# Interim Progress Report

VCM Pilot Project: “Soil Carbon Sequestration and Greenhouse Gas Reduction through Sustainable Agricultural Practices for Central India”

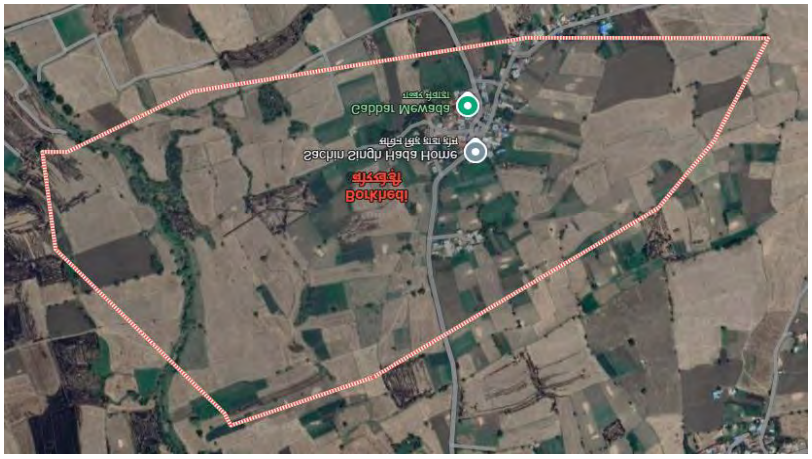
Project Period Covered: June – October 2025

Implementing Institute: ICAR-Indian Institute of Soil Science (IISS), Nabibagh, Bhopal

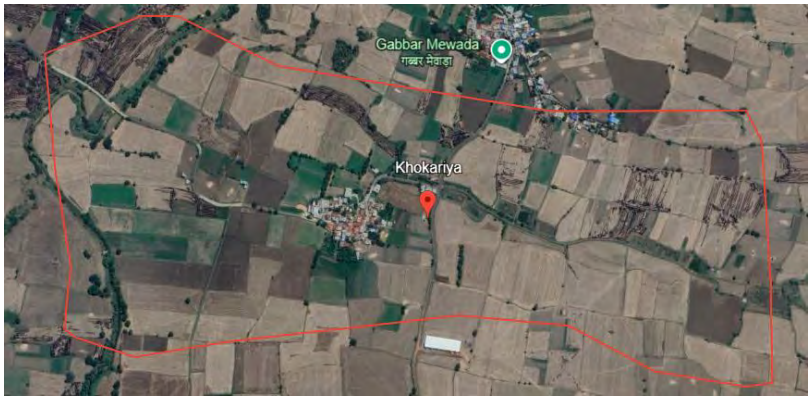
Principal Investigator: Dr. Sangeeta Lenka, principal Scientist

## 1. Background

The project received financial sanction on 1st June 2025, and implementation activities commenced thereafter. This project aims to demonstrate the potential of soil carbon sequestration and greenhouse gas (GHG) reduction through sustainable agricultural practices in central India. Pilot interventions are being carried out in three villages of Phanda block, Bhopal district: Borkhedi, Doobdi, and Khokharia. The total project area under consideration is approximately 150 acres.




Borkhedi village



Khokharia village


Doobdi village

**2. Stakeholder Engagement**

Engagement with stakeholders has been central to the project's progress, In the inception phase, several meetings were conducted with farmers, Farmer Producer Organizations (FPOs), village Sarpanch, and lead farmers to sensitize them about the key benefits of carbon credits, sustainable soil health management, and carbon farming. These meetings played a crucial role in raising awareness, building confidence, and selecting target villages and farmer participants for the pilot interventions.


MINISTRY OF
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ICAR
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- Workshops and Awareness Programs (23rd July 2025): ICAR-IISS in collaboration with IIED conducted a Voluntary Carbon Standard (VCS) project development workshop at IISS, Bhopal. It brought together farmers, project developers, NGOs, and policy practitioners. More than 50 farmers participated, gaining awareness on sustainable practices and carbon markets.


