

A close-up photograph of a small green seedling with two leaves growing out of dark, rich soil. The background is blurred, showing more of the same seedlings. White decorative swirls are in the top-left and bottom-right corners.

Ecosystem Markets 101



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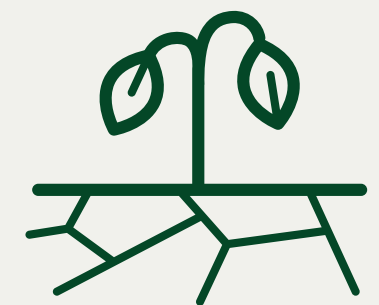
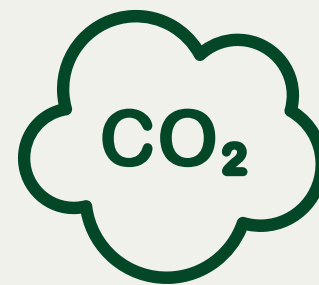
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What are Ecosystem Markets?

The level of greenhouse gasses in the atmosphere is at a record high, and so are global temperatures. This causes severe and devastating weather events across the globe such as floods, fires, and droughts.

In order to combat the effects of climate change, we must lower the amount of excess greenhouse gases in the atmosphere and take measures to include the health of our soil and water systems. Ecosystem markets are one way to accomplish this.



Ecosystem Markets

These are marketplaces that oversee the creation and transaction of ecosystem revitalization efforts as commodities. Carbon markets are an example of ecosystem markets. Carbon becomes a commodity when farmers can capture it in the soil and keep it out of the atmosphere, thus reducing greenhouse gas emissions (GHGs).

Ecosystem Credits

Ecosystem credits are the units we use to measure and sell our efforts. It functions like currency. Using carbon as an example: one credit is equal to the removal of 1 tonne of carbon dioxide (or a similar greenhouse gas) from the atmosphere.

Types of Ecosystem Markets

There are two types of markets: compliance markets and voluntary markets. This Ebook focuses on voluntary markets, as they are better-established for agricultural practices that improve soil health.

Compliance Markets

In compliance markets, regulatory bodies (usually governments) define emissions limits for regulated entities. These entities must track their emissions and purchase credits to offset their emissions if they exceed their limit. Companies who want to generate credits to be sold in compliance markets must follow the rules outlined by market-approved standards and registries. An example of a compliance market is the Cap-and-Trade Program run by the California Air Resources Board (CARB).

Voluntary Markets

Voluntary markets are not regulated or required by the government. Instead, people or companies track their own emissions and activity, and voluntarily purchase credits to meet sustainability goals such as carbon neutrality. There are many voluntary standards that outline the rules required for these credits.

Why is there interest in ecosystem markets?

More and more businesses such as consumer packaged goods companies, food processors and ag retailers are making commitments to sustainability by setting goals to reduce their emissions.

There's also a possibility that emissions reductions will become part of government regulations on a broad scale, as it has for some countries.

Agricultural carbon credits achieve the following:

- They can support farmers through an additional source of revenue.
- They recognize the importance of changing their practices, and understand that changing practices can have other environmental benefits.
- Agricultural efforts can reverse the impacts of climate change, which is important to farmers and consumers alike.



Key Players in Ecosystem Markets



Farmers

Adopt new practices, enroll in ecosystem programs and receive payment for adjusting practices.



Agronomists

Provide practice, resource and data collection recommendations to farmers.



Registries

Develop protocol that certifies high quality credits are generated (Ex. CAR, Verra, ACR).



Buyers

Purchase credits from programs.



Standards

Provide practice, resource and data collection recommendations to farmers.



Project Developers

Enroll farmers in programs, track and monitor practice changes, calculate outputs, such as carbon sequestration.



Service Providers

Entities that track, monitor, model and quantify credits using data and software. Service providers work with other key players to quantify efforts and impact.

