03rd February 2026: DSC

CCUS (Carbon Capture, Utilisation & Storage)

Why in News ?

Union Budget 2026–27 allocates ₹20,000 crore for a nationwide Carbon Capture, Utilisation and Storage (CCUS) programme, reflecting India's intention to deploy deep-decarbonisation instruments for emissions-intensive industrial sectors that are difficult to abate.

Relevance

GS-3 – Environment / Economy / Science & Tech

Climate change mitigation
Clean energy transition
Environmental technologies
Carbon markets & green economy

GS-2 – International Relations / Global Agreements

Paris Agreement & CBDR
Global climate governance

CCUS – Basics

What is CCUS ?

CCUS refers to the process of capturing CO_2 emissions at the source, compressing and transporting them for utilisation in industrial products or permanent geological storage, thereby preventing their release into the atmosphere from fossil-fuel-dependent industrial operations.

How it Works ?

The process involves post-combustion or pre-combustion capture, transportation of CO_2 through pipelines or ships, and injection into saline aquifers, depleted hydrocarbon reservoirs, or mineralisation systems to ensure long-term containment.

Budget Scheme – Key Features

Financial Commitment

The ₹20,000 crore allocation offers catalytic support for pilot initiatives, viability-gap funding, and infrastructure development, acknowledging CCUS as a capital-intensive yet indispensable pathway for achieving India's net-zero target by 2070.

Sectoral Focus

Priority sectors include steel, cement, fertilisers, refineries, and thermal power, where process-based emissions are largely unavoidable and large-scale electrification alternatives remain technologically or economically constrained in the medium term.

Design Approach

The scheme emphasises retrofitting CCUS into existing industrial facilities rather than limiting adoption to greenfield projects, lowering transition costs, protecting legacy assets, and enabling faster emission reductions across India's current industrial ecosystem.

Technology Development

The initiative promotes indigenous research and development, demonstration-scale projects, and shared transport-storage infrastructure, aiming to build domestic technological capacity and reduce long-term reliance on imported climate solutions.

Rationale Behind CCUS Push

Climate Commitments

India's Panchamrit goals include reducing emissions intensity and achieving net-zero by 2070; CCUS provides a viable route for deep decarbonisation in sectors where renewable energy alone cannot fully eliminate emissions.

Energy Transition Reality

Coal continues to account for a substantial share of electricity generation; CCUS allows cleaner utilisation of fossil fuels during the transition phase, balancing developmental imperatives with climate obligations under the Common But Differentiated Responsibilities (CBDR) principle.

Global Policy Trends

Countries such as the USA, UK, and Norway are incentivising CCUS through tax credits and carbon-market mechanisms; India's initiative aligns with growing carbon border adjustment pressures and evolving global green competitiveness standards.

Constitutional / Legal Dimension

The programme supports Article 48A's mandate for environmental protection and Article 21's right to life through pollution reduction, while future regulatory frameworks must address liability, monitoring obligations, and long-term storage risks.

Governance / Administrative Dimension

Effective implementation requires coordination among MoEFCC, DST, Ministry of Power, and state pollution control boards, along with robust MRV (Monitoring, Reporting, Verification) systems to ensure permanent containment of captured carbon.

Economic Dimension

CCUS can safeguard energy-intensive export industries from carbon tariffs, preserve employment, and create new value chains in carbon-based products, enhanced oil recovery, and green construction materials.

Environmental Dimension

The technology has potential to substantially reduce industrial emissions, but lifecycle assessments are essential to ensure net-negative outcomes and avoid indirect emission increases due to energy-intensive capture processes.

Technology / Security Dimension

CO_2 pipelines and storage facilities require leak-proof infrastructure, seismic risk assessments, and cybersecurity safeguards for digital monitoring systems, as accidental releases could compromise safety and climate objectives.

Data & Evidence

The IEA estimates that global net-zero pathways require capturing 7–8 gigatonnes of CO_2 annually by 2050, whereas current deployment is below 10% of the required scale, highlighting the magnitude of expansion needed.

India's steel and cement industries together account for a major share of industrial emissions, making them high-impact candidates where CCUS offers greater marginal abatement compared to incremental efficiency gains.

