayati Raj Institutions (PRIs) through the 73rd Constitutional Amendment Act (1992). This amendment empowered PRIs to act as effective agents in managing natural resources, especially water. As frontline institutions in rural governance, PRIs are crucial for participatory planning, implementation, and monitoring of water-related activities, ensuring both inclusivity and sustainability.



Role of PRIs in Water Management

1. Participatory Irrigation Management (PIM) :

- PRIs have facilitated the formation of Water User Associations (WUAs) for equitable irrigation distribution.
- They help maintain minor irrigation systems and resolve water-sharing disputes locally.
- PRIs coordinate with the Command Area Development Authority (CADA) to implement participatory irrigation.

2. Rural Drinking Water Supply Schemes :

- Through schemes like Jal Jeevan Mission, PRIs ensure tap water connections to every rural household.
- They are responsible for preparing Village Action Plans (VAPs) for drinking water security.
- They manage Village Water and Sanitation Committees (VWSCs), promoting community ownership.

3. Management of Water Bodies in Rural Areas :

- PRIs are entrusted with the renovation, desilting and maintenance of traditional water bodies like ponds, tanks and wells.
- Such initiatives improve local water storage capacity, groundwater recharge and ecological balance.

4. MGNREGS and Water Conservation :

- The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is used for constructing water harvesting structures, check dams, farm ponds and percolation tanks.
- PRIs play a pivotal role in planning, implementing and monitoring water conservation works, ensuring convergence with other schemes.

5. Village-level Water Budgeting :

- Some states like Maharashtra and Gujarat have empowered PRIs to prepare water budgets estimating demand *Vs.* supply at village level.
- This promotes rational water use, crop planning based on water availability and community awareness.

6. Utilization of 15th Finance Commission Grants :

- The 15th FC allocated substantial grants to rural local bodies for drinking water and sanitation.

- PRIs are the nodal implementing bodies, ensuring transparency and accountability in fund utilization.

7. Groundwater Management :

- As groundwater contributes to over 60% of irrigation and 85% of drinking water in rural India, PRIs are central to its sustainable management.
- Community-led groundwater recharge plans and well monitoring are facilitated by PRIs in coordination with the Atal Bhujal Yojana.

8. Localization of SDGs (Sustainable Development Goals) :

- PRIs act as critical agents in localizing SDG 6 : Clean Water and Sanitation, promoting water equity, gender inclusion and climate resilience.
- Several states have introduced Gram Panchayat Development Plans (GPDPs) aligned with SDG targets.

Challenges in PRI-led Water Management

- Capacity constraints in technical planning, data use and engineering skills.
- Fragmented governance due to overlapping departmental mandates.
- Lack of awareness and community participation in water budgeting or conservation.
- Inadequate financial autonomy and delays in fund disbursal.
- Climate variability leading to stress on existing water systems.

Way Forward

1. Capacity Building and Technical Training : Regular training of PRI members on hydrology, GIS mapping and water auditing tools. Partnership with NGOs, CSOs and academic institutions for skilling.

2. Digital Platforms and MIS Integration : Promote use of Jal Shakti Abhiyan dashboards, Bhuvan Panchayat portal and community apps for data-driven planning.

3. Convergence of Schemes : Ensure synergy between Jal Jeevan Mission, MGNREGS, Swachh Bharat Mission and Finance Commission Grants through integrated planning.

4. Legal Empowerment : Amend state Panchayati Raj Acts to give statutory authority to PRIs in water governance.

5. Community Engagement and Awareness : Promote water literacy campaigns, social audits, and Jal Chaupals to ensure transparency and ownership.

6. Promotion of Climate-Resilient Water Practices : Encourage watershed development, agroecological approaches, and water-saving irrigation techniques like drip and sprinkler.

Conclusion

Empowering PRIs in water management is not just a governance reform—it is a climate and livelihood imperative. With decentralization at its core, India has the institutional architecture to make rural water self-reliance a reality. By building capacities, ensuring convergence and fostering local accountability, PRIs can transform India's villages into water-smart, climate-resilient communities aligned with national development goals and SDG vision.

STRENGTHENING RURAL INDIA : THE POWER OF CAPACITY BUILDING IN PANCHAYATS

The 73rd Constitutional Amendment Act of 1993 was a watershed moment in India's democratic journey, establishing a three-tier Panchayati Raj system to promote grassroots governance. However, for Panchayati Raj Institutions (PRIs) to function effectively and fulfill their developmental roles, continuous capacity building is essential. This ensures a structured, participatory and sustainable model of governance in rural India.

1. Significance of the 73rd Constitutional Amendment

- Empowered local self-governance through PRIs at village, intermediate and district levels.
- Ensured decentralization by transferring powers to state legislatures for effective functioning.
- Made governance more participatory rather than just representative.

2. Importance of Capacity Building & Training (CB&T)

- Vital for empowering PRI stakeholders with the skills, knowledge and understanding needed for effective governance.
- Not a one-time exercise—needs to be continuous to ensure long-term sustainability.
- Helps PRIs manage economic development, social justice, planning and service delivery.
- Essential for strengthening the decision-making processes of PRIs.

3. Challenges Faced by PRIs

- Issues in governance, financial management, resource mobilization and community engagement.
- Lack of awareness and training limits service delivery effectiveness.
- Without strengthening capacities, PRIs remain incomplete in their empowerment.

4. National Capacity Building Framework (NCBF) 2022

- Launched to guide structured training and development.
- Aims to build competencies of elected representatives and PRI functionaries.

5. Rashtriya Gram Swaraj Abhiyan (RGSA)

- A central initiative for enhancing governance through continuous CB&T.
- Focus areas : health, education, sanitation, water conservation, nutrition, local self-governance, etc.
- Total financial outlay : ₹ 5,911 crore.
- Targets : Training 2·78 lakh Rural Local Bodies to achieve SDGs.

6. Leadership and Management Development Programme (MDP)

- Strategic initiative to train Elected Representatives and functionaries in : Leadership, Financial management, Project management, Innovation.
- Conducted through premier institutes like IIMs (Ahmedabad, Shillong, Amritsar, etc.), IIT Dhanbad, IRMA Anand.

7. Ongoing Capacity-Building Initiatives

- **Year-round training via institutions like :** National Institute of Rural Development & Panchayati Raj (NIRDPR). State Institutes of Rural Development (SIRDs).
- **Example :** MDP training at IIM Ahmedabad in January 2024.