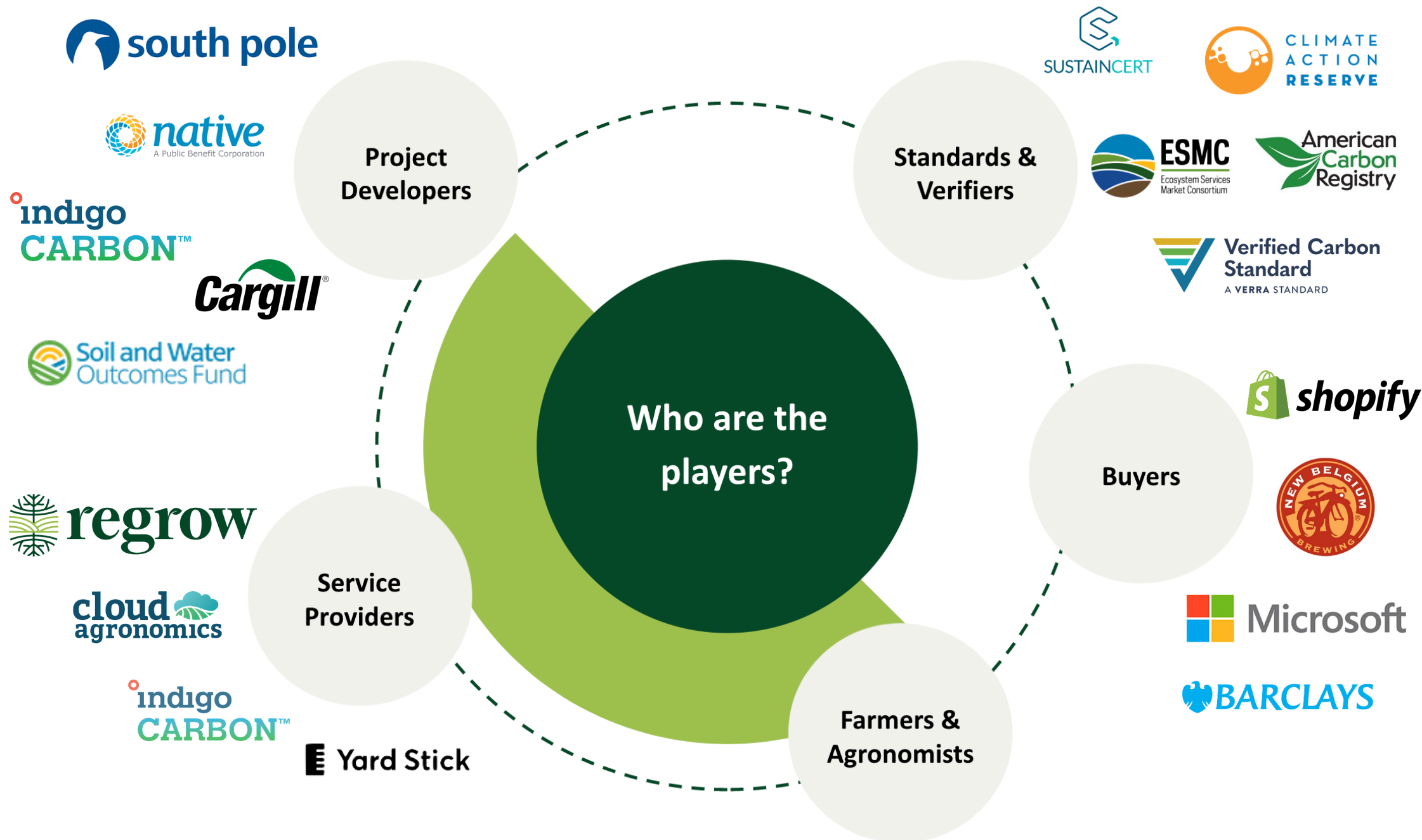


Ecosystem Programs

Develop projects according to standards, educate producers on project requirements, pay producers for credits and sell credits to customers.