- National Workshop (23rd September 2025): A high-level platform was created to connect project developers, industries, NGOs, and government agencies under India's Carbon Credit Trading Scheme (CCTS). The event discussed project financing, MRV (Monitoring, Reporting, Verification), and future collaboration mechanisms.


IISS Committee Room
Bisleri
500

- Community-Level Outreach in Villages: In Borkhedi, outreach activities focused on vermicomposting demonstrations, showcasing agricultural waste recycling, and motivating farmers to adopt residue management alternatives.

**3. Training of Farmers**

Training sessions have targeted both theoretical and practical aspects of sustainable agriculture:

- Technical Training: Farmers received guidance on soil fertility management, crop rotation, integrated nutrient management, residue recycling, irrigation efficiency, and agroforestry.

Vermibed installation in Farmers field for vermicompost production

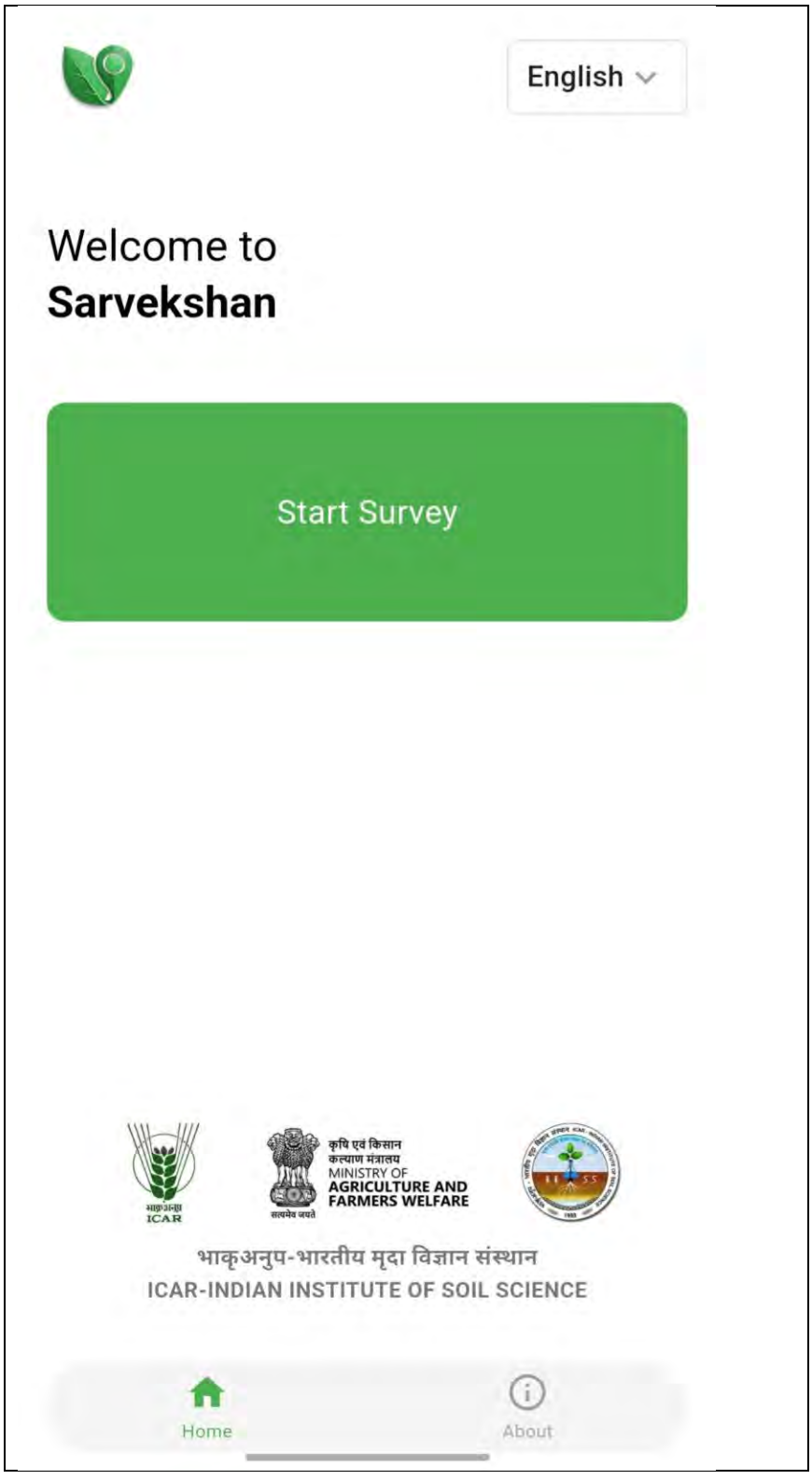
- Carbon Farming & Market Opportunities: introduced farmers to carbon markets, explaining participation mechanisms, contracts, rights, and incentive structures.

