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## HARNESSING CARBON CREDITS: OPPORTUNITIES FOR INDIAN FARMERS TO PROSPER

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Carbon credits play a pivotal role in promoting climate-smart agricultural methods that mitigate emissions, enhance carbon storage, and foster sustainable land management. This contribution not only supports global efforts to combat climate change but also bolsters essential aspects like food security, biodiversity, and rural economies. Plants and crops are central to the carbon cycle, absorbing carbon dioxide (CO<sub>2</sub>) during photosynthesis and releasing it upon decomposition. However, with proper soil carbon capture methods and the adoption of regenerative agricultural techniques, they can effectively sequester CO<sub>2</sub>. In carbon farming, carbon becomes a yield akin to other crops cultivated by farmers, providing them with a significant opportunity to convert carbon sequestration into financial value through carbon credits. The Energy Conservation (Amendment) Bill of 2022, passed in the Lok Sabha on August 8, aims to foster the domestic carbon market. While primarily focused on boosting the renewable energy sector, the bill also carries potential indirect benefits for India's farming community. With approximately 55 percent of India's workforce engaged in agriculture, the sector's reliance on natural resources like soil and water makes it profoundly vulnerable to the impacts of the climate crisis, including soil degradation and market price fluctuations. These challenges threaten the sustainability of agricultural practices and the livelihoods of millions. By integrating carbon market provisions into energy conservation efforts, the bill presents an opportunity to address these challenges and promote climate-resilient agricultural practices, ultimately benefiting both farmers and the environment.

### Improving Soil Health is Critical

The extensive use of fertilizers and pesticides since the Green Revolution has led to a decline in soil carbon levels, resulting in soil degradation. Various assessments indicate that nearly 30 percent of India's total land area has experienced degradation, with approximately

half of this land being agricultural, particularly rainfed agricultural land. Soil is composed of organic matter containing elements such as carbon, nitrogen, and phosphorus. Carbon constitutes about 50 percent of soil organic matter, making soil carbon measurement a reliable indicator of overall soil health. According to a 2017 paper by Australian microbiologist and climatologist Walter Jehne, the earth's soil carbon sponge, formed by a mixture of minerals, organic debris, and air, has an enhanced capacity to absorb and retain rainfall, enhance access to vital nutrients, and support diverse microbial processes. Therefore, a decline in soil carbon levels reduces the soil's ability to absorb and retain water, limiting the effectiveness of rainfall and making the topsoil susceptible to runoff and erosion, which in turn exacerbates cycles of floods and droughts. Carbon sequestration in soil can help elevate soil carbon levels and decrease atmospheric carbon dioxide levels, providing a dual benefit for both climate change mitigation and agriculture. Soil carbon sequestration involves the extraction and storage of carbon dioxide from the atmosphere into a soil carbon reservoir. During photosynthesis, plants convert carbon dioxide and water from the atmosphere into oxygen, sugar, and carbon-rich compounds. These compounds are transported to the roots and soil below, nourishing the organisms residing there. Increased biomass below the soil, reduced soil erosion, and minimal tilling contribute to retaining a higher percentage of carbon dioxide in the soil, thus preserving soil carbon content.

### **There Exist Methods That Farmers Can Adopt to Rejuvenate Soil Vitality**

Implementing methods that bolster biomass and diminish carbon loss from soil is crucial for enhancing soil health. These regenerative agricultural approaches encompass:

- Employing cover crops to maintain continuous soil coverage
- Utilizing residue mulching and recycling biowaste in the soil
- Incorporating manure, compost, and biofertilizers
- Implementing improved crop rotations and intercropping techniques
- Minimizing flood irrigation and reducing chemical inputs



Source: (Deep & Trivedi 2020)

### **Monetizing Carbon Credits Can Serve as The Catalyst**

As the enhancement of soil health is inherently tied to the capacity to elevate soil carbon levels, achieving this necessitates ongoing monitoring of soil carbon levels and providing incentives for its enhancement. The process of monetizing soil carbon entails a comprehensive grasp of carbon credits. These credits are certificates representing quantities of greenhouse gases that have been prevented from entering or removed from the atmosphere. Each carbon credit signifies the removal of one metric tonne of carbon dioxide from the atmosphere. Progress in remote sensing data and artificial intelligence has facilitated the prediction of carbon levels using satellite data, serving as one of the methods for calculating carbon credits. Companies and governments procure carbon credits to fulfill their climate commitments.

