CANADIAN PRODUCER PERSPECTIVES ON AGRICULTURAL SOIL OFFSETS: ISSUES, OPPORTUNITIES AND RISKS

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INTRODUCTION

Energy companies have been approaching Canadian farmers to buy "carbon offset credits" since the early 1990's. With the rapid adoption of no-till farming systems by farmers, agricultural soil carbon offsets are seen as "low hanging fruit" by those speculating on the future development of carbon trading schemes. The Saskatchewan Soil Conservation Association (SSCA) has worked closely with the Government of Canada on agricultural soil sink policy and offset trading policy. Canada is one of the few countries that have elected to include "Cropland Management" under Article 3.4 of the Kyoto Protocol. In addition, SSCA has participated in several "carbon offset" projects between 1993 and 2008.

1. Saskatchewan Soil Enhancement Project. 1993-1997.
2. Prairie Soil Carbon Balance Project. 1997-2006
3. Environment Canada's PERRL Program Pilot Trade. 2005-2008.

RESULTS AND DISCUSSION

Policy Principles

For offset trading to be a useful policy to promote the development of agricultural soil sinks, rules must be created that address the unique nature of agricultural projects. Unlike emission reductions, biological sinks can be reversed. To ensure atmospheric integrity, offset projects must account not only for emissions removed through sink creation, but also emissions caused by future reversal events (ex. Tillage).

For sinks to be an effective carbon offset, a sink must not only be created in the short-term but it must also be maintained over the long-term. Offset policy must recognize that, to be successful, millions of individual farmers around the world must take action, annually, to both create and maintain the sink. For offset credits to be relevant to farmers, policies need to be developed that maximizes the value of carbon offsets at the farm-gate.

Permanence

The potential for sinks to be reversed in the future has been a major stumbling block for their inclusion in offset trading systems. To date, the European Union has not allowed the use of Clean Development Mechanism (CDM) forestry sink credits in its Emission Trading System.

Much of the policy discussion at the international level, related to permanence, has revolved around forestry sinks. However, it is important to note that the nature of reversal potential with agricultural soil sinks is different from forestry sinks. With forestry sinks, reversal events are associated with both management decisions like harvesting and to natural events like fire. With agricultural soil sinks, reversal events are entirely associated with management decisions like tillage. This implies that permanence with agriculture soil sinks can be managed through policy measures that encourage ongoing sink maintenance.

Even though permanence risk is manageable with agricultural sinks, most of the discussion has been revolved around who is responsible for permanence liability. While conservation agriculture (CA) can sequester large amounts of soil carbon, the focus on permanence liability is a major barrier to its inclusion as an offset measure in carbon offset markets.

Figure 1 shows a theoretical example of the permanence-liability cycle for agriculture soil offsets. In this scenario, all offsets are considered permanent which means that the farmer selling a credit into this market assumes the liability for on-going maintenance of the sink credit. While a farmer can earn some income when his soil continues to sequester carbon, this revenue source will decrease to zero as the soil carbon level reaches its new equilibrium. At this point, the farmer would only hold the maintenance liability. If the farmer reverts to his previous practice and releases the stored carbon, they would be responsible to replace the offset credit at that time. If offset prices increase in value over time, a farmer could, in effect, having sold his carbon at a low price is forced to buy it back at a much higher price. In this theoretical case, the emitter (offset buyer) transfers their regulatory liability to the farmer (offset seller). (Mitchell and Bennett, 2000).

