C-GEM | Centre for Grower-centric Eco-value Mechanisms

Voluntary Carbon Market: Scale, Opportunities and Concerns

A strategic analysis of India's position in nature-based carbon markets and the path to high-integrity climate finance

Focus Area
Nature-Based Solutions

Key Stakeholders
140M+ Smallholders

01

Why Carbon Markets in India, Now?

Smallholder Dominance

India has **140+ million smallholder farmers**, creating unprecedented aggregation potential. This scale positions India as the world's largest potential supplier of nature-based carbon credits.

India issued 278M credits (2010-2022), **17% of global VCM supply**

Policy Transition

India's **Carbon Credit Trading Scheme (CCTS)** launched July 2024, creating a compliance market interface. This bridges voluntary and compliance markets, adding regulatory certainty.

Ministry of Power approved **8 methodologies** in March 2025

Corporate Net-Zero Pressure

Global corporations face mounting pressure to address **Scope** **emissions** and make credible nature claims. Indian projects off verifiable, high-impact offset opportunities.

Global VCM projected to reach **$19.8B by 2035** (25% CAGR)

Narrative Hook

"India is not just becoming one of the largest supplier of carbon credits—it is becoming a test case for whether carbon markets can work for small farmers, ecosystems, and corporate climate goals at the same time."

The decisions made today will shape the global model

02 CARBON CREDIT LIFECYCLE

How Carbon Credits Work: From Project to Market

The Carbon Credit Journey

1. **Project Design** — Develop Project Design Document (PDD)
2. **Validation** — Third-party audit & registration
3. **Implementation** — Execute project activities
4. **Monitoring** — MRV: Measure, Report, Verify
5. **Issuance** — Credits issued to registry
6. **Trading** — Buy, sell, retire credits

Real-World Example: Rice Cultivation

Baseline (Business-as-Usual):

Continuous flooding → **150 kg CH_4/ha/season**

Intervention (Alternate Wetting & Drying):

40% emission reduction → **60 kg CH_4 avoided**

Conversion to CO_2e:

60 kg CH_4 × 27.2 GWP = **1.63 tCO_2e**

After adjustments (leakage, buffer) ≈ **1.3 carbon credits**

Key Quality Criteria

- **Additionality:** Wouldn't happen without carbon finance
- **Permanence:** Emission reductions are long-lasting
- **No Leakage:** Emissions not displaced elsewhere
- **MRV:** Measurable, reportable, verifiable

Credit Retirement

Once purchased, credits are **"retired"** in a public registry—permanently removed from circulation. This ensures each credit offsets emissions only once, preventing double-counting.

03 MARKET ARCHITECTURE

How the Voluntary Carbon Market Works

The journey from project concept to retired credit

1 Project Design

Identify farms, forests, or mangroves for carbon interventions. Define boundaries, activities, and expected outcomes.

Agroforestry · Soil Carbon

2 Methodology

Select approved methodology (e.g., VM0042 for soil carbon). Submit for validation by accredited third-party verifier.

Verra VCS · Gold Standard

3 MRV

Monitor, Report, and Verify carbon outcomes using field measurements, satellite data, and modeling.

Satellite · Field Data

4 Issuance

Registry issues verified carbon credits (1 credit = 1 tCO_2e). Credits are serialized and tracked in registry database.

Serial Numbers · Tracking

5 Retirement

Buyer retires credits to claim offset. Retired credits are permanently removed from circulation.

Permanent · Non-Reusable

Timeline & Key Considerations

Typical Duration

12-24 months from design to first issuance, depending on methodology complexity

Critical Success Factors

Robust MRV systems, community engagement, and long-term monitoring commitments

Integrity Safeguards

Third-party validation, buffer pools for reversal risks, and transparent reporting

04 ARCHITECTURE

Who Sets the Rules?