- Hands-on Demonstrations: Field-based activities included vermicomposting practices and soil sample collection methods, enabling farmers to gain confidence in adopting and monitoring sustainable techniques.

**4. Baseline Farmer Survey**

A baseline survey is in progress in the three pilot villages (Borkhedi, Dubri, and Khokharia) to capture farmers' current practices, resource use, and attitudes toward sustainable agriculture.

- Digital App "Sarveshan": To improve efficiency, transparency, and traceability, a custom digital App (Sarveshan) (http://65.0.95.174:8080/appDownload.html) was developed and deployed. The App enabled field staff to record farmer-level data directly on handheld devices, reducing errors and ensuring real-time data synchronization.


English
Welcome to
Sarvekshan
Start Survey
भाकृअनुप
ICAR
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## Farmer Profile

Name *

Age *

Mobile Number *

Gender

Village Name *

District *

Educational Status

Occupational Status

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## Farm Details

Khasra Number

Total Land Size (acres)

Land Tenure Type

Area under Kharif crops (acres)

Area under Rabi crops (acres)

☐ Are legume crops included in rotation?

Type of Farming ▾

Primary Sources of Household Income ▾

### Major Crops Grown

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Neighbours: Monthly

Relatives: Weekly

University Scientists: Weekly

## Carbon Credits and Knowledge Sources

☑ Have you heard of Carbon Credits?

Willingness for Carbon Credits (if heard)

Sources of Knowledge: NGOs

Photo Status: No Photo

Location Status: No Location

Capture Photo

Get Location

Previous

Submit

- Survey Coverage: Using Sarveshan, the survey captured cropping patterns, fertilizer and water input use, residue management, tillage intensity, and household-level willingness to adopt low-emission and carbon-creditable practices. The Sarveshan App has greatly facilitated data integration and will serve as the basis for MRV protocols under Verra VCS (VM0042) and India's CCTS.

**5. Soil Sample Collection**

Soil sample collection has been undertaken across the three villages to establish baseline soil fertility and carbon stock:

- Samples were collected from representative farmer plots under existing management systems. Farmers were actively involved in the process to ensure transparency and capacity-building.


GPS Map Camera
Borkhedi, Madhya Pradesh, India
662r+3wf, Borkhedi, Madhya Pradesh 462044, India
Lat 23.19943° Long 77.241165°
Monday, 13/10/2025 11:47 AM GMT +05:30
Google

**6. Key Achievements to Date**

1. Mobilization: Project initiation and community engagement post-funding release.
2. Workshops: Local and national-level capacity-building workshops successfully organized.
3. Training: Over 100 farmers trained in sustainable practices and carbon project participation.
4. Digital App (Sarveshan): Deployment of App-based survey system for farmer baseline data collection.
5. Soil Sampling: Completion of soil sample collection from pilot villages for baseline carbon and fertility status.

**7. Next Steps**

- Complete laboratory analysis of baseline soil samples.
- Field experiments in participating farmers field from Rabi 2025: crop sowing and treatment imposition showcasing conservation agriculture, integrated nutrient management, and no-residue-burning practices
- Finalize MRV frameworks for carbon credit generation using survey and soil baseline data.
- Strengthen Farmer Producer Organizations (FPOs) to enable long-term participation in carbon markets.
- Scale up the Sarveshan App for continued monitoring and data collection throughout the project lifecycle.

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# Session 6:

# Advancing Carbon Farming through Technology and Investment

**Dr. Sangeeta Lenka**

**Principal Scientists**

**ICAR-Indian Institute of Soil Science**

ICAR- Indian Institute of Soil Science

**Project title:** Soil carbon sequestration and greenhouse gas reduction through sustainable agricultural practices for central India.

