

# Carbon Offsets – Agriculture & Forestry

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June 25, 2004



*Common Sense Solutions for  
Natural Resource Challenges*

# Carbon – Offset Opportunities

## Conservation Practice

## Potential Carbon Effect (tC/ac/yr)

Energy Crops	1.3 to 5+
Riparian Forest Buffers	1 to 5 (?)
Cropland to Forest	0.5 to 5
Cropland to Grassland	0.3 to 0.7
Windbreaks & Shelterbelts	0.25 to 0.7
Improved Forest Management	0.1 to 1.4
Conservation Tillage	0.1 to 0.25
Improved Crop Systems	0.04 to 0.12
Drainage, Wetland mgt	???
Using Forest Products	???
Extending Product Life	???

# Quantifying “Credits”

- Default/Estimate
  - Exchange adopts default from research (CCX)
- Change from Base Year
  - Measure at Year 0; Re-measure at Year X (CCX)
- Change from Business as Usual (BAU)
  - Measure at Year 0
  - Model BAU change for life of project.
  - Measure at Year X and “true up” against model
  - Credits = Difference over BAU as indicated by model

# Conservation & Carbon

- Agriculture
- Agro-Forestry
- Forestry



# Agricultural Conservation

- Improved Cropping Systems
- Conservation Tillage
- Cropland to Grassland
- Drainage, Wetland Management

# Improved Cropping Systems

- Higher crop yields (healthier plants, roots)
- Nutritional levels (plant growth, soil fauna)
- Residue management (incorporate in soil)
- Crop rotations (diversity, balance)
- Reduced soil erosion
- Range of gain – 0.04 to 0.12 tC/Ac/yr

# Conservation Tillage

- Reduced soil aeration
- Cooler soil (shade) – slows decomposition
- Increased residue input
- Reduced soil erosion
- Range of potential gain – 0.1 to 0.25 tC/Ac/yr

# Cropland to Grassland

- Could be either Conservation Reserve Program or Conservation Buffer
- Eliminate cultivation, aeration
- Increase root mass (turnover)
- Range of potential gain – 0.3 to 0.7 tC/Ac/yr



# Drainage, Wetland Management

- Saturated wetlands produce methane – a greenhouse gas 21 times as damaging to climate as carbon dioxide.
- Draining wetland soils may reduce methane, increase plant growth. It increases aeration, soil temperature, and decomposition of OM.
- Cultivating organic soils increases decomposition and emissions significantly.
- Range of potential impact – could be either positive or negative.

# Agroforestry & Energy

- Windbreaks and Shelterbelts
- Energy Crops
- Riparian Forest Buffers

# Windbreaks & Shelterbelts

- Add woody biomass; increase soil carbon
- Reduce soil erosion
- Reduce energy use (livestock facilities, farm fuels, homes)
- Lack of good growth and yield data on line-grown trees and non-commercial species
- Range of potential gain – 0.25 to 0.7 tC/Ac/yr

# Energy Crops

- 2 types of carbon benefit
  - Sequestration – increase soil carbon, woody roots
  - Substitution -- replace net increase in atmospheric CO<sub>2</sub> (fossil fuels) with a recycling process.
- Grass (switchgrass) or Trees (hybrid poplar; willow)
- Range of potential gain – 0.25 to 1 tC/Ac/yr sequestration plus 5-10 tC/ac/yr in substitution



# Riparian Forest Buffers

- Protect water quality; stream integrity
- High growth sites; moisture, nutrients
- Soil C may not change much (already high)
- Growth and Yield models for many species are lacking in the riparian situations.
- Range of potential gain – 1 to 5 tC/ac/yr

# Forest Conservation

- Cropland or Pasture to Forest
- Improved Forest Management
- Protect Forests from Conversion
- Using Forest Products
- Extending Product Life

# Crop or Pasture to Forest

- Marginal lands adapted to forest
- If soil is depleted, should recover in 25-50 years.
- Forests store wood; produce wood products that may stay intact for much longer.
- Range of potential gain – 0.5 to 5 tC/Ac/yr

# Improved Forest Management

- Longer rotations
- Fertilizer, competition control
- Full stocking; Adapt species to soil types
- Increase standing biomass on the land
- Larger wood for longer-lived products
- Range of potential gain – 0.1 to 1.4  
tC/Ac/yr



# Using Forest Products

- Wood is renewable; proper use does not degrade the environment
- Substitutes such as steel, aluminum, and concrete use much more energy to produce and use.

# Extending Product Life

- Wood coatings, preservatives
- Recycling

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