

To: Technical Advisory Committee of the WI Governor's Task Force on Global Warming

From: Agriculture and Forestry Workgroup Co-Chairs Bill Oemichen, WFC and Todd Holschbach, TNC

Re: Recommendations to address data gaps associated with greenhouse gas inventories of land use in Wisconsin

I. Introduction

The WI Governor's Global Warming Task Force has identified data gaps related to patterns and trends in land use change as the greatest need for a complete Greenhouse Gas (GHG) accounting across the state of Wisconsin.

The Agriculture and Forestry Workgroup is coordinating with the Technical Advisory Group (TAG) to describe these data gaps and recommend the development of a long-term complete land-based carbon accounting system to address this issue.

The program should be assigned to a state agency(ies) or university department with expertise in land cover monitoring and data analysis and should be provided adequate ongoing funding. The program should produce statistically valid time series data, at intervals of not less than every two years, which can be used to estimate the net carbon emissions due to land cover throughout the state. The data should be provided for the smallest land areas practical, no larger than a county basis, and should be derived both from satellite observations and field sampling. The program should stay informed of the scientific literature on land use and carbon emissions in order to obtain the most relevant and valid data sets possible. However, where possible, data should be valid over time to allow long term trend analysis. Although the program should focus on carbon emissions, the state should authorize the program to produce additional land use data on topics such as forest cover, agricultural land use, urbanization, etc.

II. Scope

The land-based carbon accounting system will address the magnitude of GHG sources and sinks from current land use and assess impacts of changes to carbon stores due to changes in use or management of lands.

A complete land-based carbon accounting system will increase the State of Wisconsin's ability to conduct GHG inventories and trend analysis. This will inform current and future policy decisions and implementation. An important aspect of any system will be the ability to present the current status of GHG inventories, monitor future changes in response to any policies or practices, and make projections into the future.

III. System Requirements

The development of a comprehensive land-based GHG accounting system requires detailed information and analysis to accurately depict the carbon stocks on the landscape and how these stocks change with changes in land use and management. Emissions from stationary sources such as power plants can be readily calculated and measured. However, emissions and removals from land use dynamics, land use change and changes in land management require a multi-faceted approach to accurately track them.

A land-based GHG accounting system tracks changes in land use over time, in addition to sources and sinks of carbon (as CO₂ and other non-CO₂ GHGs) associated with the land use before, during and after change. It is equally important to assess the emission and sequestration rates of the various land uses and management regimes and the life-cycle carbon impacts of the various products from the working landscape (e.g. food and feedstock, biofuels, durable wood products, etc).

Developing a baseline is an important first step in this effort. This baseline should be an appropriate reference year conducive to policy decisions. The assessment of current emissions and removals of GHGs and carbon stores and changes should then be made annually and compared to both the baseline and the previous years.

To build this system, multiple data sources are needed. Table 1 summarizes the various information components of a land-based accounting system, examples of specific types of information, and the source and availability. Data gaps are detailed below.

Further discussions about the design and implementation of a GHG accounting system will need to assess the ability of the state to conduct measurements of GHG emissions and removals as compared to modeling of these flows with verification.

The resources needed to develop and implement a system have not yet been estimated.

Table 1 - Information Components of a Land-Based GHG Accounting System

Information Components	Examples
Land Use and Cover Change	<ul style="list-style-type: none"> • Satellite imagery such as Landsat images collected on an annual basis • GIS analysis to detect changes in cover and use
Agriculture	<ul style="list-style-type: none"> • Crop or pasture type • Estimates of biomass accumulation • Estimates and measurements of appropriate carbon pools • Estimates of rate of carbon loss due to changes in use or management • Tillage practices • Life-cycle carbon analysis of agricultural products

Information Components	Examples
Forestry	<ul style="list-style-type: none"> • Forest type and management • Estimates of biomass carbon accumulation and decomposition rates • Estimates and measurements of appropriate carbon pools • Estimates of rate of carbon loss due to changes in use or management • Carbon content of forest products and rate of retirement or disposal • Life cycle analysis of forest products
Grasslands and Wetlands	<ul style="list-style-type: none"> • Estimates and measurements of appropriate carbon pools • Estimates of rate of carbon loss due to changes in use or management • Estimates of biomass carbon accumulation and decomposition rates
Urban and Sub-urban areas	<ul style="list-style-type: none"> • Estimates and measurements of the carbon sequestration rates for the urban forest • Estimates of the energy use impacts of the urban forest • Carbon emission and sequestration rates of public open space • Estimates of rate of carbon loss due to changes in use or management

IV. System Outputs

A land-based carbon accounting system will provide a complete GHG accounting for land-based activities in Wisconsin. The system should also have the capability to make projections about future trends and monitor results of land-use changes and management activities.

The system will support the development of appropriate policies related to climate change and provide guidance for land use and management decisions. An important benefit of a robust GHG accounting system is that the system's uncertainty and risk reduction informs better decisions.

V. Additional Research

More research is needed on the impacts of land-use of GHG emissions as well as the sequestration dynamics of the landscape. The list below represents examples of additional research that will be needed to support a land-based GHG accounting system and land-use decision making in a potentially carbon constrained future.

- Life-cycle carbon accounting for agricultural and forest products and by-products.
- Impacts of climate change on carbon dynamics within the landscape
- Co-benefits or secondary impacts associated with carbon conservation decisions
- GHG (both CO₂ and non-CO₂) monitoring and measurement techniques
- Economic and socio-cultural analysis of carbon based land use and management decisions

We believe this additional work would greatly benefit the implementation of a Wisconsin greenhouse gas reduction plan. Thank you for your consideration of our data collection recommendations to close gaps associated with greenhouse gas inventories of land use in Wisconsin.