

Thoughts on Inventory, Practices, and Decision Support Systems



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Scale Matters

- Inventory methods that are efficient for estimating national fluxes often are unreliable at the project scale
 - Reliability may depend on likelihood of adverse selection
- Methods that are reliable at the project scale often are impractical at the national scale

Full Greenhouse Accounting

- Count carbon dioxide, methane, and nitrous oxide
- Consider ozone, aerosols, black carbon (soot), water vapor, halocarbons
- Consider indirect drivers: NO_x , CO, VOC, land cover albedo

Nitrous Oxide from Fertilizer

- Some new studies suggest emissions are higher than IPCC default (others say lower)
- If 4% of fertilizer N becomes N_2O (at GWP 310):

Pounds N	Mg CO_2e
10	0.088
20	0.177
40	0.354
60	0.530

How Can Landowners Participate?

- ~~Legally require sequestration~~
- Subsidies
 - Can combined with conservation programs
 - Compatible with reduction of erosion and phosphorus water pollution (Kurkalova & Kling)
 - Could undermine markets
- Markets
 - Avoid distortions of subsidies
 - Markets for “bads” require emission limits

Offset Markets

- All parties with reasonable claim to ownership must agree to distribution
 - Problematic for wood products & many projects using renewables to offset fossil fuel
- Offset value must be high enough to be worth costs to landowner
 - Permanent limits on land use generally worth much more than a few dollars per acre

Leakage

- Displacement of emissions to outside the project area
- Likely to occur if the amount of a good supplied to a market is reduced
- Calculate using price elasticities of supply and demand (Murray)

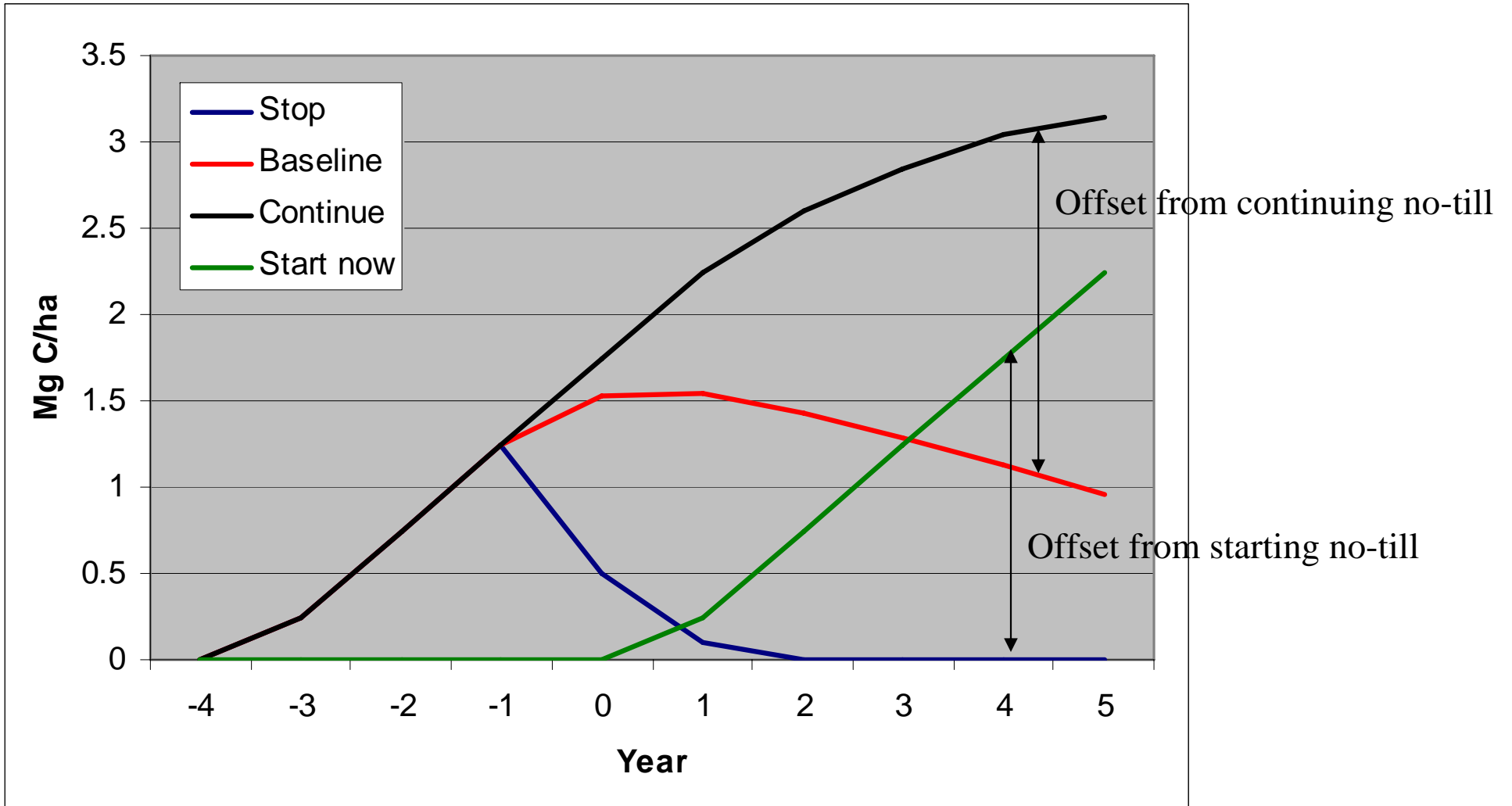
Renting Offsets

- Reversible offsets must be monitored; renting limits monitoring obligation
- Rented offsets must be replaced at end of rental period
- Value of rental = value of permanent offset now minus present value of replacing offset at end of rental period (McCarl)
- Also subtract transaction costs and risk

Baselines

- In absence of a cap, mitigation must be “additional” to what would have happened without the project
- Continuing to no-till is additional to the extent that others stop no-tilling
 - On average, farmers no-till ≤ 3 years
 - Farmers who have been no-tilling ≥ 5 years may generate more offsets than beginners

Continuing No-Till



Stop rate = 0.18/year

Quantification and Verification

- To reduce costs, use models requiring easily measured inputs to estimate carbon stocks or CH₄ or N₂O flux
 - COMET-VR for soil C
 - DNDC “GHG Wizard” for N₂O?
 - Efforts underway to calculate forest C stocks using FVS, but more input data is needed to characterize debris and forest floor stocks

Promising Practices

- Matching nitrogen inputs to plant uptake
 - Amounts, timing, forms
- Manure methane and nitrous oxide reductions
 - Especially lagoons
- Irrigation management
 - Energy, nitrous oxide, methane
- Bundling wildlife, water quality & GHG
- Wood for concrete or steel?
- Reduce stand-replacing forest fires?