Standard: VM0042


# **VM0042** Standard overview

- **VM0042 – Methodology for Improved Agricultural Land Management (IALM)**: This methodology is explicitly designed for agricultural land management: “quantifies the greenhouse gas (GHG) emission reductions and soil organic carbon (SOC) removals resulting from the adoption of improved agricultural land management practices”.

# ICAR-IISS VCM Pilot Project– Overview
## (Funded by Department of Agriculture & Farmers Welfare)

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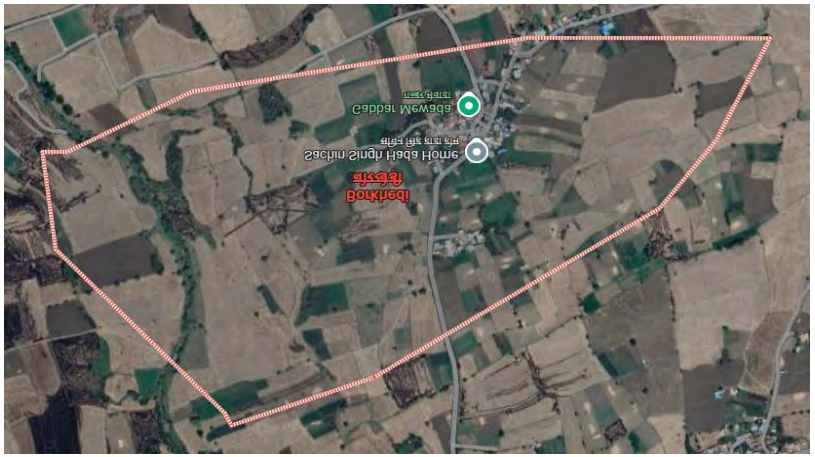
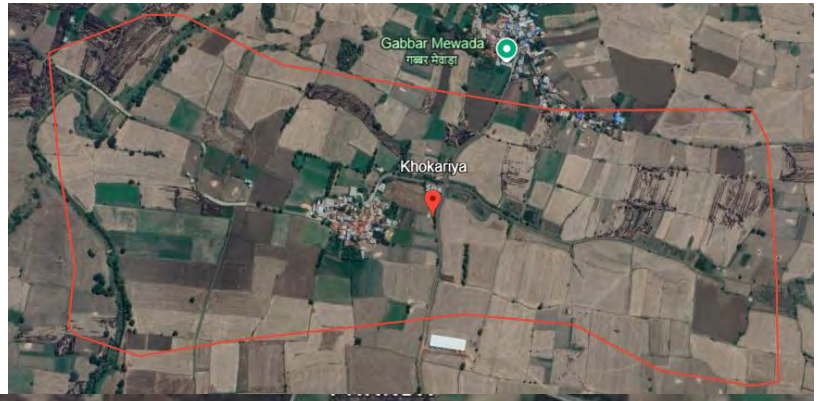
- Pilot sites: Borkhedi, Khokharia and Doodi villages, Phanda block Bhopal, Madhya Pradesh (~170 Acres and 90 farmers)
- Demonstrates carbon credits from sustainable farming through improved agricultural land management in soybean based cropping system
- Aligns with CCTS voluntary mechanism






# Climate-Smart Practices in the Pilot villages

1. $N_2O$ Emissions Reductions in Agricultural Crops through Nitrogen Fertilizer Rate Reduction (VM0022):

   ✓ Substitution of 20% inorganic N with vermicompost/FYM/organic N

2. Adoption of Sustainable Agricultural Land Management (VM0017)

   ✓ Reduced/No tillage
   ✓ Crop residue management (in-situ/ex-situ residue decomposition/Mulching)
   ✓ Incorporating crop residues back into the soil instead of burning them, enhancing soil organic carbon
   ✓ Cover crop

