

FARMER'S GUIDEBOOK

A Practical Manual to
Climate-Smart Agriculture and Carbon
Market Participation in India

Ishtiyak Ahmad Peerzada | Mohan Reddy
Ritu Bhardwaj | Geetika Thakur
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Disclaimer

This guidebook was prepared in India by IIED, SKUAST-K, and VCMI and reflects independent views of the authors who take sole responsibility for information presented in this report, as well as for any errors or omissions.

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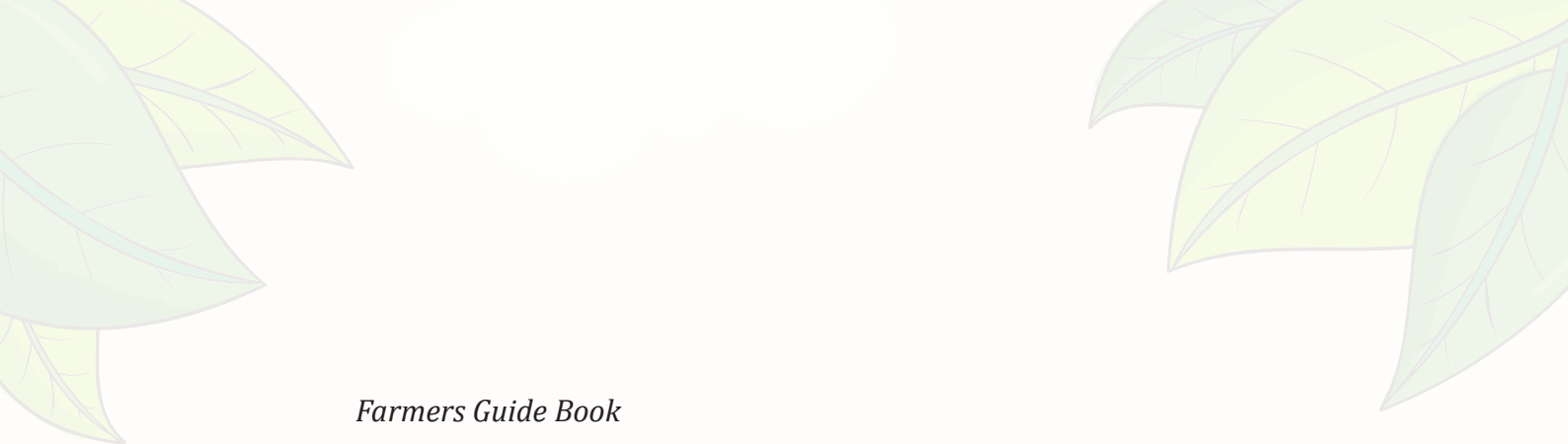
ACKNOWLEDGEMENT

The preparation of the Farmers' Guidebook: A Practical Manual to Climate-Smart Agriculture and Carbon Market Participation in India represents a collaborative effort to support farmers, Farmer Producer Organizations (FPOs), extension agencies, researchers, and agricultural practitioners in understanding and participating in emerging climate-smart agriculture and carbon market opportunities in India. This guidebook has been developed with the vision of empowering farming communities through practical knowledge, sustainable agricultural practices, and improved access to climate finance mechanisms.

We gratefully acknowledge the Ministry of Agriculture and Farmers' Welfare (MoAFW), Government of India, the International Institute for Environment and Development (IIED), the Voluntary Carbon Markets Integrity Initiative (VCMI), and Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K) for their leadership, collaboration, and continued guidance throughout the development of this publication.

We wish to express particular appreciation to the Ministry of Agriculture and Farmers' Welfare (MoAFW), Government of India, for their institutional support and policy endorsement, which provided the essential governmental framework underpinning the development of this guidebook. MoAFW's engagement reflects the Government of India's recognition of the growing importance of voluntary carbon markets as a mechanism for delivering tangible co-benefits to India's farming communities, including income diversification, adoption of climate-smart agricultural practices, sustainable land and water management, and long-term livelihood resilience. The Ministry's support facilitated inter-institutional coordination, helped ensure the guidebook's alignment with national agricultural policy priorities, and reinforced the relevance of carbon market participation as a practical tool for smallholder and marginal farmers across India. MoAFW's endorsement also anchors this guidebook within India's broader commitments to climate-resilient and low-emission agricultural development, consistent with the country's Nationally Determined Contributions (NDCs) under the Paris Agreement and its national goals for sustainable rural transformation.

IIED, VCMI, and SKUAST-K actively participated in the project Technical Support for Developing Agricultural Voluntary Carbon Markets in India, under which this Farmers' Guidebook has been developed as an important knowledge and capacity-building resource. We also acknowledge the support and collaboration extended under this project toward strengthening awareness and readiness for agricultural carbon markets in India.



Farmers Guide Book

Special thanks are extended to the editors, authors, reviewers, and technical contributors whose interdisciplinary expertise in climate-smart agriculture, carbon markets, environmental sustainability, rural livelihoods, and agricultural extension significantly strengthened the quality and practical relevance of this guidebook. We particularly appreciate the valuable technical review and guidance provided by reviewers from VCMI, whose expertise enhanced the credibility and integrity of this publication.

We particularly acknowledge contributions from the following stakeholder groups:

- Ministry of Agriculture and Farmers' Welfare (MoAFW), Government of India: We gratefully recognise MoAFW's institutional support, policy guidance, and governmental endorsement, which were instrumental in establishing the credibility and national policy relevance of this guidebook. MoAFW's engagement ensured that the content and recommendations presented herein are grounded in India's national agricultural development priorities and reflect the Government's commitment to supporting farming communities in accessing the emerging opportunities offered by climate-smart agriculture and voluntary carbon markets.
- Academic and research institutions: We express our gratitude to faculty members, researchers, and technical experts from SKUAST-K and collaborating institutions for their analytical inputs, technical support, and contributions toward strengthening the scientific foundation of this guidebook.
- International climate and development organisations: We acknowledge experts and practitioners associated with IIED, VCMI, and collaborating institutions for their guidance on climate policy, carbon market participation, sustainable agriculture, and environmental integrity.
- Carbon market practitioners and technical experts: We thank carbon market professionals, project developers, MRV experts, and sustainability practitioners who shared practical knowledge on carbon farming, Measurement, Reporting and Verification (MRV), farmer participation, and carbon credit mechanisms.
- Government agencies and extension institutions: We appreciate the engagement of agricultural departments, policymakers, extension agencies, and rural development institutions whose perspectives helped align the guidebook with national priorities and practical field-level realities.

This guidebook has been developed to help farmers better understand climate-smart agricultural practices, sustainable farming systems, and opportunities for participation in voluntary carbon markets. It aims to promote environmentally sustainable practices such as soil health management, water-use efficiency, agroforestry, crop diversification, regenerative agriculture, and carbon farming while supporting improved livelihoods, climate resilience, and long-term agricultural sustainability.

Shri Suresh Kumar Gupta (IFS)
Principal Chief Conservator of Forests (PCCF) &
Head of Forest Force (HoFF)
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Message

It is great pleasure to know that this publication titled “*Farmers’ Guidebook: a Practical Manual to Climate-Smart Agriculture and Carbon Market Participation in India*”, has been brought out through a collaborative venture between the International Institute for Environment and Development (IIED), London, and Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K), India. The guidebook is driven by a clear purpose: to equip India’s farming communities with practical knowledge, skills, and confidence to respond to climate change while unlocking new opportunities through voluntary carbon markets.

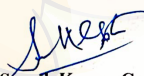
Indian agriculture is at a defining moment. Rising climate variability, erratic rainfall, soil degradation, and declining natural resources are placing growing stress on farming systems and rural livelihoods. At the same time, these challenges create a powerful opportunity to transition toward climate-smart agriculture that enhances resilience, restores ecosystems, and improves productivity. When combined with access to carbon markets, such practices can also generate supplementary income through carbon sequestration and emissions reduction, offering farmers tangible incentives for sustainable action.

This guidebook is designed as an accessible, field-oriented resource that converts complex ideas into practical guidance. A central aim is to demystify voluntary carbon markets for farmers, extension workers, and grassroots institutions. It explains how carbon markets operate, identifies agricultural practices that generate carbon credits, and outlines pathways for participation by individual farmers, cooperatives, farmer producer organizations, and community groups. Step-by-step guidance is provided on project development, registration, monitoring, verification, and certification, with emphasis on approaches that reduce transaction burdens and enhance farmer benefits. Strong attention is given to transparency, safeguards, and benefit-sharing mechanisms to ensure fair and timely compensation.

Grounded in extensive consultations with farmers, researchers, extension professionals, and carbon market practitioners, the guidebook reflects real-world experiences and constraints. Together, it aims to support farmers nationwide, in building resilience, improving livelihoods, and advancing sustainable, climate-smart agriculture for the future of rural India.

I extend my warm congratulations to the Dr. Peerzada Ishtiyak Ahmad and other editors for their dedication and scholarly rigor in bringing together this timely and impactful resource. Their efforts represent a significant contribution toward a more resilient, sustainable, and prosperous future for Indian agriculture.

Place: Jammu
Date: 24/12/2025


Suresh Kumar Gupta



Prof. Nazir A. Ganai
Vice-Chancellor

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Message

It gives me immense pleasure to present this message for ***"FARMERS' GUIDEBOOK: A Practical Manual to Climate-Smart Agriculture and Carbon Market Participation in India"***. This book arrives at a defining moment for Indian agriculture, when the twin challenges of climate change and farmers' livelihoods demand solutions that are practical, inclusive, and future-ready.



Indian farmers stand at the frontline of climate variability facing erratic rainfall, rising temperatures, soil degradation, and increasing production risks. At the same time, they hold the key to climate mitigation through sustainable land management, carbon sequestration, and regenerative agricultural practices. This guidebook bridges the crucial gap between scientific knowledge, policy frameworks, and on-ground implementation. It translates complex concepts of climate-smart agriculture and carbon markets into clear, actionable guidance that farmers, extension workers, policymakers, and agri-entrepreneurs can readily adopt.

What makes this work particularly commendable is its strong focus on practicality. The authors move beyond theory to provide step-by-step insights into climate-resilient farming practices, measurement and verification of carbon outcomes, and pathways for farmer participation in emerging carbon markets. By doing so, the book empowers farmers not only to adapt to climate change but also to benefit economically from sustainable practices transforming them from passive victims of climate impacts into active contributors to climate solutions.

Dr. Peerzada Ishtiyak Ahmad from SKUAST-Kashmir and a team of experts from IIED London deserve special appreciation for their interdisciplinary approach and their commitment to farmer-centric knowledge dissemination. This book reflects academic rigor combined with deep empathy for farming communities and a clear understanding of India's diverse agro-ecological realities. I am confident that this guidebook will serve as a valuable resource for farmers, researchers, development practitioners, and institutions across the country. It is a timely and meaningful contribution toward building a resilient, low-carbon, and prosperous agricultural future for India.

With best wishes for the wide reach and impact of this important work.

(Nazir Ahmad Ganai)

Place: SKUAST-K, Shalimar, Srinagar

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Message

It is with great appreciation that I write this message for the book *"FARMERS' GUIDEBOOK. A Practical Manual to Climate-Smart Agriculture and Carbon Market Participation in India"*. This work represents a significant contribution to applied agricultural research and knowledge translation at a time when Indian farming systems are under unprecedented climatic and economic stress.



From a research perspective, the true strength of this book lies in its ability to convert scientific evidence, policy instruments, and emerging market mechanisms into practical guidance for farmers and field-level practitioners. Climate-smart agriculture and carbon markets are often discussed in technical and policy circles, yet remain distant concepts for those working on the ground. Dr. Ishtiyak has successfully bridged this divide by presenting complex ideas in a structured, accessible, and action-oriented manner.

The guidebook provides clear insights into climate-resilient agronomic practices, soil and water management, and the measurement of carbon benefits, while also explaining how farmers and producer groups can engage with carbon market opportunities. By doing so, it positions farmers not merely as recipients of adaptation support, but as active participants in mitigation efforts and green value chains. This farmer-centric approach reflects both academic rigor and a deep understanding of rural realities.

I predominantly value the interdisciplinary foundation of this book, which draws upon agricultural science, climate research, economics, and institutional frameworks. It exemplifies how research can move beyond publications to create tangible impact by empowering communities and informing decision-making at multiple levels.

I commend Dr. Peerzada Ishtiyak Ahmad for his commitment to socially relevant research and effective knowledge dissemination. I am confident that this guidebook will serve as a valuable resource for farmers, extension agencies, researchers, and development organizations across India, and will contribute meaningfully to building resilient, low-carbon agricultural systems.

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ABOUT IIED

The International Institute for Environment and Development (IIED) is a globally respected policy and action research organisation that works to promote sustainable development and social justice. Founded in 1971 and headquartered in London, IIED collaborates with partners across the world to ensure that the voices of the most vulnerable are heard in decisions affecting their lives and the environment.

IIED's mission is to build a fairer, more sustainable world through evidence, action, and influence. It focuses on pressing global challenges such as climate change, biodiversity loss, sustainable markets, urban development, and natural resource governance. The organization operates with a strong commitment to locally led solutions, placing equity and inclusion at the heart of its work.

A hallmark of IIED's approach is its emphasis on partnerships, particularly with organisations in the Global South. Rather than imposing external solutions, IIED supports local research institutions, civil society groups, and communities to develop strategies rooted in local knowledge and context. This ensures that sustainable development policies and practices are both effective and equitable.

Through rigorous research, policy analysis, and advocacy, IIED plays a key role in shaping international debates and policies. It is a trusted advisor to governments, multilateral institutions, NGOs, and private sector stakeholders. IIED also produces influential publications, including the Environment and Urbanization Journal and numerous policy briefs that help bridge the gap between research and real-world action.

In an era of mounting environmental and social challenges, IIED's work is more critical than ever. By combining research excellence with inclusive, collaborative methods, IIED contributes to a future where people and the planet thrive together.

For more information, visit: iied.org



ABOUT VCMi

The Voluntary Carbon Markets Integrity Initiative (VCMi) is a global non-profit working to mobilize private sector finance for climate action and sustainable development by scaling high-integrity carbon credit markets.

VCMi sets the global benchmark for credible corporate use of carbon credits through its Codes of Practice, helping build trust, confidence and consistency across the market. VCMi also supports governments to unlock corporate demand for carbon credits by hosting the Secretariat for The Coalition to Grow Carbon Markets.

Through its Access Strategies Program and partnership with the Climate Vulnerable Forum and its V20 Finance Ministers (CVF-V20), VCMi supports emerging markets and developing economies to build the policies, capacity and infrastructure needed to leverage carbon markets to deliver finance for their climate and sustainable development priorities.

VCMi collaborates with stakeholders from civil society, the private sector, Indigenous Peoples, local communities, and governments to harness the full potential of high-integrity carbon markets. This includes participation from civil society, academia, government, business and other relevant initiatives focused on high-integrity carbon credit markets.

A separate governance structure exists for VCMi's work as host of the Secretariat for The Coalition to Grow Carbon Markets. The Coalition's strategy and policy positions are determined solely by its member governments.

VCMi is an independent non-profit operating as a sponsored project of Social Change Nest. VCMi was announced by COP26 President-Designate Alok Sharma on 31 March 2021, and has received funding from the Ballmer Group, Bezos Earth Fund, Children's Investment Fund Foundation, ClimateWorks Foundation, Google LLC, David and Lucile Packard Foundation, and UK Department for Business, Energy and Industrial Strategy.

For more information, visit: vcmintegrity.org



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PART - I INTRODUCTION

1.1 About this Guidebook

This guidebook offers a foundational understanding of climate-smart agriculture and outlines how farmers can actively engage in carbon and environmental markets. It highlights sustainable farming practices that not only improve soil health, water use efficiency, and biodiversity but also create opportunities for farmers to generate additional income through carbon credits. The guidebook further explains key concepts such as Measurement, Reporting, and Verification (MRV), farmer contracts, and associated rights, ensuring that farmers are well-informed and ready to participate in carbon projects. Through the inclusion of real-world case studies, it aims to motivate farmers and organizations to adopt practices that support both climate action and long-term agricultural resilience.

1.2 Objectives and how to use this guidebook

The primary objective of this guidebook is to support the effective dissemination of essential knowledge to various stakeholders like farmers, Farmer Producer Organizations (FPOs), NGOs, and agricultural practitioners involved in the Carbon Markets within the agricultural sector. By equipping stakeholders with the basic and necessary information needed to actively participate in carbon market initiatives, this guidebook aims to improve the overall efficiency and quality of carbon market projects. Furthermore, it seeks to promote the adoption of climate-smart agricultural practices that contribute to sustainable development and help increase farmers' incomes.

How to Use This Guidebook:

- **Part I** provides background on climate-smart agriculture and markets
- **Part II** explains practical farming techniques you can adopt
- **Part III** guides you on joining carbon projects and earning revenue
- **Part IV** gives an overview of carbon markets and useful terms
- **Part V** highlights digital tools and innovations for monitoring and recordkeeping.
- **Part VI** lists key actions and exercises for practical understanding.

The **Annexure** includes useful templates and contact information for participation in India's carbon markets.



INTRODUCTION

This guidebook is designed as a step-by-step reference manual. Each section can be read independently based on the reader's needs and level of engagement.

1.3 Role of Farmers and Project Developers in Sustainable Agricultural Practices

What are sustainable Agricultural Practices?

Sustainable agricultural practices are farming methods that aim to meet today's food and fiber needs without harming future generations' ability to meet their own needs. These practices focus on environmental health, economic profit, and social and economic fairness. Sustainable agriculture works with nature. It seeks to maximize food production while minimizing environmental harm. This approach involves preserving the environment, expanding natural resources, and improving life for both animals and people. It ensures long-term food sustainability while decreasing reliance on traditional farming methods and offering alternative food options. Sustainable agriculture practices include using local resources, cutting down on water usage, and applying natural fertilizers. These actions help maintain soil quality, reduce erosion, and protect natural resources for future generations.

Role of Farmers

Farmers are central to achieving sustainable agriculture. As stewards of land, water, and biodiversity, their daily choices directly impact environmental health, food security, and rural livelihoods. In a changing climate and under increasing pressure on natural resources, farmers' roles have expanded beyond food production to include environmental stewardship and climate action.

Sustainable agriculture depends on farmers actively adopting and promoting practices that maintain soil fertility, use water efficiently, minimize chemical use, and boost biodiversity. By implementing these approaches, farmers help restore ecosystems, improve crop resilience, and cut greenhouse gas emissions.

In addition to their ecological mission, farmers play a key role in emerging carbon and environmental markets. By adopting practices like agroforestry, alternate wetting and drying, and organic farming, they produce measurable environmental benefits eligible for carbon credits. These efforts not only contribute to global climate goals but also create new income opportunities for farming communities. Equipping farmers with knowledge, tools, and access to support systems is essential for scaling sustainable agriculture. Their traditional wisdom, combined with modern climate-smart techniques, forms the basis for a resilient and fair agricultural future. Farmers are not seen merely as beneficiaries anymore; they are regarded as active agents of change leading the shift toward more sustainable, inclusive, and climate-resilient farming systems.

