Canada's Nature Advantage

CASE STUDY

Precision profits

Digital agriculture as a driving force for economic and environmental efficiency

PRINCE EDWARD ISLAND, CANADA

With sights on carbon credits, Prince Edward Island farmers learned that the efficiencies they gained from practices that reduce GHG emissions were indeed the real economic opportunity.

PRINCE EDWARD ISLAND FEDERATION OF AGRICULTURE

DRIVER

A desire to incentivize farmers for their climate action was the impetus for P.E.I. Federation of Agriculture (PEIFA) in building soil carbon and GHG emissions measurement infrastructure required to connect farmers to carbon markets, while maintaining ownership of their data.

Farmers can be leaders in advancing climate solutions. Responsible management of inputs like nitrogen fertilizer that are essential tools in growing healthy crops and yields is a key part of farmers' role in driving climate action. Potato production represented most of the agricultural land use on P.E.I., roughly 86,500 acres, and potatoes are a nutrient dense crop to grow, presenting an opportunity to explore how efficiencies in fertilizer use can be incentivized through carbon credits that reward reductions of net GHG emissions.

"Farmers can be leaders in advancing climate solutions."

MECHANISM FOR CHANGE

A mix of government funding and provincial leadership spearheaded by the P.E.I. Federation of Agriculture, and the launch of the offset protocol for improved agricultural land management on VERRA's voluntary offset carbon registry, together, created the right conditions for the federation's Agriculture Internet of Things (AgIoT) to come to life. AgIoT is a farmer-owned, scalable, data-agnostic, and real-time monitoring platform.

Money, project leadership, and a protocol that outlines the standard on how to enhance soil carbon and reduce GHG emissions are all necessary pieces to producing carbon credits. But, for nature-based projects, like this, arguably the hardest part is the data collection. This is why AgIoT, a technology solution for farmers by farmers, was created.

IN THE MAKING

To access carbon markets, projects need baseline measurements, from which farmers adopt best management practices like precision nitrogen application or cover crops to show progress. The P.E.I. Federation of Agriculture developed the 'P.E.I. Low Carbon Cropping Initiative' with 4,800 acres now enrolled, forming an offset market-compliant project with the goal of registering the project on a carbon market. At the start of the project, the federation and its farmers had an 'Aha moment': farms did not have the existing capacity to collect data at a level required for accessing carbon markets. As a result, they set out to automate farmers' engagement with AgIoT as much as possible.

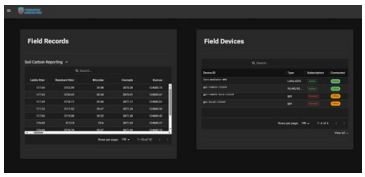
AgIoT automates data collection and processing, with the goal of reducing the burden on farmers to manage and maintain their data. In-field sensors provide real-time data collection that automatically uploads to the cloud and is accessible to the user through the AgIoT dashboard. AgIoT's soil carbon and GHG algorithms are estimating agriculture carbon in soils and GHG emissions with real farmer data to determine impacts on net GHG emissions AgIoT platform.

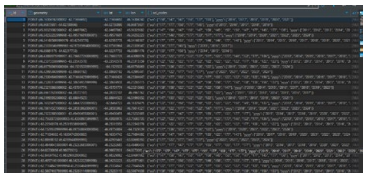
IMPACT

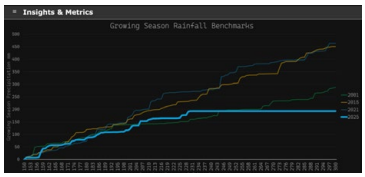
In 2024, a semi-automated software version of AgIoT algorithms was used to model pilot farms participating in the Low Carbon Cropping Initiative. It analyzed crop history submissions, recent soil cores, and a process-based model for GHG emissions and soil carbon estimation.

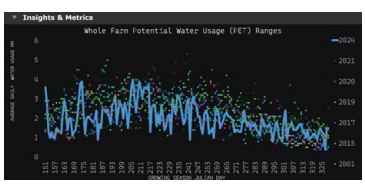
The results from the pilot farms showed that the farms' GHG emissions reductions are between 50 kilograms and 150 kilograms of carbon dioxide equivalent per hectare. The piloted practices including precision nitrogen fertilizer management also showed that farmers could save $50 to $120 per hectare on inputs. A direct result of optimizing a production system to drive positive economic and environmental outcomes.

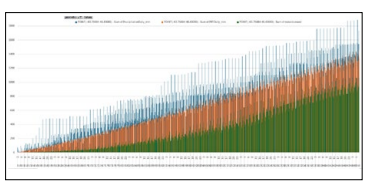
If these modelled efficiencies were applied to the 86,500 acres of annual potato production, it could result in reducing the equivalent of 1,750 to 5,250 tonnes of carbon dioxide per year. That's just from improving farmers' data resolution to inform greater efficiencies.











50–150kg

Reduced Carbon Dioxide Equivalent Per Hectare

$50–$120

Potential Input Cost Savings Per Hectare for Farmers

1,750–5,250 tonnes

Total Potential Annual Carbon Dioxide Reduction

LESSONS

Carbon markets for nature-based projects is not for the faint at heart.

It's costly. It's time consuming. And it's complicated to measure, monitor, report and verify net GHG reductions from biological systems over time because there are many variables to consider that are out of a human's control. But when you have the right mix of technical skills on-the-ground to build and apply data solutions like AgIoT, pursing carbon credits can be a pathway to unlock new innovations and efficiencies for farmers.

A farm operation that can collect the necessary data for accessing carbon markets will have a tremendous opportunity to improve decision making and profitability, which is more valuable than the actual carbon credit.

Case studies are originally published by RBC Climate Action Institute: Unearthing Value: How nature can play a critical role in pro-growth agendas.

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