Challenges / Gaps

High capture costs (often ranging from US$40–100 per tonne globally) and uncertain carbon pricing dampen private-sector participation without stable policy incentives or integration with carbon markets.

Long-term storage liability, leakage risks, and public acceptance concerns pose regulatory and social challenges, necessitating transparent risk communication and stringent environmental safeguards.

There is also a risk of moral hazard, as CCUS could prolong fossil-fuel dependence if not accompanied by aggressive renewable expansion and efficiency improvements.

Way Forward

Develop robust carbon markets and price signals to improve CCUS financial viability, integrating the technology with India's emerging Carbon Credit Trading Scheme framework.

Establish CCUS clusters near industrial hubs and sedimentary basins to reduce transport costs and enable shared infrastructure among multiple emitters.

Encourage international technology collaborations and climate finance to de-risk early investments and accelerate learning curves.

Ensure CCUS complements, rather than substitutes, renewable energy expansion and efficiency measures to maintain a balanced decarbonisation strategy.

Data & Facts

CCUS currently captures approximately 45–50 million tonnes of CO_2 annually worldwide, whereas net-zero pathways require gigatonne-scale deployment.
IEA estimates CCUS will be necessary for around 15% of cumulative global emissions reduction by 2070.
Steel and cement together contribute roughly 15–18% of global CO_2 emissions.
Norway's Longship project serves as a flagship national CCUS model.
IPCC recognises CCUS as essential for hard-to-abate sectors.
India is the world's third-largest CO_2 emitter, though per-capita emissions remain well below those of developed economies.

High-Speed Rail Corridors

Why in News ?

Union Budget 2026–27 approves seven high-speed rail corridors covering nearly 4,000 km, with an estimated outlay of ₹16 lakh crore, aimed at enhancing regional connectivity and driving economic integration.

Relevance

GS-3 – Infrastructure / Economy

Transport infrastructure
Logistics efficiency
Investment & growth multipliers
Low-carbon mobility

High-Speed Rail – Basics

Concept

High-Speed Rail (HSR) refers to passenger rail systems typically operating above 250 km/h on dedicated tracks, using advanced signalling, full grade separation, and aerodynamic rolling stock to ensure speed, safety, and operational reliability.

Global Context

Nations such as Japan, China, and France illustrate HSR's effectiveness in easing air-road congestion, shortening travel time, stimulating regional economies, and enabling transitions toward low-carbon mass mobility.

Budget Announcement – Key Features

Identified Corridors

Proposed corridors include Mumbai–Pune, Pune–Hyderabad, Hyderabad–Bengaluru, Hyderabad–Chennai, Chennai–Bengaluru, Delhi–Varanasi, and Varanasi–Siliguri, connecting major economic, cultural, and demographic growth centres.

Financial Scale

The estimated ₹16 lakh crore investment reflects a long-term commitment to infrastructure, crowding in private and multilateral funding, and positioning railways as the backbone of India's future transport and logistics system.

Travel Time Reduction

The corridors are expected to cut inter-city travel times to 2–3 hours on several routes, with select segments targeting sub-one-hour connectivity, reshaping business travel, tourism, and labour mobility dynamics.

Railway Capex Push

Indian Railways receives over ₹2.78 lakh crore in capital outlay, underscoring priorities such as network modernisation, safety enhancement, capacity expansion, and technological upgrades alongside dedicated freight and passenger corridors.

Rationale Behind HSR Push

Economic Multiplier

Large rail infrastructure projects generate strong forward and backward linkages across steel, cement, electronics, construction, and services, supporting employment generation and regional industrial ecosystems during both construction and operation phases.

Urbanisation & Mobility

With rapid urbanisation, efficient inter-city mobility is critical; HSR enables polycentric urban development, easing pressure on megacities and encouraging satellite-city growth along transport corridors.

Energy & Climate Logic

Electrified HSR offers significantly lower per-capita emissions than aviation or highways, supporting India's climate objectives and reducing fossil-fuel import dependence in the transport sector.

Constitutional / Legal Dimension

HSR advances cooperative federalism through Union–State coordination on infrastructure, while land acquisition must comply with the RFCTLARR Act, 2013, ensuring fair compensation, consent mechanisms, and rehabilitation safeguards.