Rashtriya Gram Swaraj Abhiyan (RGSA)

- Cabinet approves continuation of revamped Centrally Sponsored Scheme of Rashtriya Gram Swaraj Abhiyan (RGSA).
- Total financial outlay of the scheme is ₹ 5911 crore.
- Will help 2·78 lakh Rural Local Bodies to achieve Sustainable Development Goals.

Conclusion

The 73rd Amendment significantly transformed governance by empowering PRIs. However, their sustained success hinges on continuous capacity building, innovation and active stakeholder participation. Government initiatives like RGSA and CB&T programs, especially in collaboration with top institutions, have strengthened the delivery of services and alignment with SDGs. Encouraging innovation and refining approaches will further drive equitable and sustainable rural development, contributing to a prosperous and inclusive society.

April
2025

GIST
OF
DOWN TO EARTH

Topic

Deadly Dust - (1-15, April)

Bullion Goes Bust (16-31 March, 2025)

MISSION FOR INCLUSION – THE JOURNEY OF TRANSGENDER EMPOWERMENT IN CHHATTISGARH

The 2023 Republic Day parade in Chhattisgarh marked a historic moment with the participation of nine transgender individuals from the Bastar Fighter Force, a police unit combating Naxalism. This inclusion symbolizes a major milestone in the transgender rights movement, led by Vidya Rajput, a prominent transgender activist from Raipur.

Background of Vidya Rajput

- Born in Kondagaon, Chhattisgarh and assigned male at birth.
- Faced family challenges after identifying as a transgender woman and moved to Raipur for community support.
- In 2010, realized the lack of awareness and healthcare access when 25 of 30 transgender individuals tested HIV-positive at a group testing initiative.

Formation of Supportive Structures

- **2012 :** Founded the Chhattisgarh Mitwa Sankalp Samiti, a platform for : Community bonding through regular meetings. Awareness campaigns (*e.g.*, on HIV/AIDS). Events such as sports tournaments, green drives and public felicitation ceremonies.

Legal and Institutional Recognition

- **2014 Supreme Court Judgement :** Recognized transgender people as the 'third gender' and affirmed their fundamental rights.
- **Chhattisgarh Government Initiatives :** Established the Third Gender Welfare Board in October 2014. Built special community centers for transgender persons (2016–2019).

Employment and Inclusion Milestones

- **2021 :** Recruitment of 13 transgender individuals into the state police force. The Samiti played a key role by encouraging and preparing candidates through special coaching.
- **Facilitated employment in :** Municipal boards and private sector. Financial aid and loans for entrepreneurship. Most initiatives were funded through development grants.

Current Status and Ongoing Challenges

- Rajput is now a member of the Third Gender Welfare Board.
- Transgender people have gained partial inclusion into mainstream society.
- **Key demands remain :** Job reservations. Social acceptance, especially in areas like marriage rights.

Conclusion

The journey led by Vidya Rajput and others reflects a significant transformation in transgender rights and inclusion in Chhattisgarh. While milestones have been achieved, the movement continues to fight for full equality, dignity and societal integration.

CLIMATE TALKS

Organised by : Centre for Science and Environment (CSE), Feb 26–28, 2025, in Nimli, Rajasthan.

Focus : Environment, development, energy, health threats.

Key Highlights :

- **State of India's Environment 2025** warns Gen Alpha faces a warmer planet.
- **Environmentalism** is beyond climate change—needs sustainable development models.
- **India lags in 9 of 16 SDGs**; concerns over data gaps in poverty and water indicators.
- **Zoonotic threats** rising; poor water quality in cities flagged.
- **Electric mobility** growing, but coal still dominates—renewables only 13% of power.
- **Chemical pollution** widespread—255,000 tonnes of pesticides used annually.
- **Soil health** deteriorating—urgent local action needed; Assam most vulnerable.
- **Carbon markets** lack transparency; local communities not benefiting from credits.

READY FOR POWER SHIFT

Humanitarian Emergency

- Zambia is facing its worst drought in over 50 years, declared a national emergency in February 2024.
- Over 1 million farming families (6·6 million people) dependent on rain-fed agriculture are severely affected.

- Rising hunger and waterborne diseases (like cholera) are exacerbating the humanitarian crisis.

Energy Crisis and Economic Fallout

- The drought has crippled hydropower plants, which supply 83% of Zambia's electricity. Kariba Dam (1,080 MW) nearly shut down due to record low water levels (only 7·27% usable storage).
- Result : Prolonged power outages, devastating small-scale industries, which contribute 70% to GDP and provide 88% employment.
- Estimated loss of $ 1·3 billion due to the power crisis (~5% of GDP).
- In Lusaka, many small businesses operate only during midnight hours when power is briefly available.
- Closure of bakeries, iron workshops and florists led to job losses, increased crime and social instability.

Government's Response : Shift to Solar

- Prompted by El Niño-induced drought, Zambia is diversifying energy sources, focusing on solar power :
  - Import duties removed on solar panels and batteries. Landmark 1,000 MW solar deal with SkyPower Global (Canada). Commissioning of 60 MW solar plant in Kitwe to power copper mines (70% of exports). In February 2025, 29 agreements signed to generate 332 MW under three programmes :
    - Presidential Solar Initiative
    - Microgenerator Scheme
    - Developer-Initiated Programme
- Construction to begin by mid-2025, aiming for energy diversification by 2026.
- India approached for renewable energy collaboration.
- Zambia receives 5·5 kWh/m²/day solar radiation—ideal for large-scale solar energy.

Challenges Remain

- Despite progress, no short-term relief for struggling businesses and households.
- Many are caught in a cycle of debt, powerlessness and job loss, risking further economic instability.

THE SANDALWOOD AND RED SANDERS GAMBLE : DREAMS FADE AMID POLICY HURDLES

Once hailed as 'green gold', Indian sandalwood (Santalum album) and red sanders (Pterocarpus santalinus) have long enjoyed cultural, economic and ecological significance. In recent years, both trees have seen a surge in private cultivation, driven by policy liberalization and the lure of high-value returns. However, reality has unfolded quite differently for farmers, who now find themselves caught in a web of regulatory hurdles, ecological challenges and market inaccessibility.

1. Sandalwood Cultivation in Karnataka: From Monopoly to Disillusionment

Colonial Legacy and Monopoly Control :

- Declared the 'Royal Tree' by the Mysore state in 1792, sandalwood was state-controlled—even on private land.
- The Karnataka Forest (Amendment) Act of 2001 allowed private cultivation, but control remained strict in trade :
  - **2008 :** Only state agencies (KSDL & KSHDC) could purchase sandalwood.
  - **2022 :** Farmers allowed to sell to any buyer, supported by schemes like Sirichandana Vana and Krishi Aranya Yojana.

