Keep your carbon footprints on the ground when it comes to trading credits

According to Professor Peter Grace of Queensland University of Technology, profiting from soil carbon sequestration in Australian grain based farming systems is difficult due to the inability of the system to accumulate carbon in our climate and the expense of verification.

Carbon sequestration is the natural process of storing carbon molecules in our soils, and preventing carbon loss to the atmosphere that would add to global warming.

Global warming is due to increased atmospheric levels of several greenhouse gases that include; carbon dioxide, methane and nitrous oxide – which are all agricultural by-products.

A scale to measure 'Global warming potential', uses carbon dioxide as a base (that is, CO_2 = 1). Methane (CH_4) is equal to 23 units of CO_2, and nitrous oxide (N_2O) is equal to 310 units of CO_2.

Thereby simply reducing the release of methane or nitrous oxide has a comparably huge impact on global warming compared to a unit of CO_2.

"Focusing on methane and nitrous oxide emissions is possibly Australia's best approach, particularly as Australia's climate makes carbon sequestration in agricultural soils quite difficult to achieve," says Peter.

Carbon sequestration is possible by returning land back to bushland, or to a lesser extent via improved management of current systems. The aim is to accumulate carbon molecules by:

- Decreasing tillage;
- Increasing soil residues (particularly in cereals and pasture); and/or,
- Using plants that store large amounts of carbon.

Conditions limit organic carbon

Australia's generally high temperatures and variable rainfall, limit the amount of biomass produced and lead to rapid degradation of what is produced. Increasing soil organic carbon through zero or reduced tillage is inconsistent.

Long fallows do not produce biomass and promote degradation, a single tillage operation releases much of the carbon previously stored, and verification and transaction costs for soil carbon are high due to inherent variability of soil carbon across a field.

Peter Grace.

Sown and improved pasture management offer some benefit, but the usefulness also depends on market opportunities and their location. Excess soil water may slow the rate of decomposition of organic carbon, but increase gaseous losses of N_2O thereby reducing the effectiveness and amount of carbon sequestration.

Our best option is less N_2O release

Australia's most efficient and cheapest option maybe in reducing N_2O release due to its high 'global warming potential' (310 times that of CO_2). Decreasing nitrogen fertiliser application in situations where large amounts are lost due to de-nitrification (water logging and volatilisation of nitrogen fertilisers), would reduce Australia's impact on global warming.

Peter believes carbon would have to be worth in excess of $50 per tonne to Australian farmers before they would be able to absorb capital and transaction costs.

"Until carbon is worth this amount it is unlikely to provide enough economic incentive to stimulate farmers into significantly altering practices for carbon trading alone," says Peter.

Based on Australian figures in temperate high rainfall zones, where typically 100 kg of carbon per hectare per year could be sequestered, this equates to $5 per hectare per year.

The current price of carbon on the Australian Climate Exchange is less than $3 a tonne.

Farmers must remember though that the increased carbon levels have to be permanent and maintained for long periods of time (70–100 years in most cases) to have any financial benefit in carbon accounting systems developed under the Kyoto Protocol. "By reducing the amount of N_2O emitted at any time, the issue of permanence is not a problem – the gas simply does not get into the atmosphere," says Peter.

Australia is already trying to reduce its carbon footprint by reducing the standard amount of N_2O lost to the environment in cotton systems to a standard of 0.5 per cent from the international standard of 1.25 per cent.

Peter admits "most of the carbon sequestration information in Australia originates from the US market, as they are moving to financially reward farmers for carbon sequestration" and the sequestration potential in those (cooler and wetter) environments is higher.

For example, US farmers can register a field for carbon sequestration which is then monitored over time to ensure there is no cultivation. An amount is then paid to the farmer for this carbon sequestration.

Precise carbon estimates critical

The increased use of remote sensing and improved soil sampling techniques to reduce uncertainty is critical in developing precise estimates of carbon sequestration.

These are all additional, but necessary expenses in the monitoring and verification processes and have major impacts on the final financial return.

"The uncertainty associated with soil carbon sequestration in grain-based systems of Australia is a major financial risk at this point in time," Peter points out.

"But the overall benefits of increasing soil carbon on sustainable agricultural production and soil conservation is the real winner and will ensure growers can better adapt to climate change."

For more information and the option to measure your own carbon footprint go to: www.isr.qut.edu.au or contact Professor Peter Grace, Queensland University of Technology
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