Governance / Administrative Dimension

Successful execution requires strong project management, inter-ministerial coordination, and institutional capacity within Indian Railways, NHSRCL, and state agencies, supported by transparent procurement and time-bound delivery to prevent cost overruns.

Economic Dimension

Enhanced connectivity can boost regional productivity, tourism income, real-estate development, and supply-chain efficiency, contributing to sustained high growth and reduction in logistics costs.

Social / Ethical Dimension

Improved mobility expands access to employment, education, and healthcare, but concerns related to displacement, land conflicts, and fare affordability necessitate inclusive planning and stakeholder engagement.

Technology / Security Dimension

HSR relies on advanced signalling, Kavach-based safety systems, automatic train control, and cyber-secure digital networks, making technological reliability and data security critical national priorities.

Environmental Dimension

Although rail is environmentally preferable to road or air transport, construction impacts on forests, wildlife corridors, and land use require rigorous environmental impact assessments, mitigation strategies, and compensatory afforestation.

Data & Evidence

Rail remains one of the most energy-efficient transport modes; globally, HSR corridors often divert substantial passenger traffic from aviation on 300–800 km routes, reducing congestion and emissions.

India's logistics costs are estimated at 13–14% of GDP; faster and more efficient rail networks can structurally lower these costs, improving export competitiveness.

Challenges / Gaps

High capital requirements and long gestation periods pose risks of fiscal stress and delays, particularly given complex land acquisition and multi-state coordination challenges.

Ensuring commercial viability and sufficient ridership is essential, as inaccurate demand projections could strain public finances and undermine cost-effectiveness.

Dependence on foreign technology partners may constrain domestic value addition without robust localisation and technology-transfer mechanisms.

Way Forward

Adopt phased implementation strategies prioritising high-demand corridors to ensure financial sustainability and early demonstration of success.

Strengthen Make in India initiatives for rolling stock and signalling systems to enhance domestic manufacturing and technology absorption.

Integrate HSR with multimodal transport planning, including metros, buses, and airports, to ensure seamless last-mile connectivity.

Maintain transparent cost–benefit analysis and proactive public communication to build trust and social acceptance.

Data & Facts

Japan's Shinkansen has operated since 1964 with near-zero fatal accidents, setting a global safety benchmark.
Rail transport emits up to 70–80% less CO_2 per passenger-kilometre than aviation, according to IEA estimates.
Infrastructure multiplier effects suggest that every ₹1 invested can generate ₹2–2.5 in economic output.
China has constructed over 40,000 km of HSR, connecting regional growth clusters nationwide.
India's logistics costs remain at 13–14% of GDP, compared to 8–9% in developed economies.

Cheaper Cancer Drugs & Caregiver Training

Why in News ?

Union Budget 2026–27 announces customs duty exemption on 17 cancer-related medicines, inclusion of 7 rare diseases under the concessional import list, and training of 1.5 lakh caregivers, indicating focused health-sector intervention and targeted relief.

Relevance

GS-2 – Social Justice / Health

Public health policy
Access to medicines
Welfare schemes
Right to health dimension

GS-3 – Economy (Health Sector)

Pharmaceutical industry
Health workforce economics
Social sector expenditure

Context & Basics

Cancer & Rare Diseases in India

India is experiencing a growing cancer burden alongside substantial treatment gaps for rare diseases, driven by high drug prices, dependence on imports, limited domestic research and innovation, and an acute shortage of trained caregivers and allied health professionals.

Caregiver Role

Caregivers deliver sustained physical, emotional, and rehabilitative assistance, particularly vital in oncology, geriatric care, and chronic illness management, helping reduce hospital burden while improving treatment adherence and patient outcomes.

Budget Announcements – Key Features

Cheaper Cancer Drugs

Complete customs duty exemption on 17 cancer-related drugs and medicines reduces import costs, enhancing affordability for patients requiring prolonged and high-cost oncology therapies.

Rare Diseases Support

Seven additional rare diseases have been added to the duty-free import list for medicines, drugs, and special nutritional foods for personal use, widening the scope of India's developing rare disease policy framework.