High Investment, Low Returns :

- **Estimated Cost :** ₹ 27·5 lakh per hectare (over 15 years).
- **Expected Returns :** ₹ 1·34 crore/hectare.
- **Reality :** Many farmers face losses due to :
  - **Poor heartwood formation :** Even after 15 years, the heartwood often lacks commercial quality.
  - **Rampant theft :** Security costs like CCTV and fencing to check rampant theft of sandalwoods are high but ineffective.

Ecological & Technical Constraints :

- **Wild *Vs.* Farm-Grown :** Natural stress (drought, soil competition) in forests produces better-quality heartwood.
- **Farm conditions** with fertilizers and irrigation cause more **sapwood** and inferior oil yield.

Market Disappointment :

- Mixed-grade wood fetches ₹ 4,000–5,000/kg; pure heartwood can reach ₹ 20,000/kg.
- Oil yield is just 2–3% and farm-grown trees rarely meet premium standards.

Scientific Recommendations :

- Grow trees under forest-like stress: minimal water, no fertilizers.

- Use genetically superior native seedlings.
- Promote natural ecological growth for better heartwood.

2. Bureaucratic Bottlenecks : The Farmer's Plight

Approval & Felling Delays :

- Farmers must prove sandalwood is grown on private land via forest and revenue department certification.
- Despite a 30-day guideline, approvals can take months or even years.

Post-Harvest Hassles :

- Transit permits often valid for just a day—even for long-distance transport.
- Selling to private distillers requires extensive paperwork and verification.

Farmers' Demands :

- End the permit system under the 2001 Act.
- Recognize sandalwood as a horticultural crop.
- Implement single-window clearance.
- Enable direct market access via Farmer Producer Organizations (FPOs).
- Provide scientific and technical support.

Government's Stand :

- Sandalwood is a vulnerable species, necessitating strict documentation to prevent illegal trade.

3. Red Sanders : A Parallel Struggle in Southern India

Policy Contradictions :

- Private cultivation legal, but sale/export is highly restricted : Listed in CITES Appendix II (1994). Protected under Wildlife (Protection) Act, 2022.
- Maximum 20 kg allowed without permit.

Global Demand, Domestic Constraints :

- Sought after in China (luxury furniture), Japan (musical instruments) and pharmaceuticals.
- Yet, cultivated wood sells at ₹ 5–10 lakh/tonne, while forest wood fetches ₹ 60 lakh/tonne.
- Export restrictions and buyer preferences hurt small farmers.

Quality and Access Issues :

- Farm-grown red sanders often fail to meet export-quality standards.
- International buyers prefer physical inspection—unfeasible for small-scale growers.

Impact of Global Slowdown :

- COVID-19 and China's real estate crisis dented global demand, leaving traders with unsold inventory.

4. Conclusion : Reimagining Tree-Based Farming in India

India's move to liberalize its tree-based farming sector, especially for sandalwood and red sanders, was initially seen as a bold step towards economic empowerment and sustainable agriculture. However, the outcomes have been mixed :

- High investment risks, bureaucratic delays, poor technical support and lack of market access have made tree-farming a gamble for many.
- The disparity in quality between wild and farm-grown trees continues to disappoint buyers.
- Farmers are demanding regulatory simplification, scientific guidance and direct access to global and domestic markets to make these ventures viable.

Going forward, policies must focus not only on liberalization but also on enabling ecosystems that combine scientific rigor, market reforms and farmer welfare—ensuring that India's green gold does not fade into a forgotten promise.

INDIA'S WATER CRISIS : ALARMING TRENDS

- **Per Capita Availability :** India's annual freshwater availability is below 1,700 cubic metres per capita, categorizing it as a water-stressed country.
- **Global Rank :** India ranks 132nd globally in per capita water availability.
- **Sharp Decline** : From 1950 to 2024, per capita surface water availability has declined by **73%**.
- **Future Risk :** Without corrective action, India risks becoming water-scarce (availability <1,000 m^3 per capita/year).
- **Urban Water Stress :** Major cities like Delhi, Mumbai, Bengaluru, Hyderabad and Chennai are facing severe water shortages.
- **Climate Change Impact :** Unplanned urbanisation and climate change are aggravating water scarcity through floods, droughts and water stress.

Wastewater : A Hidden Resource

- **Definition :** All used water is wastewater, which if treated, can supplement supply and reduce environmental impact.
- **Current Management Approach :** Wastewater is largely viewed from a disposal angle, not as a reusable resource.

Sewage Generation *Vs.* Treatment (2020–21)

- **Urban sewage generated :** 72,368 MLD
- **Installed treatment capacity :** 31,841 MLD
- **Operational capacity :** 26,869 MLD
- **Treated sewage :** 20,236 MLD (only 28%)
- **Untreated sewage** : 72%, often discharged into water bodies or land.

Future Projections

- **By 2050 :** Wastewater generation expected to rise by 75–80%.
- **Estimated generation :** 0·13 million MLD (130,000 MLD).
- **Annual wastewater volume :** ~48 BCM, 3·5 times current treatment capacity.

Government Mandates & Indexes

- **Reuse Target :** Union Ministry of Jal Shakti mandates 20% reuse of consumed water in cities.
- **NITI Aayog's Composite Water Management Index :**
  - 80% states showed improvement (2017–19), avg. + 5·2 points.
  - 16 states scored <50/100, covering 48% of population, 40% of agricultural produce and 35% of economic output.

Centre for Science and Environment (CSE) Study

- **Scope :** Analysed 35 case studies in 16 cities across 7 states/UTs : Delhi, Rajasthan, Haryana, Uttar Pradesh, Maharashtra, Tamil Nadu, Karnataka.
- **Focus :** Reuse of treated wastewater from centralised treatment plants.
- **Output :** Policy insights, reuse recommendations (for agriculture, industry, construction), gaps and successful models.