Role of Project Developers

A project developer plays a pivotal role in designing, implementing, and managing the entire project lifecycle. They serve as the central coordinator between farmers, carbon standards, verifiers, and buyers, ensuring that the project delivers both environmental impact and financial value.

The project developer begins by identifying suitable climate-smart agricultural practices such as reduced tillage, agroforestry, or water-saving techniques that can result in measurable greenhouse gas (GHG) reductions or carbon sequestration. They then select the appropriate carbon standard and method-

INTRODUCTION

ology to ensure the project complies with recognized international protocols.

One of the developer's key responsibilities is to engage with farmers, FPOs, and local institutions. This includes conducting awareness sessions, offering technical training, and ensuring farmers understand and adopt the recommended sustainable practices. The developer is also responsible for establishing robust Monitoring, Reporting, and Verification (MRV) systems collecting field-level data, maintaining records, and using technology to track changes in farming practices and emissions.

Once sufficient data is collected, the project developer coordinates with accredited third-party verifiers to validate the emission reductions. After successful verification, they facilitate the issuance and sale of carbon credits. A critical part of this process is ensuring transparent benefit-sharing mechanisms so that participating farmers receive the agreed-upon incentives, which may include direct payments, infrastructure support, capacity-building, or inputs.

In essence, the project developer ensures that carbon farming projects are technically sound, compliant with international standards, financially viable, and beneficial to farmers.

Their role is critical in bridging the gap between on-ground sustainable farming efforts and global climate finance.

1.4 Overview of Climate-Smart Agriculture

Climate-smart Agriculture (CSA) is a complete approach to ending food insecurity and promoting sustainable development while tackling climate change. CSA includes agricultural practices and technologies that improve productivity, build resilience, and lower greenhouse gas emissions. While it builds on existing agricultural knowledge, technologies, and sustainability principles, CSA

stands out in several ways. First, it focuses specifically on addressing climate change within the agri food system. Second, CSA looks closely at the relationship between productivity, adaptation, and mitigation. Third, CSA includes a variety of practices and technologies that are suited to specific ecological conditions and economic contexts. These practices include adopting climate-resilient crop varieties, using conservation agriculture techniques, implementing agroforestry, applying precision farming, managing water resources, and improving livestock management. By adopting these practices, we can achieve several positive outcomes:

1. **Increased productivity:** Grow more and better-quality food without overburdening natural resources, enhancing nutritional security and raising incomes, especially for the 75 percent of India's poor who live in rural areas and primarily depend on agriculture.
2. **Enhanced resilience:** Reduce vulnerability to droughts, pests, diseases, and other climate-related risks; strengthen the ability to adapt and grow amid longer-term stresses like greater seasonal variability and unpredictable weather.
3. **Lower Emissions:** Decrease green house gas emissions from the food system prevent deforestation caused by expanding crop land, and enhance carbon sequestration in plants and soils.

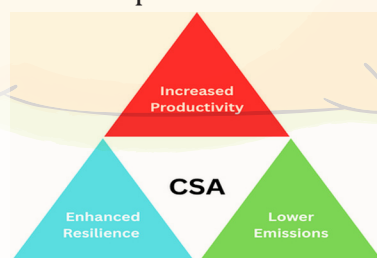


Figure 1: Pillars of Climate-Smart Agriculture

1.5 Introduction to Carbon and Environmental Markets

Carbon Markets

Carbon markets are pricing tools that allow governments and non-governmental actors to buy and sell greenhouse gas (GHG) emission reductions as credits. These markets are designed to help meet climate goals in a cost-effective way by encouraging emission reductions where they are most efficient. These emission reduction projects can generate credits in two different ways:

- **Emission Reductions** – projects that avoid or reduce emissions compared to the usual practice.
 - » Example: using less fertilizer, switching to biogas instead of burning fuelwood, efficient irrigation (AWD in paddy).
- **Carbon Removals / Sequestration** – projects that capture and store carbon from the atmosphere.
 - » Example: increasing soil organic carbon through compost, agroforestry, cover cropping, or restoring degraded land.

There are two main types of carbon markets: compliance and voluntary. In compliance markets, such as national or regional emissions trading schemes or carbon taxes, participants are required by law or regulation to limit or pay for their emissions and may in some cases be permitted to buy credits to meet some of those obligations. In contrast, voluntary carbon markets allow organizations, such as companies, cities, or institutions to buy carbon credits to meet climate or ESG goals without it being a legal requirement. One example could be to make a claim such as climate neutral, achieving net-zero emissions or those set out as best practise in VCMi's Claims Code of Practice.

Table 1:
Voluntary VS Compliance Carbon Market

	Voluntary Carbon Market	Compliance Carbon Market
Purpose	Voluntary climate actions by companies or individuals	Mandated by laws and regulation
Participants	Corporates, NGOs, individuals	Regulated entities like power plants, airlines etc.
Standards Used	VCS (Verra), Gold Standard, Plan Vivo etc.	UNFCCC (CDM), EU ETS, CCTS etc.
Flexibility	More flexible project types and locations	Rigid, jurisdiction-specific rules
Credits Issued	Verified Carbon Units (VCUs), GS-VERs, offsets	Allowances or CERs (Certified Emission Reductions)
Market Drivers	CSR Goals, Carbon Credit claims	Legal compliance and penalties

Environmental Markets

Environmental markets are systems where environmental services, such as tree planting, water conservation, pest control, or carbon reduction, are provided in exchange for payment. These market-based approaches offer financial incentives to individuals or groups who carry out actions that benefit the environment.

Such schemes have been used for decades to support biodiversity, protect water resources, and reduce greenhouse gas emissions. They usually operate under established guidelines or frameworks that clearly define the activities required to qualify for payment, ensuring that the environmental benefits are measurable and verifiable.

Carbon Credit Trading Scheme (CCTS) – India

India's Commitment to the Paris Agreement

India ratified the Paris Agreement in 2016, committing to limit global temperature rise to well below 2°C. In its first Nationally Determined Contributions (NDCs), India pledged to reduce the greenhouse gas (GHG) emission intensity of its GDP by 33–35% by 2030, compared to 2005 levels. Demonstrating enhanced ambition, the Government of India updated the NDC in August 2022, raising the national target to a 45% reduction in GHG emission intensity by 2030, signalling a strong commitment to low-carbon development and climate-resilient growth. Achieving this ambitious goal requires large-scale decarbonisation across sectors and the mobilization of climate finance through market-based mechanisms.

India's Carbon Credit Trading Scheme (CCTS)

To meet its enhanced NDC targets and accelerate the transition to a low-carbon economy, India is establishing a National Framework for the Indian Carbon Market (ICM) built on a reliable digital carbon-credit platform under the Carbon Credit Trading Scheme (CCTS). The CCTS aims to price and incentivize greenhouse-gas emission reductions, reward early climate actions, and mobilize finance for decarbonization, particularly in hard-to-abate sectors and emerging green sectors. The framework incorporates two complementary mechanisms:

Compliance Mechanism addressing emissions from energy-intensive and industrial sectors through mandatory GHG emission-intensity targets, replacing and expanding the PAT scheme.

Offset Mechanism enabling voluntary project-based carbon credits from sectors outside compliance (e.g., agriculture, waste, forestry, transport), supporting broad-based mitigation across the economy.

Compliance and Offset Pathways under CCTS

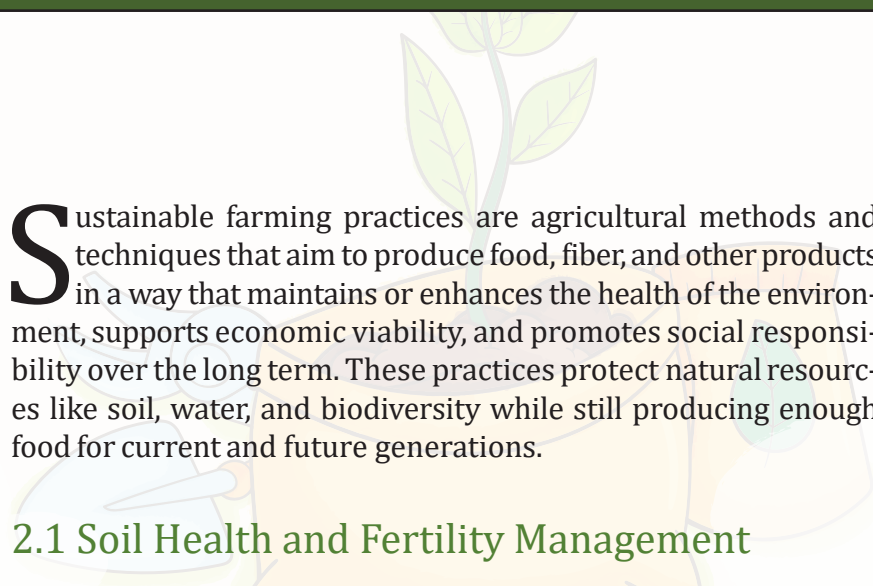
Under the compliance mechanism, GHG emission-intensity targets are set for obligated entities across nine initial sectors, including aluminium, cement, fertilizers, iron & steel, petrochemicals, petroleum refineries, pulp & paper, chlor-alkali, and textiles, with phased expansion to additional sectors. Entities outperforming targets earn CCCs, while under-performing entities must purchase and surrender CCCs equivalent to their shortfall.

The Offset Mechanism enables non-obligated entities to develop projects for emission reduction, removal, or avoidance. Approved projects will undergo a structured project cycle and, upon verification, will receive CCCs. Sectors eligible for phased implementation include energy, industry, agriculture, waste, forestry, transport, construction, solvent use, fugitive emissions, and carbon capture, utilization, and storage (CCUS).



PART - II

SUSTAINABLE FARMING PRACTICES



Sustainable farming practices are agricultural methods and techniques that aim to produce food, fiber, and other products in a way that maintains or enhances the health of the environment, supports economic viability, and promotes social responsibility over the long term. These practices protect natural resources like soil, water, and biodiversity while still producing enough food for current and future generations.

2.1 Soil Health and Fertility Management

Soil is more than just dirt; it is a living system that plays a vital role in agricultural productivity and environmental sustainability. Managing soil health and fertility is essential for sustainable farming, as it helps maintain long-term crop yields, supports plant resilience, and contributes to carbon storage and climate change mitigation.

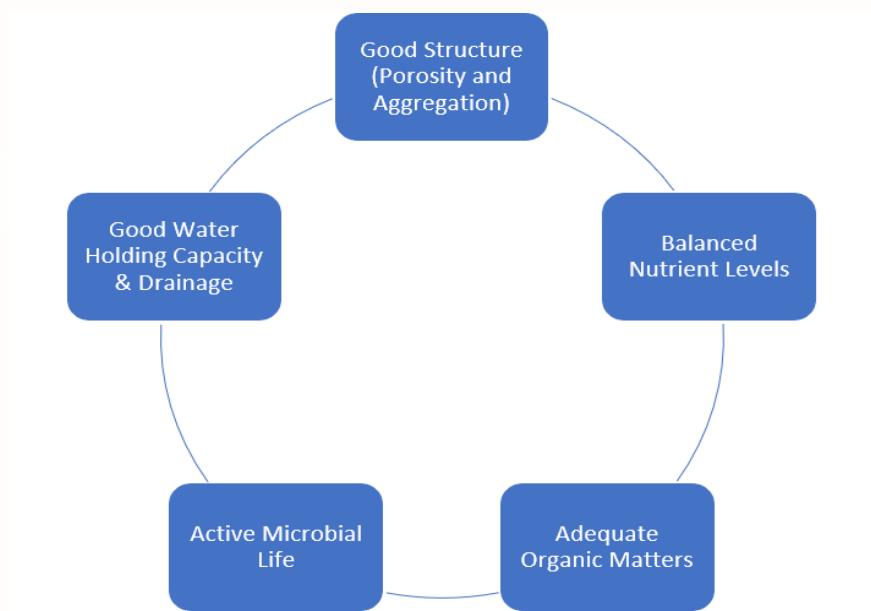


Figure 2: Key elements for Healthy Soil

What is Soil Fertility?

Soil fertility refers to the soil's capacity to support healthy plant growth by supplying essential nutrients, promoting strong root development, and maintaining proper water and air flow. It plays a vital role in achieving good crop yields, ensuring plant health, and maintaining the overall balance of the ecosystem. Following are some of the key aspects of Soil fertility:

Nutrient supply:

Fertile soil contains the necessary macronutrients (nitrogen, phosphorus, potassium, sulfur, calcium, and magnesium) and micronutrients (iron, zinc, copper, etc.) that plants need to thrive.

Physical properties:

Good soil structure, water-holding capacity, and aeration are essential for healthy root growth and nutrient uptake.

Biological activity:

A healthy soil ecosystem with diverse microorganisms and earthworms is vital for nutrient cycling, organic matter decomposition, and disease suppression.

Chemical properties:

Soil pH and the presence of harmful substances can also influence fertility. A pH range of 6-6.5 is generally considered optimal for most plants.

2.2 Water Use Efficiency and Irrigation Techniques

In Indian agriculture, where nearly 80 to 85% of freshwater is used for irrigation, improving Water Use Efficiency (WUE) is crucial for long-term water security and climate resilience. WUE measures how effectively water is used in crop production. It is the ratio of beneficial water use to total water withdrawn from rivers, canals, or groundwater sources. Efficient water use is vital for farming, especially where water is becoming limited. Traditional methods like flood and basin irrigation are still common for crops such as paddy and sugarcane, but they often result in significant water loss due to evaporation, seepage, and runoff. To tackle this issue, climate-smart irrigation methods like drip and sprinkler systems are being promoted. Drip irrigation delivers water directly to plant roots, reducing waste, improving soil moisture, and increasing crop yields by up to 50%, while using 30 to 50% less water than traditional methods. Sprinkler irrigation mimics rainfall

and distributes water evenly, making it suitable for crops like wheat, mustard, and vegetables. These modern systems save water and labor while helping farmers adapt to changing weather and enhance income through better crop growth.

Table 2:
Government Schemes Supporting Efficient Irrigation in India

Scheme Name	Objective / Focus Area	Main Benefits	Who Can Apply	Implementing Body
PMKSY – Pradhan Mantri Krishi Sinchayee Yojana ¹	Improve irrigation coverage and efficiency	Financial assistance for drip/sprinkler, water harvesting structures	All farmers	Ministry of Agriculture & State Agriculture Departments
Per Drop More Crop (PMKSY Component) ²	Promote micro-irrigation (drip/sprinkler)	Subsidy up to 50–90% for drip/sprinkler systems	Small & marginal farmers (priority)	Department of Agriculture & Farmers' Welfare
National Mission on Sustainable Agriculture (NMSA) ³	Climate-smart agriculture and water-use efficiency	Support for water-saving tech, rainwater harvesting, integrated farming	Farmers in climate-vulnerable areas	Ministry of Agriculture & Cooperation

1 <https://pmksy.gov.in/>

2 <https://www.myscheme.gov.in/schemes/pmksypdmc>

3 <https://nmsa.dac.gov.in/>

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Rashtriya Krishi Vikas Yojana (RKVY) ⁴	Support state-led agricultural development	Funding for irrigation equipment, infrastructure	Farmers through state programs	State Governments with central support
NABARD Micro-Irrigation Support ⁵	Financial aid for micro-irrigation systems	Low-interest loans and capital subsidy	Farmers through banks and cooperatives	NABARD in partnership with banks

2.3 Integrated Nutrient, Pest, and Disease Management

Integrated Nutrient, Pest and Disease Management (INPDM) is a holistic and environmentally responsible approach to crop protection and plant health management. Rather than relying solely on chemical pesticides or fertilizers, INPDM combines biological, cultural, mechanical, physical, and need-based chemical measures to sustainably manage pests, diseases, and nutrient needs. This integrated strategy ensures crop productivity while protecting beneficial organisms, human health, and the wider environment.

The primary objective of INPDM is to maintain pest and disease levels below economic thresholds, support balanced nutrient supply, and promote long-term resilience of farming systems. INPDM emphasizes prevention, early detection, and informed decision-making, reducing the dependency on chemical inputs and improving farm profitability.

4 <https://rkvy.da.gov.in/>

5 <https://www.nabard.org/content1.aspx?id=1720&catid=8&mid=8>

Key Components of INPDM

- **Organic Farmyard Manure (FYM) and Soil Health Management :** Application of well-decomposed organic FYM improves soil structure, moisture retention, microbial activity, and organic carbon content. FYM enhances nutrient availability and strengthens plant immunity, making crops more tolerant to pests and diseases. FYM also reduces dependence on synthetic fertilizers and supports carbon sequestration.
- **Monitoring and Early Detection:** Routine field scouting, pest traps, disease surveillance, and forecasting tools help identify issues at an early stage, enabling timely and targeted interventions.
- **Cultural Practices:** Crop rotation, intercropping, resistant varieties, timely sowing, good field sanitation, balanced irrigation, and appropriate plant spacing reduce the incidence of pests and diseases and support optimal nutrient use.
- **Biological Control:** Use of natural predators, parasitoids, beneficial insects, microbial agents (e.g., *Trichoderma*, *Bacillus*, *Beauveria*), and habitat management to suppress pest populations and enhance ecological balance.
- **Mechanical and Physical Measures:** Techniques such as hand-picking, traps, sticky boards, light traps, pheromone traps, nets, and crop residue management disrupt pest life cycles and reduce infestation pressure.
- **Chemical Measures (Last Resort):** When pest or disease levels exceed economic injury thresholds, selective and safe pesticides or biopesticides may be applied ju-

SUSTAINABLE FARMING PRACTICES

ditionally, following proper dosage, timing, and safety guidelines.

- **Farmer Capacity Building and Decision Support :** Training, advisory systems, digital tools, and climate-smart decision support platforms empower farmers to make informed choices based on field data, pest thresholds, and environmentally sound practices.

By using INPDM, farmers can reduce their dependence on chemicals, lower production costs, and improve crop health and yields. It also contributes to sustainable agriculture by preserving soil, water, and biodiversity, and ensuring food safety for consumers.

2.4 Crop Rotation and Diversification

Crop Rotation

Crop rotation is the practice of growing different crops on the same piece of land in a planned sequence across different seasons. For example, a farmer may grow paddy during the monsoon (kharif) season, wheat in the winter (rabi), and then plant a pulse crop like moong or urad in the summer. This practice helps maintain soil fertility, as different crops use and replenish different nutrients. Pulses, for instance, add nitrogen to the soil, which benefits the next crop. Crop rotation also helps control pests and diseases, since pests that affect one crop do not usually affect the next one in the rotation. Additionally, rotating crops improves soil structure and reduces the need for chemical fertilizers and pesticides, making farming more sustainable and affordable for small and marginal farmers.