Caregiver Training

Training of 1.5 lakh caregivers under the National Skills Qualifications Framework (NSQF) focuses on wellness, yoga, basic medical procedures, and assistive devices, strengthening community-based healthcare delivery and support systems.

Health Expenditure Snapshot

The Health Ministry allocation stands at approximately ₹1.05 lakh crore for FY 2026–27, reflecting moderate growth of around 6–9%, with emphasis on targeted interventions rather than large-scale budget expansion.

Rationale Behind the Measures

Affordability & Access

High out-of-pocket expenditure in cancer care frequently drives households into poverty; customs duty exemptions directly lower treatment costs where affordable domestic substitutes are unavailable.

Demographic & Epidemiological Transition

An ageing population and increasing prevalence of non-communicable diseases heighten demand for long-term care and palliative services, necessitating a skilled caregiver workforce beyond doctors and nurses.

Health System Efficiency

Trained caregivers facilitate task shifting, reduce pressure on medical professionals, shorten hospital stays, and strengthen continuity of care from institutional settings to home-based recovery.

Constitutional / Legal Dimension

The measures advance Article 21 (Right to Life) by improving access to essential medicines and care, and align with Article 47, which directs the State to enhance public health and nutrition standards.

Governance / Administrative Dimension

Implementation requires coordination among the Ministry of Health and Family Welfare, Ministry of Skill Development and Entrepreneurship, Customs authorities, and state health departments, alongside standardised NSQF certification to ensure quality, safety, and nationwide skill portability.

Economic Dimension

Lower drug prices reduce catastrophic health expenditure, while caregiver skilling generates employment within the health sector, particularly benefiting women and supporting inclusive service-led economic growth.

Social / Ethical Dimension

The initiative enhances equity in access to life-saving therapies for cancer and rare disease patients, fulfilling an ethical obligation toward vulnerable groups with limited treatment options.
Formal recognition and training of caregivers also restore dignity to care work that has historically remained undervalued and informal.

Health System / Technology Dimension

The measures complement expansion of clinical trial infrastructure, regulatory strengthening of pharmaceuticals, and scaling of allied health professionals, moving toward integrated, team-based, and technology-enabled care models.

Data & Evidence

Cancer treatment often costs several lakhs annually, with medicines forming a major component of out-of-pocket expenditure; duty exemptions can significantly reduce end-user prices for imported therapies.
India faces a substantial deficit of allied health professionals relative to demand, particularly in geriatrics, oncology support services, and home-based care.

Challenges / Gaps

Limited overall growth in the health budget constrains systemic expansion of public healthcare infrastructure.
Customs exemptions primarily benefit imported drugs; lack of domestic manufacturing capacity leaves long-term affordability vulnerable to exchange-rate volatility and supply disruptions.
Caregiver training programmes must ensure strong quality control, supervision, and ethical standards to prevent unsafe task shifting.

Way Forward

Promote domestic manufacturing of oncology and rare-disease drugs through R&D incentives, production-linked incentive–style schemes, and faster regulatory approvals.
Integrate trained caregivers into Ayushman Bharat–PMJAY, geriatric healthcare, and palliative care programmes to ensure institutional linkage and sustained demand.
Expand public oncology infrastructure and early detection programmes to complement affordability-focused measures.
Define a clear legal scope of practice for caregivers to safeguard patient safety and professional accountability.

Data & Facts

Cancer cases in India are projected to exceed 1.5 million annually according to ICMR estimates.
Out-of-pocket expenditure constitutes around 48–50% of total health spending in India, among the highest globally.
Rare diseases affect an estimated 70–90 million people in India.
India's doctor–population ratio is roughly 1:1500, below the WHO benchmark of 1:1000, underscoring the need for an allied workforce.
Access to palliative care remains extremely limited, reaching only about 1–2% of those in need.

Waste-to-Energy (WtE)

Why in News ?

Rapid growth in urban solid waste generation, landfill saturation, and policy emphasis under the amended Solid Waste Management Rules, 2016 have renewed attention on Waste-to-Energy (WtE) as a method for waste processing and energy recovery.