Delhi : A Case Study

- **Water dependency :** Mostly relies on **external sources** (Ganga, Yamuna, Beas, Ravi).
- **Demand *Vs.* Supply (2019) :** Delhi Jal Board (DJB) met only 74% of the 4,770 MLD water demand.
- **Treatment Infrastructure :**
  - **Wastewater generated :** 3,600 MLD
  - **Capacity :** 3,033 MLD (37 STPs)
  - **Treated :** 2,587 MLD (85%)
- **Reuse Rate :** 49% of treated water.
- **Reuse Distribution :**
  - **Horticulture :** 409 MLD
  - **Lake recharge :** 159 MLD
  - **Farming/horticulture by flood department :** 98 MLD
- **Future Plans :**
  - **Groundwater recharge :** 357 MLD (wetlands, lakes)
  - **Lake rejuvenation :** 332 MLD
- **Policy Efforts :** Draft Water Policy (2016) focuses on **decentralised reuse**, lake revival and groundwater recharge.
- **Quality Concerns** : 21 of 37 STPs don't meet Delhi Pollution Control Committee norms.
- **Thermal Plants :** Though reuse is mandated, Delhi lacks plans for using treated water in its 11 thermal power plants.

Policy Landscape : Varying State Commitments

- **Three Categories :**
  1. States with specific wastewater reuse policies.
  2. States with reuse embedded within broader water policy.
  3. States with no specific reuse policy.
- **Field Observations :** Covered sewage treatment plants and policies in locations like Jaipur, Pune, Hyderabad, Chennai, Ludhiana and more.

Conclusion : Wastewater Reuse as a Key Solution

- India's water crisis is critical and treated wastewater reuse is a sustainable solution to bridge water demand gaps.
- Policy support, infrastructure investment and quality assurance of treated water are crucial.
- A paradigm shift from 'disposal' to 'reuse' is needed to ensure urban water security.

BENGALURU'S TRAFFIC WOES AND TUNNEL INFRASTRUCTURE PLAN

- Bengaluru is the third-slowest city in the world for traffic (TomTom 2024), despite public transport expansions like metro services.
- To reduce congestion, BBMP has proposed an ambitious infrastructure plan with elevated corridors, underpasses and tunnel roads, connecting key corridors like

Hebbal Esteem Mall to Silk Road KSRP junction.

- A New Delhi-based consultancy submitted the feasibility report in December 2024.

Geological and Hydrogeological Oversight

- The feasibility report lacks emphasis on lithology and hydrogeology, crucial for assessing tunnel viability and safety.
- Bengaluru's complex terrain includes a granite highland running North to South, separating Arkavathi (west) and Ponnaiyar (east) river catchmen areas.

Western Region

- Features rugged, faulted terrain and steep gradients.
- Presence of faulted gneissic rocks, increasing risks like subsidence and earthquake damage.

Eastern Region

- Dominated by weathered gneiss and saprolite, which is porous yet collapsible when wet.
- Tunnelling here risks cave-ins, as seen in the 2022 Yettinahole water project in Hassan.

Hydrological Risks

- **Tunnel construction may :**
  - ❑ Disrupt surface drainage and perched aquifers.
  - ❑ Impact vertical groundwater movement through natural geological lineaments.
  - ❑ Affect borewells on either side of the proposed corridor due to aquifer disturbance.

Conclusion & Recommendations

- Bengaluru's land is under pressure due to urban sprawl, impermeable surfaces and poor aquifer recharge.
- **Authorities must :**
  - ❑ Conduct detailed geological surveys.
  - ❑ Seek expert geological and hydrological assessments.
  - ❑ Ensure the infrastructure plan does not exacerbate existing hazards.

WOMEN'S TIME POVERTY

Context : The National Statistical Office (NSO) conducted a Time Use Survey across India from January–December 2024, covering 454,192 individuals in rural and urban areas.

Aim : To understand how people spend their 1,440 minutes a day, with a focus on gender disparities in time allocation.

Key Findings

- Extreme time poverty among Indian women continues.
- Employment & related activities :
  - ❑ **Men :** 61% of their time
  - ❑ **Women :** Only 20·7%
- Unpaid domestic services (for household) :
  - ❑ **Women :** 81·5% of time
  - ❑ **Men :** 27%
- Unpaid caregiving for household members :
  - ❑ **Women :** 34%
  - ❑ **Men :** 18%
- Production for own final use :
  - ❑ **Women :** 21%
  - ❑ **Men :** 13%

Time Poverty Defined

- Lack of time for self-care and remunerative activities due to burden of unpaid work.
- Leads to economic exclusion of women, reinforcing gender inequality.
- Time and income poverty are interlinked—restricting women's participation in the formal economy.
- A 2015 study estimated $9 trillion loss to developing economies due to this exclusion.

Comparison with 2019 Survey

- Women's time on paid work increased by 2% since 2019.
- Time spent on caregiving rose from 27·6% (2019) to 34% (2024).
- Domestic unpaid work time also marginally increased.

Global and Historical Perspective

- First Time Use Survey was conducted in USSR, in early 20th century, to reduce housework and reassign labour to collective services.
- The 1995 UN Beijing Declaration promoted gender-disaggregated data collection.
- Time use data is now crucial for understanding economic performance through a gender lens.

Upcoming Global Event

- In March 2025, global leaders will meet in New York to mark the 30th anniversary of the Beijing Declaration.
- **A major focus :** assessing and addressing women's time poverty.

PROMISING START : SEXED SEMEN AND INDIA'S DAIRY REVOLUTION

Sexed semen technology is emerging as a transformative tool for India's small dairy farmers, offering the promise of higher incomes and reduced burden of unproductive male cattle. The technology, though rooted in complex biotechnology, is being made accessible under government schemes to improve livestock productivity.

The Technology at a Glance

- **Mechanism :** Sexed semen involves sorting sperm cells to increase the probability of giving birth to a female calf.
  - Female birth occurs when an X chromosome sperm fertilizes the egg.
  - Technologies used :
- American Breeding Services (ABS)—inactivates Y chromosomes but retains them in the semen straw.
- US-based Sexing Technologies—removes Y chromosomes using electromagnetic fields.
- Success Rate :
  - 90% chance of female calf birth.
  - 30% conception rate, which is lower than conventional AI (artificial insemination).

Socio-Economic Significance

- Male calves are considered a financial burden due to lack of agricultural utility and low resale value.
- Female calves ensure a steady income through milk production.
- Reduced number of stray bulls, a major concern in rural and urban areas.

National Rollout and Infrastructure

- **States with government semen stations :** Uttar Pradesh, Gujarat, Madhya Pradesh, Tamil Nadu, Uttarakhand.
- **Key facility :** Babugarh DFS Production Centre (Uttar Pradesh), producing ~2 million doses with help from ABS.
- **Pan-India Distribution :** 11·7 million doses delivered to 3·42 lakh farmers till February 2025.

Government Intervention

Rashtriya Gokul Mission (2018 onwards) aims for increasing milk yield and reducing stray cattle population.