Global standards and India's institutional landscape

Global Certification Bodies

V — Verra (VCS)

Largest voluntary registry globally. **1,900+ projects, ~1B credits issued**. Best for large-scale projects and technology-driven solutions.

GS — Gold Standard

Premium label for **SDG co-benefits**. Best for community initiatives, cookstoves, and water projects with strong social impact.

PV — Plan Vivo

Focus on **smallholder and community-led projects**. Emphasizes sustainable land use and local capacity building.

CAR — Climate Action Reserve

North America-focused with **25% buffer pool contribution**. Strong on forestry and landfill gas projects.

India's Institutional Framework

Bureau of Energy Efficiency (BEE)

Market administrator for CCTS. **Accredits verification agencies, maintains digital infrastructure, issues CCCs.**

Ministry of Power

Leads ICM implementation, **defines emission targets, approves methodologies**, and guides policy for compliance/voluntary mechanisms.

Indian Carbon Market (ICM)

Electronic registry for trading Carbon Credit Certificates. **Two mechanisms: compliance (CCTS) and offset (voluntary).**

Private Sector & NGOs

Indian industries participate under the cap-and-trade system. NGOs and government departments like the Forest Department participate in the Green Credits Scheme. The domestic voluntary offsetting scheme is yet to be formalised

Key Insight: Project developers must choose registries based on project type, buyer preferences, and timeline. Verra offers scale and liquidity; Gold Standard commands premium pricing for SDG-aligned projects.

STACK

India's Competitive Advantage

Four pillars positioning India as a global leader in nature-based carbon credits

Scale

Unprecedented Aggregation Potential

India has **140+ million smallholder farmers**—the largest smallholder population globally. This creates massive aggregation potential for carbon projects, enabling economies of scale that few countries can match.

278M
Credits issued (2010-22)

17%
Global VCM supply share

Diversity

Varied Ecosystems & Project Types

From the **Himalayan foothills to coastal mangroves**, India offers diverse ecosystems enabling multiple project types: agriculture, forestry, blue carbon, and soil carbon across varied climatic zones.

- Agroforestry
- Mangroves
- Soil Carbon
- Blue Carbon

Cost Curve

Low Implementation & MRV Costs

Well-designed projects benefit from **lower labor costs and digital MRV tools** (satellite, AI, mobile apps) that reduce verification expenses while maintaining integrity.

Digital MRV can reduce costs by **40-60%** compared to traditional field-based monitoring

Co-benefits

Beyond Carbon: Livelihoods & Resilience

Carbon projects deliver **multiple co-benefits**: improved livelihoods, water security, biodiversity conservation, and climate resilience—aligning with corporate SDG commitments.

- Water security
- Biodiversity
- Livelihoods
- Resilience

Market Outlook: India's voluntary carbon credit revenue projected to reach **$20-40 billion by 2030**, driven by these four competitive advantages and growing global demand for high-integrity nature-based credits.

STACK

High-Potential Project Types in India

Five nature-based solutions categories with proven viability and scalability

Agroforestry

Tree-based systems integrated with crops. **VM0047 methodology** for smallholder bunds. Generates both carbon credits and additional income from timber/fruit.

Example: UP's 25,000 farmer program with ₹10,000 advance payments

Soil Carbon

Regenerative agriculture practices sequester carbon in soils. **VM0042 methodology**—first Asian issuance by Grow Indigo in 2025.

Impact: 30,000 acres, 50,000+ credits, pathway to 4M tCO_2e annually

Mangroves

Coastal wetlands store **26.62 Tg of blue carbon** in Sundarbans. High permanence, strong co-benefits for coastal protection and fisheries.

Challenge: Cyclones, erosion, and salinity stress require adaptive management

Biochar

India's total gross crop residue reaches approx. 686-1043 million tonnes. Biochar based carbon credits present a massive potential to utilize the residue, help in soil improvement and carbon revenue.

