Our Carbon Credit Ratings Framework for Regenerative Agriculture (Croplands) Projects

Incentivizing investment in real climate action

Sylvera

Introduction

Sylvera Ratings are the most reliable and trustworthy in the market.

Sylvera has developed a rigorous bottom-up approach in order to produce the most accurate ratings and analyses for projects in the carbon markets.

What sets Sylvera apart

- **Project-type-specific frameworks:** We build rigorous frameworks and production systems for every project category to accurately test project design, carbon accounting, and climate impact claims.

  Sylvera's frameworks are peer-reviewed by a committee of experts and carbon market stakeholders – including project developers & registries – to ensure scientific consensus. We have published this document so buyers understand how we developed our unique, nuanced framework, and we have included some examples of exactly what we test and how we do it. Read our white paper for more information.

- **Unparalleled depth & accuracy:** We extract, clean, and organize data from project design documentation (PDD) and every monitoring report. Then we meticulously build carbon, strength of baseline and financial additionality models from the ground up to validate emissions reductions or removals claims and evaluate project economics.

  Our project assessments are the most comprehensive in the market, providing granular analysis of core project characteristics, insightful data visualizations, and interactive maps.

- **Independent Data Validation:** Our expert analysts leverage advanced machine learning (ML) technology, verified, independent data, and proprietary field data to test the accuracy of credit issuances and claims.

  The comparison of independent data specific to each project against the data reported in the project's documentation is the cornerstone of high quality due diligence. For example, we use market-leading geospatial ML models when rating nature-based solutions. Future versions of this framework will incorporate ML modeling.

Key terms and concepts

Regenerative agriculture (Regen Ag)	A system of farming principles and practices that seeks to rehabilitate and enhance the entire ecosystem of the farm by placing a heavy premium on soil health with attention also to water management, fertility management, and more.
Croplands	Subtype of Regen Ag projects with a primary focus on implementing regenerative practices in fields used for crops. Sylvera has developed separate frameworks for cropland and grassland management due to inherent differences in the activities observed.
Soil organic carbon (SOC)	A component of soil organic matter (complex material derived from the decay of plant and animal material) that is composed of carbon-based compounds.
Cover cropping	Crops that are planted primarily during the off-season to manage soil erosion, soil fertility, soil quality, water, weeds, pests, diseases, biodiversity, and wildlife.
Crop rotations	The practice of alternating different crops in the same field to improve soil health, reduce pests, and increase yield.
Intercropping	Growing two or more crops together in the same field to optimize space, improve yields, and enhance soil health.
Improved residue management	The use of plant materials left in the field after harvest to improve soil health, reduce erosion, and maintain productivity.
Tillage	The agricultural preparation of soil by mechanical agitation of various types, such as digging, stirring, and overturning.
No-till	An agricultural technique that involves growing crops without disturbing the soil through tillage. It is a key strategy for soil health and carbon capture.
Agroforestry	Integration of trees in the crop systems which leads to better yield (e.g., coffee grows better in the shade of trees). Note that this project activity often falls under Afforestation and Reforestation (ARR) projects.
Reduced fertilizers	A reduction in the use of synthetic nitrogen fertilizers, thereby reducing nitrous oxide emissions in some cases.
Integrated pest management	Careful consideration and planning of use of both chemical and non-chemical (biological, mechanical) plant protection practices and their implementation.
Soil model	A model that simulates soil processes like carbon cycling, decomposition, and nutrient dynamics over time.
Soil model calibration	Model calibration is the process of adjusting model parameters to reflect experimental data.
Carbon credit	A tradable unit representing one metric ton of carbon dioxide (CO_2), or an equivalent amount of another greenhouse gas (GHG), avoided or removed from Earth's atmosphere.
Over-Crediting Risk	This refers to the risk that the project has issued credits in excess of what is justifiable against the business as usual scenario.
Project emissions	Emissions associated with ongoing operations of the carbon credit project.
Vintage	This refers to the year, or timeframe, associated with an issued carbon credit.
Voluntary carbon market (VCM)	A marketplace for buying and selling carbon offsets, which are generated by projects that reduce or sequester greenhouse gas emissions voluntarily.

The challenge

Regenerative agriculture (Regen Ag) is an essential set of management tools to help decouple agricultural productivity from the degradation of soils and landscapes. Since Regen Ag also increases soil carbon, this approach offers vast potential for carbon sequestration. Global cropland soils have the capacity to sequester upwards of 1.85 billion tonnes of carbon (or roughly 6.79 billion tonnes of CO_2) annually (Zomer *et al.*, 2017), which represents roughly seven times the entire carbon market (cumulative tons retired across all project types from 2004 to 2023).

Regen Ag developers and registries are nascent and ultimately have yet to face the same scrutiny as other sectors of the market. For Regen Ag projects there is a notable deficiency of data available around key project performance parameters. The rush to procure Regen Ag credits is understandable, but without transparency and deep due diligence the credits represent a material risk in any carbon credit portfolio.

