

Payments for Ecosystem Services: New Opportunities and Way Forward

Ramanjaneyulu

Abstract

Ecosystem Services Payments and Carbon Finance are smart ways of realizing how valuable nature is in dealing with environmental problems and tackling climate change. These methods encourage sustainable actions that improve the services nature provides. Ecosystem services payments reward activities that help with things like storing carbon, protecting wildlife, managing land better, and safeguarding important habitats. These efforts are good for both the environment and people.

Carbon Finance: Carbon finance involves using incentives to encourage actions that reduce the amount of greenhouse gases in the air, helping to combat climate change. Natural farming has the potential to capture and store carbon in the soil and plants. This can be measured and traded as carbon credits or offsets. It can also attract climate finance support, like grants, loans, and investments, for projects that reduce emissions. Right now, carbon finance is mostly part of voluntary markets, but natural farming projects could greatly benefit from them. Government of India has notified Framework for Voluntary Carbon Markets in January, 2024.

Green Credits Program: India's environment ministry has suggested a program called the Green Credit Program. This program lets individuals, groups, and companies earn credits for doing things that are good for the environment. These credits can then be traded. Some of the important activities related to natural farming that can earn credits include planting trees, conserving forests, saving water, using water more efficiently, promoting natural and sustainable farming, restoring land for better farming, and managing waste and recycling.

PM PRANAAM: In 2023, India's Prime Minister launched a program called PM PRANAAM, which stands for Promotion of Alternate Nutrients for Agriculture Management Yojana. This program encourages states to use fewer chemical fertilizers in farming. Under this plan, 50% of subsidy on fertilizers saved by the state compared to the last three years' average consumption, will be passed on as a grant to the state. Seventy per cent of this grant can be used to invest in new technology and equipment for using alternative fertilizers. The remaining 30% can be used to reward farmers, village councils, farmer organizations, and community groups that help reduce fertilizer use and spread awareness about it.

Data sets required:

	Data sets	Source	Frequency
--	-----------	--------	-----------

1	Farmers' -land details	Primary data	One time
2	Farmers' crop details	Primary data	As and when required
3	Practices followed	Farmer records	Seasonal
4	Carbon Sequestered in soils	Farmer records/ Soil test reports/ Satellite data	Annual
5	Carbon Sequestered in trees	Farmer records	
6	Water use reduction	Farmers records	Annual
7	Energy use in production and supply chain	Farmers records and records of other supply chain actors	
8	Fertilizer, water, energy use reduced at farm level	Farmer records	Annual
9	Fertilizers use/sales at dist and state level	Department of agril records Fertilizer management System records	annual

Ecosystem Services

Agriculture is facing a crisis, evident through falling incomes, mounting debts, increased vulnerability to crop failures, deteriorating soil health, declining groundwater levels, and the impacts of climate change. Addressing these pressing concerns calls for a fundamental shift towards an ecological approach to farming. To achieve and sustain this transformation, innovative financing programs and projects must be put in place to support mitigation and adaptation efforts. Integrating these two policy imperatives demands a fresh perspective on the agricultural sector.

The initial step involves stabilizing farm incomes by breaking their dependence on two factors: crop yield and commodity prices. The next crucial move is to tie improved incomes for farmers to the adoption of ecological practices that can be implemented on a broader ecosystem scale. This approach entails linking financial incentives not only to yields and prices but also to the adoption of sustainable practices such as water conservation methods, organic agricultural techniques, and carbon sequestration practices. By encouraging and rewarding these environmentally friendly practices, we can foster a more resilient and ecologically balanced agricultural system.

Carbon Financing

Addressing climate change is one of the greatest global governance problems of our time to incentivize the reduction of greenhouse gas (GHG) emissions in a cost-effective and flexible way, and several more are being planned or considered. Carbon financing is an innovative funding tool that places a financial value on carbon emissions and allows companies wishing to offset their own emissions to buy carbon credits earned from sustainable projects. The emission reductions are typically measured in tonnes of carbon dioxide equivalent (tCO₂e) and are represented by carbon credits. One carbon credit is equal to 1 tonne of tCO₂e removed or avoided.

Carbon Equivalence: A carbon dioxide equivalent or CO₂ equivalent, abbreviated as CO₂-eq is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.

Different greenhouse gases last in the atmosphere for different lengths of time, and they also absorb different amounts of heat. The “global warming potential” (or “GWP”) of a GHG indicates the amount of warming a gas causes over a given period of time (normally 100 years). GWP is an index, with CO₂ having the index value of 1, and the GWP for all other GHGs is the number of times more warming they cause compared to CO₂. E.g. 1kg of methane causes 29.8 times more warming over a 100 year period compared to 1kg of CO₂, and so methane has a GWP of 29.8.