- Soil health and quic=k turn-around

Rice Methane Reduction

Alternate Wetting & Drying (AWD) and direct seeding reduce methane emissions from rice paddies. **Fastest-growing segment** at 37.8% CAGR through 2034.

- High demand from food sector Scope 3 reductions

Key Success Factors

All project types require **robust MRV systems**, **community engagement**, and **long-term monitoring commitments**. Projects with strong co-benefits and transparent benefit sharing command premium pricing and attract quality-focused buyers.

07

STACK

Buyer Demand Trends

Who's buying carbon credits and what's driving their decisions

Multinationals

Primary Motivation

Scope 3 emissions reduction and nature-positive claims. Science-Based Targets initiative (SBTi) driving 90% value chain reductions.

Focus: Insetting within supply chains, not just offsetting

Financial Institutions

Primary Motivation

Nature-positive investment portfolios and ESG fund requirements. Investors demand evidence-based carbon reduction roadmaps.

Example: Mirova's $30M investment in Varaha's soil carbon project

Domestic Corporates

Primary Motivation

Preparing for compliance exposure under India's CCTS. Voluntary credits as hedge against future regulatory requirements.

Strategy: "Compliance-grade voluntary credits"

Global Market Size & Growth

$2.1B
2025 Market Size

$19.8B
2035 Projection

25%
CAGR (2025-2035)

Driven by net-zero commitments and Scope 3 pressures

Market Shift: Quality Over Quantity

Low-Integrity Credits Declining
CCC-rated credits dropped from **29% to 15%** (2022-2024)

High-Integrity Credits Rising
A/AA-rated credits **doubled** in same period

Premium Pricing Emerging
New nature-restoration projects: **$40-50/t** vs $10-15/t spot

Critical Insight: Buyers increasingly prioritize **co-benefits, transparency, and corresponding adjustments**. Projects with strong SDG alignment and clear benefit-sharing mechanisms command 20-40% price premiums.

08

PROBLEM

The Three Credibility Tests

Core integrity principles that determine carbon credit quality

Additionality

The Counterfactual Challenge

Would this have happened anyway? Carbon credits must represent emission reductions that would not have occurred without carbon finance.

Assessment Questions:

- Is the project legally required?
- Is it common practice in the region?
- Would it be financially viable without credits?

Risk: Over-crediting when baselines are inflated

Permanence

Will Carbon Stay Locked Up?

Carbon stored must remain out of the atmosphere for a sufficiently long term—typically 100 years benchmark.

Reversal Risks:

- Natural: fires, storms, pests, disease
- Human: illegal logging, land conversion
- Economic: market pressures, policy changes

Mitigation: Buffer pools (10-25% of credits)

Leakage

Are Emissions Moving Elsewhere?

Displacement of emissions from project area to other locations. If one forest is protected but another is cut down, net emissions may not change.

Types of Leakage:

- Activity displacement: work moves elsewhere
- Market effects: supply shifts to other regions
- Life-cycle: upstream/downstream impacts

Assessment: Requires broad system boundaries

MSCI Integrity Framework: Weighted Assessment

35%	20%	15%	20%	10%
Additionality	Quantification	Permanence	Co-benefits	Legal/Ethical

Inverse weighting mechanism: A very low score in any criterion cannot be offset by high scores elsewhere. This ensures projects must perform well across all dimensions to achieve high integrity ratings (AAA, AA, A).

PROBLEM

Ground-Level Risks in India

Five critical challenges specific to the Indian context

Information Asymmetry

Farmers often **don't fully understand contracts**, benefit-sharing arrangements, or long-term implications. Complex carbon market concepts are difficult to communicate across language and literacy barriers.

Impact: Farmers may commit to unfavorable terms without informed consent

Aggregator Dominance

Project developers and aggregators often hold **disproportionate power** in negotiations with smallholders. This can lead to inequitable contracts and limited farmer agency.