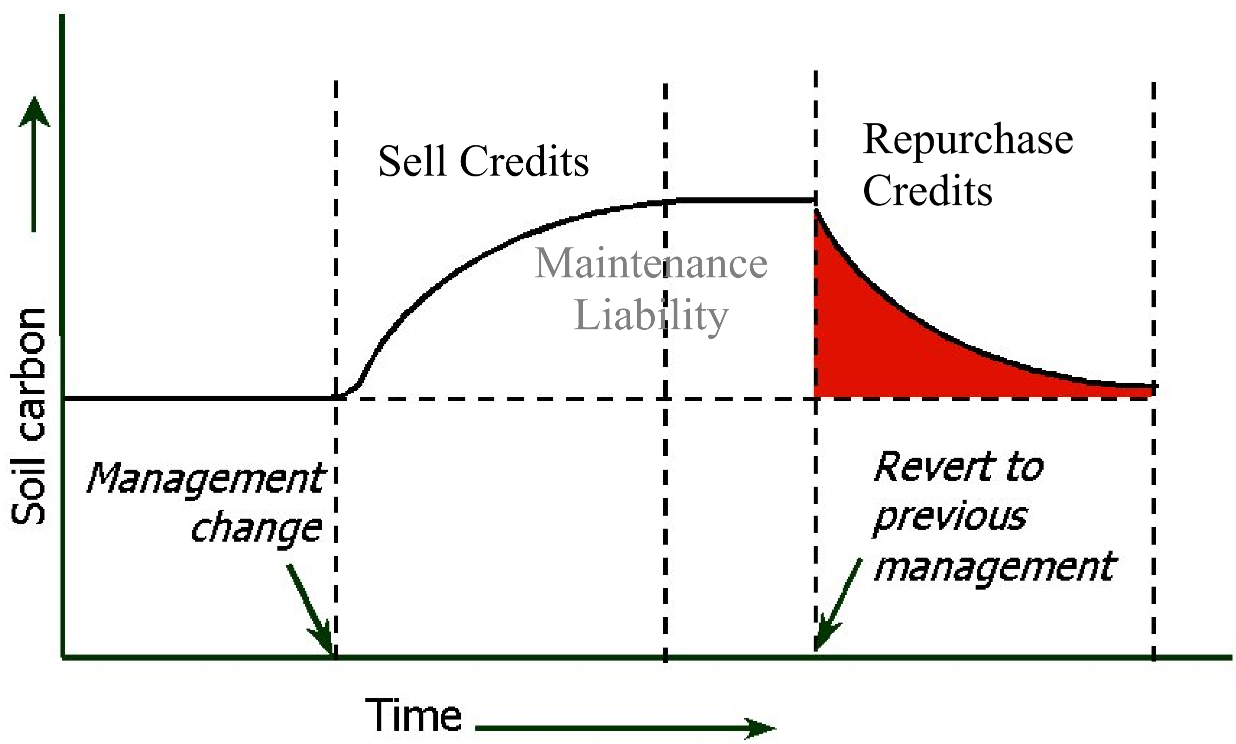

Figure 1. Permanence liability cycle.

In the theoretical case, the sink must be maintained forever to offset an emission. In this case the risk of reversal cannot be defined, making traditional risk management practices like insurance unworkable. The Government of Canada’s proposed Offset System proposes that for sink credits to be considered permanent that they be maintained for a fixed liability period (Environment Canada, 2008). The length of this period has not been determined but it could extend up to 30 years. Since this liability transfer would not be acceptable to farmers, several other approaches have been proposed to address this issue.

Temporary credits (TC), sometimes referred to as credit leasing, is one proposed option to manage risk (Mitchell and Bennett, 2000). TCs expire after one year but are automatically reissued if the stored carbon is retained. For a farmer, these credits accumulate over time as increasing amounts of carbon are stored. If the farmer tills his only financial penalty is that he will have fewer TCs to sell. There are several policy implications for TCs. Since credits accumulate over time, this type of credit creates an incentive for long-term maintenance of the sink. Price risk is eliminated since temporary credits will rise/fall over time along with other permanent credits (PCs). Since the long-term liability for the emission offset remains with the emitter, TCs also create an incentive for emitters to reduce their emissions, at source.

However, while there are positive policy implications for TCs, they have a few significant problems. Emitters (buyers) have been very resistant to the concept of TCs. Their main objection is they do not want to retain the long-term liability for the emission offset. In addition, by there nature, TCs are heavily discounted compared to PCs (McCarl et al.). However, many fixed and variable costs associated with developing an offset project (ie. verification, administration etc.) are the same as they would be for PCs. This makes it difficult to develop a viable aggregation business model to develop a project based on TCs.

The Tillage Reduction protocol developed for the Alberta Offset System took an innovative risk-sharing approach to the permanence problem (Goddard, 2008). The Government of Alberta used expert opinion to assign a reversal risk factor, called an Assurance Factor, for reduced and no-till systems. The carbon sequestration rate for the Alberta soil regions are discounted according to the Assurance Factor for each soil region. With this approach, the reversal risk is shared between, farmers, who see payments reduced by the Assurance Factor, and the Government of Alberta, who guarantees the permanence of the offsets issued.

Other insurance approaches have also been proposed, all of which increase the transaction costs associated with sink credits. The actual costs will depend on the regulatory regimes that are developed and how long they must insure permanence for.

As a result, permanence continues to be a problem area for offset policy. All proposed measures to account for permanence discount the value of agricultural soil offsets.

Additionality

Additionality or incrementality policies are intended to show that offsets are created over and above a business-as-usual baseline. In practice, this means that emission reductions/removals can be divided into two separate pools*:

- one that **is** eligible to earn credits,
- one that **is not** eligible to earn credits.

**It is important to note that the atmosphere only sees one pool.*

There are several unintended problems caused by the creation of these two artificial pools. While it may be relatively simple to identify where an emission reduction change occurs at an industrial facility, this is not the case for agricultural soil sinks. It would be very difficult to determine which farms or fields have adopted CA. Do to changes in land tenure (ownership/tenants) the same field can see changes in management over time that makes it difficult to assign a field to one pool or the other.

The biggest problem caused by the creation of the two pools, is that it acts as a perverse incentive to reduce emissions. It rewards late adopters (i.e. bad actors), and provides them with an economic advantage over early adopters. The consequence of this policy is that it delays action to reduce or remove emissions. The moral hazard of this approach is not only can it place economic hardship of early adopters, it also discourages innovation to develop environmental goods and services. This approach also creates a perverse incentive to revert to intensive tillage systems resulting in increased emissions.