Because CO₂ is considered the most important greenhouse gas some GHG assessments or reports only include CO₂, and don't consider the other greenhouse gases, and this can

lead to an understatement of total global warming impact. Greenhouse gas inventories are more complete if they include all GHGs and not just CO₂.

Carbon dioxide equivalent (CO₂e)

“Carbon dioxide equivalent” or “CO₂e” is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO₂e signifies the amount of CO₂ which would have the equivalent global warming impact.

A quantity of GHG can be expressed as CO₂e by multiplying the amount of the GHG by its GWP. E.g. if 1kg of methane is emitted, this can be expressed as 29.8kg of CO₂e (1kg CH₄ * 29.8 = 29.8kg CO₂e).

“CO₂e” is a very useful term for a number of reasons: it allows “bundles” of greenhouse gases to be expressed as a single number; and it allows different bundles of GHGs to be easily compared (in terms of their total global warming impact).

- There are two ways to produce these credits:
 - **Mitigation:** Development and operation of projects that remove and reduce carbon from the air. E.g. soil organic sequestration, agroforestry which sequester carbon in tree biomass etc.
 - **Adaptation:** Adopting practices or initiatives that purposefully reduce business-as-usual emissions. E.g. Alternate wetting and drying or shifting to drying sowing of rice, shifting from electricity use to solar energy for pumping water, using biogas etc
- **Standards:** To avoid the heterogeneity of the practices, and methodologies to quantify the carbon credits, standards and accounting procedures are developed and notified. Adherence to these standards are audited by identified agencies. Currently we have these standards adopted in agriculture
 - VERRA VCS standards: <https://verra.org/>
 - Gold Standards: <https://www.goldstandard.org/>
 - Biocarbon Registry market: <https://biocarbonregistry.com/en/>
 - Plan Vivo Standard: <https://www.planvivo.org/standard-overview>
- Trading Credits in Carbon Markets
 - **Voluntary Market:** Individuals and organisations can trade credits voluntarily. Government of India has notified Framework for Voluntary Carbon Markets in January, 2024.
 - **Compliance Market:** The government imposes restrictions on the reduction in emissions and accounting for credits.
- Financial tools in the Compliance market
 - PM PRANAAM
 - Green credits and bonds
 - Carbon taxes

How it works

- When organic matter is added to the soil externally or through root biomass/exudates, carbon is sequestered as organic carbon. 0.1% increase in

soil organic carbon leads to the sequestration of 2.9 tons of CO₂ from the atmosphere

- Currently one carbon credit is trading at \$ 10
- Exploring Agroforestry and horticulture for carbon sequestration: One ton for 50 trees/year and about 50 trees of 3-8 yrs age of mango per acre per year can produce about net one credit
- While accounting for carbon credits, stacking can be done by avoidance and mitigation credits together
 - Ponding rice to AWD/SRI: reduction of 5 tons of CO₂e- per acre per season which equals to 5 credits
 - In the second season, pulse and oilseeds crops are taken as intercrops and the crop residues are incorporated into the soil.
 - Soil organic carbon increase by 0.1% per acre per year-equals to 3 credits
 - In the second s
 - So total per year it accounts to 8 credits.

Green Credit Program

The Indian Government's Ministry of Environment, Forest, and Climate Change has recently unveiled the draft implementation rules for the 'Green Credit Programme (GCP)'. This innovative program aims to leverage a competitive market-based approach and foster voluntary environmental initiatives by a wide range of stakeholders. Operating in conjunction with the domestic Carbon Market, the GCP offers enticing incentives in the form of 'Green Credits' to companies, individuals, and local bodies for their sustainable practices. These special incentives will recognize and reward their efforts in advancing a greener and more environmentally conscious future for the nation.

The Green Credit System sets itself apart from conventional carbon credit systems by encompassing a broader spectrum of environmental responsibilities beyond CO₂ emission reductions. These green credits will be tradable, creating an opportunity for participants to sell the credits they earn. The Green Credit Programme is designed to cover eight sectors, with a primary focus on rural areas with the following objectives

1. **Tree plantation:** To promote activities for increasing the green cover across the country through tree plantation and related activities
2. **Water:** To promote water conservation, water harvesting, and water use efficiency/savings, including treatment and reuse of wastewater
3. **Sustainable agriculture:** To promote natural and regenerative agricultural practices and land restoration to improve productivity, soil health, and nutritional value of food produced
4. **Waste management:** To promote sustainable and improved practices for waste management, including collection, segregation, and treatment
5. **Air pollution reduction:** To promote measures for reducing air pollution and other pollution abatement activities
6. **Mangrove conservation and restoration:** To promote measures for conservation and restoration of mangroves
7. **Ecomark-based green credit:** To encourage manufacturers to obtain an 'Ecomark' label for their goods and services

8. Sustainable building and infrastructure: To encourage the construction of buildings and other infrastructure using sustainable technologies and materials

Currently, the Green Credit Programme (GCP) lacks a standardized unit of measurement to quantify the benefits obtained from different activities. While the GCP is designed to operate as an independent market mechanism, there is a possibility of overlapping with the carbon market if the "green credit" system also leads to a reduction in carbon emissions. This potential overlap emphasizes the need for careful coordination and clear guidelines to ensure the effective functioning of both mechanisms while maximizing their collective environmental impact.