Mitigation: FPOs and NGOs as intermediaries to balance power

Land-Use Restrictions

Carbon projects often require **long-term land-use commitments** (20-30+ years). This can constrain farmer flexibility to adapt to changing market conditions or climate impacts.

Challenge: Tenant farmers (30% of land) face additional complexity

Weak Benefit-Sharing

Many projects lack **transparent, equitable benefit-sharing frameworks**. Farmers may receive minimal revenue while intermediaries capture disproportionate value.

Best Practice: Carbon projects are a business deal and benefit-sharing should be strongly negotiated

Opaque Pricing

Farmers often have **limited visibility into credit pricing** and revenue calculations. Volatile carbon prices (dropped from $15-20/t to single digits in 2022-23) create uncertainty.

Solution: Advance payments and price floors to reduce risk

The Path Forward

Addressing these risks requires **stronger governance, transparent contracts, and farmer-centric design**. Projects must prioritize FPIC, clear benefit-sharing, and grievance mechanisms to build trust and ensure long-term viability.

PROBLEM

The Reputation Risk

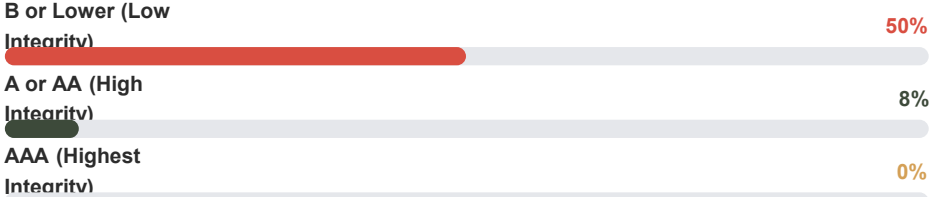
Why integrity in India matters for the global carbon market

Key Message

"A low-integrity project in India doesn't just fail locally—it weakens the global credibility of nature-based credits."

As one of the largest suppliers to the voluntary carbon market, India's project quality has outsized impact on global market reputation. High-profile failures can trigger market-wide skepticism.

Credit Quality Distribution (2024)



↓ **Positive Trend:** CCC-rated credits dropped from 29% to 15% (2022-24)

Consequences of Low Integrity

Price Collapse
Credits fell from **$15-20/t to $3-5/t** in 2022-23 amid integrity concerns

Buyer Withdrawal
Major corporates paused offset purchases, seeking higher-integrity alternatives

Regulatory Scrutiny
EU Green Claims Directive bans offset-only claims; requires transparency

Market Stigmatization
"Carbon offsetting" increasingly associated with greenwashing

The Opportunity: India can lead by example. By demonstrating that **high-integrity, farmer-centric projects** are viable at scale, India can help restore global confidence in nature-based solutions.

CONVERGENCE

Voluntary vs. Compliance Interface

What's coming as markets converge and rules crystallize

India's Carbon Market (ICM) Evolution

July 2024

CCTS Detailed Regulations: Intensity-based baseline-and-credit system covering 9 energy-intensive sectors

March 2025

8 Methodologies Approved: Including mangrove afforestation, green hydrogen, renewable energy, industrial efficiency

Ongoing

ICM Registry Development: Electronic platform for trading Carbon Credit Certificates (CCCs)

Key Feature: Both compliance and offset mechanisms under unified framework

Article 6 & Corresponding Adjustments

Article 6.2: Cooperative Approaches

Bilateral/multilateral agreements for transferring Internationally Transferred Mitigation Outcomes (ITMOs)

Corresponding Adjustments (CAs)

Host country subtracts transferred credits from its NDC; buyer country counts them toward its target. Prevents double counting.

India's Position

Developing meta-registry for Article 6 alignment; may restrict VCM exports if NDC targets at risk

Impact: Credits with CAs may trade at premium; adds regulatory certainty

Risk of "Double Claiming"

Same emission reduction claimed by both host country (toward NDC) and buyer (toward corporate target).