# GHG Reduction & Carbon Credit Potential

- $N_2O$: Reduced via less synthetic N
- $CO_2$: Avoided by no burning & soil C sequestration
- $CH_4$: Reduced via better residue & water management
- Estimated Carbon Credits: 2–3 $tCO_2e$/ha/yr (conservative figure) to 12-14 $tCO_2e$/ha/yr → ~40–60 credits/ha to 240 –280 $tCO_2e$/ha/yr over 20 years

# Engaging Stakeholders and Local Communities




# Capacity building of farmers

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# Workshops: Local and national-level capacity-building workshops

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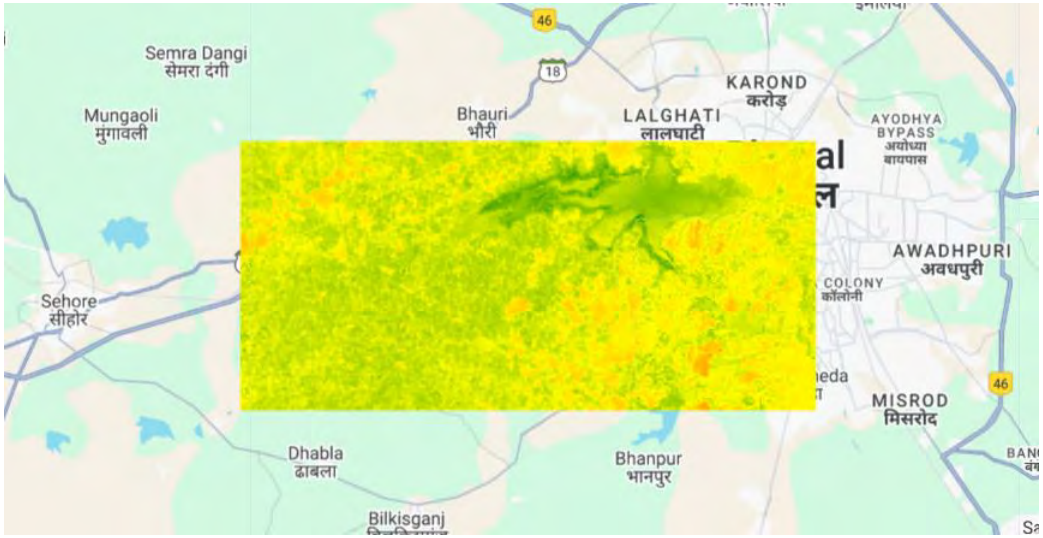
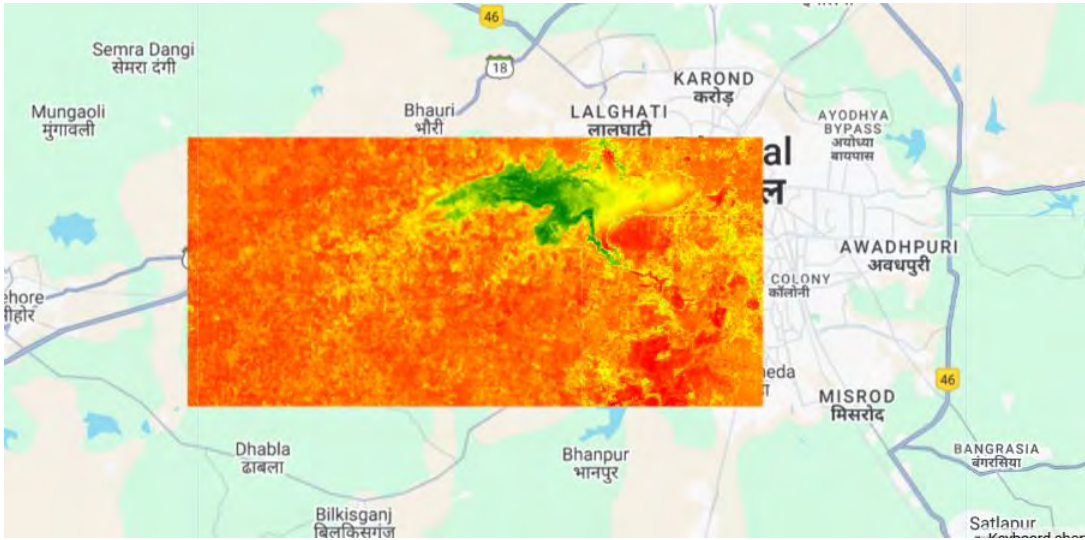
**Remote sensing**, **IoT-based soil sensors**, and **GIS mapping** enable accurate tracking of soil organic carbon, crop residue management, and land-use changes in real time.