The guidelines of the Green Credit Programme (GCP) can integrate mechanisms to quantify and support ecosystem services, providing invaluable support to organic farmers and Farmer Producer Organizations (FPOs). As a catalyst for sustainable actions and living, the program empowers individuals, companies, and local bodies to contribute positively to the environment. By fostering the adoption of sustainable practices, the GCP plays a crucial role in promoting environmental stewardship and creating a more sustainable future for all.

The Green Credit Programme (GCP) will be rolled out in stages. In the initial phase, the program will focus on two to three activities from the selected sectors, with additional activities added gradually. The Indian Council of Forestry Research and Education (ICFRE) will assume the role of program administrator, responsible for formulating guidelines, processes, and procedures for implementation. They will also set up thresholds and benchmarks for each Green Credit activity.

The GCP aims to encourage private sector industries, companies, and other entities to fulfill their existing obligations by aligning their actions with those that contribute to the generation or acquisition of green credits. This strategic alignment fosters a partnership between environmental responsibility and business objectives, ensuring a collective effort toward sustainable practices and a greener future.

PM-PRANAM

PM-PRANAM stands for the PM Programme for Restoration, Awareness Generation, Nourishment, and Amelioration of Mother Earth.

PM-PRANAM is launched by Government of India to incentivize States that actively contribute towards balanced use of chemical fertilizers. The plan entails granting 50% of the saved fertilizer subsidy, resulting from decreased chemical fertilizer usage compared to the previous three-year average, to the respective State or Union Territory. This innovative approach aims to encourage regions to take concrete steps towards sustainable agriculture and environmental preservation.

The primary goal of the PM-PRANAM is to address a pressing issue – the excessive use of chemical fertilizers and pesticides in agriculture. In pursuit of higher production, there is an excess use of fertilizers and pesticides that is making the mother earth sick and

reducing its production capacity. It is well known fact that excess chemical use can cause serious ailments like cancer etc.

There is a need to adopt soil test based balanced use of fertilizers by integrating bio/ organic fertilizers into agriculture for nutrition security of soil. Alongside, should also adopt organic/ natural farming practices, resource conservation technologies like integrated farming systems, micro irrigation, mulching, no tillage, crop rotation etc. into the farming practices. This shift towards sustainable agricultural practices will enhance soil fertility, reduce environmental pollution, and bolster long-term agricultural productivity.

The calculation of the fertilizer subsidy savings will be based on data entered into the Integrated Fertilizer Management System (iFMS) portal during a financial year, coupled with the subsidy rates of the assessment year. The increased adoption of organic and alternative fertilizers and the expansion of organic farming practices will also be taken into account. In cases where adjoining districts in other States experience an increase in fertilizer consumption, deductions from savings will be applied. Moreover, in instances of natural calamities like droughts or floods leading to decreased fertilizer usage, the Government of India will decide the appropriate subsidy allocation for the affected State.

The Department of Expenditure will oversee the disbursement of grants through its existing schemes. Out of the total grant, 95% will be allocated to the respective State, with 65% of this amount earmarked for capital expenditure projects. The remaining 30% will be untied funds that States can utilize for Information, Education, and Communication (IEC) activities aimed at promoting soil health and the use of alternative fertilizers. The Government of India will manage the remaining 5% of the grant, channelling it towards monitoring, IEC initiatives, research, capacity building, and recognition programs.

The proposed budget for this initiative will be sourced from the existing fertilizer subsidy schemes, thereby fostering a self-sustaining cycle. Considering an estimated yearly increase in fertilizer consumption (CAGR 1.5%) over the next three years, the projected savings in fertilizer consumption over the same period is approximately 45.78 LMT. These savings are expected to translate into a financial gain of around Rs. 19,450 crores due to reduced fertilizer consumption, contributing to both environmental preservation and economic efficiency.

The health of our mother earth is to be ensured for sustainable agriculture and food availability for future generations. Efforts in this direction will be adequately incentivised that can be used for infrastructure development, health, education etc. in respective areas.

It is hoped that all will adopt these steps for the benefit of their village, their children, agriculture land and the future generations.