Relevance

GS-3 – Environment / Ecology

Solid waste management
Pollution control
Circular economy
Renewable energy debates

GS-2 – Governance (Local Bodies)

Role of Urban Local Bodies
Environmental regulation

Waste-to-Energy – Basics

Definition

Waste-to-Energy (WtE) refers to the conversion of non-recyclable solid waste into usable energy such as electricity, heat, or fuel through thermal, chemical, or biological processes, reducing landfill volumes while recovering embedded energy from waste streams.

Major Technologies

Incineration combusts waste at high temperatures to generate steam and electricity; gasification and pyrolysis convert waste into syngas under limited oxygen conditions; anaerobic digestion uses microbial processes to produce biogas from organic waste.

Policy & Regulatory Framework

Solid Waste Management Rules

The SWM Rules, 2016 mandate source segregation, scientific processing, and promotion of refuse-derived fuel, positioning WtE as a treatment option for residual waste after recycling and composting to minimise landfill reliance.

Institutional Ecosystem

The Ministry of Housing and Urban Affairs, Central Pollution Control Board, State Pollution Control Boards, and Urban Local Bodies regulate WtE facilities, prescribing emission standards, environmental clearances, and compliance requirements for air pollution and ash disposal.

Rationale for WtE Push

Urbanisation & Waste Surge

India generates approximately 1.5–1.7 lakh tonnes of municipal solid waste daily, a figure expected to rise with urbanisation and consumption growth; WtE offers volume reduction and partial energy recovery from waste otherwise dumped in landfills.

Land Scarcity

Large cities face acute landfill saturation and land shortages; WtE can reduce waste volumes by nearly 80–90%, extending landfill lifespans and easing urban land-use pressures.

Climate Link

Diverting waste from open dumps reduces methane emissions, a highly potent greenhouse gas; controlled combustion with safeguards can be environmentally preferable to uncontrolled dumping and burning.

Constitutional / Legal Dimension

WtE aligns with Article 48A on environmental protection and Article 21's right to a clean environment, while reflecting the polluter-pays and precautionary principles embedded in Indian environmental jurisprudence.

Governance / Administrative Dimension

Successful WtE implementation requires strict source segregation, consistent feedstock quality, long-term municipal contracts, and credible monitoring capacity, which remain weak across many Urban Local Bodies due to fiscal and technical constraints.

Economic Dimension

WtE projects involve high capital and operating costs; financial viability depends on tipping fees, power tariffs, and assured waste supply, raising concerns about long-term fiscal sustainability.

Environmental Dimension

Poorly managed WtE facilities can emit dioxins, furans, particulate matter, and heavy metals; safe operation demands advanced flue-gas treatment, continuous emissions monitoring, and scientific handling of residual ash.

Social / Ethical Dimension

Informal waste pickers risk livelihood loss if recyclable materials are diverted toward incineration; inclusive policy must integrate them into segregation, recycling, and formal waste-management value chains.

Technology Dimension

Indian municipal waste has high moisture content and low calorific value due to large organic fractions, reducing incineration efficiency; technological adaptation and effective segregation are essential for optimal plant performance.

Data & Evidence

India operates over 20 WtE plants and more than 100 biogas facilities; several projects have faced shutdowns due to poor segregation, community opposition, and emission-related concerns.
Research indicates that recycling often delivers greater energy savings and emission reductions than incineration, reinforcing the waste hierarchy that prioritises reduction, reuse, and recycling.

Challenges / Gaps

Mixed waste collection lowers calorific value and increases pollution risks, making many WtE projects environmentally and technologically inefficient.
Public resistance arises from health concerns, siting conflicts, and limited transparency in emissions monitoring.
Excessive focus on WtE can create incentives to burn recyclable materials, undermining circular-economy practices such as composting and material recovery.

Way Forward

Enforce strict source segregation and decentralised composting of wet waste, reserving WtE exclusively for non-recyclable, high-calorific residual waste in line with waste-hierarchy principles.
Strengthen real-time emissions monitoring, public disclosure, and independent audits to build trust and ensure regulatory compliance.
Integrate informal waste workers into formal systems through material recovery facilities, cooperatives, and social protection measures to enable a just transition.
Promote circular-economy policies, extended producer responsibility, and waste reduction strategies to address root causes rather than relying on end-of-pipe solutions.

