Track 4: Natural Carbon Sinks

Note to presenter: When you advance to the next slide, your presentation will appear. Track Subtopics

- Optimizing Carbon Sink Strategies in Forests
- Optimizing Carbon Sink Strategies in Agriculture
- Optimizing Carbon Sink Strategies in Conservation Lands
- Optimizing Carbon Sink Strategies in Urban Forests
- Advancing Working Lands Greenhouse Gas Emission Reduction Strategies



Wisconsin Academy Climate Fast Forward Conference

Natural Carbon Storage Track





Biomass and Soil Carbon

US **forests** store 600 to 700 MMT CO_2 eq per year

US **agricultural land**: carbon equilibrium??

Conservation land stores ??

Urban forests store 90 MMT CO₂eq

Ch 2 North American Carbon Budget, Second State of the Carbon Cycle Report

DOE Genomic Science program https://public.ornl.gov/site/gallery/



Agriculture: Carbon Sink or Source?

US agricultural soils stored 59 MMT CO_2eq in 2000 – and lost 2 MMT CO_2eq in 2013.

Net US agricultural GHG emissions were roughly 486 MMT CO₂eq in 2000, and 600 MMT CO₂eq in 2013:

- N_2O from cropland 31%
- CH₄ from ruminants 28%
- Energy use 14%
- $N_2O \& CH_4$ from grassland 13%
- CH₄ from stored manure 12%
- Rice 2%

Increasing natural carbon storage is a key strategy for reducing agriculture's climate impact, and for increasing agricultural resilience.



Agricultural Carbon Strategies

Reduce soil disturbance (tillage)

Keep soil covered and roots in soil yearround (cover crops, diverse crops)

Convert cropland to perennials (pasture, prairie strips)

Plant trees (windbreaks, silvopasture)

Retire marginal cropland

FOREST-CLIMATE Working Group

Forests – A Powerful Offset for Carbon Emissions

- Forests in the US are estimated to offset over 14% of total US carbon emissions.
- In Wisconsin, with 17 Million acres of forest, that number is almost certainly higher.
- With good management and increased investment in forests and conservation lands we can significantly increase emission offsets AND have a healthier forest sector.



Forest Carbon Offset Strategies

- Keep Forests In Forest
- Reforestation
- Afforestation
- Improved Forest Management
- Build with Wood
- Greening our Cities



Urban Forests: Carbon Sinks

US urban forests store 90 MMT CO_2eq , or about 10% of current land carbon storage.

In addition, urban trees

- moderate temperatures,
- improve air quality,
- reduce noise,
- improve public health,
- improve property values,
- and create livable communities.



Urban Forest Carbon Strategies

Increase tree canopy and greenspaces in parks and streets.

Increase tree cover at homes and businesses

Emphasize "Tree Equity" to address needs in underserved and low-income communities

Use trees and green engineering for shade, wind protection, air quality, noise reduction, flood abatement, and snow barriers



Conservation Lands: Carbon Sinks

Prairies, wetlands, and other conservation lands build carbon in the soil.

Key strategies:

- Manage for healthy ecosystems
- Prevent land use change
- Restore wetlands

Photo by Joshua Mayer



Emission Reduction Strategies

Improve Nitrogen fertilizer management

Improve ruminant diets

Reduce pesticide use

Conserve energy in farm and forest operations

Improve manure management

Utilize tree waste for heating, electricity generation, etc.



Maintain Provisioning Services





Questions? Comments?



U.S. Agriculture and Forestry Greenhouse Gas Inventory: 1990–2013



Figure 1-1 Agricultural Sources of Greenhouse Gas Emissions in 2013 (CH₄ is methane; N₂O is nitrous oxide; CO₂ is carbon dioxide. MMT CO₂ eq. is million metric tons of carbon dioxide equivalent) Figure 1-2 Agricultural and Forest Sinks of Carbon Dioxide in 2013 (MMT CO₂ eq. is million metric tons of carbon dioxide equivalent)

Net emissions from Agriculture ~ 418 MMT

Net C uptake from forests ~ 700+ MMT

US Agriculture and Forestry Greenhouse Gas Inventory 1990 – 2013



U.S. Greenhouse Gas Emissions and Sinks by Economic Sector, 1990–2014

Data source: U.S. EPA (U.S. Environmental Protection Agency). 2016. Inventory of U.S. greenhouse gas emissions and sinks: 1990–2014. EPA 430-R-16-002. www.epa.gov/climatechange/ghgemissions/usinventoryreport.html.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.