Key Players in Ecosystem Markets

Ecosystem markets for agriculture are complex. There are many key players, all working to move credits through one system and offer payments to farmers. This system is flexible and could change as new companies, organizations and regulating bodies enter the market.



Regrow is a data platform and a technical provider. We use technologies and connectivity to farm management systems to support the implementation of markets on a large scale.

We work with all other key players to transparently quantify agriculture's impact on the environment and on greenhouse gas emissions.

Producers & Ecosystem Markets

Producers play a large role in ecosystem markets. The practices they employ contribute directly to the health of our ecosystems and our environments, and the results of their efforts is the foundation of ecosystem credits.

Here are a few practices producers can employ to increase environmental health.



Cover-cropping



No till or conservation tillage



Rotational Grazing



Integrated crop-livestock systems



Improved water management



Reduced Synthetic Fertilizer

Benefits of Reduced Tillage & Cover Crops



Increased organic matter and soil health.



Increased moisture for plants and water infiltration in the soil.



Improved habitat for life above and below ground.



Reduced soil erosion (wind, sheet, rill and water).



Fewer passes over fields and reduced fuel consumption.



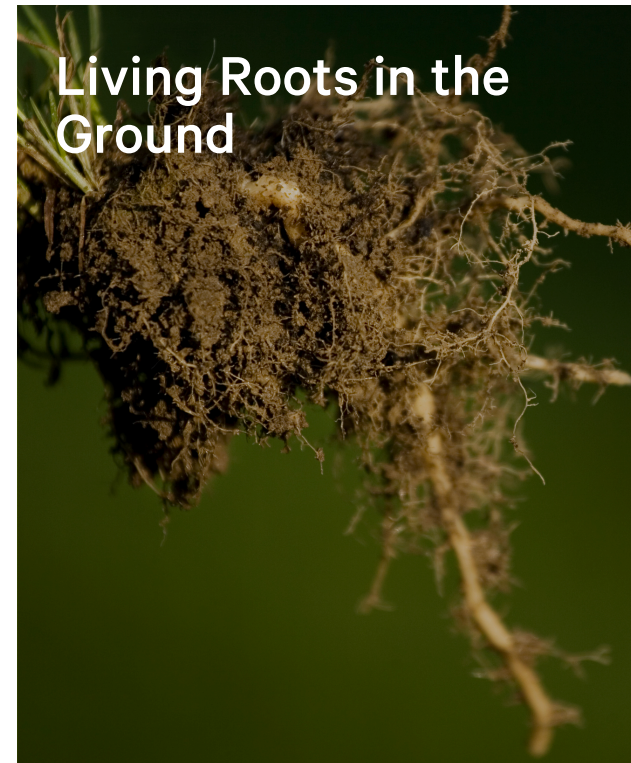
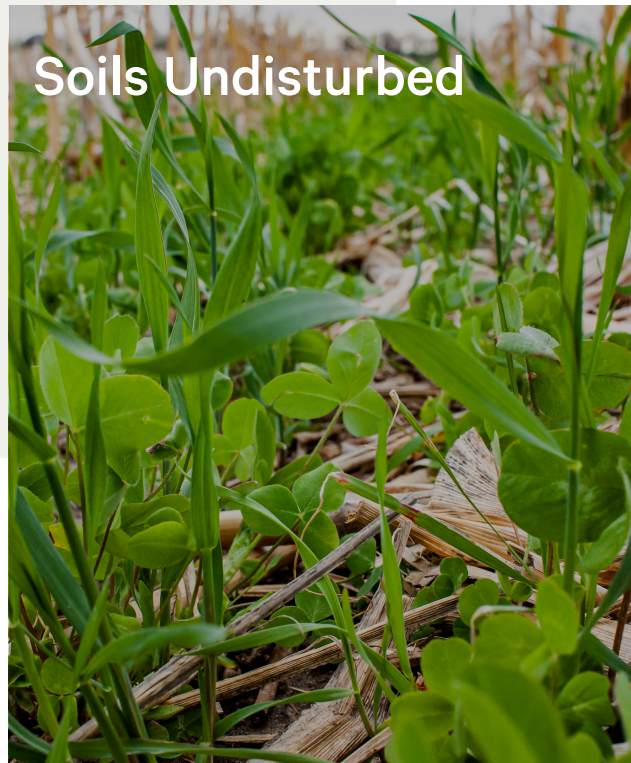
Reduced weed pressure.