Current data disclosure, along with other limitations discussed below, only allows for Sylvera to produce provisional ratings. This white paper clarifies our provisional rating approach, highlights key components of the rating framework, and emphasizes the need for higher data transparency standards for a complete rating.

Sylvera is actively working with stakeholders in this space to share data on projects in hopes of catalyzing scale and quality for the Regen Ag market.

The solution

To overcome the challenge of data transparency and scale the regenerative agricultural offset market, the following data points are needed to ensure trust in Regen Ag credits:

1. **Spatial Boundaries for Project Areas/field-level boundaries:** Although Sylvera is conscious of potential data privacy barriers, the precise geographical location of each participating farm field is a fundamental requirement for data transparency in these projects. This data allows the market to verify the authenticity of offset claims. Developers who offer spatial files that accurately represent the field-level project areas increase their credibility, especially when field-level management activities are provided. Alternatively, Sylvera uses administrative level boundaries for geospatial analysis, which introduces uncertainties in the rating.

2. **Activity Data:** Detailed records of project activities occurring in each participating farm field are essential for evaluating their impact on soil carbon levels. Sylvera is advocating for developers to offer spatial files for each field, accompanied by comprehensive activity data specific to that field.

3. **Participant Demographics:** It is crucial to provide characteristics of the participants involved in the project such as production type, aggregated financial statistics (ensuring farmer privacy), and land tenure. This data is used for evaluating project additionality and co-benefits.

4. **Soil Modelling:** Most projects utilize soil models to predict soil carbon dynamics throughout the project duration. The reliability of these models significantly depends on their calibration, which involves adjusting model parameters to match observed data and ensure accuracy. Hence, the market's confidence in the dependability of carbon offsets hinges on thorough reports on model calibration.

5. **Soil Sampling:** Thorough sampling and model calibration reduce uncertainty and over-crediting risk. There is higher confidence in the accuracy of project-reported sequestration when a detailed description of the sampling strategy and uncertainty quantification is available.

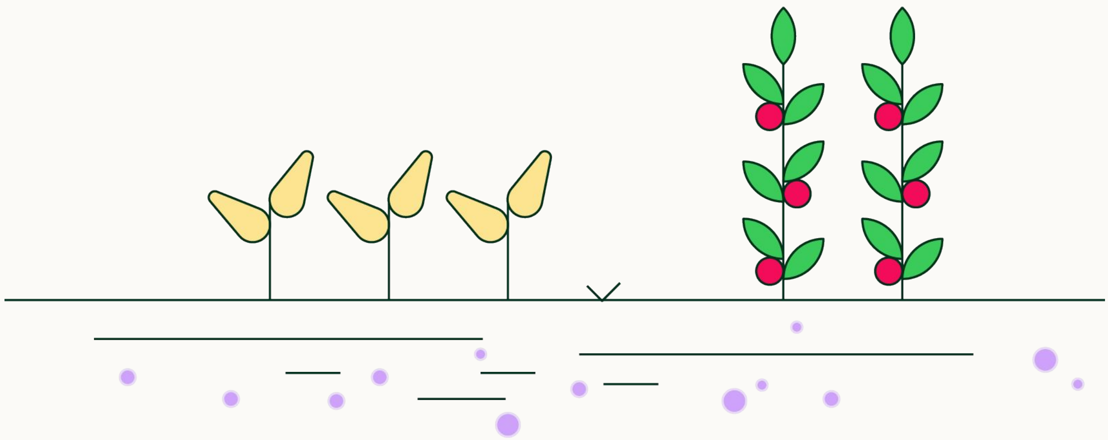
What is a Croplands project?

Conventional agricultural systems often follow an extractive approach, draining the soil's organic matter (and therefore its carbon) through practices such as tilling, bare fallowing, or overgrazing. Dependence on synthetic fertilizers and monocultural production also contribute to the gradual reduction of soil carbon. On the contrary, regenerative agricultural systems enrich soil nutrients and carbon, reversing the depletion process. This approach applies to both crop and livestock systems, but the current framework focuses on croplands. A separate grassland framework, primarily addressing livestock production in grazing systems, will be released in the future.

Cropland Regen Ag management encompasses practices that enhance soil physical, chemical, and biological health. These practices include:

- Implementing **cover crops** to maintain soil organic carbon (SOC) by promoting year-round soil biological activity;
- Practising **crop rotations** and **intercropping** to boost soil biodiversity and carbon retention;
- **Improved residue management**, which contributes an additional source of carbon for soil sequestration;
- Promoting **no-till or reduced-tillage techniques**, which minimise carbon-depleting mechanical disturbance of soils;
- **Reducing fertilizers** to minimize emissions and promote natural nutrient cycling for better soil carbon retention;
- Using **improved pest management** to decrease chemical inputs and support soil biodiversity, enhancing carbon levels;
- Introducing **agroforestry practices** to integrate trees into farming systems, increasing soil carbon sequestration and improving soil structure.