Crop Diversification

Crop diversification means growing a variety of crops instead of focusing on just one. Farmers may grow vegetables, cereals, pulses, or oilseeds together or across different parts of their land, depending on the season and local climate. This approach reduces the risk of total crop failure due to pests, disease, or changing weather, as not all crops are affected the same way. Diversification also improves food security and household nutrition by providing a mix of food types. In many parts of India, especially rain-fed or drought-prone areas, crop diversification helps farmers make better use of limited resources like water and land, while increasing their chances of earning stable income through local markets.

2.5 Organic and Low-Input Farming

Organic and low-input farming is a method of cultivation that focuses on working with nature rather than relying heavily on synthetic chemicals like chemical fertilizers, pesticides, or herbicides. In this system, farmers use natural inputs such as compost, green manure, cow dung, neem oil, and biological pest controls to nourish the soil and protect crops. Traditional Indian practices like using jeevamrit, panchagavya, or vermicompost are commonly adopted. This approach improves soil health, promotes biodiversity, and reduces environmental pollution. Since input costs are lower, farmers can save money while producing safer and healthier food. Though yields may be slightly lower in the beginning, the long-term benefits of improved soil fertility, better resilience to climate change, and growing consumer demand for organic produce make it a sustainable and profitable choice for small and marginal farmers.

2.6 Agroforestry and tree-based farming

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Agroforestry is a farming approach that integrates trees and shrubs with crops or livestock on the same land. This method brings many benefits to farmers and the environment. Trees improve soil health by adding organic matter, preventing erosion, and enhancing moisture retention. Their deep roots can draw nutrients from deeper soil layers, benefiting crops planted nearby.

By planting fruit trees, timber species, or medicinal plants alongside food crops, farmers can diversify their income, making their livelihoods more resilient. Agroforestry also provides habitats for birds and beneficial insects, helping with natural pest control. Trees play a crucial role in capturing carbon from the atmosphere, which helps fight climate change and can earn farmers carbon credits when done under recognized carbon programs.

In India, farmers in states like Maharashtra, Madhya Pradesh, and Odisha have adopted agroforestry with species like mango, guava, teak, and bamboo, combining short-term crop income with long-term benefits from timber or fruit harvests. Agroforestry not only enhances biodiversity but also promotes sustainable and climate-smart agriculture.



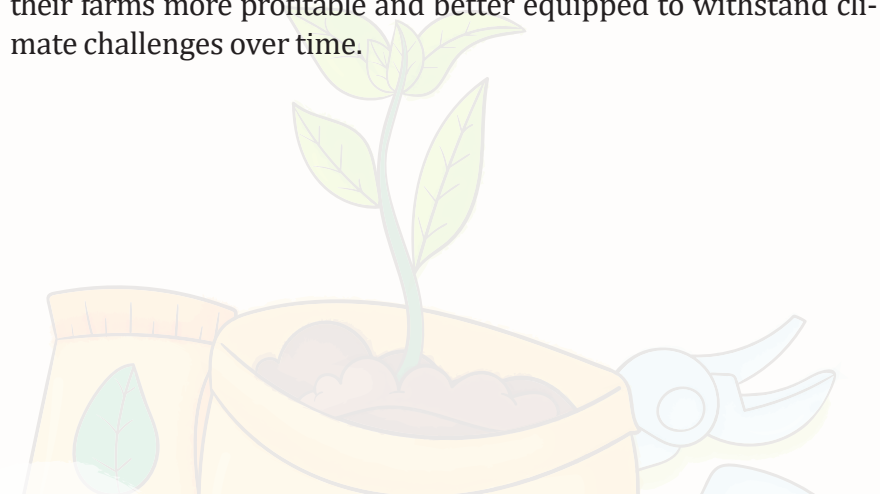
PART - III

CLIMATE ACTION AND CARBON FARMING

3.1 What is Carbon Farming?

Carbon farming is a sustainable agricultural method that captures carbon dioxide (CO₂) from the air and stores it in soil and plants. This approach not only helps fight climate change but also boosts farm productivity and resilience. Common techniques in carbon farming include cover cropping, agroforestry, composting, minimal tillage, and better water management. In India, climate-smart rice cultivation practices such as the System of Rice Intensification (SRI) and Alternate Wetting and Drying (AWD) have demonstrated significant potential for reducing methane emissions from paddy fields. Studies indicate that SRI can reduce total methane emissions by approximately 29%, while AWD has been reported to achieve methane emission reductions of up to 44% compared with conventional continuously flooded

rice cultivation⁶⁷. Long-term application of organic amendments (5–10 Mg ha⁻¹ yr⁻¹) through farmyard manure or compost in subtropical India could increase soil organic carbon (SOC) by approximately 10.7%, with only 18% of the applied carbon being retained in the soil the rest lost through oxidation⁸. In addition to its climate benefits, carbon farming improves soil quality, making it better at retaining water, reducing erosion, and supporting plant growth. For farmers, these practices increase productivity and create new income opportunities. By engaging in carbon markets, farmers can earn carbon credits for their efforts, helping to make their farms more profitable and better equipped to withstand climate challenges over time.

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- 6 Rajkishore SK, Doraisamy P, Subramanian KS, et al. : Methane emission patterns and their associated soil microflora with SRI and conventional systems of rice cultivation in Tamil Nadu, India. Taiwan Water Conser. 2013
- 7 Bouman BAM, Peng S, Castañeda AR, et al. : Yield and water use of irrigated tropical aerobic rice systems. Agric Water Manage. 2005
- 8 The potential of cropping systems and soil amendments for carbon sequestration in soils under long-term experiments in subtropical India, https://www.academia.edu/47258488/The_potential_of_cropping_systems_and_soil_amendments_for_carbon_sequestration_in_soils_under_long_term_experiments_in_subtropical_India

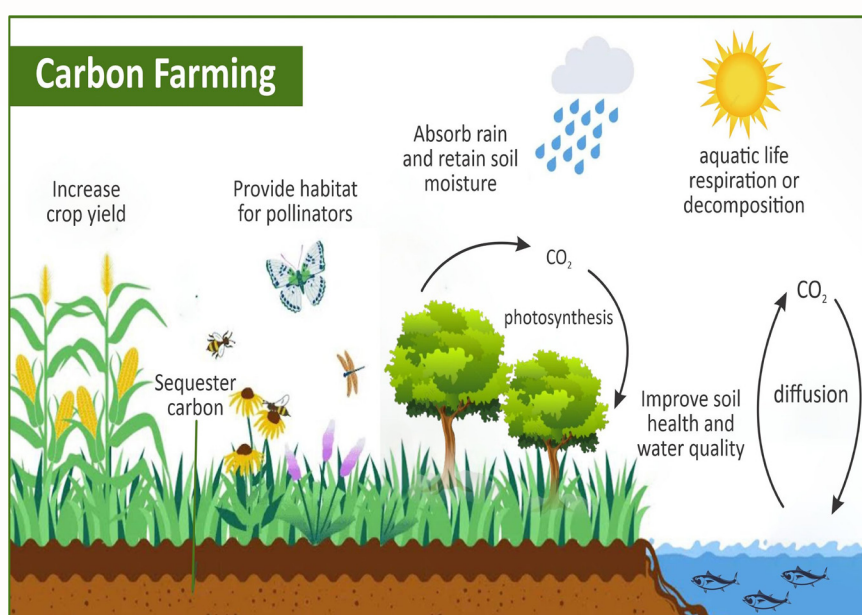


Figure 3: Carbon Farming Cycle⁹

Carbon Farming Projects

India has witnessed a growing number of carbon farming initiatives, primarily led by private sector organizations. As of now, over 140 agriculture land management projects are registered under the Verra carbon registry, collectively aiming to reduce more than 27 million tonnes of CO_2e .

With an estimated market price of 27 million tonnes of CO_2 equivalent emissions annually at US\$10 per credit, it could be worth approximately INR 2,200 crores. If even 60% of this val-

⁹ <https://www.drishtiias.com/daily-updates/daily-news-editorials/carbon-farming-a-pathway-to-sustainable-agriculture>

ue reaches the farmersite, it could result in a direct benefit of around INR 1,300 crores to the farming community. Several carbon farming projects from India are at different stages of registration and validation within the Verra registry. These projects aim to incentivize farmers to continue practicing sustainable, climate-resilient agriculture, with carbon credits serving as a long-term reward mechanism.

Industries such as aviation, mining, and fertilizer, where direct emission reductions are challenging due to the nature of operations, can purchase these agricultural carbon credits to offset their environmental impact. While the idea of using carbon markets to support climate-friendly agriculture is promising, it's important to note that as of 2021, agriculture accounted for only about 1% of the global carbon credits issued, according to the Berkeley Carbon Trading Project. This highlights both the untapped potential and the need for greater integration of agriculture into global carbon markets.

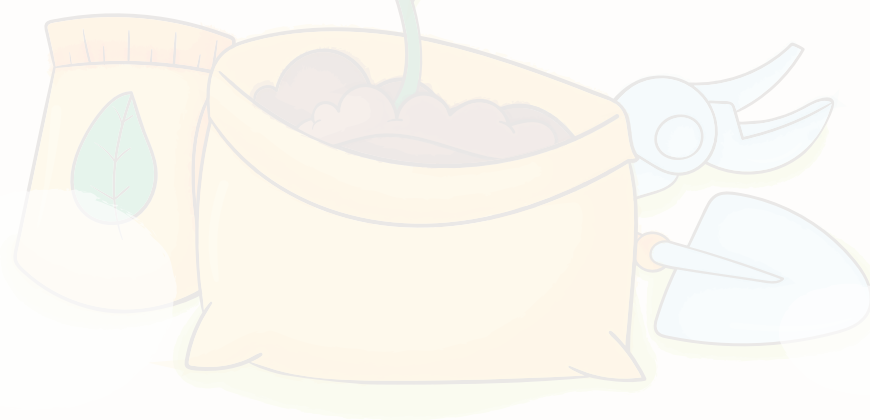


Table 3:
Active Projects Across Regions¹⁰

Project Name	Project Proponent(s)	Location	Interventions	Registration Status	Estimated Emission Reduction (tCO ₂ e/yr)	Project Duration
Agricultural land management	Godrej Properties Ltd	Beed District, Maharashtra	Tree plantations, differential cropping patterns, vermicomposting, etc.	Registered	33,764	2017–2037
Horticulture plantation in Central India	AadharStambh Consultancy Services Pvt Ltd	Madhya Pradesh	Planting, nurturing, and management of fruit-bearing species (e.g., guava, orange, lemon)	Under validation	115,000	2021–2041
Promoting regenerative agriculture and growth through income generation	Grow Indigo Pvt Ltd	Andhra Pradesh, Chhattisgarh, Karnataka, Odisha, Telangana	Improved fertilizer management, cover cropping, crop rotation, reduced tillage, water & residue management, agroforestry	Under development	5,326,066	2020–2040

10 https://www.icar-crida.res.in/assets/c/img/Policypapers/VCM-Policy_paper-2025.pdf

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Aaraku Valley livelihood project	Livelihoods Fund SICAV SIF France	Andhra Pradesh	Planting of trees, horticultural crops, shrubs, coffee, bamboo,	Registered	80,660	2010-2030
Incentivizing smallholder farmers to transition to low-emissions agriculture and agroforestry	Climate-verse Pvt Ltd	Central Plateau, Southern Plateau, East Coast Plains	DSR, AWD, zero tillage, cover cropping, agroforestry, green manuring, residue & nutrient management	Under development	463,650	2022-2032
Afforestation, Reforestation and Revegetation (ARR)	Crop Zone Agro Forestry Ltd (CZAF)	Andhra Pradesh, Telangana, Karnataka, Maharashtra	Planting of fruit-bearing and commercial trees	Registered	10,673	2017-2036
Community-based reforestation	Indian Farm Forestry Co-operative Ltd	Uttar Pradesh	Plantation on wastelands and marginally productive lands	Registered	5,651	2008-2038
Mahogany Plantation in India	MahoganyVishw Agro Pvt Ltd	Maharashtra, MP, Karnataka, Gujarat, Telangana	Planting of Mahogany trees	Registered	8,446	2019-2049
Improved agricultural practices for rice	Kosher Climate India Pvt Ltd	Assam and West Bengal	Alternate Wetting and Drying (AWD)	Registration requested	217,728	2023-2043

3.2 Eligible Practices for Carbon Credits

The following are examples of practices that may be eligible for carbon credits. This list is illustrative rather than exhaustive. Additional practices may also qualify, provided they comply with the eligibility requirements of recognized carbon standards (such as Verra VCS, Gold Standard, or Plan Vivo) and are implemented in accordance with approved methodologies

3.2.1 Alternate Wetting and Drying (AWD)

Alternate Wetting and Drying (AWD) is a water-saving technique for rice cultivation that offers significant environmental and economic benefits. By draining and reflooding paddy fields periodically instead of keeping them continuously flooded, AWD can lower irrigation water use by up to 30%. This helps farmers cut input costs without compromising yields. A simple perforated tube is placed vertically in the field to monitor water levels, allowing irrigation only when the water table drops about 15 cm below the soil surface. One major advantage of AWD is its ability to reduce methane emissions, a potent greenhouse gas produced in waterlogged rice fields. By creating intermittent dry periods, the anaerobic conditions that favor methane-producing microbes are disrupted. Studies show that AWD can reduce methane emissions by 44% , making it an effective climate mitigation practice¹¹.

Due to these reductions in greenhouse gases, AWD is recognized as an eligible practice in carbon farming and can help generate carbon credits. Farmers and project developers who incorporate AWD into a verified carbon project can measure emission reductions, report them under credible standards like Verra's VCS, and generate

11 Bouman BAM, Peng S, Castañeda AR, et al. : Yield and water use of irrigated tropical aerobic rice systems. Agric Water Manage. 2005

credits that can be traded in voluntary carbon markets. These credits provide an additional source of income and create financial motivation to adopt sustainable practices. AWD is a climate-smart method that conserves water, maintains productivity, and opens new economic opportunities through participation in carbon markets.

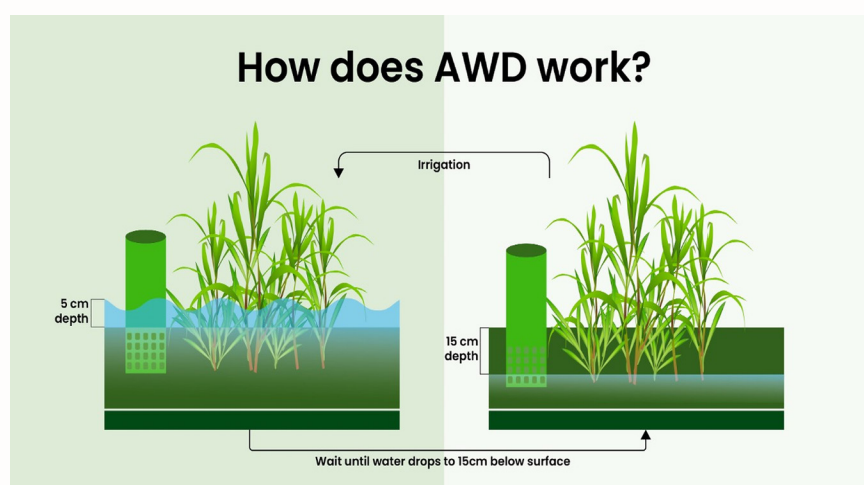


Figure 4: Alternate Wetting and Drying Process ¹²

3.2.2 System of Rice Intensification (SRI)

The System of Rice Intensification (SRI) is an innovative method of growing rice that involves a set of improved farming practices. Although it uses many of the same basic principles as conventional rice farming, it focuses on modifying specific agronomic techniques to increase yields, improve plant health, and reduce environmental impacts. SRI is not a fixed package but a flexible approach with four key components:

¹² <https://tracextech.com/awd-rice-cultivation/>

Climate Action and Carbon Farming

1. Soil Fertility Management
2. Planting Techniques
3. Water Management
4. Weed Control

Several field practices have been developed under these components, which together create a healthier growing environment for rice crop.

Key SRI Practices:

- **Land Preparation:** Fields are carefully leveled and raked, with 30 cm-wide drainage channels laid out every two meters to control water flow and avoid flooding.
- **Use of Organic Inputs:** Compost or farmyard manure is preferred over chemical fertilizers to boost soil biodiversity and improve long-term soil health, which is essential for sustainable productivity.
- **Nursery Management:** Nutrient-rich nurseries are created close to the main field, and young seedlings (8–12 days old) are transplanted early to ensure strong and healthy root development.
- **Wider Plant Spacing:** Instead of planting densely, seedlings are spaced at about 25 x 25 cm. This gives each plant more space to grow, encouraging better root and canopy development.
- **Single Seedling Transplantation:** Only one seedling is planted per spot, at a shallow depth (1–2 cm), allowing it to establish quickly without stress.
- **Manual Weeding:** A simple manual weeder is used 10–12 days after transplanting, and then every 10–12 days. This not only controls weed but also aerates the soil, improving nutrient availability.

- **Water Management:** Unlike traditional flooded fields, SRI keeps the soil moist but not continuously submerged. This practice supports better root growth and reduces methane emissions, a key greenhouse gas in rice farming.

SRI not only improves productivity but also contributes to climate change mitigation, making it eligible for carbon credit programs. By using less water, SRI reduces methane emissions by up to 40–60%, compared to conventional flooded rice farming. When adopted under certified carbon programs, these emission reductions can be measured and verified, allowing farmers to earn carbon credits.

These carbon credits can be sold in voluntary or compliance markets, providing farmers with an additional income stream. For example, one hectare of SRI-managed rice field can potentially generate 1.5–3 tones of CO₂-equivalent reductions per season, depending on local conditions. This can translate into thousands of rupees in extra revenue annually.

3.2.3 Cover Crops and other Regenerative Agriculture Practices

Cover crops are plants grown not for harvest, but to improve soil health and enhance farm sustainability. Typically planted between main cropping seasons or alongside plantation crops, they help protect and enrich the soil when fields might otherwise remain bare. These crops can be rotated with cash crops or used as intercrops, depending on the farming system. Cover crops offer multiple benefits: they prevent soil erosion by shielding the soil surface, add organic matter to improve soil structure and fertility, and help fix nitrogen, particularly when using leguminous plants like pulses thereby reducing the need for synthetic fertiliz-

ers. In addition, they suppress weeds by covering the soil and limiting sunlight, interrupt pest and disease cycles, and reduce the dependency on chemical pesticides. Some cover crops, especially short-duration pulses, can also act as catch crops during drought periods, providing a source of income while protecting soil health. These crops may be annual, biennial, or perennial, and can be either leguminous or non-leguminous, depending on local climate, soil conditions, and cropping patterns.

Other key regenerative interventions include conservation tillage or no-till, cover cropping, crop rotation, organic soil amendments (compost, biochar), agroforestry, and improved grazing management such as rotational grazing. These practices increase soil organic carbon, improve water retention, reduce erosion, and lower synthetic input use, thereby generating measurable and verifiable carbon credits. For instance, integrating cover crops into a crop rotation system can increase soil organic carbon by 0.3 to 1 tone per hectare annually, depending on the species used and climate conditions. This can translate into 0.3 to 1 carbon credit per hectare each year, which can be sold in voluntary carbon markets.