Data & Facts

India generates around 55–60 million tonnes of municipal solid waste annually, projected to double by 2030.
Approximately 70–75% of urban waste remains unsegregated in many cities.
Methane emissions from landfills have a warming potential nearly 28 times that of CO_2 .
The EU waste hierarchy prioritises Reduce, Reuse, Recycle, Recover, and Dispose.
Sweden imports waste for energy generation due to advanced segregation and efficient WtE infrastructure.

Livestock & Fisheries Push

Why in News ?

Union Budget 2026–27 announces enhanced allocations and new initiatives for livestock and fisheries, emphasising value-chain strengthening, entrepreneurship, and rural job creation, signalling a strategic move to diversify farm incomes beyond crop-centric agriculture.

Relevance

GS-3 – Agriculture / Economy

Allied agricultural sectors
Blue economy
Food processing and exports
Rural income diversification

GS-2 – Governance / Welfare

Farmer welfare policies
Institutional credit systems

Sector Basics

Livestock Sector

The livestock sector encompasses dairy, poultry, sheep-goat rearing, and related activities, making a substantial contribution to agricultural GVA, nutritional security, and supplementary incomes, particularly for small farmers, marginal cultivators, and landless households.

Fisheries Sector

Fisheries include marine, inland, and aquaculture systems, supporting livelihoods in coastal and inland regions, contributing to exports and protein availability, with India ranking among the leading fish-producing nations globally.

Budget Announcements – Key Features

Fisheries Push

The enhanced allocation for the Ministry of Fisheries (around ₹2,761.8 crore) supports one of the world's largest inland reservoir networks, spanning approximately 31.5 lakh hectares, with focus on value addition, infrastructure expansion, and export competitiveness.

Value-Chain Development

Budgetary emphasis on cold storage, processing facilities, logistics, and market linkages aims to reduce post-harvest losses and improve farmer realisation across fisheries and animal husbandry value chains.

Entrepreneurship & Start-ups

The push promotes start-ups, women-led collectives, and Farmer Producer Organisations (FPOs) in livestock and fisheries, integrating them into formal value chains and enhancing access to institutional credit, technology, and markets.

Animal Husbandry Allocation

The Ministry of Animal Husbandry receives an allocation of about ₹6,153.46 crore, reflecting an increase of nearly 21%, directed toward genetic improvement, veterinary infrastructure, and disease prevention programmes.

Credit-Linked Support

Entrepreneurship is encouraged through credit-linked subsidy mechanisms, stimulating private investment in dairy farms, hatcheries, feed production units, and processing enterprises.

Rationale Behind the Push

Income Diversification

Allied sectors provide income stability against monsoon dependence and price volatility in crops, aligning with the broader policy objective of doubling farmers' income through diversification.

Nutrition Security

Livestock products and fish supply high-quality protein and essential micronutrients, addressing malnutrition and dietary diversity gaps highlighted in national nutrition assessments.

Export Potential

Marine and animal-based products constitute a significant share of agricultural exports; enhanced value addition and quality compliance can strengthen foreign exchange earnings and global competitiveness.

Constitutional / Legal Dimension

The initiatives align with Article 48, which directs the State to organise animal husbandry on modern and scientific lines, and Article 47, which mandates improvement of nutrition and public health.

Governance / Administrative Dimension

Effective delivery requires coordination among the Department of Animal Husbandry and Dairying, Department of Fisheries, state veterinary services, MPEDA, NABARD, and strong disease surveillance, extension, and credit-delivery systems.

Economic Dimension

Livestock accounts for over 30% of agricultural GVA in recent years; strengthening allied sectors boosts rural employment, MSME growth, and value-added agri-exports.

Social / Ethical Dimension

Livestock and fisheries significantly support women's economic participation and livelihoods of marginalised communities; ethical considerations include animal welfare standards and sustainable fishing practices.

Environmental Dimension

Challenges such as overfishing, habitat degradation, and methane emissions from livestock raise sustainability concerns, requiring integration of climate-smart livestock management and responsible aquaculture practices.

Technology Dimension

Use of genetic improvement, vaccination programmes, IoT-based monitoring, precision feeding, and modern husbandry practices can enhance productivity while reducing disease incidence and mortality.