**Normalized burnt ratio of study area to establish additionality and Baseline**



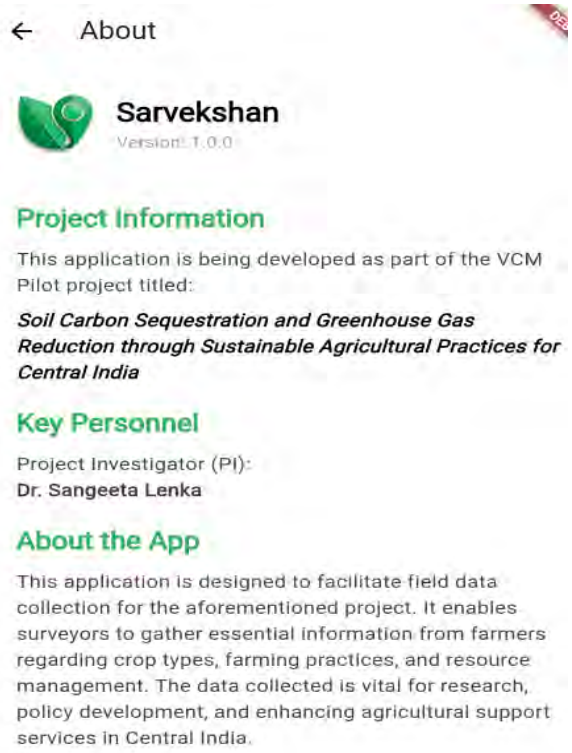

**NBR (Burn Severity)**

- Burned Area (Low NBR)
- Neutral
- Healthy Vegetation (High NBR)

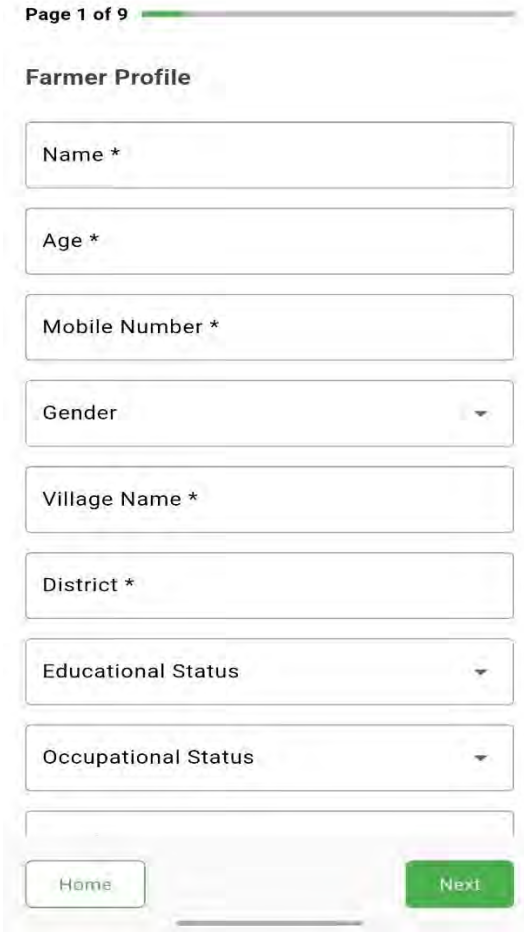


# Digital Tools/App: “Sarveshan developed by ICAR-IISS)

Baseline data collection, verification, and reporting processes.