3.2.4 Agroforestry

Agroforestry is a sustainable land-use system that intentionally combines trees, shrubs, and woody plants with crops and/or livestock on the same piece of land. This integration mimics natural ecosystems, enhancing biodiversity, improving soil health, reducing erosion, conserving water, and creating beneficial microclimates for both crops and animals. By diversifying farming systems in this way, agroforestry offers multiple ecological, social, and economic benefits including increased crop yields, additional income from products like timber and fruit, and enhanced ecosystem services such as habitat provision and nutrient cycling.

Agroforestry is recognized as an eligible practice for carbon credits by major international carbon standards like Verra's Verified Carbon Standard, Gold Standard, and Plan Vivo. It qualifies because it sequesters carbon dioxide both in the biomass of trees and shrubs above ground and in the soil below ground. Carbon credit projects using agroforestry establish a baseline of existing carbon stocks, demonstrate that the activities are additional to "business as usual," and apply rigorous monitoring and verification to track carbon sequestration over time. Through this, agroforestry projects generate verified emission reductions that can be converted into carbon credits, providing farmers with new income streams alongside their traditional agricultural production. Additionally, agroforestry projects contribute to soil fertility, biodiversity conservation, and climate resilience, making them both environmentally and socio-economically valuable. Successful examples, such as Rabobank's Acorn¹³ project in India, demonstrate how smallholder farmers can participate in these carbon markets, showcasing agroforestry as a climate-smart and widely encouraged practice globally.

3.3 How to participate in Carbon Project

Farmers can participate in carbon projects by adopting climate-friendly agricultural practices and collaborating with project developers, NGOs, or companies involved in carbon markets.

The basic steps include:

1. **Learn & Adopt Practices:** Implement eligible practices such as reduced tillage, agroforestry, cover cropping, System of Rice Intensification (SRI), or alternate wet-

13 <https://acorn.rabobank.com/en/projects/india-iora/>

- ting and drying (AWD) in paddy fields, which help sequester carbon or reduce greenhouse gas emissions.
2. **Join a Project:** Farmers typically join a carbon project through an aggregator, FPO, NGO, or a carbon project developer. These organizations register the project with a recognized carbon standard (such as Verra VCS or Gold Standard).
 3. **Baseline Data Collection:** Information about current farming practices and land condition is recorded to set a “baseline” for measuring improvements.
 4. **Implement & Record:** Farmers continue applying sustainable practices while maintaining proper records, often using mobile apps or simple logbooks provided by the project developer.
 5. **MRV Process:** The project undergoes Measurement, Reporting, and Verification (MRV), where third-party auditors verify the reduction or removal of greenhouse gases.
 6. **Issuance of Carbon Credits:** Verified carbon credits are issued to the project, and the revenue is shared with participating farmers based on pre-agreed terms.

3.4 Farmer Participation Requirements

There are some basic conditions that must be met before a farmer can join a Carbon project. These ensure that the farmer receives proper and long-term benefits, and the project is successful.

3.4.1 Eligibility Criteria

To participate in the SOC project, farmers must fulfill the following:

(a) Permanent Agricultural Land

- The farmer must be actively cultivating land that is used regularly for farming.
- Barren, unused, or non-agricultural land is not eligible.

(b) Willingness to Participate for At Least One Crop Cycle

- The farmer must commit to participating in the project for at least one full crop season (Kharif, Rabi, or Zaid).
- Leaving midway will affect monitoring and may result in loss of benefits.

(c) Agreement to Adopt the Given Practices

- The farmer must be ready to adopt certain sustainable farming practices such as:

- (a) Reduced tillage (less ploughing)
- (b) Using organic manure or compost
- (c) Managing crop residues (leaving them on the field instead of burning)

- These practices improve soil health and help store carbon in the soil.

(d) Allow Survey, Soil Sampling, and Monitoring

- The project team will visit the farmer's field for surveys and soil testing.
- The farmer must allow access and cooperate with data collection.

(e) Mobile Number or Valid ID Proof

- The farmer should have a working mobile phone number or government ID (like Aadhaar) to receive updates and stay in contact.

(f) Demonstration of additionality

- The farmer should be qualified for the additionality conditions set by the project developer.

3.4.2 Land Ownership or Lease Status

The project allows different types of land, but ownership or usage must be legal and verifiable:

a) Privately Owned Land

- Land owned by the farmer or their family is allowed.

Leased Land

- Leased land can be included only if the lease duration is equal to or more than the project duration (usually 2–5 years).

Shared Land

- If the land is jointly owned, all stakeholders (owners) must give written consent.

Documents Required:

- Farmers must provide valid documents as proof of ownership or lease. These can include:
 - (a) *Khatauni* (land record)
 - (b) Lease agreement
 - (c) Other government land records

3.4.3 Crop, Land, and Practice Suitability

The suitability of the farmer's land and practices is also checked before inclusion in the SOC project:

Soil Type Must Be Suitable

The land should have cultivable soil such as:

- Loamy soil (good mix of sand, silt, clay)
- Black soil (rich in nutrients)
- Sandy soil (if organic matter can be improved)

Organic or Low-Chemical Farming in Recent Years

- The field should already be under low chemical input or organic cultivation for at least the last 1–2 years.
- This helps ensure that the shift to SOC-friendly practices is feasible.

Potential for Organic Improvement

- The field should have potential for better soil health through organic methods.

- If the soil is too damaged or already highly degraded, it may not be suitable.

Willingness to Adopt Carbon-friendly Practices

Farmers must be open to adopting practices such as:

- **Reduced tillage** – less ploughing to maintain soil structure
- **Use of compost or organic manure** – to increase organic carbon in soil
- **Residue management** – not burning crop residues, but incorporating them into the soil
- **Cover cropping** or **crop rotation** – to maintain soil fertility

3.5 Understanding Farmer Contracts and Rights

When farmers join a carbon project under the Voluntary Carbon Market (VCM), they usually sign a contract or agreement with a project developer, NGO, company, or FPO. This contract is a legal document that outlines the rights, responsibilities, and benefits for both sides.

Understanding this contract is very important, as it helps protect farmers' interests and ensures that they are treated fairly and receive the rewards they deserve.

Key elements a farmer should look for in a Carbon Project Contract:

A. Practices You Are Expected to Follow

The contract will mention what sustainable farming practices are required, such as using organic compost, avoiding burning, reduc-

ing tillage, or planting cover crops. Farmers must clearly understand what actions they are committing to.

B. Duration of the Agreement

Many carbon projects run for a long period often 5 to 10 years or more. Farmers should carefully check how long they are tied to the project, and whether they can leave the project in case of problems or changes in their situation.

C. Who Owns the Carbon Credits?

Carbon credits are created based on farmers' sustainable practices. The contract should clearly mention who owns those credits the farmer, the project developer, or both and how revenue will be shared. Transparency is key.

D. How and When You Will Be Paid

Payments are usually made after monitoring and third-party verification. Farmers should understand:

- What is the amount and method of payment?
- What must be done to qualify for payment?
- How often and when will payment be made?

E. Monitoring Visits and Data Collection

Project staff may visit farms, take photos, conduct surveys, or use satellite data. The contract should explain what kind of monitoring will happen and how the information will be used. Farmers should be comfortable with the level of access granted.

F. Privacy and Consent

Farmers have the right to know how their personal and farm data will be used, who will access it, and whether it will be shared. Any data collection must be done with clear consent.

G. Complaint or Grievance Process

A good contract should explain how a farmer can raise a concern or file a complaint if something goes wrong, such as delayed payments or miscommunication. Farmers should always be able to voice concerns without fear.

H. Right to Exit the Project

Life circumstances may change. The contract should state whether a farmer can leave the project early, under what conditions, and if there are any penalties or restrictions for doing so.

3.5.1 What is a Cultivation Log?

A Cultivation Log is a simple but very important notebook or register where farmers record all major activities they do on their farm, in the order they happen.

It is used to:

- Keep track of farming practices
- Prove to the project team what work was done and when
- Help measure and verify how much carbon is stored in the soil over time

What to Record in Your Cultivation Log:

To make sure that the farm activities are well documented for carbon credit projects, following details should be clearly noted down in the log:

1. **Crop Details** – Name of the crop you grow and the dates when you sow and harvest it.
2. **Manure & Fertilizer Use** – Type (organic or chemical) and quantity applied.
3. **Tillage Method** – Whether you used low tillage or zero tillage for land preparation.
4. **Residue Handling** – What you did with leftover crop material (burned, mulched, or left in the field).
5. **Irrigation Method** – Type of irrigation used, such as drip, sprinkler, or flood.
6. **Cover Crops or Additional Planting** – Any extra crops or plants grown to improve soil health.
7. **Soil Improvement Practices** – Steps taken to enrich the soil, like adding compost, green manure, or biochar.

It is advised to always keep the Cultivation Log up to date. Even small activities like applying compost or planting a small patch of cover crop should be noted. The more complete your log, the easier it will be to claim carbon credits.

Free, Prior and Informed Consent (FPIC)¹⁴

FPIC is a principle that requires the rights of Indigenous people and local communities to be respected when carbon projects are being implemented on their lands or territories. FPIC means that communities must be consulted and have given their free, prior, and informed consent to a project before it can be implemented. This involves awareness-raising through community meetings, wall paintings, and awareness vans, which ensure that communities are aware of the project activities and also have a say in them. FPIC is an important principle

14 <https://faolex.fao.org/docs/pdf/IND227223.pdf>

3.6 Incentive Structures and Revenue Opportunities

Carbon farming provides Indian farmers with an opportunity to generate additional income by adopting climate-friendly agricultural practices. By implementing techniques such as alternate wetting and drying (AWD) in paddy, System of Rice Intensification (SRI), cover cropping, reduced tillage, and agroforestry, farmers can reduce greenhouse gas (GHG) emissions or increase carbon sequestration in soils and biomass. These actions earn carbon credits (1 credit = 1 tonne CO₂e reduced/removed), which can be sold in voluntary carbon markets or through India's emerging Carbon Credit Trading Scheme (CCTS).

Farmers usually participate through aggregators or project developers who manage project registration, MRV (Measurement, Reporting, Verification), and credit sales. Farmers typically receive 50–70% of the carbon revenue after operational costs. Besides direct financial returns, farmers also benefit from improved soil fertility, reduced input costs (fertilizer, water), better yields, and resilience to climate impacts.

VCM projects are performance-based. Farmers receive support and payment based on how well they adopt and maintain sustainable practices. The incentive structure typically includes:

Table 4:
Incentive Structure for Carbon Farming Projects

Incentive Type	Details
Upfront Support	Tools, seeds, compost units, or training offered to help farmers start new practices
Implementation Support	Small incentives or honorarium for adopting climate-smart practices
Carbon Credit Payments	A share of revenue from carbon credits sold (based on area, practice, or impact)
Group/Community Incentives	Bonus or pooled payments for FPOs, SHGs, or communities meeting adoption goals
Non-Monetary Benefits	Soil health, better productivity, organic certification, training, and market access

Carbon payments usually begin 2–3 years after project initiation, once the monitoring and verification process is completed.

Financial Benefits and Opportunities from Climate-Smart Agriculture Projects

The revenue figures below are illustrative estimates¹⁵ based on recent examples of agricultural carbon projects in India. Actual income from carbon credits depends on several factors, including the prevailing carbon credit price, project verification

¹⁵ These figures are indicative and based on publicly available data and project examples as of 2024–25. Actual earnings depend on the prevailing carbon credit market price, verification standards, and project quality. High-quality projects with strong monitoring, additional social or biodiversity co-benefits, and alignment with recognized standards such as Verra VCS or Gold Standard typically achieve higher credit prices due to greater buyer confidence.

Climate Action and Carbon Farming

costs, and the share of revenue passed on to farmers. It is important to note that carbon credit prices in the Voluntary Carbon Market (VCM) are volatile; they fluctuate depending on global demand, credit type, and perceived quality. High-integrity projects that demonstrate strong environmental and social benefits, robust monitoring, and credible verification often attract higher prices in the market.



Table 5:
Financial Benefits and Opportunities from Climate-Smart Agriculture Projects

Practice Type	Illustrative Practices	Indicative Revenue from Carbon Credits (₹/acre/year)	Additional Co-benefits (₹/acre/year)	Examples
1. Soil Carbon Projects	Composting, cover cropping, reduced tillage, crop residue management	₹1,500 – ₹3,000	₹600 – ₹1,200	ITC's Soil Carbon Initiative in Andhra Pradesh pays ₹2,500/acre/year for verified sequestration; Takachar's biochar program in Punjab earns ₹3,000/acre from carbon credits and ₹500–1,000/acre from biochar sales.
2. Agroforestry / Boundary Tree Planting	Tree planting on field boundaries or intercropping systems	₹1,800 – ₹4,000	₹800 – ₹1,600	Boomitra's agroforestry project in Maharashtra helps farmers earn ₹4,000/acre/year in carbon credits and additional ₹8,000–15,000/acre from fruits/timber after 5–7 years.
3. Rice Methane Reduction (AWD/SRI)	Alternate Wetting & Drying (AWD), System of Rice Intensification (SRI)	₹2,000 – ₹3,500	₹700 – ₹1,400	NABARD's SRI program in Tamil Nadu enables farmers to earn ₹3,000/acre/year in carbon credits while saving 30% water and increasing yields by 20%.

3.7 Monitoring, Reporting and Verification (MRV) for farmers

Monitoring, Reporting and Verification (MRV) is the process of tracking, documenting, and verifying climate-smart practices and environmental outcomes on the farm. It ensures that the work done by farmers is transparent, measurable, and can be rewarded through carbon or environmental projects.

The first step in MRV is Monitoring, which involves collecting information from the field about the practices farmers are using. This includes things like whether they are using organic fertilizers, reducing tillage, avoiding crop residue burning, planting cover crops, or managing water more efficiently. Monitoring can be done through field visits, mobile apps, farmer interviews, GPS photos, or even satellite images. It helps project teams know what is happening on the ground and whether the planned climate-friendly practices are being followed.

Next comes Reporting, where all the monitored data is carefully organized and recorded. Reports include details such as the number of farmers involved, what sustainable methods they are using, and how those methods are helping reduce greenhouse gas emissions or improve soil carbon. These reports are shared with carbon credit programs, NGOs, or government bodies to show the progress being made. Good reporting ensures that everyone involved in the project has clear and reliable information about the farmers' contributions.

The final step is Verification, which is done by an independent third-party organization. Their job is to review the reports and confirm that the information is correct and honest. This may include visiting a sample of farms, checking satellite data, or reviewing how the data was collected. Verification builds trust and transparency, and it is necessary for the project to be

officially approved and for farmers to receive payments or recognition for their climate-smart efforts.

Importance of MRV for farmers:

Earn Carbon Credit Payments

- MRV allows farmers to prove their sustainable practices, making them eligible for carbon credits and financial incentives.

Access to Climate Programs and Support

- Verified data helps farmers qualify for government schemes, NGO projects, and international climate initiatives.

Builds Trust and Transparency

- MRV ensures that the data is reliable, which builds trust with buyers, partners, and project developers.

Recognizes Farmers' Climate Efforts

- It gives farmers visibility and recognition as key contributors to climate change solutions.

Improves Decision-Making

- By tracking changes over time, MRV helps farmers understand what practices work best, leading to smarter, more productive farming.

3.8 Success stories and Case Studies^{16/17}

Varaha –

Agroforestry & Soil Carbon Regeneration
Standard- Verra (VCS)
Methodology- VM0042
Location- Gujarat

Varaha started a project to tap into the significant carbon storage and ecological restoration benefits of regenerative farming practices in Gujarat. This project aims to promote these methods among farms growing crops like cotton, cotton-wheat, rice, legumes, maize-wheat, and rice-wheat. The goal is to accelerate the adoption of better farming practices among Indian farmers. The project will develop in phases, adding new activities over its duration. Initially, it will focus on cotton-wheat and cotton cropping systems. Later phases will consider other cropping methods, including sugarcane, rice, legumes, and maize-wheat. Interventions will be carried out in collaboration with the Aga Khan Rural Support Program (India) - AKRSP (I). The project's interventions began in 2020. Starting with 25,000 hectares, the area will grow to 312,000 hectares by 2029 and will be maintained until 2040.

¹⁶ <https://sowandreap.in/gold-standard-credits-for-rice-cultivation/>

¹⁷ <https://www.varaha.earth/ourProjects/regen-gujarat>

Sow & Reap Agro Pvt Ltd–

Alternate Wetting and Drying

Standard- Gold Standard

Location- Telangana

"Sow & Reap Agro Pvt Ltd" project in India, which became the first Indian company to earn Gold Standard carbon credits for paddy cultivation. The VARRI initiative, run in collaboration with Kosher Climate, adopted the Alternate Wetting and Drying (AWD) technique in rice fields across Telangana. This innovative water-saving approach, compared to traditional flooded paddy, brought direct benefits: improved yields, reduced water usage and fertilizer needs, and significantly diminished greenhouse gas emissions. Over three years, the project empowered more than 35,000 farmers across over 100,000 acres, ultimately earning 37,405 Gold Standard-certified carbon credits for their climate-smart practices, creating a new source of income for farmers as well as critical co-benefits in water conservation and soil health.

PART - IV

OVERVIEW OF CARBON MARKETS

4.1 Compliance Carbon Trading System (CCTS) in India

As part of India's efforts to establish a national carbon credit market, On June 28, 2023, the Government of India officially announced the Carbon Credit Trading Scheme (CCTS), marking a significant step toward establishing a structured carbon credit market in the country. This initiative stems from the Energy Conservation (Amendment) Act, 2022, which grants the Central Government the authority to define a carbon trading framework in coordination with the Bureau of Energy Efficiency (BEE).

Figure 1: Step-by-Step Project Registration and Issuance Process under Offset Mechanism

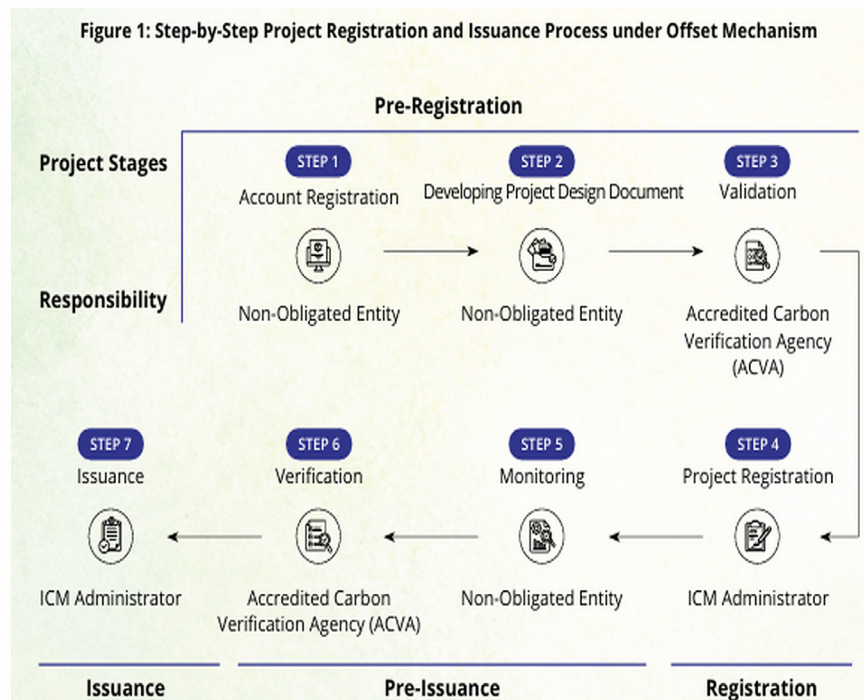


Figure 5: CCTS Process Flow¹⁸

Under this scheme:

- **Accredited Carbon Verifiers (ACVs)**, recognized by BEE, will carry out validation and verification of emission reduction activities submitted under the CCTS.
- **Registered entities** that successfully demonstrate emissions reductions will be issued Carbon Credit Cer-

18 <https://www.thesustainabilitycloud.com/blog/carbon-credit-trading-scheme-ccts/>

Overview of Carbon Markets

tificates, each equivalent to the reduction or removal of one tonne of CO₂ equivalent (tCO₂e).