- **Subsidy Model :**
  - Example : Uttar Pradesh offers straws at ₹ 100, subsidised from actual cost of ₹ 766. Cost shared equally between Centre and State (50:50).

Challenges and Scientific Concerns

- **Conception Failure :**
  - Haryana paused the project temporarily due to low success rates.
  - **Reason :** Sexed semen contains only 2 million sperms *Vs* 20 million in conventional AI.
- **Potential DNA Damage :**
  - Concerns over long-term genetic impact of dye used in sex sorting.
  - **Response :** Indigenous 'label-free technology' being developed by IIT Delhi, IIT Madras, LUVAS and ICAR-IVRI; expected by October 2026.

Ethical and Legal Dimensions

- Gender selection in humans is banned in India due to ethical concerns.
- In animals, it's seen as a solution to :
  - Rural economic distress.
  - Overpopulation of stray cattle.
  - Boosting dairy productivity.

Conclusion

Sexed semen technology represents a promising leap in India's livestock management, aligning with broader goals of rural empowerment, sustainable dairy farming and animal welfare. While the road ahead requires technological refinement and ethical mindfulness, its careful and equitable implementation could reshape India's dairy sector.

ASIATIC LIONS VENTURING BEYOND GIR : A GROWING CONCERN & CONSERVATION OPPORTUNITY

Recent Sightings

- On March 16, 2025, an Asiatic lion was spotted on Diu Island, outside Gujarat's Gir forest.
- At least 10 such lion movements to Diu occurred in the past 6 months.
- Forest officials believe the lions are swimming across a tidal creek during low tide.

Territorial Expansion & Carrying Capacity

- Experts suggest Gir forest may have reached its carrying capacity, pushing lions to explore new areas.
- Lion population (2020 census) :
  - Total : 674
  - Inside protected forests : 345
  - Outside protected forests : 329 (nearly doubled from 2015)
- Lions now inhabit 30,000 sq km across 53 talukas in 9 Saurashtra districts.

Why Diu ?

- Dense vegetation of invasive species like *Prosopis juliflora* offers cover.
- Abundance of prey animals like Nilgai and wild pigs.
- Terrain includes scrubs, farmlands and thickets ideal for lions.

Historical Context

- Once ranged across Asia, now only found in the wild in Gujarat.
- Downlisted from 'Critically Endangered' to 'Endangered' by IUCN (2008) due to population recovery.
- Lions began recolonising coastal villages like Mul Dwarka, Kodinar and Jafrabad since the 1990s.

Risks of Single Habitat Dependence

- A 2013 SC judgement mandated translocation to Kuno National Park (Madhya Pradesh), but was resisted by Gujarat.
- Disease outbreaks, such as those that caused 30% of lion deaths (2007–2019), remain a key threat.
- Forest fires, epidemics and limited gene pool pose risks in a single-area population.

Conservation Insights

- Lions may be reclaiming historical territory from 150–200 years ago.
- Experts stress need for satellite populations (*e.g.*, Diu) for species resilience.
- Suggest better community engagement, broader territorial planning and multi-state cooperation.

Key Takeaways for Exams

- Gir is the only habitat for wild Asiatic lions.
- Lion dispersal is natural due to overpopulation and territorial instincts.
- Translocation and multi-state coordination are crucial for long-term conservation.
- Gujarat's pride in exclusivity may hinder broader conservation efforts.
- Diu's role as a potential satellite habitat is gaining importance.

SILICOSIS IN INDIA – A HIDDEN EPIDEMIC

Understanding Silicosis

- **Definition** : An incurable, chronic occupational lung disease caused by inhaling fine silica (SiO_2) dust.
- **Mechanism :**
  - Silica particles (<10 microns) are inhaled.
  - They kill macrophages in the lungs.
  - Dead cells form fibrous nodules, impairing lung function.
- **Complications** : Increases risk of tuberculosis, lung cancer and leads to silicotuberculosis if both diseases occur together.

Industries at Risk

- **High-exposure sectors :**
  - Mining
  - Stone quarries
  - Glass and bangle factories
  - Ramming mass factories
  - Ceramics and slate-pencil units
- **Silica content in materials :**
  - Quartzite : 98·9–99·5%
  - Granite/Basalt : 63–73%
  - Sandstone : 30–40%
  - Marble : 20–25%

High-Risk States

- **Rajasthan :** Jodhpur, Jaisalmer, Udaipur (stone mining).
- **Madhya Pradesh :** Mandsaur, Panna (mining and slate pencil).
- **Gujarat :** Khambhat (agate), Morbi, Himmatnagar (tiles).
- **Others :** Andhra Pradesh (Markapur slate), West Bengal, Tamil Nadu, Jharkhand.

Challenges in Diagnosis

- Symptoms mimic TB : Cough, fever, weight loss.
- Poor diagnostic tools at primary health centres.
- Overreliance on sputum tests, ignoring occupational history.
- Lack of CT scans leads to misdiagnosis.

Recommended Solutions

Prevention & Regulation :

- **Reduce silica exposure :** Engineering controls (dust barriers, ventilation).
- Job rotation in dusty environments.
- Strict occupational safety laws for informal sector.

Awareness & Diagnosis

- Training doctors to identify silicosis symptoms on X-rays.
- Ask occupational history of patients.
- Use of telemedicine for rural diagnosis.

Relief for Victims

- Compensation and medical support.
- Employer accountability for workplace safety.
- Social security for informal sector workers.

Conclusion

Silicosis is a 'silent epidemic' in India, devastating rural mining communities and burdening the healthcare system. Misdiagnosis, lack of awareness and poor regulation in the informal sector contribute to its spread. It is imperative to address this occupational hazard to meet India's TB elimination target by 2025 and ensure the right to health and dignity for all workers.

ASKOT-ARAKOT ABHIYAN : A 50-YEAR LEGACY OF GRASSROOTS EXPLORATION

A unique 45-day foot march conducted every decade since 1974 in the western Himalayas of Uttarakhand. Organised by scholars, students, journalists, and activists to document socio-environmental changes and reconnect with remote communities.

Askot-Arakot Abhiyan 2024 Highlights : Route and Duration

- Began on May 25, 2024, from Pangu village (near Nepal border) to Arakot village in Uttarkashi (near Himachal border).
- Approximate distance : over 1,000 km, covering 350 villages in 45 days.
- Participants often deviated from the central path to visit isolated Himalayan settlements.

Participants and Objectives

- 40 member team included young poets, students, researchers and veterans like Shekhar Pathak, who has participated in all six yatras since 1974.
- **Central theme :** 'Source to Confluence'—exploring communities' connections with rivers.
- **Aim :** Assess changes in land, water, forest resources, economic, social and cultural conditions.