Regen Ag projects aim to maximize soil carbon sequestration and retention on agricultural lands to generate removal credits, and to minimize emissions to generate avoidance credits; However, the benefits of Regen Ag span beyond carbon sequestration. This is achieved by implementing a range of management techniques, like those mentioned above.



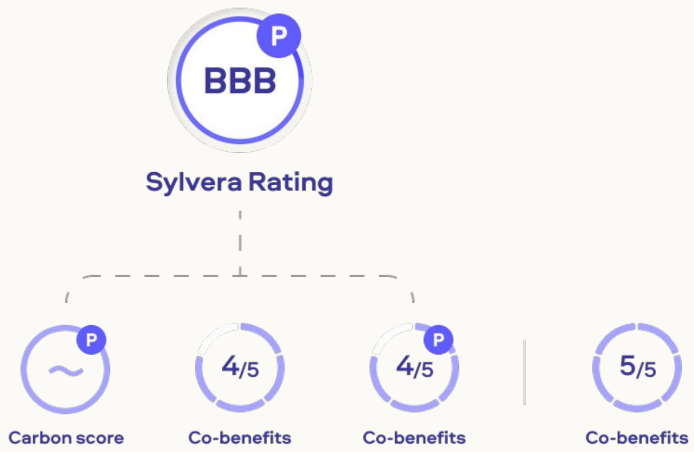
Croplands projects, apart from sequestering carbon, bring added benefits to the wider agro-ecosystem. Regenerative agriculture practices can improve soil health and promote soil microbial diversity; decrease soil erosion risk; conserve water and improve drought resilience; reduce dependence on synthetic fertilizers and improve overall crop resilience. More detail is available in the Co-benefits section of the whitepaper.

A reminder of our scoring pillars

Our top level Sylvera Ratings (**AAA, AA, A, BBB, BB, B, C, D)** reflect whether each credit associated with the project is likely to remove 1 metric ton of CO_2e emissions. Since the current Croplands Regen Ag framework is Provisional, for the reasons explained below, this is also reflected in the letter ratings span: **provisional (p) AAA** to **pD.**

This rating is derived from a combination of scores that assess the **carbon** performance, **additionality** and **permanence** of the project. The scores in these three core pillars are combined in a series of matrices to ensure that underperformance in one key area does not get overshadowed by high performance in others.

Co-benefits are also assessed but they do not feed into the Sylvera Rating, as they do not have a direct bearing on the climate impact of carbon credits. Including them in the Sylvera Rating could lead to a high co-benefits score obscuring poor performance on carbon removal. Aspects of the project relating to co-benefits that could materially impact the project's ability to deliver it's stated climate benefit are, however, reflected in the Sylvera Rating.



Carbon Score

Sylvera's Carbon Score verifies whether the project has delivered on its carbon claims by comparing permanence adjustment factors to Sylvera's calculated factor using third-party data.

Until a soil carbon quantification tool is productized, all carbon scores are provisional for this framework.

Additionality Score

Sylvera's Additionality Score assesses the likelihood the project activities would have been implemented in absence of the carbon revenues. It also quantifies the likelihood and extent the project is over-issuing credits due to methodological errors.

Permanence Score

Sylvera's Permanence Score assesses whether the carbon removed by the project is likely to stay sequestered based on natural risks (fire, drought, etc.) and anthropogenic risks.

Direct modeling of soil erosion is currently impossible due to uncertainties from large, complex project boundaries. The current Permanence Score is provisional, with a qualitative erosion risk assessment that does not affect the score until a future quantitative method is developed.

Co-benefits Score

Sylvera's Co-benefits Score assesses the scope and relative impact of project activities on local biodiversity and communities—which are linked to UN Sustainable Development Goals (SDGs).

Given the **inherent uncertainty in carbon accounting**, it is not possible to produce complete ratings for Regen Ag (Croplands) credits. While the Carbon Score is assigned a positive, neutral or negative score, the other pillars are assessed in a similar manner to other project types, on a scale from 1 to 5. Permanence, although on a 1–5 scale, is also marked as provisional due to reasons outlined above.

Carbon Score

What is it?

Sylvera's Carbon Score verifies whether a project is accurately reporting on the carbon removals achieved by the activity. If multiple vintages have been permitted, the Carbon Score is a vintage-weighted average score.

Note: *The Carbon Score must be considered alongside the Additionality Score, which considers the overcrediting risks, to understand the climate impact of the project.*

Why does it matter?

Accurate carbon accounting underpins the validity of a project's issuance and material under or over reporting of emissions will impact the number of credits that have been issued. If Sylvera-detected project activity extents are significantly lower than the project's reported figures, reported carbon removal amounts are likely inaccurate and there is a higher risk of overissuance.

How do we calculate the Carbon Score?

A future rating will compare Sylvera-estimated removals to project-reported removals in order to calculate a Carbon Score. However, given the lack of tools and data required to quantitatively analyze project carbon credits, this version of the framework will apply a provisional Carbon Score instead.