- The governance of the Indian Carbon Market (ICM) will be overseen by the newly established Indian Carbon Market Governing Board (ICMGB), comprising representatives from various central ministries and agencies.

The illustration below shows that obligated entity 'A' receives CCC for achieving a GHG emission intensity below the target. In contrast, obligated entity 'B' must purchase the CCCs from the trading platform to comply with the GHG emission intensity targets.

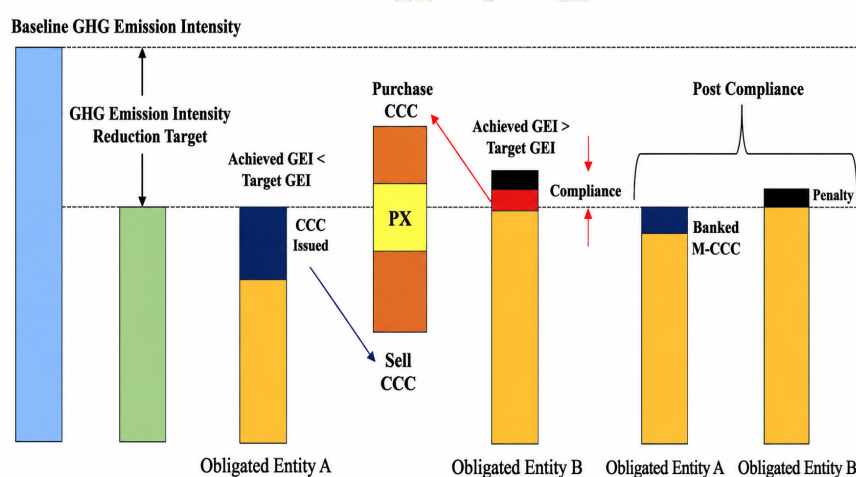


Figure 6: Detailed Procedure for Compliance Mechanism under CCTS, Version 1.0 (BEE)¹⁹

19 <https://beeindia.gov.in/sites/default/files/Detailed%20Procedure%20for%20Compliance%20Procedure%20under%20CCTS.pdf>

Approved Methodologies under CCTS

- **Methane Recovery from Livestock and Manure Management** methodology enables the installation of biogas units or anaerobic digestion systems to capture and combust methane generated from manure in small farms and rural households. This prevents methane emissions that would otherwise escape into the atmosphere and converts the captured biogas into a useful source of clean energy, replacing fossil fuel consumption.
- **Afforestation and Reforestation of Lands Except Wetlands** methodology supports the establishment of forests on eligible degraded or non-forested lands, focusing on sustainable planting and minimal soil disturbance. This methodology quantifies carbon sequestration through increased biomass and soil carbon storage, contributing to long-term carbon removal and ecosystem restoration.
- **Biofuel Production methodology** covers the establishment of facilities that convert agricultural residues, biomass, or organic waste into renewable fuels for use in transportation, generators, or industrial applications. By substituting fossil fuels with bio-based energy, the methodology results in measurable reductions in life-cycle GHG emissions and promotes circular bioeconomy practices.

Note: More Methodologies on Biochar, Crop Residue Management, Methane reduction from Rice farming under development

The obligated entity 'A' may sell their Certified Carbon Credits (CCC), while obligated entity 'B' must surrender the CCC through the trading exchange to comply with the notified annual greenhouse gas (GHG) emission intensity targets.

While CCTS is primarily designed to serve the compliance carbon market, the government has also indicated that the Voluntary Carbon Market (VCM) will eventually be integrated into this platform, enhancing its scope and reach.

This framework not only formalizes carbon trading in India but also sets the foundation for regulatory clarity, greater market confidence, and broader participation in climate action through carbon credits.

4.2 Introduction to International Standards

The Voluntary Carbon Market (VCM) is guided by several international standards that ensure credibility and trust. Well-known examples include Verra VCS, Gold Standard, and Plan Vivo but these are only illustrative, not a complete list. The market is dynamic, with new and updated methodologies regularly introduced in response to the latest climate science, feedback from stakeholders, and the specific needs of different sectors. Standards bodies also revise existing methodologies to improve how greenhouse gas (GHG) reductions and removals are measured, reported, and verified.

4.2.1 Verra VCS

Verra,²⁰ formerly known as the Verified Carbon Standard (VCS), is one of the leading global platforms for the voluntary certification of greenhouse gas



²⁰ <https://verra.org/>

(GHG) emission reduction projects. It plays a pivotal role in setting international benchmarks for climate action and sustainable development. Verra's mission is to develop and manage robust standards that support initiatives aimed at offsetting emissions, preventing deforestation, improving agricultural practices, reducing plastic pollution, and advancing gender equality.

The VCS Program, operated by Verra, is the world's most widely adopted voluntary GHG crediting framework. Projects certified under this program have collectively reduced or removed over one billion tonnes of carbon dioxide and other greenhouse gas emissions from the atmosphere. As of late 2023, there were around 3,886 project entries in the Verra registry, with 2,059 fully registered projects issuing roughly 1.22 billion Verified Carbon Units (VCUs). These emission reductions are quantified and issued as Verified Carbon Units (VCUs), with each VCU representing one tonne of CO₂ equivalent (tCO₂e) reduced or removed. While initially designed for the voluntary carbon market, the VCS Program has also gained recognition in compliance markets such as those in Colombia, South Africa, and under the international aviation scheme CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation).

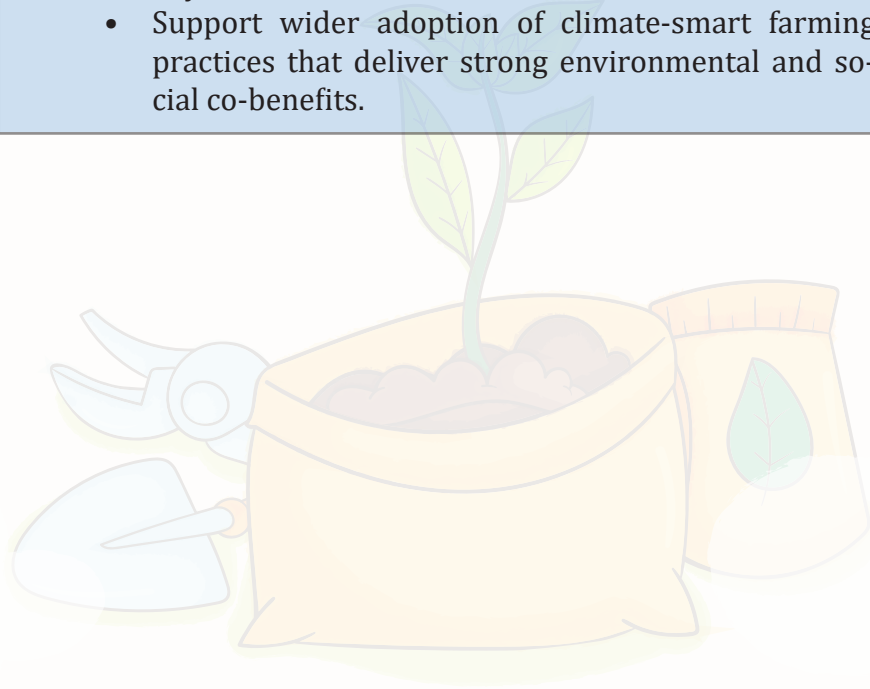
Integrity Council for the Voluntary Carbon Market (ICVCM)

An independent governance body that has developed the Core Carbon Principles (CCPs). These principles define what a high-quality carbon credit should look like. ICVCM is reviewing methodologies across different standards and will certify only those that meet strict requirements on issues such as additionality, permanence, and safeguards for environmental and social benefits.

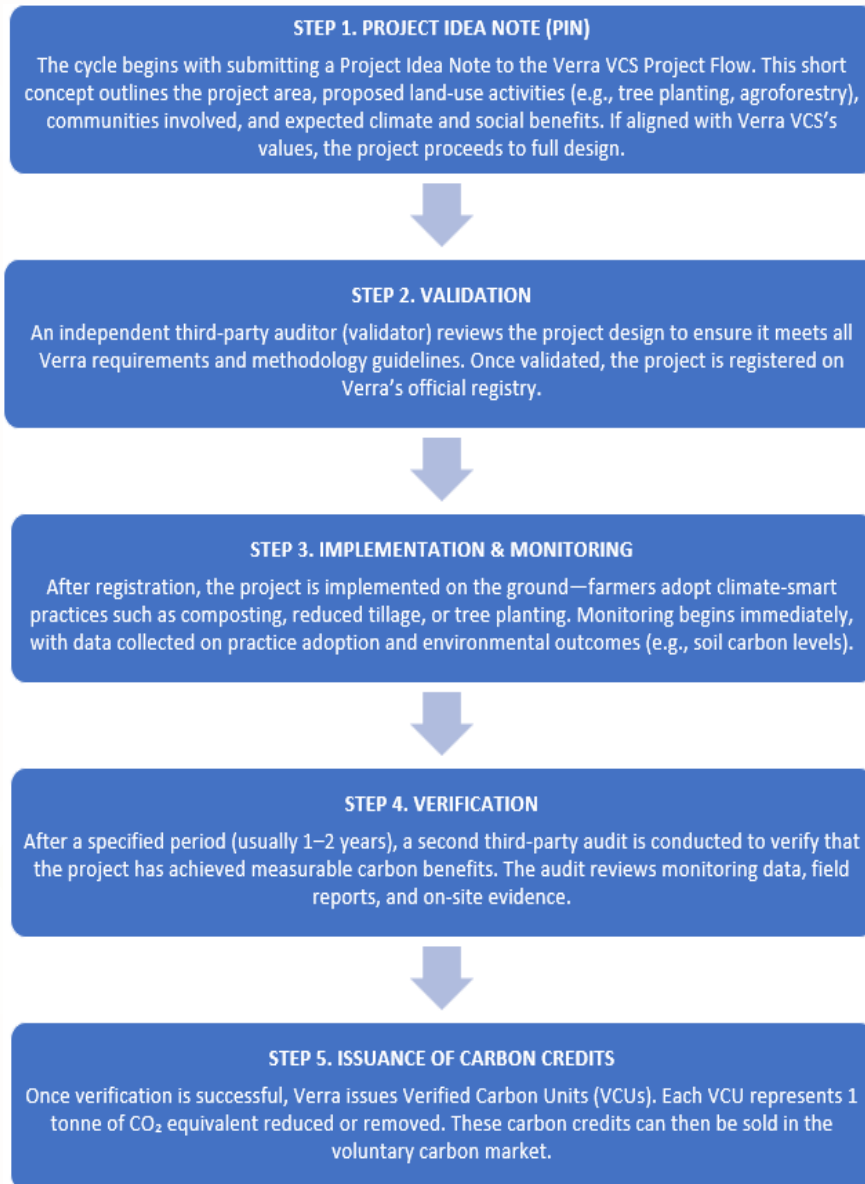
Overview of Carbon Markets

As ICVCM completed their assessments, future agricultural carbon methodologies (for example, in soil carbon, agroforestry, or regenerative practices) that are approved by these bodies will carry an international stamp of best practice and high quality. This will:

- Strengthen buyer confidence in credits from agricultural projects.
- Likely lead to higher market prices for these credits, since demand is moving toward verified, high-integrity units.
- Support wider adoption of climate-smart farming practices that deliver strong environmental and social co-benefits.



Project Flow & Key Requirements:



Key Requirements for registering under Verra (VCS):

- Must use a Verra-approved methodology.
- Requires baseline definition, leakage assessment, and permanence planning.
- Third-party validation and verification are mandatory.
- Detailed documentation and robust MRV system needed.

4.2.2 Gold Standard

Gold Standard²¹ is an internationally acclaimed certification body established in 2003 by the World Wide Fund for Nature (WWF) and other leading environmental NGOs to ensure that carbon offset projects deliver not only verified emission reductions but also tangible social and environmental benefits.

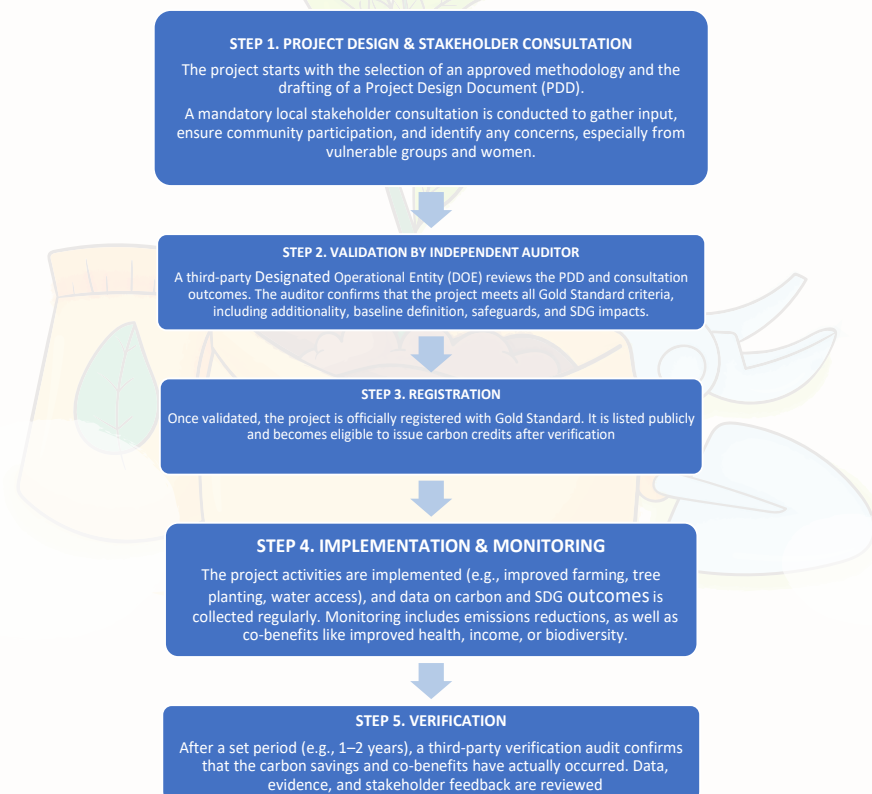
Designed to go beyond carbon mitigation, Gold Standard sets rigorous requirements for projects to contribute meaningfully to multiple Sustainable Development Goals (SDGs), such as improving health, promoting gender equality, enhancing energy access, and supporting local livelihoods.

What sets Gold Standard apart is its emphasis on high integrity, transparency, and stakeholder engagement. Projects must demonstrate verifiable co-benefits in addition to reducing greenhouse gas emissions, making it a preferred standard for organizations and investors seeking credible climate action with measurable sustainable development outcomes. Each carbon credit issued under Gold Standard, referred to as a Verified Emission Reduction (VER) represents the reduction or removal of one tonne of CO₂ equivalent. These credits undergo strict third-party validation and verification to maintain environmental integrity and ensure results.

²¹ <https://www.goldstandard.org/>

Gold Standard certifies a broad range of project types, including renewable energy projects like wind, solar, and biogas; energy efficiency initiatives such as clean cookstoves and efficient lighting; afforestation and reforestation efforts; sustainable agriculture and land use; and safe water access and purification projects. These initiatives not only address climate change but also improve community resilience, health, and economic well-being. As of 2023, over 1,500 projects fully certified, with annual credit issuances growing by 41%.^A

Project Flow & Key Requirements:



Key requirement for registering under Gold Standard:

- Project must contribute to at least 3 Sustainable Development Goals (SDGs).
- Stakeholder consultation and gender inclusion are mandatory.
- Use of approved methodology or tailored approach.
- Periodic monitoring of both carbon and social impact.
- Transparent benefit sharing and reporting.

4.2.3 Plan Vivo



Plan Vivo²² is a globally recognized carbon standard focused on community-led, nature-based solutions for climate mitigation and sustainable development. Launched in the late 1990s, it was among the first certification systems to emphasize the importance of involving local communities particularly smallholder farmers and indigenous groups in climate action and natural resource management. The Plan Vivo Standard certifies projects that generate verified carbon credits through activities such as afforestation, reforestation, agroforestry, improved forest management, sustainable agriculture, and ecosystem restoration. These initiatives are designed not only to reduce or remove greenhouse gas emissions but also to deliver meaningful co-benefits aligned with the Sustainable

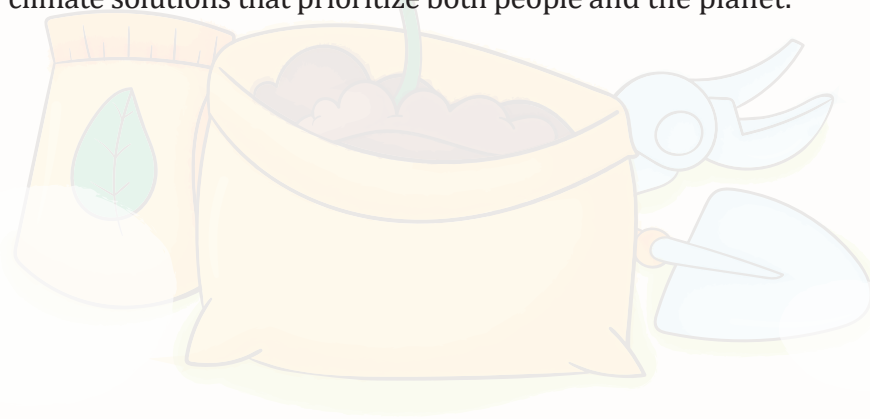
²² <https://www.planvivo.org/>

Farmers Guide Book

Development Goals (SDGs), such as poverty reduction, biodiversity conservation, and livelihood enhancement.