Major Observations (2014–2024) : A Decade of Transformation

1. Unprecedented Development and Destruction : Rapid expansion of road infrastructure, hydropower projects and tunnels. Mountains excavated and debris dumped in rivers like Kali, causing ecological imbalance.

2. Changing Consumption and Livelihood Patterns : Villagers dependent on vegetables/grains from cities (*e.g.*, Pilibhit, Moradabad), despite local produce. Loss of agricultural and pastoral lands has triggered **out-**migration.

3. Rise in Human-Made Disasters : Increased frequency of landslides, floods, forest fires and droughts. Forest fires seen on 28 out of 45 days in 2024; even oak and rhododendron forests burned. Landslides prevalent along the Char Dham route due to unscientific rock-cutting.

Social and Cultural Trends

1. Positive Developments : Increased access to education for girls. Emergence of Mahila Mangal Dals, Gram Sabhas and cottage industries in areas like Dharchula and Munsyari. People opting to stay in villages rather than migrate due to better livelihood opportunities.

2. Emerging Concerns : Growing religious intolerance and violence against Dalits and minorities. Spread of misinformation, shifting focus from real developmental needs. Key issues of the Uttarakhand statehood movement (resources, decentralisation, education, healthcare) remain unaddressed.

Historical Context

Origin in the Chipko Era : Askot-Arakot Abhiyan conceptualised during the 1970s amidst the Chipko movement. Inspired by pioneers like Sundarlal Bahuguna, who highlighted youth discontent with exploitation of natural resources and forced migration.

Conclusion

The Askot-Arakot Abhiyan serves as a living chronicle of ecological, social, and economic transformations in Uttarakhand. Over five decades, it has revealed both the progress and the deep contradictions in the state's development narrative. While road connectivity has increased, so has the vulnerability to dis-asters, cultural erosion, and ecological damage—underscoring the urgent need for a people-centric and sustainable development model.

JOSHIMATH LAND SUBSIDENCE CRISIS

- **Location :** Joshimath, Chamoli district, Uttarakhand.
- **Incident :** Over 800 houses developed cracks in Jan 2023; residents forced to evacuate.
- **Ongoing Subsidence :** Between Dec 2022–Dec 2024, parts of the town sank over 30 cm.
- **Severely Affected :** Dense settlements & two national highways; subsidence rates range from 5 cm to 30+ cm in two years.
- **Geological Risk :** Town built on ancient landslide debris in a high earthquake-prone zone.
- **Urban Pressure :** Built-up area doubled in 17 years, worsening the vulnerability.
- **Core Issue :** Unregulated urban expansion on fragile terrain continues despite warnings.

US TARIFFS ON PHARMA & WTO CRISIS

- **Trump's Move :** Plans to impose 10–25% tariffs on pharmaceutical imports from April 2025, including generic drugs and APIs.
- **Violation of WTO Rules :** Tariffs breach WTO norms, as most pharma products are exempt from levies.
- **WTO Dysfunction :**
  - WTO's Appellate Body (AB)—core to dispute resolution is non-functional, blocked by the US since Obama era.
  - No legal recourse for countries like India or EU.
  - WTO's legitimacy undermined; labelled 'dead' since 2018 steel/aluminium tariffs.
- **Impact on India :** India exports ~$8·72 billion worth of drugs to the US (nearly 1/3rd of total exports).
- **Global Pharma Response :** Firms like Pfizer plan to relocate production to the US. Concerns over supply chain disruption, particularly in medical equipment and APIs.
- **Political Undercurrent :** US using tariffs as a leverage tool. "Coalition for a Prosperous America" frames Indian & Chinese pharma as national security threats.

Conclusion

With WTO's regulatory function crippled and legal remedies blocked, global pharma faces rising uncertainty, especially exporters from the Global South.

TAMING THE TEAK

- **Teak's Value :** Teak (Tectona grandis) is a highly valued tropical hardwood, essential for shipbuilding, construction and high-end furniture. India holds 35% of the world's teak forests, primarily in Madhya Pradesh and Maharashtra.
- **Challenges in Teak Cultivation :** Natural regeneration of teak faces issues like low fruit production, poor seed viability and challenges in vegetative propagation. These issues hinder productivity and demand alternative methods.
- **Tissue Culture as a Solution :** Tissue culture propagation, pioneered in the 1970s, helps produce genetically superior, disease-free teak plants. Over 200 tissue culture labs in India now produce teak saplings.
- **Mixed Results :** While tissue-cultured teak has shown potential for high growth, field studies are limited and success is variable. Some plantations show excellent growth, while others experience poor results. Economic viability depends on plantation type and management practices.
- **Economic Considerations :** A study suggests that intensively managed plantations with proper spacing yield higher returns compared to unmanaged or line plantations. However, claims of accelerated growth from tissue culture need further verification.
- **Conclusion** : Despite the promise of tissue culture, long-term research and field studies are required to fully assess its effectiveness in boosting teak productivity under various conditions.

THE WORLD IS IN DEBT

- **Global Debt Crisis :** Public debt has reached historic levels worldwide, with the global public debt surpassing $ 100 trillion by early 2025. Developed and developing

countries alike are struggling to service these debts.

- **Impact on Developing Nations :** Developing nations are particularly burdened, with external debt reaching $ 11·4 trillion in 2023, nearly equivalent to their export earnings. These countries are forced to divert budgets away from essential sectors like health and education to service their debt.
- **Debt Servicing *Vs.* Development :** A large portion of government revenue in developing countries is spent on debt servicing, with some nations spending more on debt interest than on critical social sectors. This creates a vicious cycle where debt limits the ability to invest in human development and climate response.
- **Urgency of Action :** UNCTAD and the IMF highlight the urgent need for a global solution, with debt restructuring or relief becoming a central focus. The Fourth International Conference on Financing for Development (FfD4), scheduled for June 2024 in Spain, will address the challenges of funding sustainable development goals (SDGs) amidst the debt crisis.
- **Potential for Debt Relief :** Calls for global debt restructuring or a debt waiver are increasing. If successful, this could unlock funds for addressing poverty and the climate crisis, which are intertwined challenges exacerbated by debt.