Feed and forage provided for grazing livestock and wildlife.

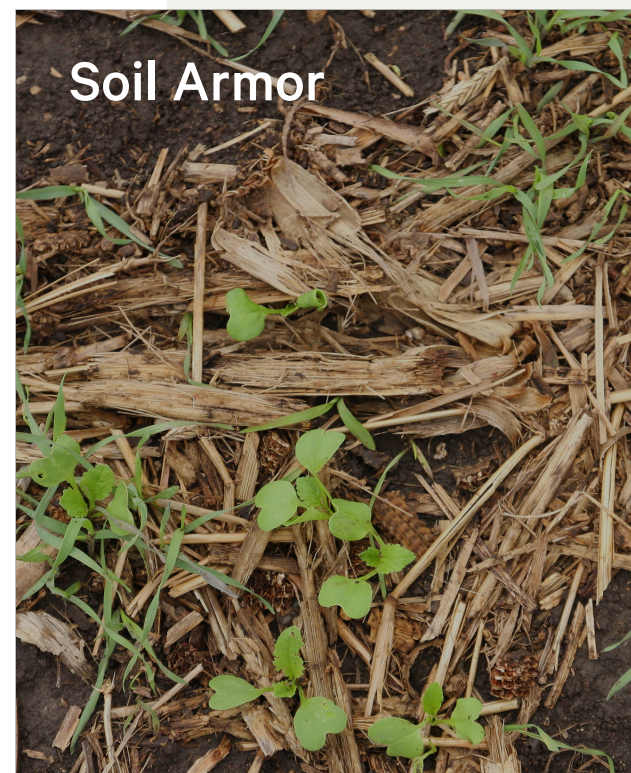
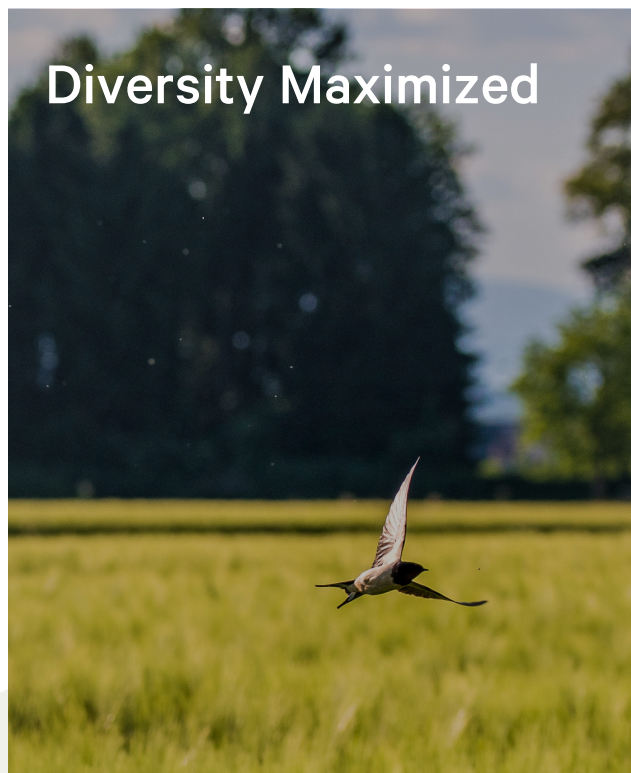


Conserved nutrients for crop growth.