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# Soil sample collection: Georeferenced

(to establish baseline soil fertility and carbon stock)


# Monitoring, Reporting & Verification (MRV)

- ✓ Baseline via historical data/control plots
- ✓ Monitor fertilizer use, residue handling, SOC levels
- ✓ Soil organic carbon monitoring through **direct sampling, measurement and modelling**
- ✓ Verification by independent auditors
- ✓ Transparent data for credit issuance

# Project impact from GHG Reduction & Carbon Credit Potential

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# Project impacts: Co-Benefits to soil and communities

1. Soil Health: Higher SOC, nutrient retention
2. Soil health card
3. Farmer Income: Lower fertilizer costs, carbon revenue
4. Environment: Cleaner air (no burning), water quality
5. Biodiversity: Improved soil biota & farm ecosystems

# Infrastructure Facilities Needed in Village

to religiously follow and implement VM0042

Long-term **financial support** for consistent and continuous support

- ✓ Larger capacity vermicompost/FYM production units,
- ✓ Machinery banks for residue/tillage management (**Super seeder/rota Mulcher/Happy seeder** etc.),
- ✓ Strong FPO-led monitoring system,
- ✓ Digital MRV: Monitoring & Recordkeeping
- ✓ Scaling Up Implementation and Market Integration

# Scaling Up & Industry Engagement

- Scalable across India's 120M ha cropland

- Policy integration with CCTS framework

- Industry can buy credits & support farmers also help create infrastructure facilities

- Multi-win: Climate, rural livelihoods, resilience

# Implementation Challenges

1. Majority of Farmers are small and marginal with limited literacy, convincing them, capacity building
2. Clear land titles
3. Land Use  land cover (LULUC) analysis need to be done for 10 years that adds significant cost to the project
4. Lengthy registration and issuance process: Farmers frequently ask question when do we get the benefits? After how many years and for How many years?
5. Benefit sharing protocol
6. Cost of maintaining data records, log books and monitoring
7. Retaining farmers to continue practice for long period of time
8. Better prices for produce from sustainable practices

# Enhanced Rock Weathering
# (Potentials for carbon credits in Agricultural Soils)

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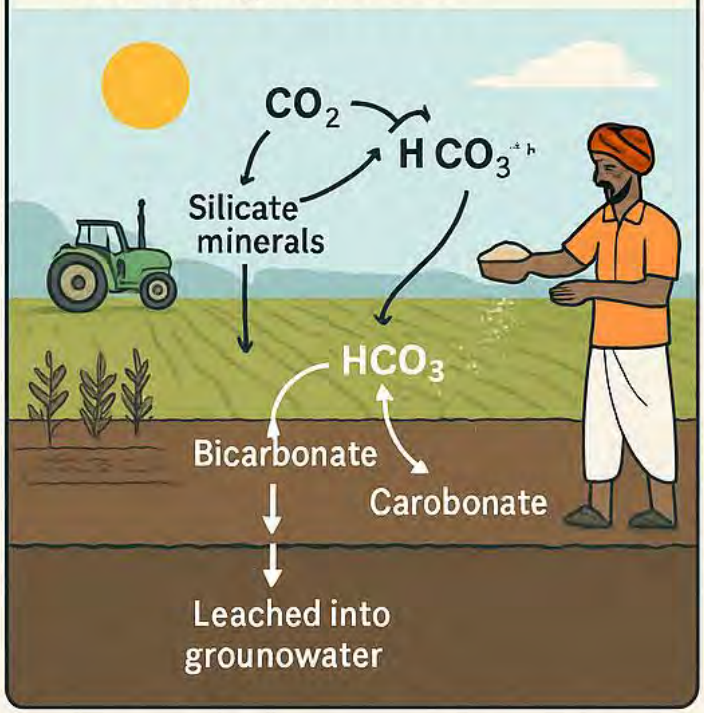
## Underlying Processes




## Implications for Carbon Credits

- $CO_4$ removal and soil health
- Scale of arabe land in India
- Additional income for farmers