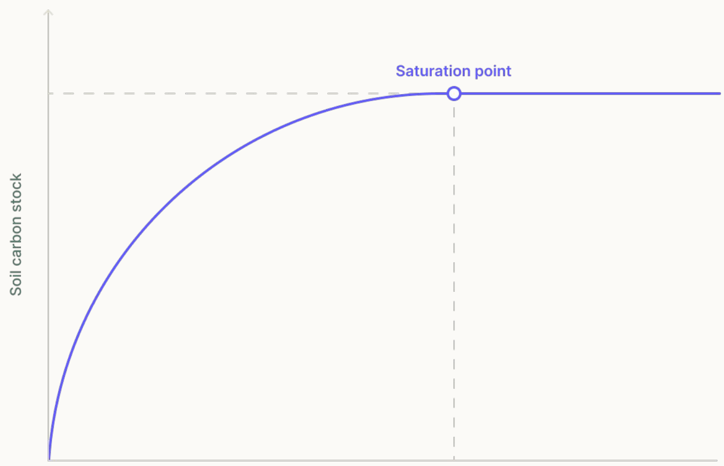
The current Carbon Score is based on comparing the project's reduction claims with peer-reviewed reports on plausible sequestration rates for the region. This component serves as a red flag check to ensure that the sequestration rates reported by developers are scientifically plausible. It carries relatively little weight in the overall score due to the inherent uncertainty in this approach.

Once Sylvera's remote soil organic carbon (SOC) quantification tools are fully developed and minimum data disclosure requirements are met, we will be able to quantitatively assess project-reported carbon removals and the risk of over-crediting. This will rely on spatial data to accurately pinpoint field locations and activities.

$$\text{Carbon Score} = \frac{\text{Sylvera Audited Removals}}{\text{Verified Removals}} = \frac{\text{ML-Detected Project Activities}}{\text{Project-reported Activities}}$$

Our current SOC quantification prototype, a global SOC raster, estimates mean, median, and uncertainty for soil carbon stocks. Under a future version, this tool will enable validation of project-reported baseline SOC with lower uncertainty than publicly available maps. Given that sequestration potential depends on initial carbon saturation, we will also validate estimates of future sequestration potential.

Future versions will incorporate process-based soil models to project global SOC and sequestration potential. Meanwhile, our field data science team is collecting historical and current samples to train the model, aiming to detect SOC changes over time.



(Hediger, 2009)

Additionality Score

What is it?

Sylvera's additionality score assesses whether (1) the project activities would have taken place without the carbon project revenue and (2) the project had sold too many credits due to invalid baseline assumptions, overlooked leakage, or issues with soil sampling or modelling.

Why does it matter?

Additionality underpins the validity of credits issued by a project. If the project is not additional, then one credit purchased does not equate to one metric ton of carbon avoided and therefore yields no climate benefit above the business-as-usual (BAU) scenario.

Assessing the additionality of carbon credits is essential to understand their climate impact. The degree of additionality of a project depends on the carbon price required to make it economic. A project would score high in additionality if Sylvera's financial analysis proved the need for carbon finance to make the project economic. Conversely, a project would score low in additionality if the revenues from Regen Ag activities were substantial enough to make the project economically viable.

While the additionality of activities is challenging the BAU scenario, the Over-Crediting Risk is challenging the quantification of that scenario and factors that contribute to the crediting, such as leakage. Our assessment of the over-crediting risk is broken down into three elements: strength of baseline, leakage, and soil sampling and modeling.

Additionality of Activities	**Financial Additionality:** When financial information is disclosed in project documentation, we compare revenue in the baseline and project scenarios. We research financial barriers in the project region to validate that financial appeal was not understated and costs were not overstated in the reported figures, so as to make the project scenario economics appear subeconomic.
	Policy and Regulatory Barriers: If subsidies or capital are provided by the government for farmers to adopt Regen Ag practices, then the project may have diminished additionality if these subsidies caused the BAU scenario to be economic.
	Common Practice: We assess both the project activities with respect to a relevant proxy and the historic activities in the Project Area (PA), focusing particularly on investigating whether farmers were likely to adopt Regen Ag activities regardless of monetary incentives from the VCM. To assess the risk of overlooked local trends in adoption, we consider the scale at which regional adoption was assessed by the project.
Over-Crediting Risk	**Strength of Baseline:** We compare the baseline provided by the project to third party data to assess the validity of project-calculated baseline emissions to determine whether a project's issuance is reasonably estimated.
	Leakage: If the project does not appropriately account for potential leakage, as a result of activity shifting or market leakage, then this will lead to inflated issuance.
	Soil Sampling Strategy and Soil Modelling: We evaluate the project's soil carbon sampling strategy for adequacy in capturing soil carbon variability across the project area, considering sample density, frequency, and stratification. The soil model (if applied) is scrutinized based on its sensitivity and scientific reputation. We also evaluate the effectiveness of the model calibration procedure adopted by the project proponents.