Reduced Tillage and Cover Crops Benefit the Soil

Reducing tillage and cover cropping are two practices that significantly increase soil health. These practices reduce the disturbance in the soil, which leads to reductions in soil erosion, a decrease in the loss of sediment-bound nutrients in the soil and an increase in fertilizer efficiency. Soils under long-term no-till plans have also shown increased microbial diversity and mycorrhizal fungal networks which mitigate disease, increase carbon stock and feed plants with additional nutrients. Leaving the soil undisturbed also improves root and soil structure and water infiltration, and reducing tillage leads to reduced fuel consumption and air pollution.



Implementing practices that promote soil health is essential in creating more environmental, sustainable agricultural systems. It allows us to sequester carbon and improve our waterways. These practices are traceable and performance is measurable, making these practices essential for the function of ecosystem markets.

Food Companies & Ecosystem Markets

On the other end of these markets lie food companies. Brands propel ecosystem markets by incentivizing regenerative and sustainable farming practices. When companies purchase ecosystem credits, they are adding demand to the markets and further incentivizing sustainable practices.

These brands are driven by consumer demand, and they help establish regenerative farming as a profitable system for both growers and companies. This increases adoption for these practices.



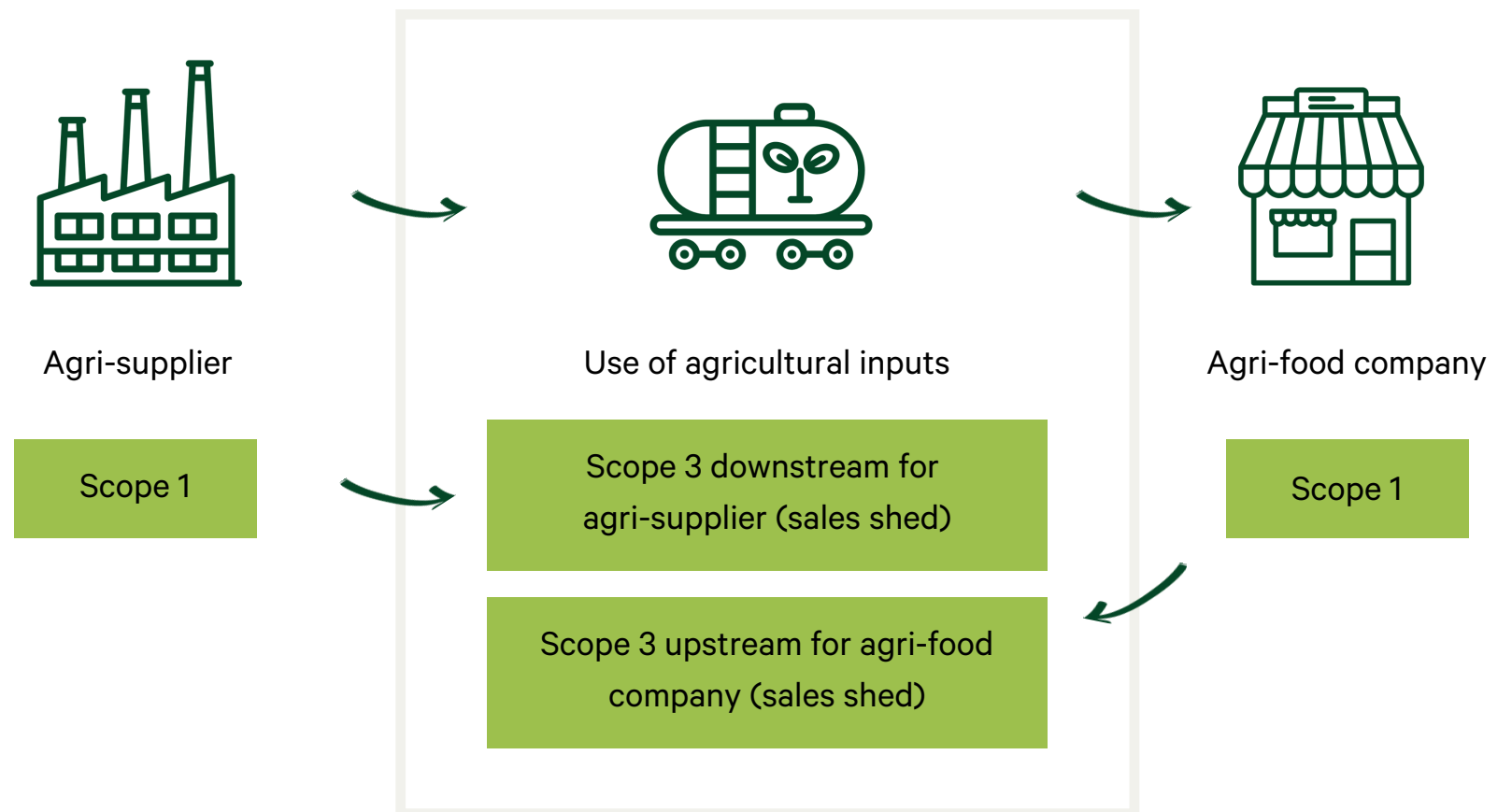
Types of Ecosystem Market Credits

Scope 1

- Scope 1 credits are offsets. Anyone can purchase an offset credit and count it against their unavoidable emissions and activity.