Solution: Corresponding adjustments ensure transparent accounting

Corporate Strategy Uncertainty

Evolving rules create uncertainty for buyers. SBTi decision pending on whether offsets can apply to Scope 3.

Approach: Design for flexibility; prioritize high-integrity credits

Market Integration

Voluntary and compliance markets increasingly interconnected. High-integrity VCM credits may become compliance-eligible.

Opportunity: "Compliance-grade voluntary" positioning

LIKE

Gold Standard for Indian NbS Projects

Five tests for high-integrity, farmer-centric carbon projects

1 FPIC
Free, Prior & Informed Consent

Farmers must understand and voluntarily agree to project terms before implementation. No coercion, full disclosure.

✓ Community meetings, local language materials

2 Benefit-Sharing
Transparent Revenue Distribution

Clear, equitable revenue splits with majority share (75%+) flowing directly to farmers. Transparent pricing and calculations.

✓ Written agreements, regular reporting

3 Local MRV
Participatory Monitoring

Farmers participate in data collection and verification. Builds capacity, trust, and ensures local knowledge informs assessments.

✓ Training, mobile apps, community verification

4 Conservative Crediting
Avoid Over-Issuance

Use conservative baselines and discount factors. Better to under-credit than risk over-crediting and reputational damage.

✓ Buffer pools, third-party validation

5 Grievance Systems
Accountability Mechanisms

Accessible, culturally appropriate channels for farmers to raise concerns and seek redress. Independent oversight where possible.

✓ Local representatives, escalation procedures

The Bottom Line: Projects that meet these five tests are not just more ethical—they're **more durable, more credible, and command premium pricing**. In a market increasingly focused on integrity, doing right by farmers is also good business.

CONVERGENCE

Strategic Implications for Market Participants

How developers, buyers, and intermediaries should position for the emerging market

For Developers

Design for Future Alignment

Build projects that can seamlessly transition to compliance markets. Use ICM-approved methodologies from the start.

Invest in Robust MRV

Digital MRV systems (satellite, AI, mobile) reduce costs and increase credibility. Essential for scaling.

Prioritize Farmer Relationships

Transparent benefit-sharing and FPIC build trust, reduce attrition, and attract quality-focused buyers.

For Buyers

Demand "Compliance-Grade" Credits

Prioritize credits with pathways to corresponding adjustments. Future-proofs your portfolio against regulatory changes.

Focus on Co-benefits

Projects with strong SDG alignment (livelihoods, biodiversity, water) offer greater resilience and brand value.

Engage Directly with Projects

Long-term offtake agreements provide project developers with capital certainty and ensure supply security.

For NGOs & FPOs

Become Critical Intermediaries

Bridge the trust gap between developers and farmers. Provide aggregation, capacity building, and grievance redressal.

Champion Farmer Interests

Ensure transparent benefit-sharing and FPIC. Hold developers accountable to social and environmental commitments.

Build Technical Capacity

Train farmers in sustainable practices, MRV participation, and contract literacy. Enable genuine co-creation.

Positioning for the Emerging Market Structure

Short-Term (2025-2027)

- Focus on high-integrity project development
- Build farmer trust through transparent practices
- Establish digital MRV capabilities

Long-Term (2028-2030)

- Scale proven models with compliance alignment
- Capture premium pricing for quality credits
- Influence policy through demonstrated success

CLOSING FRAME

The Real Choice

"India can become the **world's largest supplier** of nature-based credits—or the **world's strongest example** of how carbon markets can work for farmers, ecosystems, and climate integrity at once."

It won't be both by default.

Scale
140M+ smallholders

Integrity
Five gold standard tests

Impact
Farmers, ecosystems, climate

→ **The path chosen today—by policymakers, developers, buyers, and intermediaries—will define the next decade of climate finance and determine whether carbon markets fulfill their promise as a tool for equitable, effective climate action.**