### **Farmers Can Reap Rewards from Engaging in The Carbon Market**

The primary advantage is the provision of monetary incentives to farmers for the carbon they have contributed to sequestering in their lands. At current market rates, a farmer can earn approximately INR 780 for each carbon credit they sequester, although larger

corporations may offer higher rates, potentially up to INR 2,000, particularly when purchasing significant volumes of carbon credits directly from farmers. Based on our observations, farmers implementing regenerative practices typically sequester between one to four carbon credits per acre. Additionally, farmers experience indirect benefits, notably the enhancement of soil health attributed to the carbon captured in the soil. This improvement can be assessed by observing indicators such as increased water-holding capacity, reduced soil density, enhanced water infiltration, greater nutrient availability, and decreased soil surface temperatures. Through the consistent adoption of these practices over several seasons, soil carbon levels experience enhancement, consequently leading to increased yields. Nevertheless, farmers may require incentives to embrace these practices due to their time-consuming and costly nature, which may not yield immediate returns. The opportunity to participate in voluntary carbon markets and trade carbon credits can serve as a compelling incentive for farmers to adopt these practices.

### **How Do Carbon Credit Programs for Farmers Function?**

While individual farmers may find it challenging to navigate this path, non-profit organizations and farmer producer organizations (FPOs) can assist them in accessing the benefits of carbon credit programs.

#### **1. Adopt regenerative agriculture practices as a collective**

Non-profits/FPOs should encourage farmer groups to embrace regenerative agriculture practices, particularly focusing on enhancing soil organic matter and carbon content. Since this transition may initially lead to lower yields and requires time, it's crucial to provide ongoing support and guidance to farmers during the initial phases. Demonstrating the adoption of these regenerative practices is a vital step in qualifying for carbon credits.

#### **2. Collaborate with an Agri-tech or project partner**

Agri-tech firms like Boomitra, Nurture.farm, CarbonX, and Carbon Count operate in voluntary carbon markets. Partnering with these entities facilitates the listing and trading of farmers' projects.

#### **3. Onboard and verify carbon credits through third-party agencies**

Once projects are identified and listed, third-party organizations like Verra conduct verification. Following verification and approval, these credits are traded in credit markets,

and the incentives are distributed to the FPOs/non-profits and farmers. Typically, this process takes between eight to 12 months from project listing.

### Challenges Associated with Farming-Based Carbon Credits

Like any emerging field, farming-based carbon credits encounter various challenges.

- Ensuring verification and accurate accounting of soil carbon increases is complex, especially in demonstrating additionality—proof that farmers adopted new practices beyond routine ones to boost soil carbon levels.
- The wait for cash incentives can be prolonged, taking eight to 12 months post-listing. Additionally, listing a project itself may take about 12 to 18 months, posing challenges for farmers.
- Given the small landholding size of Indian farmers, the received carbon credits may not suffice to adopt regenerative practices. Moreover, low awareness among farmers about carbon credit trading exacerbates the situation.

### Addressing These Challenges

1. Raising awareness among farmers about carbon credit programs is crucial to ensure that all regenerative agriculture practitioners can benefit.
2. As per McKinsey, the demand for carbon credits is projected to surge by approximately 15 times by 2030, potentially leading to improved market prices.
3. Technological advancements are streamlining the measurement and verification of carbon captured in soil, making the process simpler.
4. Since most programs involve farmer groups rather than individuals, the cost and risk associated with participation for individual farmers are reduced.
5. Government initiatives at the state and central levels could integrate existing natural, regenerative, and organic farming schemes to encourage farmer participation in carbon credit programs. For instance, scheme guidelines could mandate regular estimation of soil carbon levels, facilitating measurement and verification processes.

Increasing soil carbon levels offers multifaceted benefits and could spur the widespread adoption of regenerative agriculture practices, aiding in climate change mitigation. China initiated its carbon trading market last year. Introducing a similar market in India could serve as a catalyst for achieving climate objectives and promoting regenerative agriculture through carbon-driven incentives.

## Conclusion

The integration of carbon credit programs into agricultural practices presents a promising avenue for addressing climate change while simultaneously enhancing soil health and farmer livelihoods. By incentivizing regenerative agriculture practices and carbon sequestration, these programs offer tangible benefits to both the environment and the farming community. Despite facing challenges such as verification complexities and lengthy processes, efforts to address these issues are underway through technological advancements and policy initiatives. As awareness grows and market demand for carbon credits rises, there is significant potential for these programs to become a cornerstone of sustainable agriculture and climate action. With countries worldwide committing to climate goals, the evolution of carbon credit markets and their alignment with agricultural practices is imperative for achieving meaningful progress in combating climate change. By leveraging lessons from initiatives like China's carbon trading market, India can position itself as a leader in promoting regenerative agriculture and realizing the dual benefits of climate resilience and agricultural sustainability.

## Reference

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