- Scope 1 credits are more rigorous and therefore more valuable than Scope 3 credits. Most standards deal primarily with Scope 1 offsets.

Scope 3

- Scope 3 credits are used by companies to reduce emissions within their supply chain. Scope 3 accounting considers the impact of agricultural management on the environmental footprint of the associated commodity.
- Crediting schemes for Scope 3 are less established by standards, but it is a fast growing area of development. Groups like ESMC are leading the way in Scope 3 crediting schemes.



What makes a high value credit?

There is a common set of principles that standards employ in order to ensure that credits are real and impactful. Right now, these standards are used for carbon markets, but we expect these methods will extend to other ecosystem credits in the future. High quality credits maximize the amount of money a buyer will pay for a carbon credit because the buyer can verify the following:

Additionality

Proof that carbon sequestered or the greenhouse gas reduction would not have happened if the farmer was not enrolled in a credit program. For example, if there wasn't a program, the farmer in question would never have adopted no-till farming or cover crops.

Permanence

The guarantee that the carbon will stay in the soil and not be released back into the atmosphere in the near future.

Baselines

The initial carbon that is in the soil when a farmer enrolls in a carbon program. Carbon payments are based on the amount of carbon sequestered above the baseline.

Leakage

Identifying if a project has unintentionally caused emissions outside of the project boundary.

Project Boundary

The project boundary defines what sources and sinks are accounted for in determining how many credits a project can generate.