~0.5 – 2 t $CO_2$ $ha^{-1}$ $yr^{-1}$

## Opportunities

- Availability silicate rock feedstock
- MRV

## Key Enabling Factors

- MRV system
- Government
- Incentives

## Challenges & Caveats

- Quantification uncertainties
- Supply chain emissions
- Agronomic variability

## Suggestions for Research & Policy Action

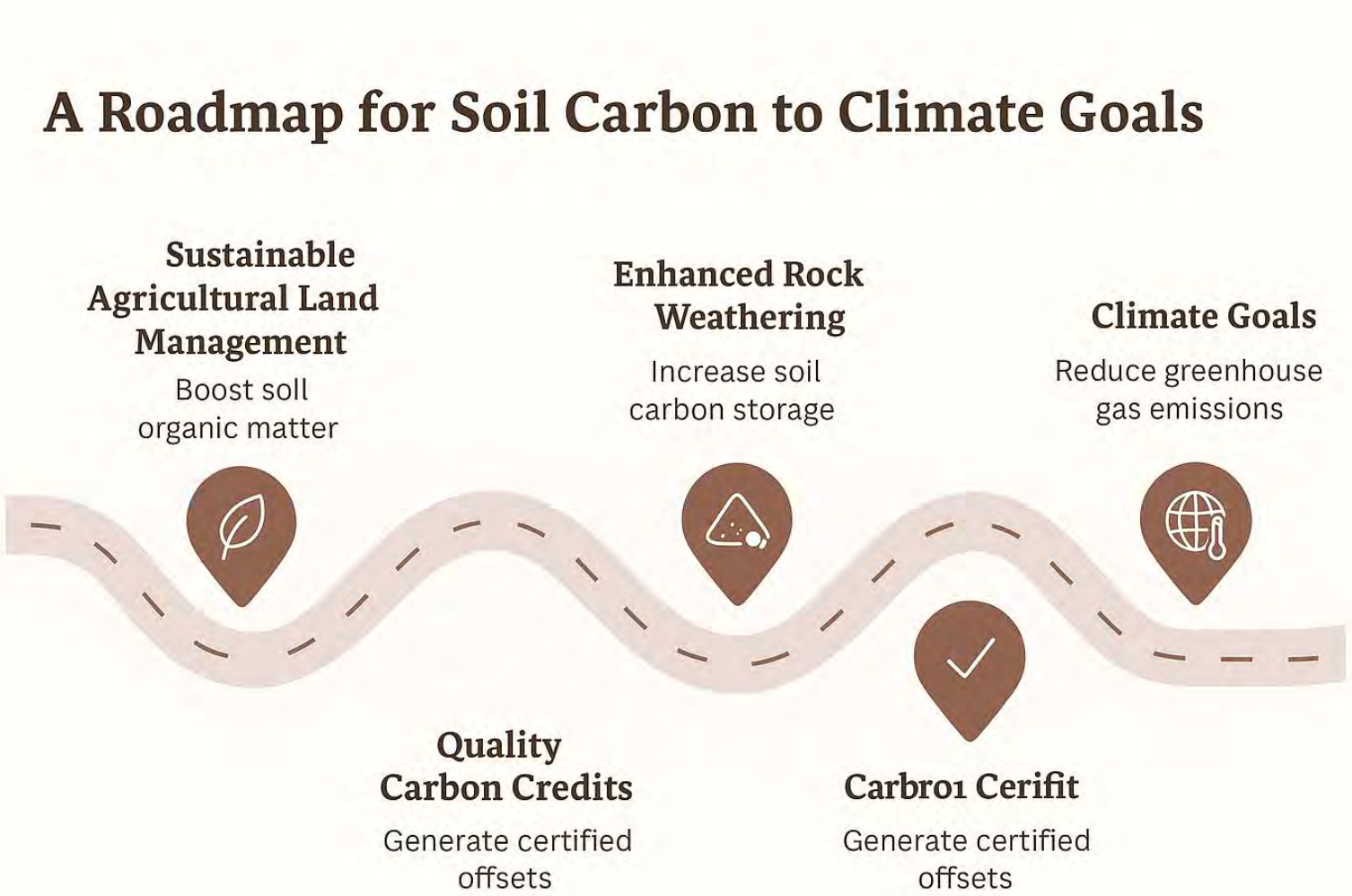
- Field trials
- Development
- Methodology
- Support farmer adopt

## Soil and Agronomic Co-Benefits

- **Soil fertility improvement**
  Replenish nutrients soil-mitigatiction
- **Improved resilience**
- **Increase crop productivity**

**ICAR-IISS & Core CarbonX**

# Linking Sustainable Agriculture, ERW, soil health and Climate Goals



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