Data & Evidence

India ranks among the world's largest producers of milk and fish, with fisheries exports generating several billion dollars annually, reflecting strong international demand.
High post-harvest losses in fisheries and perishables persist due to inadequate cold-chain infrastructure, underscoring the need for logistics investment.

Challenges / Gaps

Frequent disease outbreaks in poultry and cattle can trigger severe income shocks, while veterinary infrastructure and surveillance remain uneven across states.
Fragmented supply chains and limited processing capacity reduce farmers' share in consumer prices.
Climate variability and environmental stress threaten fish stocks, fodder availability, and long-term sustainability.

Way Forward

Expand cold-chain and processing infrastructure through PPP models and viability-gap funding.
Strengthen animal health systems via universal vaccination, digital livestock databases, and traceability mechanisms.
Promote sustainable fisheries management through regulated catch limits, aquaculture standards, and habitat conservation.
Integrate producers into FPOs and cooperatives to enhance bargaining power, scale, and market access.

Data & Facts

Livestock contributes over 30% to agricultural GVA, surpassing crops in certain years.
India is the world's largest milk producer.
The fisheries sector grows at approximately 8–10% annually, among the fastest-growing segments of agriculture.
Marine exports exceed USD 7–8 billion each year.
Protein deficiency remains a concern, with per-capita intake below global averages.
FAO identifies aquaculture as the fastest-growing food-production sector worldwide.

Rakhigarhi & Harappan Heritage

Why in News ?

Union Budget 2026–27 proposes the development of Rakhigarhi, a prominent Harappan civilisation site in Haryana, as a cultural-tourism hub; however, slow progress and land-related issues have triggered public dissatisfaction at the local level.

Relevance

GS-1 – History & Culture

Indus Valley Civilisation
Archaeology and heritage
Art and culture

GS-2 – Governance / Culture

Heritage conservation policy
Role of ASI and heritage legislation

Rakhigarhi – Basics

Location & Identity

Rakhigarhi, situated in Hisar district of Haryana, is among the largest Harappan sites in the Indian subcontinent, often compared with Mohenjo-daro and Harappa in terms of scale, urban complexity, and archaeological significance.

Chronology

The site broadly dates to the period 2600–1900 BCE, corresponding to the Mature Harappan phase, with evidence of earlier and later cultural layers that help trace the evolution and decline of the Indus Valley Civilisation.

Archaeological Significance

Excavations have revealed well-planned streets, drainage networks, craft-production zones, burial sites, and diverse artefacts, reflecting advanced urban planning, extensive trade links, and organised social structures characteristic of Harappan culture.

Key Budget & Policy Announcement

Heritage Development Push

The government proposes integrated development of the site through conservation measures, museum creation, and tourism infrastructure, aiming to transform Rakhigarhi into an international heritage destination while generating local economic opportunities.

Part of Wider Revamp

Rakhigarhi forms part of a broader plan to rejuvenate multiple archaeological sites, indicating a policy shift toward heritage-led development and cultural tourism as instruments of soft power and regional growth.

Historical & Cultural Importance

Civilisational Value

Rakhigarhi reinforces the understanding that the Harappan civilisation extended deep into present-day India, challenging earlier geographically limited narratives and enriching India's civilisational history.

Knowledge Contributions

Archaeological findings related to diet, burial customs, pottery, metallurgy, and settlement organisation offer valuable insights into Harappan life, trade practices, and social differentiation, aiding historical and archaeological research.

Constitutional / Legal Dimension

Conservation efforts align with Article 49, which obligates the State to protect monuments of national importance, and with the Ancient Monuments and Archaeological Sites and Remains Act, 1958 governing protected heritage locations.

Governance / Administrative Dimension

Development requires coordination among the Archaeological Survey of India, state authorities, Ministry of Tourism, and local administration, balancing heritage conservation with land acquisition, rehabilitation, and community participation.

Economic Dimension

Heritage-based tourism can generate local employment, stimulate MSME activity, boost hospitality demand, and improve rural infrastructure, converting archaeological assets into sustainable economic multipliers.

Social / Ethical Dimension

Local resistance often arises when communities fear displacement, inadequate compensation, or exclusion from tourism benefits, underscoring the need for participatory and inclusive heritage-management models.