Spotlight on Additionality

Common Practice

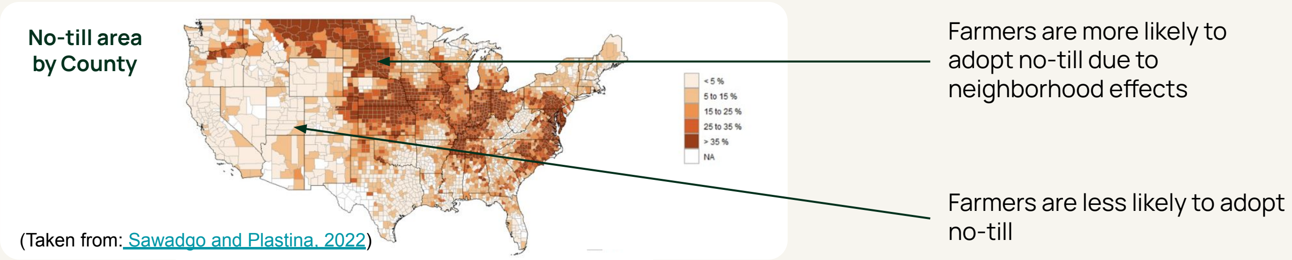
In order to establish additionality, all Croplands projects must prove that regional adoption rates of Regen Ag management are below a certain protocol-approved threshold. Adoption rates are often assessed at the provincial or national level, an approach that overlooks an important phenomenon highlighted in literature on the adoption of agricultural technologies: adoption rates can be significantly swayed by hyperlocal trends.

For instance, despite the *national* adoption rate being less than 20%, a farmer is more likely to adopt Regen Ag practices, regardless of the VCM, if another farmer *in their municipality* has adopted such practices (Alvarado Sandino *et al*., 2023; de Souza Filho *et al*., 2021; Rizzo *et al*., 2024). High quality projects will assess adoption rates on as granular a scale as possible to account for this neighbourhood effect when establishing baselines.

Additionally, projects must consider VCM-independent factors that boost Regen Ag adoption according to the literature, such as:

- **Slope of Project Area:** Heavy machinery is difficult to use on steep slopes. Farmers on highly sloped lands are more likely to adopt Regen Ag management, which has a lower reliance on heavy machinery.
- **Baseline soil quality:** Low soil quality incentivises farmers to adopt soil enhancing management strategies such as Regen Ag. Poor soil quality therefore reduces additionality.
- **Farmer perception of benefits of Regen Ag:** If farmers understand the benefits of Regen Ag, additionality will be lower. This could be proxied by local education metrics or the presence of local extension services dedicated to Regen Ag.

Agricultural neighbourhood effect



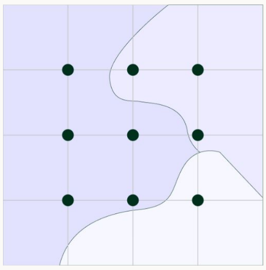
(Taken from: Sawadgo and Plastina, 2022)

Soil Sampling Strategy and Soil Modeling (Over-Crediting Risk)

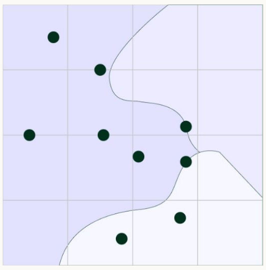
Considering the heterogeneity of soils, it is crucial for projects to implement thorough sampling strategies to decrease uncertainty in SOC estimates. This involves regular sampling from densely distributed, fixed locations over time. The stratification of the sample area, which takes into account variations in soil types across the Project Area (PA), is especially vital. This ensures that the samples better represent the entire PA. Over-crediting risk (OCR) is higher when projects neglect to incorporate any of these aspects of effective sampling.

Most projects use models that simulate soil carbon dynamics over time. According to existing literature, model accuracy heavily relies on site-specific calibration. Thus, we will assign higher OCR scores to projects that provide evidence of thorough and effective model calibration processes, substantiated by dedicated calibration documentation.

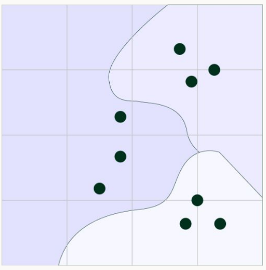
Soil sample stratification



Systematic Samples



Simple Random Samples



Stratified Random Samples

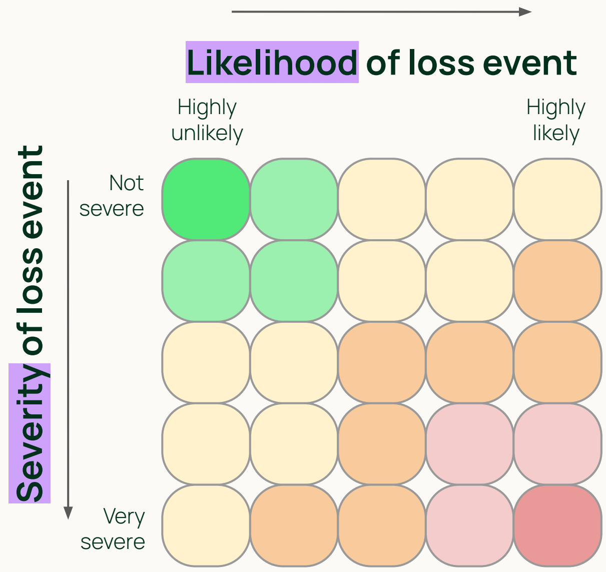
Permanence Score

What is it?