April
2025

GIST
OF
SCIENCE REPORTER

Topic

Human Cell Atlas

HEALTHY BEGINNINGS, HOPEFUL FUTURES : NEED TO PRIORITISE MATERNAL AND NEWBORN HEALTH

Every year, World Health Day is observed on 7 April to reflect on pressing global health issues. The theme for 2025, *"Healthy Beginnings, Hopeful Futures"*, puts a spotlight on the health of mothers and newborns—a foundational yet often overlooked area of public health.

Global Targets to Help Countries Improve Maternal and Newborn Survival

- Four or more antenatal care contracts.
- Post-natal care for women and newborns.
- Skilled attendant at birth.
- Equity within countries in achieving these targets.

1. Significance of the Theme : Focuses on ensuring safe pregnancies and healthy births. Emphasises the need for early care and proper nutrition for both mothers and infants. Advocates for universal access to maternal and child healthcare services.

2. Current Challenges : Many low- and middle-income countries face high maternal and infant mortality rates. Lack of infrastructure, skilled health workers and public health investment continue to hinder outcomes. Newborns and mothers often face health risks due to poverty, undernutrition and inadequate prenatal care.

3. The Need for Collective Responsibility Governments, NGOs, and international bodies must prioritise funding, awareness, and policy reforms. Importance of strengthening healthcare systems to offer equitable access. Encourages community involvement and education to support maternal and newborn care.

4. Long-Term Benefits : Prioritising maternal and newborn health helps in :

- Reducing child mortality and morbidity.
- Breaking intergenerational cycles of poor health.
- Ensuring economic and social development through healthier populations.

Conclusion

The 2025 theme serves as a timely reminder that the health of mothers and newborns is central to global well-being. By investing in maternal and newborn health today, we lay the foundation for a healthier, more resilient future. *Healthy beginnings* are the first step toward *hopeful futures*—and must be a global health priority.

THE HUMAN CELL ATLAS : CELLULAR CARTOGRAPHY OF THE HUMAN BODY

The human body is home to approximately 37 trillion cells, yet the exact number of distinct cell types remains unknown, underscoring the vast complexity of human biology. This remarkable diversity of cells sets the stage for understanding the importance of initiatives like the Human Cell Atlas, which aims to map and unravel the intricate makeup of our cellular structure.

1. Diversity and Function of Human Cells

- Each cell type has a specific function, *e.g.* : Red blood cells transport oxygen. White blood cells fight infections. Beta cells in the pancreas secrete insulin.
- **Cell types differ in :** Function, structure, organ-specific presence, abundance in the body.

2. Challenges in Mapping Cell Types

- Some cells are very rare, making them difficult to study.
- Not all cell types are present in all organs.
- The same organ may contain multiple, diverse cell types.
- Cellular functions and compositions vary even within the same type depending on location and context.

3. The Human Cell Atlas Initiative

- It is an international scientific project aiming to create a comprehensive reference map of all human cells. Identify all cell types based on structure, function and molecular signature.
- Combines cutting-edge technologies like single-cell RNA sequencing, imaging and machine learning.
- Expected to transform diagnosis, treatment, and understanding of diseases by revealing how different cells behave in health and disease.

4. Implications for Science and Medicine

- Helps uncover early signs of diseases at the cellular level.
- Aids in targeted therapies by identifying specific cell types involved in conditions. Supports precision medicine by personali-

zing treatment based on individual cellular make-up.

Conclusion

- The Human Cell Atlas represents a revolutionary step toward decoding the complexity of the human body.
- By mapping every cell type, scientists aim to build a cellular-level blueprint of the body.
- This initiative holds immense promise for advancing medical research, improving healthcare and deepening our understanding of life itself.

AN ENCYCLOPAEDIA IN THE MAKING : UNLOCKING THE BENEFITS OF HCA

- Advances in cellular biology are transforming healthcare by enabling precise diagnosis and personalised treatment.
- Mapping every human cell type can significantly improve understanding of diseases and treatment strategies.

What is Cellular Mapping ?

- Creation of a comprehensive reference of all human cell types.
- Helps identify how healthy cells differ from diseased ones at the molecular level.

Application in Personalised Medicine

- Cell profiling allows identification of disease-causing mutations in specific cells. Enables development of targeted therapies, such as gene-silencing drugs tailored to individual patients.

Advantages

- Faster and more accurate diagnoses.
- Personalised treatments reduce side effects and improve recovery.
- Aids in understanding rare and complex diseases.
- Useful in cancer treatment, genetic disorders and regenerative medicine.

Technological Integration

- Combines genomics, transcriptomics and advanced computing.
- Builds a dynamic, searchable database for global medical use.

Conclusion

- Cellular cartography is paving the way for a future where treatments are precise, effective and customised.
- It represents a major leap towards achieving truly personalised and predictive healthcare.

INNOVATIONS IN VACCINES : UNRAVELING THE DIVERSE LANDSCAPE OF VACCINE DEVELOPMENT

Vaccines are an essential biological tools that trigger immunity and protect against infectious diseases. They have played a pivotal role in eradicating or controlling diseases like smallpox, polio, measles and rubella globally.

Significance of Vaccination

- Prevents widespread outbreaks and reduces fatalities, especially among children.
- Global immunization saves over 4 million children annually (as per UNICEF).

Impact of Vaccination Programmes

- Large-scale efforts lead to herd immunity, safeguarding even those not directly vaccinated.
- Strengthens public health systems and contributes to long-term disease control.

COVID-19 as a Case Study

- Highlighted the importance of rapid vaccine development and deployment.
- Demonstrated the potential of global cooperation in fighting pandemics.

Economic and Health Returns

- Vaccines provide an exceptional return on investment.
- Every rupee invested in vaccination yields over 20 rupees in healthcare savings and productivity gains.

Innovation in Vaccine Development

- Modern approaches include mRNA vaccines, vector-based platforms and recombinant technologies.
- Continuous R&D is essential to address emerging and re-emerging diseases.

Conclusion

Innovations in vaccines are crucial not just for current health challenges but also for future preparedness. Investing in vaccine development ensures resilient public health, economic stability and a healthier global population.

VACCINES TO END TB—WHERE THEY STAND IN PREVENTING TB

Tuberculosis (TB) remains one of the deadliest infectious diseases worldwide, primarily affecting the lungs. Caused by Mycobacterium tuberculosis (Mtb), the pathogen is airborne and has plagued humanity for thousands of years. Despite medical advances, TB still causes over a million deaths annually, reflecting the complex nature of the disease and its resilience.

Nature and Spread of TB

- Mtb is airborne, spreading through sneezing or coughing.
- Besides lungs, it can also affect the spleen, liver, bones, digestive tract, reproductive organs, meninges and eyes.