The Canadian approach to work around some of these problems is to merge the two pools by applying an additionality discount to the carbon sequestration coefficient. To do this, they used information on tillage systems from the Canadian Census of Agriculture to determine regional baselines for various tillage systems. The sequestration rate is then discounted by the level of adoption (Haak, 2008). This approach is administratively simple but the discounting may reduce the financial incentive to the point where it reduces farmer participation. If farmers do not participate, the policy will not meet its stated goal to incent action. The end result could be a policy failure.

Government officials often state that farmers have adopted practices for other reasons and that the risk of them reverting is low. However, this assumes that there are no competing interests for soil carbon. Figure 2 shows the value of one tonne CO_2e of soil organic nitrogen as a function of urea price. At current urea prices, the CO_2e value of the nitrogen in soil organic matter ranges from $40-60 per tonne CO_2e. This compares to current prices on the Alberta Offset market of around $12 per tonne CO_2e. As profit maximizers, farmers will take all these factors into account when making future land management decisions. With current fertilizer prices, some Saskatchewan farmers are seriously considering increasing their summerfallow level to reduce fertilizer inputs.

The proposed Canadian Offset System also mentions reassessing baselines every 8 years. It is not clear how this will apply to sinks projects.

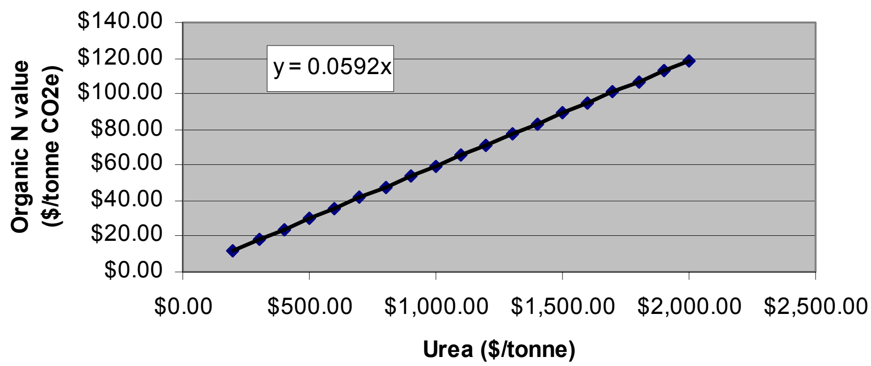

Figure 2. Value of one tonne CO2e of soil organic nitrogen as a function of Urea price

Policy Interactions

One of the interesting facts about the concepts of additionality and permanence is that they contradict each other. Additionality, as a policy, states that an emission reduction/removal has no value because it is going to happen anyway. This implies that there is no risk that the sink will not be created or destroyed. On the other hand permanence is based on the fact that there is a risk that sinks can be destroyed. The unique aspect to this dynamic that does not apply to other emission reductions, is that since sinks can be destroyed, practice reversal not only does not sequester carbon, it causes previously stored carbon to be reemitted; effectively eliminating the baseline.

As a result, both permanence and additionality discount the value of the total agricultural soil sink. Depending how each policy interacts with each other, it may reduce the sink value to the point where it has no value. This can also be rephrased to say that society, based on these policy implications, does not care if sinks are created or maintained. Considering the size of GHG emissions coming from Land Use, Land Use Change and Forestry activities (including agriculture), are these policies that society can afford?

Are there solutions? The “Net-Net” accounting rules for agricultural sinks, developed for the Marrakesh Accord, can offer some guidance. These rules look at the difference between the net emissions from agriculture land in the 2008-2012 period and the net emissions in 1990 (UNFCCC reference year). These rules consider only the net environmental effect of land management over a period of time. This is sometimes referred to as an environmental baseline, since this reflects the change the environment sees. It avoids the messy and subjective rules that are created to implement economic baseline approaches.

Other Issues

Farm-scale emission reductions/removals projects are, in most cases, too small to justify the transaction costs for offset trading. This means that aggregation businesses or some other form of pooling will be necessary to minimize these costs t individual farmers.

To date, aggregation businesses have been the method used to pool farm-level offsets. Aggregators perform both credit creation and marketing functions. However, the aggregation model may not always produce ideal results. Multiple-aggregators in a local market will not be able to minimize many credit creation costs like verification (ie. multiple verifiers). In addition, depending on contract arrangements, signing an aggregation contract with a company who performs poorly can be a significant risk for a farmer. In the Alberta example, depending on who they signed with, Alberta farmers saw a range in carbon price of $6 - $12/tonne with 30-40% transaction costs (Goddard, 2008).

Other approaches, like carbon banking, could resolve some of these issues. Carbon banking separates the offset credit creation from credit marketing. In this case, the carbon bank goes through the process of credit creation, including verification and other regulatory requirements. Farmers can then market their credits through a broker. With this approach, farmers minimize the costs of credit creation and give themselves the freedom to market their carbon "crop" like other commodities. However, this type of option would require a high degree of cooperation between both farmers themselves, and farmers with government to establish the carbon banking structures.

CONCLUSION

Permanence and additionality are the largest constraints to creating a carbon offset market for agricultural soil credits. Policymakers need to find solutions to resolve the conflicting principles of these two issues. Policymakers also need to consider ways to minimize transaction costs to farmers. Developing successful solutions to these issues are necessary to ensure that agricultural soil offset trading is a successful policy.

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