Permanence refers to the risk that the sequestered carbon will later be reversed and released back into the atmosphere. Our Permanence Score uses a risk matrix approach for the major risks to soil carbon stability. The final score is calculated considering the additive and maximum risks present in the project. The input of climatic variables, record of past events, project specific conditions and mitigative activities are used to inform the risk scoring. Permanence is conceptualised as a scale that distinguishes the relative degree of non-permanence (or reversal) risk between projects.

The permanence risk of Croplands projects is based on risks to SOC stability resulting from erosion, fires, droughts, floods, storms, and anthropogenic disturbances, although erosion will not quantitatively affect ratings in the first version of the framework. Croplands projects should account for any likely carbon release in their calculation of removal credits and contribution to permanence risk buffer pools. Natural disturbances pose a risk to the permanence of SOC, a common concern across many nature-based projects. Therefore, the adopted strategy is to quantify the severity and likelihood of natural risk factors based on the surrounding climate and land use. The permanence of Regen Ag carbon stocks depends on the behaviour of the land manager. For example, should a farmer opt to cease no-till management and resume regular tillage, this would result in SOC loss, presenting a permanence risk. To capture the nuances of management decisions and their probabilities, this framework relies on detailed demographic data on project participants.

The likelihood of floods, storms, fires, and droughts largely depends on the geographic characteristics of the project area, such as mean annual rainfall, which is linked to flood, fire, and drought likelihood. The severity of these risks can be attenuated by project activities. For example, a project that incorporates year-round soil cover via cover crops to address the root driver of wind erosion risks—soil exposure—will achieve a better Permanence Score than a project that does not take such measures. These risks will be estimated using proprietary climate models combined with project documentation.

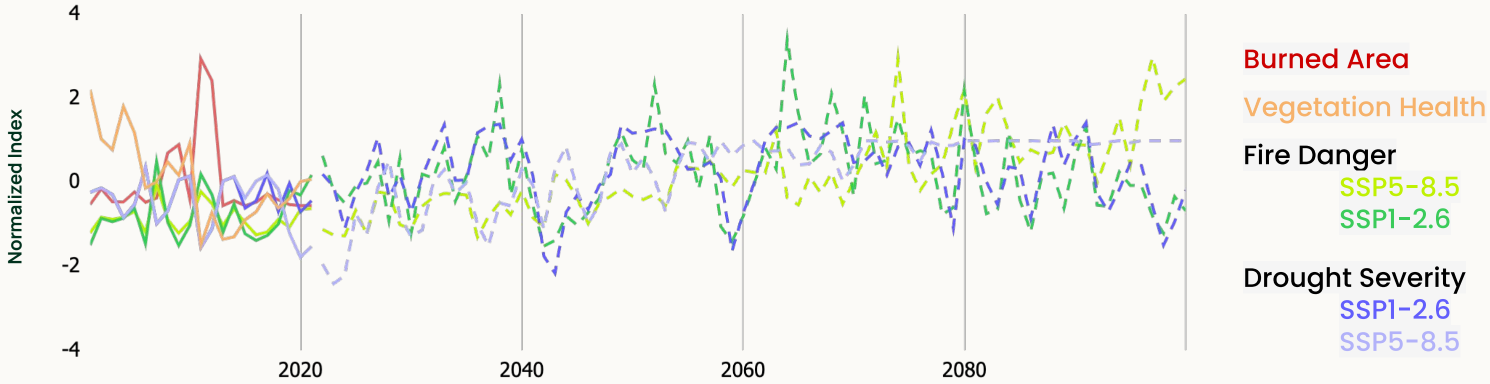


Although factors such as geopolitical risks can be estimated using current data availability, anthropogenic permanence risk ratings are more complex and therefore require a higher standard of data disclosure regarding project participants. For example, there is a lack of information on land tenure and participant age, which are both required to assess the risk of land ownership change. Aggregated participant statistics, such as mean age or land tenure descriptions, could be provided in such a way that protects farmer privacy while enabling a more robust anthropogenic risk assessment.

Permanence Score Continued

What data do we use in the Permanence Score?