Historical and Evolutionary Context

- TB has an ancient history—genomic evidence traces Mtb in humans for over 60,000 years.
- TB bacteria were detected even in Egyptian mummies (600 BC).

Scientific Challenge

- Typically, long-term exposure to a pathogen allows the host immune system to evolve and eliminate it efficiently.
- However, Mtb defies this norm — immune evasion and persistence make it difficult to eradicate.

Limitations of Current Approaches

- No universal rule governs how the immune system handles Mtb.
- Existing vaccines (like BCG) have limited efficacy, especially in adults and against pulmonary TB.

Conclusion

- TB continues to be a scientific enigma despite its long coexistence with humans.
- The development of effective vaccines is crucial to break the transmission chain and move towards a TB-free world.
- Ongoing research is vital for developing next-generation TB vaccines that offer broad and lasting protection.

NON-RECOVERY TYPE STAMP CHARGING COKE OVEN A TECHNOLOGY, ALIGNED WITH 'VIKSIT BHARAT' ASPIRATION

India's vision of 'Viksit Bharat' (Developed India) emphasizes self-reliance and sustainable industrial growth.The CSIR-CIMFR has been at the forefront of developing indigenous coke oven technologies to reduce dependence on imports and utilize low-grade coking coal efficiently.

Initial Developments

- Early technologies relied on imported by-product recovery coke ovens, unsuitable for Indian coal quality.
- CSIR-CIMFR responded by developing sole-heated bee hive ovens, initially with multi-chimney designs, later improved to single-chimney models.

Energy Efficiency Measures

- Advancements included better heating and insulation systems in non-recovery type ovens, which do not recover by-products but focus on energy-efficient operations.

Stamp Charging Technology

- To meet the demands for higher productivity and better coke quality, CSIR-CIMFR developed the stamp charging system.
- This system allows the use of inferior-grade coals, enhancing coal blending flexibility and coke strength.

Coke Quenching Process

- A coke quenching system was introduced for temperature control, improving safety and coke stability.

Conclusion

The Non-Recovery Type Stamp Charging Coke Oven exemplifies indigenous innovation aligned with the 'Viksit Bharat' aspiration. It enhances industrial self-sufficiency, promotes the efficient use of local resources, and supports sustainable growth in India's metallurgical sector.

I HAVE A GOOD CANCER

Thyroid cancer is the seventh most common cancer globally, with increasing incidence, especially among women. Referred to as a 'good cancer' due to its slow growth, localized effect, and excellent treatment outcomes.

Global and Regional Trends

- In 2022, 73% of thyroid cancer cases were diagnosed in Asia.
- In India, only 1·5% of new cancer cases in 2022 were thyroid cancer.
- Over-diagnosis is common in high-income countries, often detecting nodules unlikely to cause harm.

Characteristics of Thyroid Cancer

- Most thyroid nodules are benign (non-cancerous).
- Only about 1 in 10 nodules are malignant.
- Nodules causing hyperthyroidism are rarely cancerous.
- Small cancerous nodules often remain asymptomatic & respond well to treatment.

Detection and Diagnosis

- Less than 10% of adults have nodules large enough to be felt during physical examination.
- Advances in imaging and diagnostics have led to increased detection, particularly in countries with greater healthcare access.

Conclusion

While thyroid cancer is rising globally, its low mortality, slow progression and high treatment success lead to it being called a 'good cancer'. Awareness, balanced diagnosis, and appropriate treatment are key to managing this condition effectively without over-medicalization.

BRACING TO FEED A POPULOUS WARM WORLD : TOWARDS NUDGING PLANTS TO PRODUCE MORE

Rising Global Population : The human population is expected to grow from 8 billion to 9·7 billion by 2050, creating immense pressure on food production. The land that currently feeds 27 people will need to support 43 by 2050.

- **Challenges in Agriculture :** With limited possibilities to expand arable land and the continuous threat of global warming, agricultural breakthroughs are essential to avoid mass starvation.
- **Impact of CO_2 on Agriculture :** Atmospheric CO_2, primarily from fossil fuel burning, is a major contributor to global warming. About one-third of global greenhouse gas emissions come from food systems. The rise in CO_2 levels worsens droughts, impacts crop productivity and encourages pests and diseases.
- **Global Climate Goals :** The Paris Climate Agreement aims to keep global temperatures from rising more than 1·5°C above pre-industrial levels by 2050, but with current trends, achieving this goal is increasingly challenging.
- **Need for Innovation in Agriculture :** To meet the challenges posed by climate change, agricultural methods must adapt, focusing on increasing crop yield and resilience in the face of changing environmental conditions.

This highlights the urgent need for innovations that boost plant productivity and resilience, ensuring food security in an increasingly warm world.

VITAMIN D AND ITS IMPORTANCE FOR HUMAN HEALTH

- **Crucial Role in Health :** Vitamin D plays a vital role in overall human health, affecting much more than just bone health. It has gained increasing attention for its multifunctional role in maintaining various bodily functions.
- **Bone Health :** Initially, vitamin D was recognized for its essential role in calcium and phosphorus metabolism, which are key for strong bones. Its deficiency can lead to diseases like rickets in children and osteomalacia in adults.
- **Rickets and Osteomalacia :**
  - **Rickets :** A deficiency in vitamin D in children leads to skeletal deformities, such as bowed legs, misshapen pelvis, enlarged head, curvature of the spine, poor teeth and flabby legs.
  - **Osteomalacia :** In adults, a lack of vitamin D results in bone softness, muscle pain and weakness.
- **Expanding Understanding :** Beyond its role in bone health, research is now highlighting Vitamin D's impact on other health aspects, leading to growing interest from researchers, food technologists and regulatory bodies worldwide.

BIOPHILIA – MAN'S INNATE LOVE FOR NATURE

- **Concept of Biophilia :** Biophilia, a term coined by psychologist Erich Fromm in 1973, refers to man's inherent love for nature and its diversity, which is crucial for healthy living and wellbeing.
- **Expansion of the Idea :** In 1984, Biologist Edward O. Wilson further developed this idea in his book *Biophilia: The Human Bond with Other Species*, suggesting that humans' positive emotional responses to nature are an innate part of human psychology.
- **Meaning of Biophilia :** Derived from Greek, 'philia' means 'love of' and 'bio' means living things, so biophilia translates to 'love of living things', emphasizing a deep, ingrained connection to nature.
- **Innate Human Connection :** Many scientists believe this love for nature is embedded in human DNA, helping people identify with and find comfort in the natural world, essential for mental and physical wellbeing.