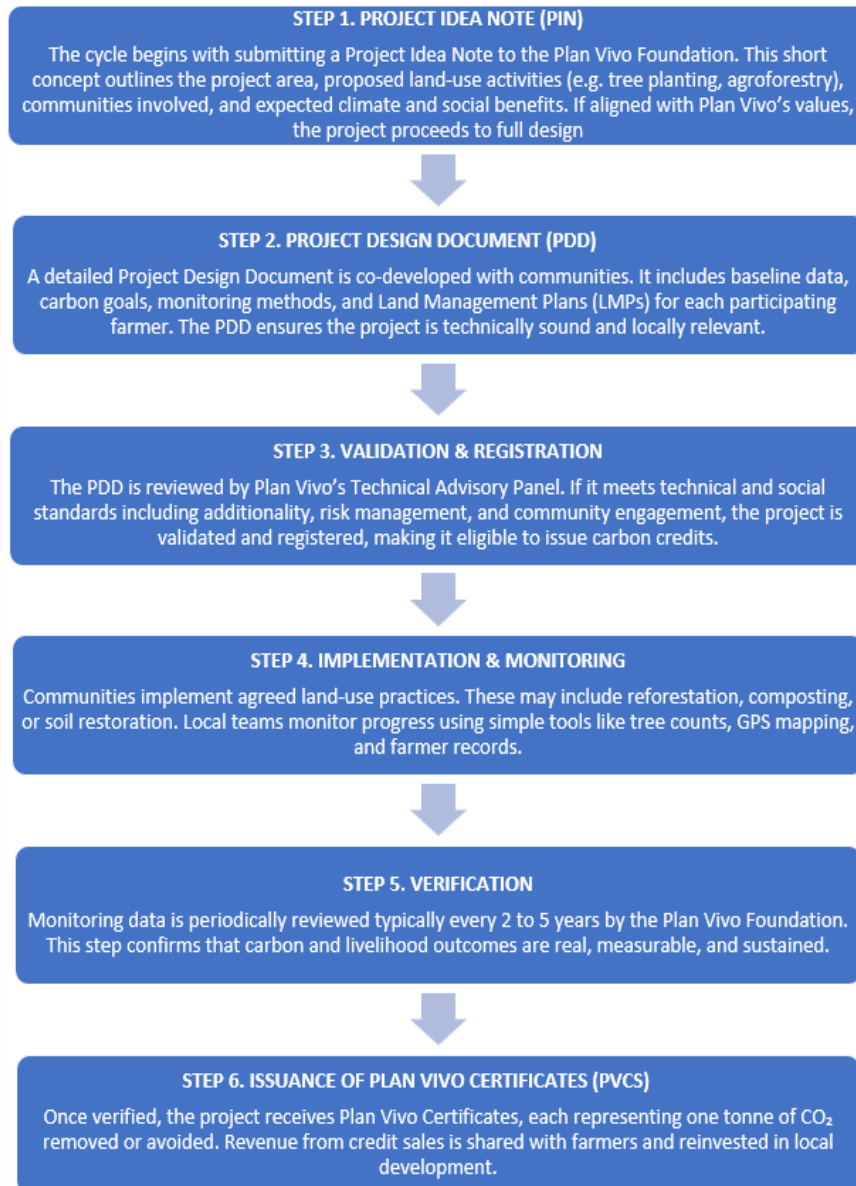
A key feature of the Plan Vivo model is its commitment to long-term sustainability, community participation, and equitable benefit-sharing. Each carbon credit issued known as a Plan Vivo Certificate (PVC) represents the verified reduction or removal of one tonne of carbon dioxide equivalent (tCO₂e). All projects must undergo rigorous validation and monitoring processes and are required to demonstrate both environmental and social impacts beyond just carbon mitigation.

As of 2024, Plan Vivo supports over 30 registered projects across regions such as Africa, Asia, and Latin America. These projects engage tens of thousands of rural households and have resulted in the protection and restoration of hundreds of thousands of hectares of forests and landscapes. With millions of carbon credits issued, Plan Vivo remains a trusted standard in the voluntary carbon market, especially for stakeholders seeking ethical and inclusive climate solutions that prioritize both people and the planet.



Overview of Carbon Markets

Project Flow & Key Requirements:



Key requirements for registering under Plan Vivo:

- Project must be community-led, with strong participation.
- Requires simple, cost-effective monitoring systems suitable for smallholders.
- Emphasizes livelihood improvement and long-term sustainability.
- Focus on inclusivity, low-cost verification, and long-term carbon storage.

4.3 Other Voluntary Carbon Market and Opportunities

The Voluntary Carbon Market (VCM) is a fast-growing space that allows businesses, organizations, and individuals to voluntarily buy carbon credits to offset their greenhouse gas emissions. Unlike compliance markets, which are mandatory, participation in the VCM is optional and mainly driven by corporate climate commitments, CSR goals, and consumer expectations. The VCM enables organizations to fund projects that reduce, remove, or avoid emissions, helping them meet net-zero or climate-neutral targets. It also provides opportunities to:

- Contribute to global climate action and Paris Agreement goals, going beyond regulatory requirements.
- Support CSR efforts through investments that deliver real community and environmental benefits.
- Advance the UN Sustainable Development Goals (SDGs) by promoting outcomes like food security, gender equity, clean energy access, and resilient livelihoods.

Overview of Carbon Markets

Create positive impacts on biodiversity and ecosystems, including forest restoration, improved soil health, and water conservation.

The VCM is experiencing impressive growth. In 2023, its global value reached around USD 2 billion, up from about USD 500 million in 2020. Experts predict that it could expand to USD 10 to 50 billion annually by 2030, driven by increasing corporate climate commitments. A strong indicator of this growth is the issuance of over 500 million Verified Carbon Units (VCUs) under the Verra VCS program in 2023 alone, equivalent to more than 500 million tonnes of CO₂ reduced or removed.

VCM projects encompass various sectors, including renewable energy, afforestation, reforestation, sustainable agriculture, blue carbon, and waste management. These projects adhere to methodologies outlined by standards such as Verra VCS, Gold Standard, and Plan Vivo. Once established, projects undergo thorough third-party validation and verification to ensure that the emission reductions or removals are real, additional, and measurable. For every verified reduction of one tonne of CO₂e, a carbon credit is issued. These credits can be traded in carbon markets or sold directly to buyers and are retired to prevent reuse.

Opportunities

For farmers and landowners, the VCM creates new income opportunities by adopting practices such as regenerative agriculture, agroforestry, conservation tillage, and better manure management. In India, over 140 agricultural land management projects are registered with Verra and collectively represent more than 27 million tonnes of CO₂e reductions annually. At an average credit price of USD 10, this amounts to a potential market value of INR 2,200 crores each year, with around INR 1,300 crores potentially benefiting farmers.

For project developers, the VCM offers chances to aggregate smallholder farmers into larger initiatives, especially in areas with high demand, like soil carbon sequestration, REDD+ forest conservation, and biodiversity-linked projects. Corporations and investors are increasingly active buyers, using the VCM to meet their climate commitments while backing projects with strong co-benefits aligned with CSR, SDGs, and biodiversity goals. Notable corporate buyers include Microsoft, Amazon, Google, Shell, and Delta Airlines.

The market is advancing quickly in terms of technology and transparency. Digital trading platforms like Climate Impact X, Xpansiv, and AirCarbon Exchange are making transactions more efficient and traceable. In 2023, more than half of all VCM trades were linked to nature-based solutions (NbS) such as forest and land-use initiatives. Additionally, over 6,000 companies globally have made net-zero or carbon-neutral pledges, driving demand for high-quality credits with measurable climate and development benefits.

Overall, the Voluntary Carbon Market is not just a tool for offsetting emissions, but also a significant way for businesses, farmers, project developers, and communities to access climate finance, contribute to global climate goals, support CSR, promote the SDGs, and create biodiversity-positive impacts.

4.4 Roles and Responsibilities of the Key Stakeholders in Carbon Offset Projects

Carbon offset projects involve multiple stakeholders working together to generate credible and measurable greenhouse-gas (GHG) reductions or removals. Each stakeholder has a distinct role and set of responsibilities essential to ensuring integrity, transparency, and successful project implementation. The key ac-

tors include Project Developers, Participating Farmers, Certification Bodies, and Carbon Registries, who collectively contribute to project design, field implementation, monitoring and verification, credit issuance, and transparent benefit distribution.

4.4.1 Project Developers

Project Developers are responsible for designing, implementing, and managing carbon offset projects. Their responsibilities include identifying project boundaries and baselines, applying appropriate methodologies, preparing project documentation, and registering projects under recognized carbon standards. They mobilize and train farmers, coordinate the deployment of monitoring technologies, and lead data collection and MRV (Monitoring, Reporting, and Verification). Project Developers engage third-party validators and verifiers, manage credit issuance and market transactions, develop transparent benefit-sharing mechanisms, distribute revenues to participating farmers, and ensure compliance with environmental and social safeguards and national Article 6 regulatory frameworks.

Table 6:
Role of Project Developers

Project Design & Documentation	Identify project boundary, baseline, methodology, and expected emission reductions.
	Register the project with recognized carbon standards (Verra, Gold Standard, etc.).
Farmer Mobilization & Capacity Building	Conduct awareness sessions, training, and field demonstrations.
	Sign participation agreements with farmers / FPOs.

Provide Technology & Implementation Support	Tools, field monitoring devices, mobile apps, soil sampling, drone monitoring, AWD tubes, etc. Supply advisory support from agronomists and field teams.
Data Collection & MRV (Monitoring, Reporting & Verification)	Collect farm-level data, conduct sampling, remote sensing, field surveys.
	Maintain data quality and transparency in reporting.
Validation & Verification	Engage independent VVB to validate and verify the project.
	Credit Issuance & Sale
Obtain carbon credits from registry and sell them to buyers.	Manage financial transactions for carbon revenue distribution.
Benefit-Sharing & Transparency	Develop and disclose benefit-sharing plan.
	Ensure timely payment to farmers and FPOs.
Safeguards & Compliance	Ensure compliance with environmental and social safeguards, Article 6 rules, and national requirements

4.4.2 Participating Farmers

Participating Farmers adopt climate-smart agricultural practices that generate GHG reductions or removals and actively collaborate in the carbon project. They provide farm-level data, support field surveys, remote-sensing access, and soil sampling, and cooperate with verification and monitoring requirements. Farmers commit to sustainable practice implementation throughout the crediting period and uphold transparency and recordkeeping. In return, they receive financial benefits through structured benefit-sharing arrangements based on carbon credit revenue.

Table 7:
Roles, Responsibilities, and Commitments of Participating Farmers

Enroll in the Carbon Project	Provide consent, land ownership / cultivation proof, and sign participation agreement.
Implement Climate-Friendly Practices	Adopt approved practices such as AWD, low-tillage, organic manure, reduced fertilizer use, composting, cover cropping, or agroforestry.
Participate in Training	Attend training sessions and follow recommended practices throughout project duration.
Share Field Data	Maintain simple daily/seasonal field logs (water, fertilizer, activity records).
	Allow field visits, soil sampling, drone mapping, and verification audits.
Allow Monitoring & Verification	Permit access to farms for monitoring, validation, verification.
Ensure Additionality	Implement new practices not previously adopted or established.
Maintain Permanence Principle	Continue implementing practices across agreed crediting period.
Receive and Share Benefits	Receive carbon revenue as per benefit-sharing mechanism.
	Contribute to transparent collective benefit planning.

4.4.3 Certification Bodies

Certification Bodies (Validation & Verification Bodies – VVBs) are accredited independent entities responsible for validating project design and verifying monitoring results. They assess project eligibility, confirm baseline and methodology application, evaluate emission reduction calculations, and ensure compliance with standard requirements. Certification Bodies conduct periodic audits, approve monitoring reports, issue verification statements, and provide assurance that claimed carbon outcomes are real, measurable, and based on credible evidence. Their approval is required for project registration, credit issuance, and renewal.

4.4.4 Carbon Registries

Carbon Registries are authoritative platforms that record project details and manage carbon credit issuance, serialization, transfer, and retirement. Their role includes reviewing and approving project documentation, maintaining transparent tracking systems, preventing double counting, and ensuring alignment with market integrity frameworks such as Article 6 corresponding adjustments. Registries serve as the official repository for carbon units, enabling traceability and market confidence among buyers, governments, and stakeholders.

4.4 Key Terms Explained

Baseline	In a carbon project, the term Baseline refers to the current or existing farming practice or condition before any new climate-friendly action is implemented. It represents the normal situation that would continue if the carbon project did not take place. The baseline is used as a reference point to measure the reduction in greenhouse gas emissions or the increase in carbon stored through improved agricultural practices.
Project Design Document	Project Design Document (PDD) is the primary document that provides detailed information about a carbon project. It explains what activities will be carried out, the baseline conditions before the project begins, the expected greenhouse gas emission reductions, the monitoring and data collection plan, and the benefit-sharing structure for farmers. The PDD is submitted to a carbon standard such as Verra or Gold Standard to demonstrate the eligibility and design of the project and is required for project registration.
Verification	Verification is a formal process carried out by an independent third-party organization known as a Validation and Verification Body (VVB). The verifier checks the project's field data, farmer activity records, monitoring information, and calculation methods to confirm that the claimed emission reductions are real, measurable, and compliant with the approved methodology. Verification usually involves site visits, data audits, and interviews with field teams and farmers. Successful verification allows the project to proceed to issuance of carbon credits.

Methodology

A Methodology refers to the official scientific guidelines that carbon projects must follow to measure and calculate emission reductions or carbon removals. Each methodology describes how baseline and project data must be collected, what assumptions and formulas should be used, what parameters need to be monitored, and how emission reductions will be quantified. Examples include methodologies for reducing methane emissions in rice cultivation through Alternate Wetting and Drying (AWD), enhancing Soil Organic Carbon, or developing agroforestry systems. Projects must strictly follow the approved methodology to be eligible for carbon credits.

Issuance

Issuance is the step where carbon credits are formally created and added to the project's account in the carbon registry after successful verification. For every one metric ton of carbon dioxide equivalent (CO₂e) reduced or removed, one carbon credit is issued. These issued credits can then be sold to companies or international buyers, generating financial returns for the project, farmers, and partner organizations based on the agreed benefit-sharing mechanism.

Cultivation Log

Cultivation Log, also called a field logbook or farmer diary, is a simple record maintained by participating farmers to document farm activities relevant to the carbon project. It may include information such as the date of land preparation, sowing, irrigation schedule, water depth (in the case of AWD), fertilizer and organic manure application, and harvesting dates. These logs serve as proof of practice change and are essential for accurate monitoring, reporting, and verification.

Overview of Carbon Markets

Carbon credit	A carbon credit is a tradable certificate that represents the reduction or removal of one metric ton of carbon dioxide (CO ₂) or an equivalent amount of other greenhouse gases such as methane (CH ₄) or nitrous oxide (N ₂ O). Carbon credits are created when individuals, companies, or farmers implement activities that reduce emissions or store carbon in soil, trees, or biomass.
Project Registration	Project Registration is the official approval process where the project is submitted to a recognized carbon registry platform for review and acceptance. Registration confirms that the project design meets the requirements of the carbon standard and is eligible to generate carbon credits. Once registered, the project can begin implementation, data collection, and monitoring, ultimately leading toward verification and issuance of credits.
Farmer Participation Contract	Farmer Participation Contract is a legal agreement between the Project Developer and the Participating Farmer. The contract explains the duties, benefits, and obligations of each party and sets the rules for how carbon credits will be generated and shared. The following terms are important for understanding the agreement
Additionality	Additionality is a foundational principle in carbon markets that guarantees carbon credits are awarded only to projects delivering emission reductions or removals that would not have happened without the incentive and funding from selling these credits. This principle ensures real climate impact by verifying that projects go beyond “business as usual” and are not simply profiting from activities that would already have occurred due to financial, legal, or standard industry forces. Many sustainable agriculture initiatives are inherently climate-positive,

so early framing of additionality criteria for farmer selection strengthens the narrative, supports eligibility under standards such as VCS, Gold Standard, and Article 6.2/6.4, and ensures that documentation and monitoring systems are established from the beginning.

Key Dimensions of Additionality:

- **Financial Additionality:** Demonstrates that the project is not financially viable or attractive without income from carbon credit sales. The carbon revenue must be crucial to overcoming the project's financial barriers or improving its rate of return enough to make it feasible.
- **Regulatory Additionality:** Confirms that the project activity is not legally required or mandated by existing policies, regulations, or government programs. For example, emission control systems mandated by law cannot generate additional carbon credits.

Technological or Market Additionality: Ensures that the technology or practice being implemented is not yet common or standard in the industry. Only projects that adopt practices going beyond current norms or prevailing technologies are eligible.

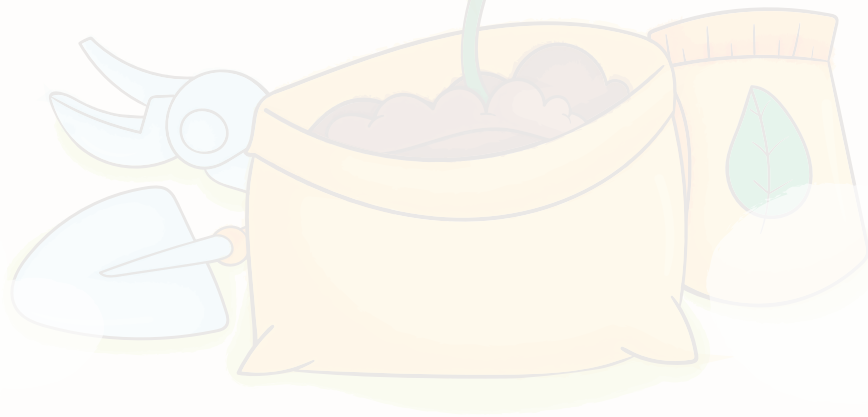
- **Barrier or Institutional Additionality:** Assesses whether non-financial barriers, such as lack of technical know-how, institutional capacity, or enabling infrastructure would have prevented the activity from happening without the carbon project framework.
- **Common Practice Additionality:** Evaluates whether similar activities are already widespread in a region or sector. If an activity is common practice, the project must prove it offers distinct or superior environmental performance to remain additional. Without strong additionality, carbon credits can

Overview of Carbon Markets

Leakage

lose their value and integrity, allowing companies to claim climate benefits for projects that would have occurred anyway. This undermines both the credibility of carbon markets and global efforts to genuinely mitigate climate change. High-integrity carbon standards therefore require robust additionality tests to assure buyers and the public that each credit stands for a real and measurable climate benefit.

Leakage refers to any unintended increase in emissions that happen outside the project boundary due to the project's activities. For example, protecting a forest in one area might cause deforestation to shift elsewhere, offsetting some of the environmental gains. Accounting for leakage involves identifying, quantifying, and minimizing these displaced emissions so that carbon credits reflect net positive climate outcomes.



PART - V

MRV, DIGITAL TOOLS, AND INNOVATIONS

5.1 Basics of MRV: What Farmers Need to Know

MRV stands for Monitoring, Reporting, and Verification. It is a structured process that helps track, record, and confirm the environmental benefits created when farmers adopt climate-friendly practices. MRV ensures that the emission reductions or carbon storage from farming activities are real, measurable, and credible, so that they can be converted into carbon credits. These carbon credits can then be sold in the voluntary carbon market, generating a potential source of income for farmers or community groups.