The permanence score leverages a range of observational and modelled data, meaning we are able to assess historically and into the future under different Intergovernmental Panel on Climate Change (IPCC) emissions pathways. The analysis utilizes cutting-edge scientific standards and remote sensing in conjunction with local project conditions and any mitigative activities in place.



Note: The data displayed is real but the underlying index data has been manipulated for the sake of visualization, not interpretation. This data pertains to forestry-based project types. A bespoke ensemble of environmental risk analytics, which slightly differs from the one above, is used for cropland projects.

Qualitative assessment of erosion data

The erosive forces are the principal risk to the longevity of soil carbon stocks. Sylvera's permanence assessment considers multiple environmental factors contributing to SOC loss; however, direct modeling of soil erosion, a key factor, is currently not possible. Sylvera's erosion assessment tool is in prototype and has not yet captured the high uncertainties from large, complex project boundaries. As a result, the current Permanence Score is provisional. Nevertheless, we provide a qualitative assessment of erosion risk, though this does not quantitatively impact the Permanence Score until a quantitative method is developed under a future version of the framework.

The erosion risk modeling process utilizes GloSEM 1.3, a global raster dataset with modeled soil erosion rates. Erosion rates are calculated using across global and subnational boundaries, producing rough regional estimates due to data gaps and marginal overlaps. Erosion risk is categorized based on thresholds (minimal to very high), ranging from less than 1.5 tCO_2e/ha/yr to greater than 20 tCO_2e/ha/yr. The inherent heterogeneity of soils results in extremely high uncertainty, making this approach unsuitable for direct inclusion in the ratings. As a result, the first version of the framework will present erosion risk qualitatively, with future iterations aiming to quantify it at the project-area level, ensuring sufficiently low uncertainty.

Co-Benefits Score

What is it?

Sylvera's Co-Benefits Score examines whether the project is implementing activities to support local biodiversity and communities in addition to carbon sequestration, as well as the scale and likely impact of these activities.

Added benefits of Croplands projects

Enhanced Soil Health
Regen Ag practices improve the soil structure, increase the organic matter content, and enhance soil fertility, thereby creating robust soil ecosystems.

Increased Biodiversity
Regen Ag practices promote biodiversity both above and below the soil surface by fostering a wide variety of plants, insects, and soil microbial life.

Water Conservation
Healthy soils resulting from Regen Ag have greater water-holding capacity, which improves the farm's resilience to drought and reduces the need for irrigation.

Reduced Agrochemical and Fossil Fuel Dependency
By relying on functional ecosystems for nutrient provision and pest control, Regen Ag practices rely on reduce dependence on synthetic fertilisers, pesticides, and fuel for machinery.

Reduced Erosion
By keeping the soil covered and undisturbed, methods such as cover cropping and no-till farming can significantly decrease soil erosion to prevent topsoil loss.

Increased Crop Resilience
By developing diverse ecosystems and improving soil health, Regen Ag helps increase crop resilience against pests, pathogens, and climate change.

How do we assess the Biodiversity Co-Benefits of Croplands credits?

Sylvera measures the impact that Regen Ag project activities have on biodiversity by leveraging data provided by project developers and the International Union for Conservation of Nature (IUCN).

There are no significant threats associated with the adoption of Regen Ag practices on existing agricultural lands. The transition from conventional to regenerative agriculture generates *positive* impacts on soil microbial diversity. Projects can further enhance local biodiversity by conserving or establishing new patches of natural habitats around the agricultural fields, for example, by introducing buffer areas around the fields or between the crops.

The Biodiversity sub-score assesses net harm any implemented activities might impose on the local ecosystem, for example, resulting from the use of any chemical pesticides with known adverse effects.

How do we assess the Community Co-Benefits of Croplands credits?

Sylvera utilizes data disclosed by project developers and the Sustainable Development Goals (SDG) framework to triangulate a project's community impact. Identified project activities are matched to appropriate SDG targets in respective countries to assess the scale of impact.

To ensure projects are only rewarded if they demonstrate no-net harm, Sylvera also assesses whether the project implemented appropriate safeguarding measures (fair and equitable employment practices, secure land ownership) and identify any potential mistreatments of the local community.

An example of a Croplands Regen Ag project's contribution to biodiversity and community matched to SDGs:

Improving food security by increasing farm resilience	2 ZERO HUNGER
Enhancing water conservation	6 CLEAN WATER AND SANITATION
Improving soil fertility and soil microbial diversity	15 LIFE ON LAND
Promoting agricultural best-practice	12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Interpreting Additionality Score and Over-Crediting Risk

5/5

Indicates very high confidence that a project is additional and unlikely to over-credit.

Example: The project's baseline scenario is conservative and has been robustly quantified using locally relevant data. There is a significant difference in the activities between the counterfactual and project scenarios, and the counterfactual scenario activities are highly incentivized in the project region. Therefore, the project activities were highly likely to be a direct result of the offset project.

4/5

Indicates high confidence that the project is additional and unlikely to over-credit.

3/5

Indicates the project is likely additional and unlikely to over-credit.

