

3. Carbon Credits for Methane Emission- Environment

Making money from methane emission reductions in paddy fields. Traditional flooded rice farming creates anaerobic conditions that release methane, a potent greenhouse gas; however, the Alternate Wetting and Drying (AWD) technique allows farmers to reduce emissions and water use without yield loss, creating an opportunity to earn additional income through carbon credits.

Overview

Context- Rice farmers in India can now generate additional income by adopting climate-smart, water saving practices.

Mechanism- These practices reduce methane emissions, which can be monetized as carbon credits.

1. The Problem- Traditional Rice Farming

Method- Conventional cultivation involves keeping fields continuously flooded with approximately 4–5 cm of water for the first two months after transplanting.

Purpose- The standing water creates an anaerobic (oxygen-free) environment that prevents weed seeds from germinating, serving as a primary method of weed control.

Environmental Impact

Methane Production- The waterlogged conditions promote the growth of methanogenic microbes, which decompose organic matter and release methane.

Global Warming Potential- Methane is a potent greenhouse gas, possessing 28 times the global warming potential of carbon dioxide (CO₂) over a 100-year period.

2. The Solution- Alternate Wetting and Drying (AWD)

Definition- AWD is a water management technique for irrigated rice that uses significantly less water than conventional flooding.

Process- Farmers allow fields to dry periodically before re-flooding them.

Scientific Basis- This periodic drying interrupts the anaerobic soil conditions, thereby significantly reducing methane production.

Global Promotion- The International Rice Research Institute (IRRI) is a key promoter of AWD as a smart water-saving technology, particularly across Asia.

3. Comparative Benefits- AWD vs. Continuous Flooding (CF)

Feature	Continuously Flooded (CF) Fields	Alternate Wetting and Drying (AWD)
Water Usage	High (4.96 million litres/acre)	Lower (3.14 million litres/acre)
Methane Emissions	High (6 tonnes CO ₂ equivalent/hectare)	Reduced (3.5 tonnes CO ₂ equivalent/hectare)
Grain Yield	Approx. 2.5 tonnes/acre	Maintained (Approx. 2.5 tonnes/acre)
Soil Condition	Anaerobic (Oxygen-free)	periodically Aerobic (Oxygenated)

4. Economic Opportunity- Carbon Credits

Concept- The verified reduction in methane emissions can be converted into sellable carbon credits.

Buyers- These credits are purchased by entities (e.g., data centres, airlines) seeking to offset their own carbon footprint.

Market Value- Credits for methane reduction trade at approximately \$15–25 per tonne of CO₂ equivalent.

Farmer Earnings Potential

Emission Reduction- AWD reduces emissions by roughly 2.5 tonnes of CO₂ equivalent per hectare per crop.

Income Estimate- Farmers can earn at least \$37.5 per hectare per crop cycle.

Local Currency- This translates to roughly ₹1,363 per acre, providing significant additional revenue.

5. Real-World Implementation (Case Studies)

Mitti Labs (India)

Scale- Collaborating with tens of thousands of farmers across multiple states.

Methodology- Uses digital technology to track water levels and verify that farmers are adopting the practice.

Impact- A study in Telangana documented 37% water savings while maintaining crop yields.

Green Carbon (Vietnam)

Scale- Operates in six northern provinces with expansion plans.

Methodology- Partners with national agricultural institutes for technical support and data verification.

Impact- Reported a massive ~55% reduction in methane and a 5.5% increase in yield in Nghe An province.

6. Understanding Carbon Credits

Definition- A carbon credit is a tradable certificate representing the right to emit one tonne of CO₂ or an equivalent amount of another greenhouse gas (like methane).

Purpose- It is a market-based tool incentivizing Greenhouse Gas (GHG) reductions, rooted in global frameworks like the Kyoto Protocol and Paris Agreement.

Key International Mechanisms

Clean Development Mechanism (CDM)- Established under the Kyoto Protocol; allowed developed nations to earn credits by funding projects in developing nations.

Article 6 of Paris Agreement- The current framework enabling international carbon trading.

The System Works

1. **Project Implementation-** An activity (e.g., adopting AWD farming) prevents or removes GHGs.
2. **Verification-** Independent bodies verify the reduction is real, measurable, and additional (meaning it required the funding to happen).
3. **Issuance-** One credit is issued for every tonne of CO₂ equivalent (CO₂e) reduced.
4. **Trading- Corporate Buyers-** Buy to meet regulatory caps or voluntary "Net Zero" targets. Investors Buy to trade for profit.

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