

Next Generation Cash Crops: Empowering Farmers through Indian Carbon Market

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Agriculture today finds itself at a crossroads. On one hand, it is deeply vulnerable to the effects of climate change. On the other, it contributes to global Green-House Gas (GHG) emissions through the use of chemical fertilizers, pesticides, animal manure, and crop-burning practices. In fact, land use, including agriculture accounts for nearly one-third of all human-caused GHG emissions (Krishnan & Singhal, 2023). Yet, agriculture with careful management holds promising potential of reducing and/or capturing these emissions. Soils are the second-largest reservoir of carbon after the oceans, storing more carbon than plants and the atmosphere combined (Das, Roy, & Singh, 2020). With better management practices, farms can transform from carbon emitters into carbon sinks, actively capturing and storing carbon. This approach, known as carbon farming, can simultaneously reduce GHG emissions and offer farmers a new source of income.

What is carbon farming?

Carbon farming refers to the use of farming methods that reduce greenhouse gas emissions, and/or capture and hold carbon in vegetation and soils. Some of the techniques that can increase carbon sink into the soil or carbon sequestration are as follows,

- Zero-tillage or minimum tillage,
- Retaining crop residues,
- Cover crops,
- Agroforestry,
- Methane-reducing animal feed supplements and
- Improved nutrient management etc.

These eco-friendly practices enhance the soil's organic carbon content, slow climate change, and improve farm productivity. However, farmers often find such methods costly and unrewarding in the short term (Girish & Trivedi, 2022). This is where carbon trading becomes crucial and through which farmers can gain economic incentives for taking steps to reduce GHG emissions through carbon markets.

Understanding emission trading

Carbon pricing is an indirect market-based approach of pricing CO₂ or equivalent GHG emissions to reduce pollution (Bhowmik, 2017). Generally, there are two approaches of carbon pricing: Emission Trading System (ETS) and carbon tax (Hyesu & Young-Han, 2022).

1. **Emission Trading System (ETS):** Also called 'cap-and-trade,' where the government sets a cap on the total amount of emissions that can be released by all participating industries or companies. Within the overall cap, individual companies receive allowances, which represent the maximum allowable limit of emissions. If a company emits less than its allocated quota, it can sell extra allowances as tradable “carbon credits” to other companies exceeding their limits. This creates a financial incentive for companies to reduce their emissions efficiently.
2. **Carbon tax:** It is a direct tax imposed on the carbon content of fossil fuels used by the companies. The higher the carbon content, the higher the tax. It is designed to make carbon-intensive activities more expensive and thereby encourage individuals and businesses to reduce their greenhouse gas emissions.

Carbon trading grows out of the ETS framework and specifically refers to the trading of carbon credits. A carbon credit represents offsetting one ton of carbon dioxide or its equivalent. Farmers or companies that cut emissions or capture carbon can earn and sell these carbon credits to those needing to meet targets. Thus, carbon trading financially rewards climate-friendly practices (Bhowmik, 2017).

India's Carbon Market (ICM)

India, under its climate commitments to the Paris Agreement, has pledged to reduce its emissions intensity and achieve net zero emissions by 2070. To meet these goals, the Government of India has initiated the development of a domestic carbon market under the Energy Conservation (amendment) Bill, 2022 (Bureau of Energy Efficiency, 2022; Singh & Chaturvedi, 2023).

The ICM has two components:

1. Carbon credit trading mechanism for industries obligated to reduce emissions.
2. Voluntary offset schemes that allow non-obligated sectors, including agriculture, to participate.

For farmers, carbon farming projects fall under the voluntary offset scheme, opening opportunities to earn additional income while promoting sustainable agriculture.

Benefits to the farmers

Carbon trading can benefit farmers in several ways:

- Additional income: Carbon credits provide an extra revenue stream.
- Sustainable adoption: Incentives encourage eco-friendly, climate-smart farming practices.
- Capacity building: Revenue can fund training, better farm inputs, and technology adoption.
- Resilience: Farmers become better equipped to handle climate risks.

This way, carbon becomes not merely a pollutant, but a new cash crop.

How farmers can participate

Individual farmers may find it difficult to navigate carbon credit programs due to technical and verification requirements. But through collective platforms, such as Farmer Producer Organizations (FPOs) or Self-Help Groups (SHGs), farmers can avail the benefits (Girish & Trivedi, 2022). The integration process typically involves,

1. Adopting regenerative practices at group scale to increase soil carbon.
2. Partnering with agri-tech companies like Boomitra, Nurture.farm, or Grow Indigo, which facilitate carbon credit generation.
3. Verification and certification by third-party bodies, after which credits are earned and can be sold.

Modern tools such as satellite data, AI, and remote sensing are making monitoring more accurate and affordable (Girish & Trivedi, 2022).

Agri-Tech Companies Linking Farmers to Carbon Trading

- Boomitra: Active across India, Latin America, and Africa. It uses satellites and machine learning to monitor soil carbon. In India, its projects span over 2,00,000 acres across

Indo-gangetic plains and South of Vindhya. By partnering with local organizations, it promotes improved practices like reduced tillage, crop residue management, improved water management, and crop rotations in the production of cereals, grains, pulses, sugar cane, fibers, and other crops.

- Grow Indigo: A joint venture between Mahyco and Indigo Ag. It partners with local institutions to promote the practices like direct seeding of rice, reduced field flooding, no or reduced tillage, and integrated nutrient management.
- Nurture.farm: Known for its #EndTheBurn programme in Haryana and Punjab, a movement initiated to prevent stubble burning and cut methane emissions by partnering with the Indian Agriculture Research Institute (IARI) to use PUSA decomposer over 4,20,000 acres.

Success story

Jharkhand's Birsa Harit Gram Yojana (BHGY)

In Jharkhand, the Birsa Harit Gram Yojana (BHGY), launched in 2016-17 aimed to boost rural incomes while turning fallow lands into green assets. Since its launch, over 1.35 lakh farmers have planted mango and other fruit-bearing trees on more than 1.16 lakh acres, creating both livelihood opportunities and ecological benefits.

BHGY has been linked to the carbon finance model, where farmers earn payments based on the carbon credits generated by their plantations. Those who planted on one acre since 2018 are eligible to receive about ₹60,000 over 20 years, with 80 per cent of the revenue going directly into their bank accounts. By mid-2025, more than 30,000 farmers had received their first instalments. Using satellite monitoring and AI to track tree growth and carbon capture, the scheme ensures transparency while showcasing how climate action can also put money in farmers' hands (Jain, 2025)

Conclusion and Way Forward

Carbon trading offers Indian farmers a remarkable chance to earn while fighting climate change. Over time, carbon is undergoing a transformation into a valuable commercial crop, which holds promise of increasing farmers income. However, the potential for farmers to benefit from carbon trading is still in its early stages, with persistent challenges like strengthening reliable verification & certification process, infrastructure, and trading platforms and need to raise awareness among farmers about carbon farming and trading practices. Importantly, profits must reach the grassroots so that farmers remain central beneficiaries of the Indian Carbon Market. With the right policies, technology, and partnerships, Indian agriculture can turn climate risk into an economic opportunity, making farming both sustainable and profitable.

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