Example: The project's baseline assessment has mixed results and could be at risk of over-issuance. There is a difference in the activities between the counterfactual and project scenarios. The project activities implemented may be a direct result of the offset project.

2/5

Indicates uncertainty about the project's additionality claim and over-crediting risk.

1/5

Indicates we found a serious red flag questioning the project's claims of additionality and over-crediting risk

Example: The project's baseline assessment indicates a high likelihood of severe over-issuance. The activities in the counterfactual and project scenarios are highly likely the same.

Interpreting the Permanence Score

5/5

Indicates very high permanence and low risk, the project carbon credits are very likely to remain valid long-term.

Example: Across all pillars of loss, likelihood and severity of carbon stock loss are low. The project also implements effective mitigation activities.

4/5

Indicates high permanence, the project carbon credits are likely to remain valid long-term.

3/5

Indicates moderate permanence, the project carbon credits may remain valid long-term.

2/5

Indicates low permanence, the project carbon credits are unlikely to remain valid long-term.

1/5

Indicates very low permanence and high risk, the project carbon credits are highly unlikely to remain valid long-term.

Example: At least one pillar of loss component has scored as 'Extreme' or more than four components have scored as 'High' risk.

Interpreting the Co-benefits Score

5/5

Indicates no evidence of materialized harms and the project implementing activities that provide diverse, extensive and well-evidenced benefits to both community biodiversity protection/gain.

Example: The project implements a broad range of SDG activities with extensive reach in the community, and has strong biodiversity benefits including additional measures such as implementation and conservation of biodiversity corridors within the agro-ecosystem.

4/5

Indicates no evidence of materialized harms and strong progression of targeted SDGs, as well as mitigates biodiversity risk; or exceptional benefits in one sub-pillar and moderate benefits in the other.

3/5

Indicates no materialized harms and the project implements activities that provide moderate benefits for community sustainable development and biodiversity protection/gains; or, activities provide mixed benefits (strong benefits for one sub-pillar and low benefits for the other); or, a risk of minor negative impacts identified but project activities provide strong and well documented benefits to community and biodiversity.

2/5

Indicates no severe materialized harms, but the project implements none or few activities that provide limited benefits to community and/or biodiversity; or, project implementation results in some negative impact alongside the delivery of activities that provide some benefits to community and/or biodiversity.

1/5

Indicates project implementation resulted in materialized harm to communities and/or ecosystems and no project activities benefit the community and/or biodiversity; or, materialized harms from project implementation is great enough to negate any positive impacts of project activities aiming at community and/or biodiversity benefits.

Example: The project does not have any appropriate safeguarding measures, including no evidence of Free, Prior and Informed Consent, leads to insecure land tenure, and/or uses chemical pesticides with known adverse effects on the environment.

Key takeaways

Regen Ag in the VCM

Regenerative agriculture enhances soil carbon sequestration into one of the largest terrestrial carbon sinks, offering large potential for scaling the VCM. Farmers and land managers implement management activities that can generate carbon credits, representing sequestered CO_2, which they can sell in the VCM. This allows organizations to offset their emissions while financially incentivizing sustainable farming. However, projects must meet standards ensuring additionality, permanence, and credit integrity, with the most significant challenge being the accurate quantification of soil carbon changes over time.

To illustrate the complexity of the SOC quantification challenge, consider this: the spatial variability of soil carbon is greater than the increases we aim to measure at the desired spatial and temporal scales. For example, soil carbon content can vary by 20% within just one meter (Poeplau, 2022). In contrast, the 4 per 1000 initiative, launched at COP21 to boost global soil carbon for food security and climate mitigation, targets just a 10–12% increase in soil carbon over a decade (UN, 2024). Therefore, it is essential to account for spatial heterogeneity in sampling and modelling SOC.

Call for improved data transparency

To enhance data transparency and scale the regenerative agriculture offset market with credibility, Sylvera urges developers to improve data disclosure in the following areas:

- Spatial Data: Precise locations of participating farm fields are needed to verify offset claims.
- Activity Data: Detailed records of activities on each farm field are necessary for evaluating impacts on soil carbon.
- Participant Demographics: Information on project participants is crucial to assess additionality, permanence, and co-benefits.
- Soil Modelling: Dependable and calibrated soil models, documented extensively, are vital for predicting soil carbon dynamics while being mindful of uncertainties.

Call for Higher Standards for Sampling and Modelling

To enhance confidence in Regen Ag projects, developers can improve standards in the following areas:

- Soil Sampling: Sampling should account for spatial heterogeneity by using a stratified random sampling approach where strata are delineated based, at least partially, on soil texture, and samples are take from densely distributed fixed locations over time.
- Regional Adoption Rate: Adoption rate sampling should take place at as granular a scale as possible to create baselines that are reflective of land manager behaviour at the project area scale.
- Soil Model Calibration: Any models used for simulating soil carbon dynamics should be calibrated to the biophysical conditions of the project area.

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