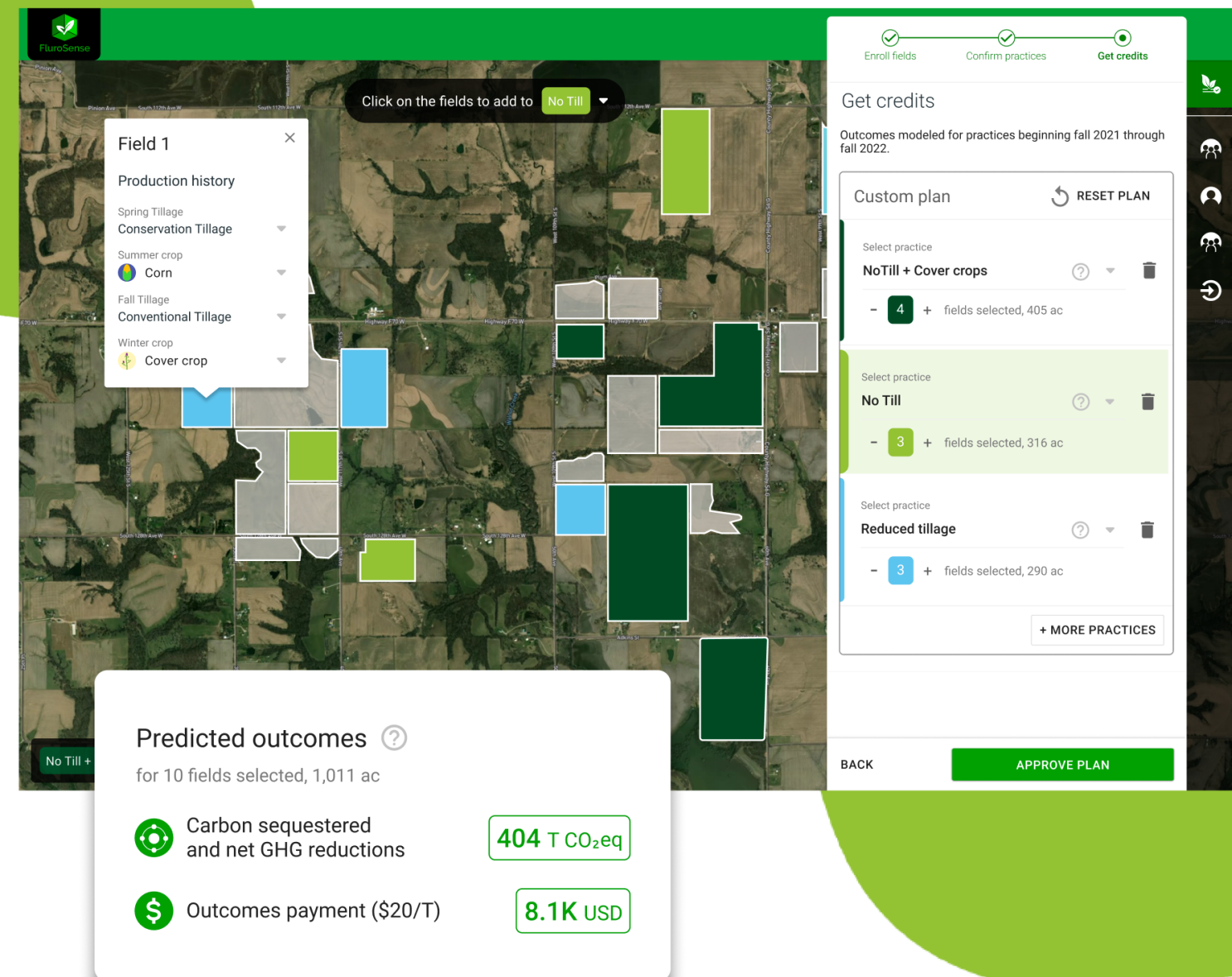
Regrow is Transforming Ecosystem Markets

Ecosystem markets are tricky. Adopting climate-smart practices requires time and money for farmers, and receiving appropriate payment for these efforts is complicated. Right now, the companies that started these markets are both measuring farmers' efforts and setting the price for credits. This creates a conflict of interest, and a lack of transparency and integrity in the marketplace.

Independent Measurement, Reporting, and Verification software (MRV) solves that problem.

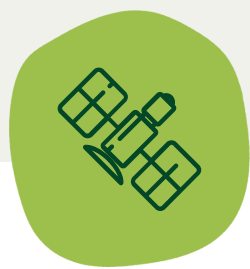
Key aspects of a transparent MRV are transparency and quantifiable uncertainty. These are accessible through the FluroSense platform as an independent MRV system (pictured on the right).

If you're interested in learning more about Regrow's products as an MRV system, contact us.



Regrow is Transforming Ecosystem Markets

Currently, markets rely on manual data entry, extensive in-field data collection, and soil sampling to quantify credits and payment for farmers. These market programs, as they currently operate, will not be scalable for agriculture. Science and technology can help overcome these barriers in scalability and lower uncertainty. The lower the uncertainty - the more credits can be issued to the farmer and the larger our collective impact will be. These technologies include:



Remote Sensing

Satellite imagery can help us map our efforts to combat climate change. By using satellite imagery instead of people on the ground, markets can dramatically reduce their costs.