Cultural Diplomacy / Soft Power

Showcasing Harappan heritage strengthens India's civilisational diplomacy, global academic collaboration, and cultural branding, similar to how countries like Egypt leverage ancient heritage for international soft power.

Data & Evidence

Rakhigarhi extends across multiple mounds over a vast area, making it one of the most extensive Harappan sites; DNA and material analyses from the site have informed debates on Harappan origins and population history.

Challenges / Gaps

Slow excavation progress, funding limitations, and conservation delays constrain research output and weaken public confidence in development commitments.
Encroachments and agricultural activity threaten site integrity and stratigraphic preservation.
Unregulated commercialisation risks diluting authenticity and undermining scientific conservation standards.

Way Forward

Adopt community-based heritage management models that ensure local populations benefit through employment, homestays, and tourism services, fostering stewardship and conservation ownership.
Increase funding for scientific excavation, interdisciplinary research, and digital documentation using GIS, 3D mapping, and advanced analytical techniques.
Develop site museums and interpretation centres, linking Rakhigarhi with broader Harappan heritage circuits for education and tourism.

Data & Facts

Rakhigarhi covers over 350 hectares, making it one of the largest known Harappan sites.
The Indus Valley Civilisation spanned approximately 1.3 million square kilometres, larger

than Egypt and Mesopotamia combined.
Harappans used standardised bricks in a 1:2:4 ratio, reflecting advanced civil engineering.
Absence of monumental temples or palaces suggests relatively egalitarian urban planning.
Genetic studies indicate a complex indigenous population history without simplistic invasion narratives.

03rd February 2026: Daily MCQs

Q1. With reference to the livestock sector in India, consider the following statements:

1. Livestock contributes more than 30% to India's agricultural Gross Value Added in recent years.
2. Livestock-based livelihoods are particularly significant for landless and marginal farmers.
3. The Constitution of India explicitly directs the State to organise animal husbandry on scientific lines.

Which of the statements given above are correct?

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

Answer: (d)
Explanation: Article 48 mandates scientific animal husbandry; livestock contributes over 30% of agri-GVA and supports smallholders and landless households.

Q2. With reference to fisheries in India, consider the following statements:

1. India is among the top global producers of fish from both marine and inland sources.
2. Fisheries growth rate in India is among the fastest within the agriculture sector.
3. Inland fisheries contribute a larger share to India's total fish production than marine fisheries.

Which of the statements given above are correct?

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

Answer: (d)
Explanation: India is a top producer; fisheries grow at ~8–10%; inland fisheries contribute a dominant share.

Q3. Consider the following with reference to value-chain development in livestock and fisheries:

1. Cold-chain infrastructure reduces post-harvest losses.

2. Processing and storage improve farmer price realisation.
3. Export competitiveness depends only on production volume.

Which of the statements given above are correct?

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

Answer: (a)
Explanation: Export competitiveness also depends on quality, standards, and value addition, not just volume.

Q4. Rakhigarhi is important in the study of the Harappan civilisation because:

1. It is among the largest Harappan sites discovered in the Indian subcontinent.
2. Archaeological evidence suggests advanced urban planning and drainage systems.
3. DNA studies from the site have contributed to understanding Harappan population history.

Which of the statements given above are correct?

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

Answer: (d)
Explanation: Rakhigarhi is one of the largest sites, shows classic Harappan urban features, and has contributed to genetic and anthropological research.

Q5. With reference to Harappan civilisation, consider the following statements:

1. The Indus Valley Civilisation covered a geographical area larger than Egypt and Mesopotamia combined.
2. Standardised bricks in the ratio 1:2:4 indicate advanced civil engineering.
3. Presence of monumental temples and palaces suggests a theocratic political system.

Which of the statements given above are correct?

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

Answer: (a)
Explanation: Harappan cities lacked monumental temples or palaces, indicating relatively egalitarian urban planning.

Mains: Livestock and fisheries are emerging as critical drivers of income diversification and resilience in Indian agriculture. Discuss the rationale behind the recent policy push for these sectors and examine the challenges that may limit their contribution to sustainable rural livelihoods. (GS-3 | 250 words)