Key components of MRV for farmers include:

- **Monitoring:** This stage involves regularly observing and recording the changes happening on the farm due to improved practices. This could include activities like using compost instead of chemical fertilizers, growing cover crops, reducing tillage, planting trees, or changing irrigation methods like switching to Alternate Wetting and Drying (AWD) in rice cultivation. Monitoring can be done through farmer self-recording, field visits by trained personnel, photographs, satellite images, or digital tools like mobile apps. The goal is to gather clear data that shows what sustainable practices are being used, when, where, and how consistently.
- **Reporting:** In this next stage the collected data is organized into structured documents or digital records. These reports typically describe the number of farmers involved, the area of land under sustainable practices, the type of interventions made, and the time period covered. The reports also calculate the expected greenhouse gas reductions or carbon sequestration based on established scientific methods and standards. Reporting is usually handled by project developers, NGOs, or supporting institutions working with the farmers.
- **Verification:** In this final stage, an independent third-party organization reviews the monitoring and reporting data. This step is essential to ensure that the reported results are accurate and reliable. The verifier may conduct sample field visits, interview farmers, or check satellite records. Once satisfied, they approve the data, and the project becomes eligible to receive verified carbon credits, which can be registered and sold.

This process builds trust among buyers and investors in the voluntary carbon market and ensures that farmers and communities are rewarded for their real and honest efforts.

MRV provides a framework for farmers to quantify their environmental impact, track their progress towards sustainability goals, Access new revenue streams and markets, and Improve their farm management practices.

5.2 Monitoring & Evaluation (M&E) Data

Monitoring and Evaluation (M&E) is a critical part of carbon farming and sustainable agriculture projects. It refers to the systematic process of tracking the progress, performance, and overall impact of the project over time. Unlike MRV (Monitoring, Reporting & Verification), which focuses specifically on carbon emission reductions for credit generation, M&E takes a broader approach by assessing how the project is benefiting the environment, the economy, and the local communities-especially the farmers involved.

M&E data is collected at various stages of the project and helps answer key questions such as: Are farmers adopting the recommended practices? Is soil health improving? Are yields increasing? Are farmers earning more or saving on input costs? Is the project reaching smallholder and women farmers effectively? By collecting and analyzing such information, project teams can identify what's working, what needs improvement, and how to adjust the implementation strategy to achieve better results.

Field-level M&E data is usually gathered using mobile applications, surveys, field visits, interviews, GPS mapping, and even satellite imagery. The process is often supported by trained field staff, local NGOs, and FPOs. For farmers, this data ensures that their efforts are properly recorded and rewarded, and that they remain at

the center of decision-making. For project developers, M&E helps in transparent reporting, continuous improvement, and meeting the requirements of carbon standards and funding agencies.

Table 8:
Types of Monitoring & Evaluation (M&E) Data

Category	Examples of Data Collected
Farmer Participation	Number of farmers enrolled, attendance at training sessions, gender and age breakdown
Practice Adoption	Number of farmers adopting composting, AWD, agroforestry, or residue management practices
Land Use & Area Covered	Total land area under sustainable practices, cropping patterns, GPS coordinates
Environmental Indicators	Soil organic carbon (SOC) levels, water use reduction, tree survival rate, GHG emissions
Economic Outcomes	Change in crop yield, input cost savings, income from carbon credits or premium produce
Social Impact	Participation of women and marginalized groups, improved community resources (e.g., water)
Training & Support	Number of trainings conducted, feedback from farmers, satisfaction with technical assistance
Carbon Credit Metrics	Estimated vs. actual carbon credits generated, credits verified and issued

5.3 Tools for Data collection and Field Monitoring

Accurate and reliable data collection is the foundation of any successful carbon farming project. In the carbon market, both buyers and certification bodies demand proof that the claimed reduc-

tions in greenhouse gas (GHG) emissions or increases in soil carbon are real, quantifiable, and verifiable. This is where systematic field monitoring, supported by the right tools, plays a crucial role.

Modern tools and technologies make it possible for farmers and project developers to efficiently measure and track key variables such as soil organic carbon levels, land-use changes, input applications (fertilizer, pesticides), and crop yields. These records are essential for preparing project documentation, meeting MRV (Measurement, Reporting, Verification) standards, and ensuring that carbon credits generated are credible and marketable.

Key Tools in Use

- Mobile Applications and Digital Logbooks
- Soil Testing Kits and Sensors
- GPS Devices and Geospatial Software
- Drones and UAVs (Unmanned Aerial Vehicles)
- Remote Sensing and Satellite Imagery
- Third-party Monitoring and Verification Services

5.4 Using Digital Apps for Recordkeeping

Mobile and desktop-based apps are becoming indispensable tools for project developers and modern farmers, especially those participating in carbon markets. These digital solutions simplify the complex task of recording and managing data related to daily agricultural practices, such as sowing and harvesting dates, types and quantities of fertilizer and pesticide applications, irrigation patterns, machinery use, and overall land management activities.

By using these apps, farmers can maintain accurate, consistent, and time-stamped digital records, essential for meeting the

stringent data requirements of Measurement, Reporting, and Verification (MRV) protocols that underpin carbon credit issuance. In contrast to traditional paper-based records, which are often inconsistent or incomplete, these apps create a centralized, verifiable digital history of farming practices.

Popular platforms like CropIn, DeHaat, and AgriDigital are already being used in India and globally. These apps offer:

- User-friendly interfaces designed with farmers in mind
- Support for local languages, making them more accessible in rural areas
- Integration with carbon project platforms and MRV systems, enabling seamless data sharing with project developers, verifiers, and registries

Additionally, many of these tools provide farmers with real-time feedback, agronomic advice, and weather alerts, helping them improve productivity and sustainability while also generating revenue from carbon credits.

By digitizing farm records and linking them with carbon projects, farmers can:

- Demonstrate their commitment to sustainable agriculture
- Build trust with buyers of carbon credits
- Ensure eligibility for premium markets
- Strengthen resilience through better farm management insights

For farmers mobile and desktop apps are not only streamlining compliance with MRV but are also empowering them to actively participate in the emerging green economy.

5.5 Role of Drones and Remote Sensing in Climate Smart Agriculture

In India, drones (Unmanned Aerial Vehicles) and satellite-based remote sensing are playing an increasingly important role in advancing climate-smart agriculture. These technologies provide highly accurate data on soil moisture, crop health, land-use patterns, and biomass essential for monitoring and verifying sustainable farming practices under carbon credit programs.

The Indian government has recognized this potential and launched several initiatives. Under the Sub-Mission on Agricultural Mechanization (SMAM), the government is offering subsidies of up to ₹10 lakh for drone procurement and use in precision agriculture. In 2022, the Ministry of Agriculture also issued guidelines for drone-based pesticide spraying, which helps reduce chemical usage and prevents soil degradation. According to FICCI, India's agricultural drone market is projected to grow at 38% CAGR through 2028.

States like Punjab and Haryana are now deploying drones to monitor stubble burning, a major source of GHG emissions. By identifying hotspots through drones and satellites, local authorities can take timely action to discourage residue burning and promote alternate uses such as bioenergy production, supporting mitigation of CO₂ emissions.

In the carbon farming space, organizations like the International Rice Research Institute (IRRI) are working with Indian farmers in states such as Odisha and Andhra Pradesh to deploy multispectral drones. These drones assess nitrogen use efficiency in rice cultivation, helping farmers reduce fertilizer inputs by up to 20–30%, which directly lowers nitrous oxide (N₂O) emissions, a potent greenhouse gas.

Satellite-based platforms such as Farmonaut and CropIn are being widely used by farmers and carbon project developers to col-

lect verifiable data on farm-level practices. The Madhya Pradesh Forest Department is using Sentinel-2 satellite data to monitor reforestation and agroforestry efforts under large-scale afforestation carbon projects.

By integrating drones and remote sensing into MRV systems, carbon projects in India are reducing the costs of on-ground verification and ensuring higher transparency and credibility in carbon credit issuance. This technological integration empowers Indian farmers to adopt climate-smart practices while unlocking new revenue streams through participation in voluntary and compliance carbon markets.

Table 9:
Different types of agricultural Drones²³

One Type	Description	Key Features	Application in Agriculture	Advantages	Limitations
Fixed-Wing UAV	UAV with stationary aerofoil shaped wings that generate lift a certain speed	Longer flight duration	Large scale field mapping	Covers large areas quickly	Needs open space for landing Higher cost
		High-speed coverage	Crop monitoring	More efficient for extensive farms	
		Requires a runway for takeoff and landing	Soil analysis		

²³ <https://www.extensionjournal.com/article/view/1669/8-3-7>

MRV, Digital Tools, and Innovations

Helicopter UAV	Single set of horizontally rotating blades attached to a central pole	Vertical takeoff and landing	Targeted pesticide spraying	Can operate in crowded or remote locations	Higher maintenance cost
		Ability to hover and maneuver in confined spaces	Crop surveillance in inaccessible areas	High maneuverability	Shorter flight time than fixed-wing drones
Multi-Copter UAV	UAV's with multiple rotors (usually 4-8) that provide lift and control	Highly stable	Crop health assessment	Easy to deploy	Shorter battery life
		Can hover precisely	Fertilizer & pesticide application	Operates in small and uneven fields	Limited payload capacity
		AI- integrated semi-controlled operations	Irrigation monitoring		
AI- Integrated Drones	Drones that use AI for autonomous decision-making based on sensor data	Real time data analysis	Spatial variability mapping	Enhances farm productivity	Requires prior AI training
		Decision making based on prior training Improved efficiency	Soil health monitoring, Precision agriculture	Reduces manual labor	Expensive to implement
GPS-Based Autonomous Drones	Unmanned aerial vehicles controlled via GPS instead of manual radio control	Automated flight paths	Remote crop monitoring	Less need for human intervention	Initial setup cost is high
		Customizable camera and sensor integration	High-precision mapping	Improved accuracy	Dependent on satellite signals
			Variable rate application (VRA)		



Figure 7: Image of a helicopter dron used in Agriculture²⁴

5.6 Accessing Digital Platforms and Farmer Dashboard

Digital platforms and farmer dashboards are becoming essential tools for enabling smallholder farmers to participate in carbon markets. These platforms help farmers digitize and manage key farm data, such as sowing dates, fertilizer use, irrigation practices, and crop yields, which is critical for meeting the Measurement, Reporting, and Verification (MRV) requirements of carbon projects. By maintaining accurate and transparent records, farmers can demonstrate their environmental impact and become eligible for carbon credits and associated financial incentives.

²⁴ <https://www.extensionjournal.com/article/view/1669/8-3-7>

MRV, Digital Tools, and Innovations

In India, platforms like Crop In Smart Farm, used by over 6 million farmers, and DeHaat's Carbon Farming Platform, serving more than 1.5 million farmers across states such as Bihar, Odisha, and Uttar Pradesh, provide easy-to-use interfaces and support local languages. Emerging players like Boomitra and Agri Carbon are building AI-driven dashboards that enable real-time soil carbon monitoring and earnings projections from carbon credits. Many of these platforms also integrate advisory services, market linkages, and training modules to support farmers in adopting climate-smart practices. In addition, government-backed initiatives like eNAM (National Agriculture Market) are exploring integration with carbon market data to help farmers access both commodity markets and carbon incentives through a single interface.



Figure 8: CropIn Smart Farm Web Page²⁵

25 <https://cropin.com/>

Farmers Guide Book

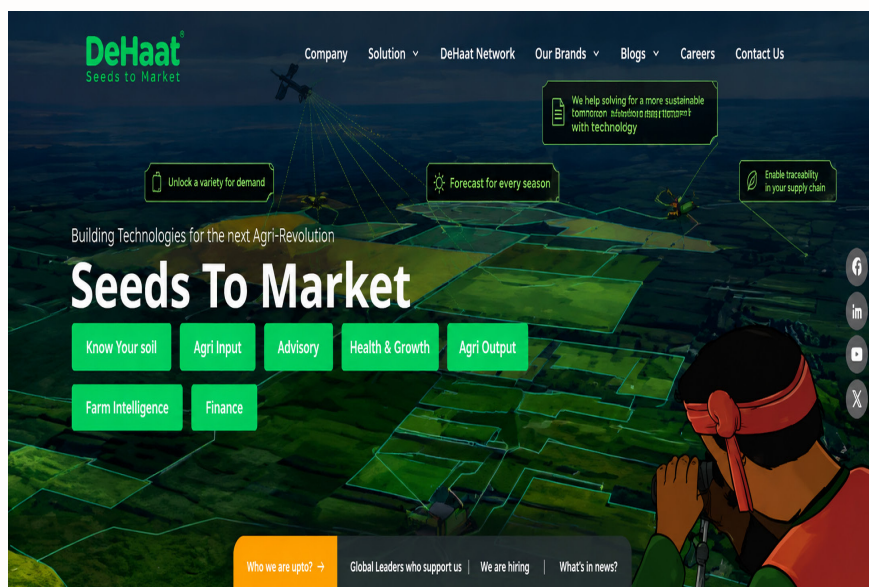


Figure 9: DeHaat's Carbon Farming Web Page²⁶

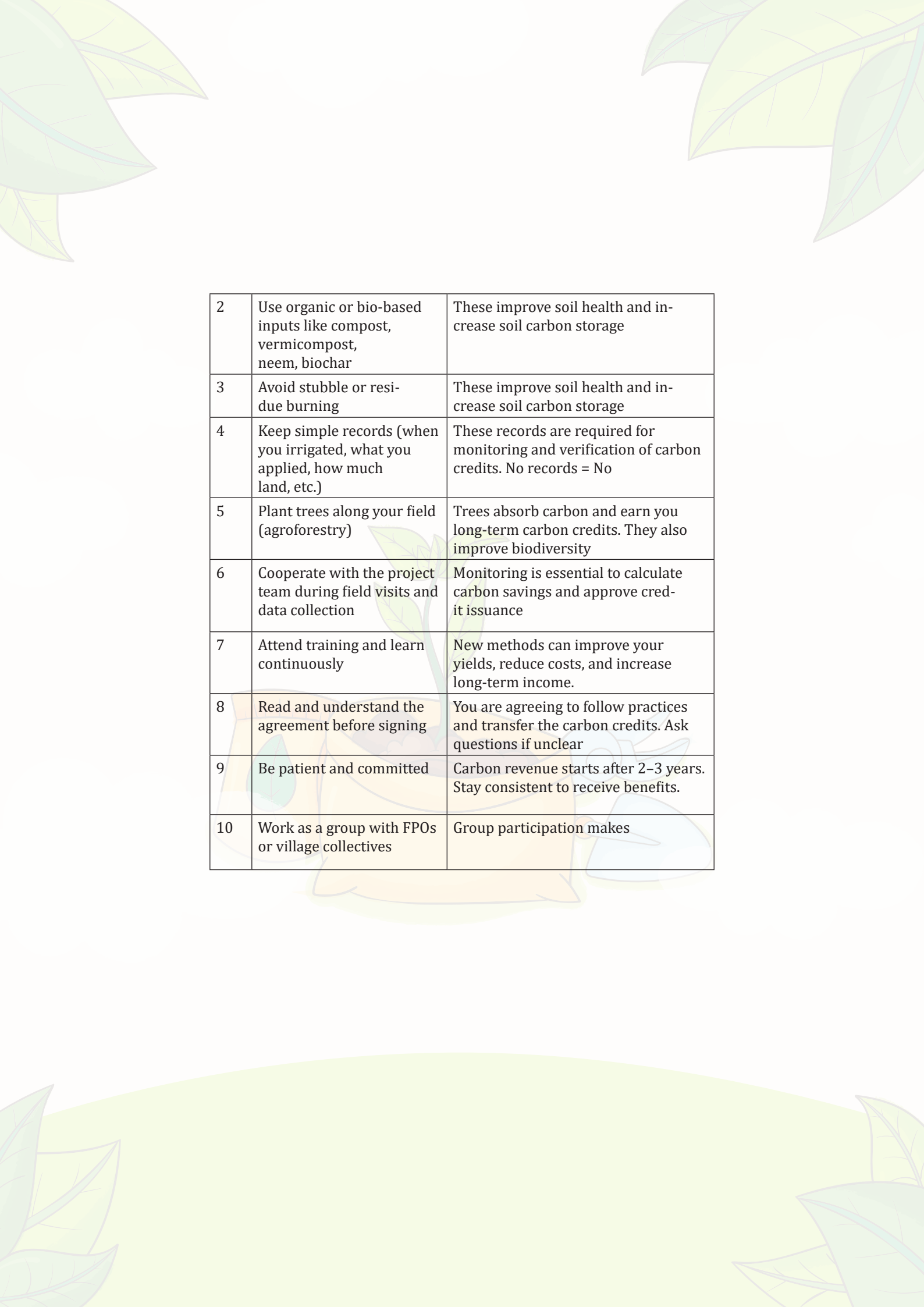
26 <https://agrevolution.in/>

PART - VI ACTION, CAUTION & EXERCISE

6.1 Do's and Don'ts for Farmers in Carbon Farming Projects

Participating in a carbon farming project can provide additional income, improve your soil and water, and make your farm climate-resilient. But to succeed, farmers must follow certain practices and avoid common mistakes.

	DO	Why It's Important
1	Follow sustainable practices (like composting, crop rotation, water-saving, etc.)	These reduce greenhouse gases and help you qualify for carbon credits.



2	Use organic or bio-based inputs like compost, vermicompost, neem, biochar	These improve soil health and increase soil carbon storage
3	Avoid stubble or residue burning	These improve soil health and increase soil carbon storage
4	Keep simple records (when you irrigated, what you applied, how much land, etc.)	These records are required for monitoring and verification of carbon credits. No records = No
5	Plant trees along your field (agroforestry)	Trees absorb carbon and earn you long-term carbon credits. They also improve biodiversity
6	Cooperate with the project team during field visits and data collection	Monitoring is essential to calculate carbon savings and approve credit issuance
7	Attend training and learn continuously	New methods can improve your yields, reduce costs, and increase long-term income.
8	Read and understand the agreement before signing	You are agreeing to follow practices and transfer the carbon credits. Ask questions if unclear
9	Be patient and committed	Carbon revenue starts after 2–3 years. Stay consistent to receive benefits.
10	Work as a group with FPOs or village collectives	Group participation makes

ACTION, CAUTION & EXERCISE

	DON'T	Why It's a Problem
1	Don't burn crop residues or plastic waste	This cancels out your carbon gains and is harmful to health and soil.
2	Don't stop the practices mid-way without notice	If you leave the project or change your farming suddenly, you may become ineligible for income.
3	Don't expect instant profits	Carbon credits take time after measurement, verification, and sale. Payments often come in the 2nd or 3rd year
4	Don't share false data (e.g., giving wrong land size or fake records)	This can disqualify the whole group or project and may result in blacklisting
5	Don't use banned pesticides or excessive chemical fertilizers	This harms soil carbon and violates project rules
6	Don't ignore instructions from field teams or project partners	They're there to guide and support you , communication is key
7	Don't give up if you face challenges in the first season	Learning and adjustment take time, stay committed to reap rewards
8	Don't assume all practices are allowed	Only approved methods earn carbon credits. Always check with your project team.
9	Don't sign contracts you don't understand	Always ask for help or translation if the contract is not clear. It's your right
10	Don't sell your carbon credits to two projects at once	This is illegal and will result in cancellation of your credits. Each land parcel must be enrolled with only one project.