Biogeochemical Modeling

Typically, farmers measure their soil health by conducting soil samples. which is a manual process that requires a lot of time and labor. Instead, technology can allow us to use calibrated and validated scientific models to estimate soil health as well as how much additional carbon will be sequestered if new management practices are adopted.



Soil Carbon Analysis

There have been a number of innovations in soil carbon analysis and as these technologies mature and come into the market, more soil carbon data will become available. This will further fuel the development of the models and algorithms for new practices and geographies in agricultural systems.

Glossary

Additionality: The principle, often applied to carbon offsets, that a project should only be able to earn credits if the greenhouse gas emission reductions produced by the project exceed what would have happened in the absence of the carbon credit component. (Source: Point Carbon)

Carbon Credit: A permit which allows a country or organization to produce a certain amount of carbon emissions and which can be traded if the full allowance is not used.

Carbon Sequestration: A natural or artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form

Cap-and-Trade: A flexible environmental regulation mechanism that sets an overall limit on the emission of a certain pollutant, but allows companies that can easily reduce emissions to sell credits to other companies for which such reduction would be difficult. The cap ensures that emissions will not exceed a desired amount. (Source: CSA)

Compliance: 1) The act, specific to cap-and-trade schemes, of surrendering the required amount of allowances, or some combination of allowances and offsets, to cover an entity's emissions. 2) Achievement by an entity in meeting its quantified emission limitation and reduction commitments under the applicable law or treaty. (Source: Point Carbon)

DNDC: A computer simulation model of carbon and nitrogen biogeochemistry in agro-ecosystems. The model can be used for predicting crop growth, soil temperature and moisture regimes, soil carbon dynamics, nitrogen leaching, and emissions of trace gases including nitrous oxide (N₂O), nitric oxide (NO), dinitrogen (N₂), ammonia (NH₃), methane (CH₄) and carbon dioxide (CO₂) (<https://www.dndc.sr.unh.edu/>).

Emissions Cap: A mandated restraint in a scheduled timeframe that puts a "ceiling" on the total amount of anthropogenic greenhouse gas emissions that can be released into the atmosphere. This can be measured as gross emissions or as net emissions (emissions minus gases that are sequestered). (Source: Center for Climate and Energy Solutions)

Greenhouse gases (GHGs) : Natural and industrial gases that trap heat within the Earth's atmosphere.

Leakage: Term applied to businesses that leave the state rather than submit to cap-and-trade regulation. Sometimes called "carbon leakage" because emissions of the relocated industry are no longer regulated by the home state.

Offsets: Emission reduction credits from project-based activities that can be used to meet compliance or corporate objectives as a supplement or alternative to reducing one's own emissions. In a cap-and-trade scheme, offsets may be used instead of allowances, sometimes up to a limit. California allows the use of offsets to satisfy up to 8% of a company's compliance requirement. Initially four types of offset programs were allowed: expansion of forests and urban forests, methane capture on farms and ranches and reduction of ozone-depleting substances. (Source: Point Carbon)

OpTIS: The Operational Tillage Information System (OpTIS), a Legacy Dagan technology , uses remote sensing (satellite-based) data to monitor conservation practices in agricultural systems, including various forms of reduced tillage and the planting of winter cover crops. While the OpTIS calculations are performed and validated at the farm-field scale, the privacy of individual producers is fully protected by distributing only spatially-aggregated results – at the county and watershed (8-digit HUC) scale.



Like what you've heard
so far? Let's explore
more!

Contact us to learn more about our work with ecosystem
markets.

For more knowledge, articles and case studies, check out
the additional resources on our website: www.regrow.ag.

[CONTACT US NOW](#)