6.2 Practical Exercises for Farmers

Exercise:1

Self-Check: What Am I Already Doing on My Farm?

	Yes	No
I grow different crops in different seasons. (Crop rotation)		
I let leftover plants decompose in the field instead of burning them.		
I add cow dung, compost, or green leaves to my soil		
I use natural sprays (like neem, chilli, garlic) to control pests		
I save water by not flooding my field too much		
I plant trees near the field or on bunds.		
I try to reduce the use of chemical fertilizers.		
I use local seeds or traditional varieties when possible		
I make my own compost at home or on the farm		
I have talked to other farmers or trainers about new farm practices		
I avoid burning plastic, chemicals, or waste in the open		
I have measured how much water I use during irrigation.		
I keep basic records of what I apply to my field.		
I have tried intercropping (growing two crops together).		
I know where I can get information about sustainable farming.		

10–15

Yes = You are a Climate Champion!

6–9

Yes = You are on the right path, keep going!

0–5

Yes = Good start! This guidebook will help you learn more.

Exercise: 2

Tick the correct answers

Composting is good for:

- Killing pests
- Improving soil health
- Increasing chemical use

Tree planting on field edges helps in:

- Storing carbon and providing shade
- Reducing yield
- Attracting pests

Which of these practices help reduce carbon emissions?

- Using less water
- Avoiding burning
- Burning plastic

Which is a climate-friendly irrigation method?

- Alternate Wetting and Drying (AWD)
- Flood irrigation every day
- No irrigation at all

Which of these improves soil health naturally?

- Adding compost or green manure
- Only using urea
- Burning straw and crop waste

Cover crops are used to:

- Prevent soil erosion and store carbon
- Replace the main crop
- Attract pests

A carbon credit is earned when a farmer:

- Reduces greenhouse gases from farming
- Uses more tractors
- Burns plastic for fuel

Why should stubble burning be avoided?

- It causes pollution and harms the soil
- It makes harvesting easier
- It increases yield

Planting trees between fields is also known as:

- Agroforestry
- Deforestation
- Mono-cropping

What is one benefit of crop rotation?

- Improves soil and reduces pests
- Uses more fertilizer
- Grows only one crop again and again

8–10 **correct** – You are a **Carbon Smart Farmer!**
5–7 **correct** – Great effort! Keep learning.
0–4 **correct** – Time to explore new farming ideas!

Exercise: 3

Carbon Market Myth or Fact?

Write F (Fact) or M (Myth) next to each sentence:

Statements

1. Farmers can earn money by reducing greenhouse gas emissions on their farms.
2. Carbon credits are only for large industries.
3. You must record your farming practices to get credits.
4. Burning crop waste helps earn more credits.
5. Agroforestry (planting trees) can earn you carbon credits over the years.
6. Using organic compost improves your soil and also helps store carbon.
7. Only international farmers can sell carbon credits.
8. You must be part of a registered project to receive carbon credit income.
9. Using less water in paddy fields can reduce methane emissions.
10. Carbon credits are fixed in price and farmers cannot negotiate or benefit from market changes.
11. Keeping records of fertilizer and water use is important for carbon projects.
12. If a farmer burns plastic, he gets more carbon credits.
13. Crop rotation improves soil carbon over time.
14. Carbon farming only applies to organic farmers.
15. Trees planted on farm boundaries don't count for carbon credits.
16. Carbon projects can run for 5–10 years and provide yearly income.

Answer Keys

Exercise: 2

1. Improving soil health
2. Storing carbon and providing shade
3. Using less water, Avoiding burning
4. Alternate Wetting and Drying (AWD)
5. Adding compost or green manure
6. Prevent soil erosion and store carbon
7. Reduces greenhouse gases from farming
8. It causes pollution and harms the soil
9. Agroforestry
10. Improves soil and reduces pests

Exercise: 3

1. F
2. M
3. F
4. M
5. F
6. F
7. M
8. F
9. F
10. M
11. F

ACTION, CAUTION & EXERCISE

12. M
13. F
14. M
15. M
16. F



ANNEXURE - I TEMPLATE (FARMER CONTRACT FORM)

AGREEMENT FOR IMPLEMENTATION OF SUSTAINABLE FARMING PRACTICES AND TRANSFER OF VOLUNTARY CARBON UNITS (VERs)

Between [ICAR Institute Name] and Farmer

This Agreement is made on this _____ day of _____, 20.

By and Between [Full Name of Farmer], aged about _____ years,
residing at _____ hereinafter referred to as the
“Farmer”, which expression shall, unless repugnant to the context
or meaning thereof, include his successors, legal heirs,
assignees, etc.,

AND

[ICAR Institute Name], under the aegis of the Ministry of Ag-
riculture & Farmers Welfare, Government of India, having its
office at _____, hereinafter referred to as the “Institute”.

The Farmer and the Institute shall hereinafter be individually referred to as a “Party” and collectively as the “Parties”.

WHEREAS:

- (a) The Institute is engaged in agricultural research, education, and implementation of carbon emission reduction projects to develop sustainable farming solutions (hereinafter referred to as the “Institute”).
- (b) The Farmer owns and operates agricultural land for the cultivation of Rice/Paddy (the “Produce”) as described in **Annexure A** (the “Land”).
- (c) The Farmer wishes to participate in the carbon reduction initiative and consents to transfer his entitlement to the resulting voluntary emission reductions (VERs) to the Institute.

Now, therefore, in consideration of the mutual covenants, the Parties agree as follows:

1. SCOPE

- (a) The Institute shall provide the Farmer with services under the [Name of the Programme] (“Services”), as detailed in **Annexure B**.
- (b) This Agreement is exclusive; the Farmer shall not receive similar agricultural services from another institute for the duration of this Agreement.
- (c) The Institute shall coordinate regularly with the Farmer and provide necessary support.
- (d) The Farmer shall maintain records and data as required under the program.

TEMPLATE(Farmer Contract Form)

- (e) The Institute has explained the concept of climate change, sustainable practices, and voluntary carbon units (VERs) to the Farmer.
- (f) The Farmer understands and agrees to irrevocably transfer any VERs generated from his Land due to the adoption of improved practices to the Institute. The Institute shall have the full right to trade/sell such VERs.
- (g) The Farmer agrees to undertake all necessary actions to facilitate the transfer of VERs to the Institute.
- (h) The Farmer shall execute any documentation requested by the Institute to support the transfer and registration of VERs.
- (i) From the effective date, the Farmer relinquishes all rights to the VERs in favour of the Institute and waives any claim to compensation or proceeds from their sale.
- (j) The Institute is not liable for any changes in land characteristics or produce yield post-implementation.

2. REPRESENTATIONS AND WARRANTIES

The Farmer represents and warrants that:

- (a) He is the legal owner of the Land and is fully competent to enter into this Agreement.
- (b) He possesses valid title documents for the Land.
- (c) He understands the terms of this Agreement and is entering it voluntarily.
- (d) He has not been promised specific increases in yield or income through adoption of Sustainable agriculture methods. Details
- (e) He is of sound mind and in good health.
- (f) He shall make no future claim over the VERs once transferred to the Institute.

- (g) He has understood the implications of adopting sustainable agricultural practices.
- (h) He shall comply with all applicable laws and the Institute's policies as updated from time to time.
- (i) He shall not engage in practices such as stubble burning or continuous flooded irrigation.

3. TERM AND TERMINATION

- (a) This Agreement shall be valid for a term of **ten (10) years** from the date of execution, unless terminated earlier.
- (b) The Farmer may terminate this Agreement by sending an email to **info@.com** or submitting a written withdrawal request to the concerned Institute office. Termination shall be effective **45 days** from the date of submission.
- (c) The Institute may terminate the Agreement by providing **30 days'** prior notice.
- (d) The Institute may terminate the Agreement with immediate effect if the Farmer breaches any terms herein.
- (e) If the Agreement is terminated mid-season, the Institute retains entitlement to the VERs for that season.
- (f) Termination will not affect VERs already accrued to the Institute.

4. CONFIDENTIALITY

- (a) The Farmer shall not disclose any Confidential Information of the Institute and shall maintain its confidentiality throughout and post the Agreement term.
- (b) "Confidential Information" includes, but is not limited to, program details, data collection methods, mobile applications, promotional material, and VER-related data.

5. INDEMNIFICATION

The Farmer agrees to indemnify and hold harmless the Institute, its officers, employees, and representatives from any loss, legal action, or claim arising due to the Farmer's breach or misrepresentation.

6. LIMITATION OF LIABILITY

The Institute shall not be liable for any reduction in yield, change in land quality or other consequences arising from the adoption of the prescribed farming methods.

7. ASSIGNMENT

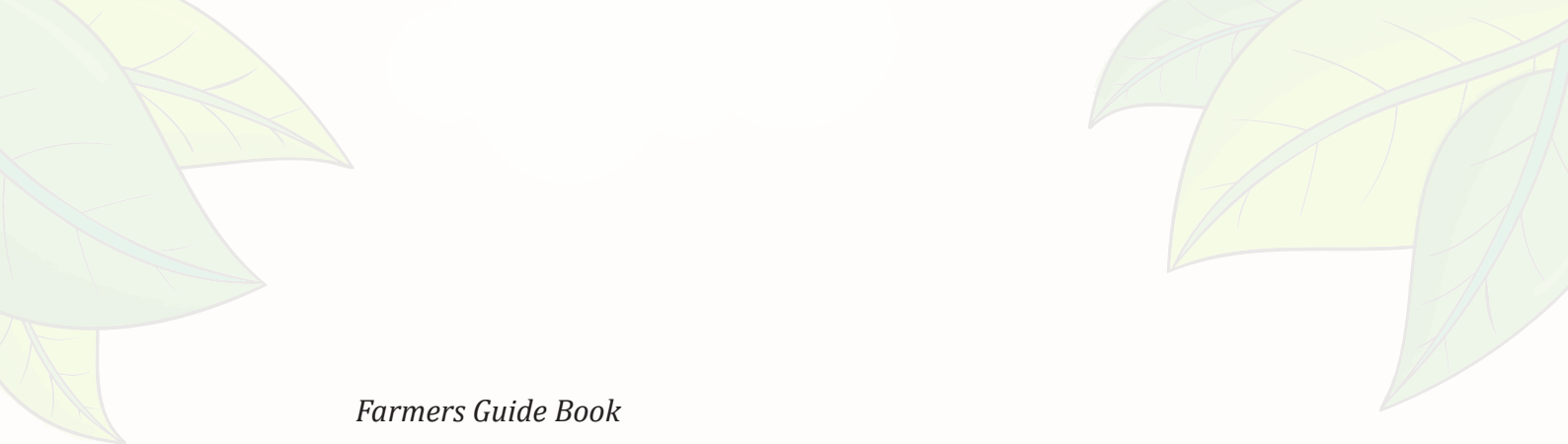
The Institute may assign this Agreement to any other party. The Farmer may not assign it without prior written consent. Successors to the land shall be bound by this Agreement.

8. GOVERNING LAW AND JURISDICTION

This Agreement shall be governed by the laws of **India**. All disputes shall be subject to the jurisdiction of the **courts at Location**.

9. MISCELLANEOUS

- (a) **Amendment:** Any modification must be in writing and signed by both Parties.
- (b) **Counterparts:** This Agreement may be executed in multiple counterparts, each of which shall be considered an original.



Farmers Guide Book

Signed by the Parties:

FARMER:

Signature: _____

Name: _____

Date: _____

(I understand English / I have been explained this Agreement in my local language.)

On behalf of the INSTITUTE:

Signature: _____

Name & Designation: _____

Institute Name: _____

Date: _____

ANNEXURE A: LAND SCHEDULE

1. Copy of Land Records
2. Copy of Farmer's ID

ANNEXURE B: SERVICES

Provide details of the Project and service offering

- Project details
- Access to Land for field visits, data collection, photographs, and interviews
- Regular interaction and advisory services by the Institute's field agents Monitoring of sustainability practices and data recording

"Disclaimer: The benefit-sharing provisions included in this illustrative contract template are provided solely for demonstrative purposes and do not constitute a standard arrangement. Actual benefit-sharing terms should be negotiated and adapted to reflect project-specific circumstances, applicable legal and regulatory requirements, and the principles outlined in Section 3.5. In particular, compensation and benefit-sharing mechanisms should ensure that participating farmers receive a fair and equitable share of the economic and non-economic benefits generated through carbon credit activities."

TEMPLATE (FARMER CONSENT FORM)

Project Title: _____
Implementing Organization: _____
Partner Institutions (if any): _____
Date: _/ _/ 20 _

Farmer Details

Full Name: _____
Father's / Husband's Name: _____
Age: _____
Gender: ☐ Male ☐ Female ☐ Other
Village: _____
District: _____
State: _____
Mobile Number: _____
Email (if any): _____

Land Details

Total Land Holding (in acres): _____

Land Parcel Location / Plot Number: _____

Type of Crops Grown: _____

Ownership Type:

☐ Self-owned ☐ Leased ☐ Community ☐ Other: _____

Consent Declaration

I, the undersigned farmer, hereby voluntarily agree to participate in the above-mentioned project involving sustainable agriculture practices and/or carbon credit generation. I confirm that:

1. I have been informed about the purpose of the project, its benefits, potential risks, and the practices I may be required to adopt.
2. I understand that the project may involve data collection on my farming activities, including field visits, photographs, soil samples, and yield records.
3. I consent to the use of this data for monitoring, reporting, and verification (MRV) purposes and for issuing voluntary carbon credits.
4. I agree to transfer any carbon credits generated from my land under this project to the implementing agency, as per the project agreement.
5. I understand that I may receive non-cash or financial incentives depending on the carbon credit revenue model.
6. I am participating in this project of my own free will and may withdraw by submitting a written request to the project team, subject to agreement terms.
7. I have read and/or had the form explained to me in my local language and fully understand its contents.

(Farmer Consent Form)

Signature / Thumb Impression of Farmer: _____

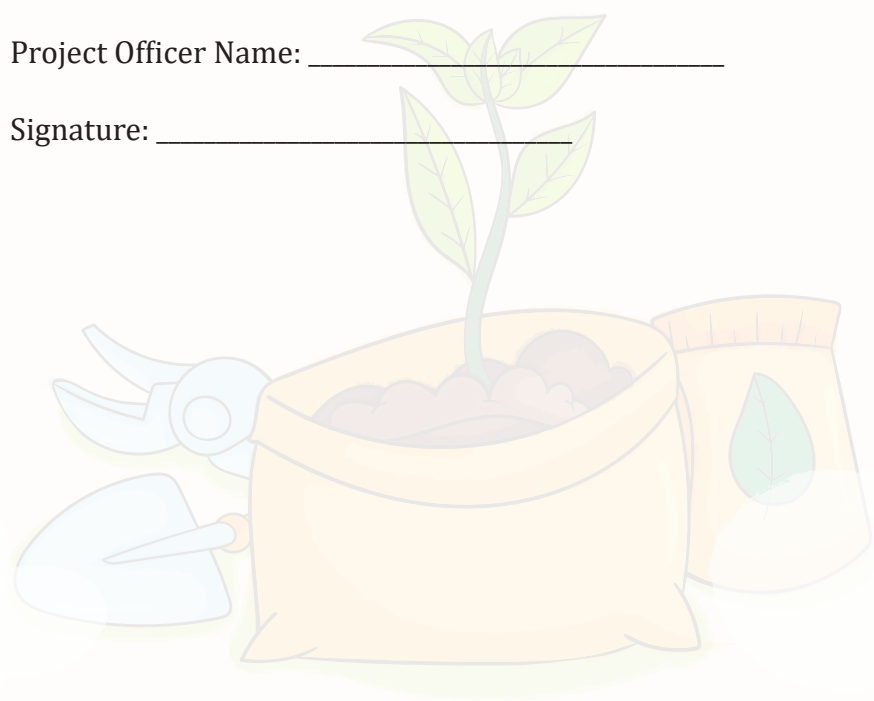
Date: ____/____/ 20

Witness Name: _____

Witness Signature: _____

Project Officer Name: _____

Signature: _____



Key Contacts for Carbon Market Participation in Indian Agriculture

Ministry of Environment, Forest and Climate Change (MoEFCC) ²³	National authority for climate policy, carbon markets, and India's Nationally Determined Contributions (NDCs). Coordinates international and domestic climate action, including carbon credit mechanisms.
Bureau of Energy Efficiency (BEE) ²⁴	Nodal agency implementing the Carbon Credit Trading Scheme (CCTS) under the Energy Conservation Act. Manages the registry for compliance and voluntary market participation in India.
Ministry of Agriculture and Farmers Welfare (MoAFW) ²⁵	Promotes sustainable and climate-resilient agriculture through programs such as the National Mission for Sustainable Agriculture (NMSA), Natural Farming, and Soil Health Management. Farmers can contact their local agricultural departments for carbon farming initiatives.
National Bank for Agriculture and Rural Development (NABARD) ²⁶	Supports carbon and climate finance projects through programs like the NABARD Climate Change Adaptation Fund and SRI-based methane reduction initiatives. Provides technical assistance and connects farmers with project developers.
Voluntary Carbon Standard Bodies: • Verra (VCS)²⁷ • Gold Standard²⁸ • Plan Vivo Foundation²⁹	Farmers and project developers may also refer to these recognized international standards for registering carbon projects.

23 <https://moef.gov.in/>

24 <https://beeindia.gov.in/>

25 <https://agriwelfare.gov.in/>

26 <https://www.nabard.org/EngDefault.aspx>

27 <https://verra.org/>

28 <https://www.goldstandard.org/>

29 <https://www.planvivo.org/>



IIED is a policy and action research organisation. We promote sustainable development to improve livelihoods and protect the environments on which these livelihoods are built. We specialise in linking local priorities to global challenges. IIED is based in London and works in Africa, Asia, Latin America, the Middle East and the Pacific, with some of the world's most vulnerable people. We work with them to strengthen their voice in the decision-making arenas that affect them - from village councils to international conventions.



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About Book

This guidebook is a practical companion for India's farmers, FPOs, and extension workers navigating the shift toward climate-smart agriculture and carbon markets. It explains sustainable farming practices from soil health and water-efficient irrigation to agroforestry and organic inputs that build resilience while opening new income opportunities. Readers will learn how techniques like Alternate Wetting and Drying and the System of Rice Intensification can earn carbon credits, how to understand farmer contracts and MRV requirements, and how India's Carbon Credit Trading Scheme and international standards such as Verra, Gold Standard, and Plan Vivo work in practice. Packed with real project case studies, government schemes, digital tools, and ready-to-use templates and exercises, this guidebook equips farming communities to adopt climate-resilient practices and participate confidently in the growing green economy.

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