Leakage with Forestry and Agriculture Offsets: What do we really know?

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Presented at: Biological Sequestration through Greenhouse Gas Offsets Conference

April 29, 2009
Washington, DC
What is Leakage?

• Efforts targeted to reduce emissions in one place simply shift emissions to another location or sector *where they remain uncontrolled or uncounted*.

• Types
  – International: shifting from an uncapped country to a capped country
  – Subnational:
    • Shifting from a capped source to an uncapped source
    • Shifting from an offset project
      – to a source in the same uncapped sector
      – to a source in another uncapped sector
Why do we care about leakage?

- Erodes the GHG benefits/offset value of a project
- Can be difficult to measure
- Difficult to enforce due to incomplete contracts
- Potential to undermine a project-based offset system
Why Leakage Occurs

• **Leakage occurs ...**
  - “whenever the spatial scale of the intervention is inferior to the full scale of the targeted problem” (Wunder 2008)
  - Rules, regulations, and incentives for action affect only part of the potential participants or emissions sources

• **Economic forces**: Supply/demand supplanted by the project is met elsewhere
  • Formal markets
  • Other institutional arrangements
Leakage in forestry and agriculture projects

• Leakage is **not unique to forest and agriculture projects**
• But, features of forestry and agriculture make them **susceptible**
  – Fixed land base: Land use change has spillover effects
  – Commodity markets are often broad in scope (regional, national, global)
Afforestation project: agricultural land

Deforestation elsewhere to clear land for agriculture
What do we know?
Does leakage really exist?
Ex post analysis of other land-based policies

✓ Wear and Murray (2004)
  ✓ Evidence: Net effects of federal timber harvests in Pacific Northwest.
  ✓ Harvests elsewhere offset reductions by 84%
  ✓ Denominated in timber, not carbon
✓ Wu (2002) and Roberts and Bucholtz (2005) – CRP program slippage

Table 8
Leakage effectsa

| Public harvest timber reductions | West coast | 1200.4 |
| Inland west | 866.8 |
| Total west | 2067.2 |
| Induced harvests elsewhere | Percent leakageb |
| Western private lands | 894.6 | 43.3% |
| South | 298.9 |
| US total | 1193.5 | 57.7% |
| Canada | 550.4 |
| North America total | 1744.0 | 84.4% |

a All quantities are in million board feet, timber scale (1990–1995 annual average).
b Leakage = Induced harvest in area / divided by total west public harvest reduction.
Predictive Estimates: Regional US Forest Carbon Programs

Program targeted at specific activities by region

<table>
<thead>
<tr>
<th>Region</th>
<th>No Harvesting Allowed</th>
<th>Harvesting Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Northwest— East Side</td>
<td>8.9</td>
<td>7.9</td>
</tr>
<tr>
<td>Northeast</td>
<td>43.1</td>
<td>41.4</td>
</tr>
<tr>
<td>Lake States</td>
<td>92.2</td>
<td>73.4</td>
</tr>
<tr>
<td>Corn Belt</td>
<td>31.5</td>
<td>-4.4</td>
</tr>
<tr>
<td>South-Central</td>
<td>28.8</td>
<td>21.3</td>
</tr>
</tbody>
</table>

Predictive Estimates: National-scale Programs

Table 6-2: Leakage Estimates by Mitigation Activity at a GHG Price of $15/t CO₂ Eq.
All quantities are on an annualized basis for the time period 2010–2110.

<table>
<thead>
<tr>
<th>Selected Mitigation Activities</th>
<th>A GHG Effects of Targeted Payment (Tg CO₂ Eq.)</th>
<th>B Net GHG Effects of All Activities (Tg CO₂ Eq.)</th>
<th>C Indirect GHG Effects from Nontargeted Activity (Tg CO₂ Eq.)</th>
<th>D Leakage Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afforestation only</td>
<td>137</td>
<td>104</td>
<td>-33</td>
<td>24.0</td>
</tr>
<tr>
<td>Afforestation + forest management</td>
<td>338</td>
<td>348</td>
<td>10</td>
<td>-2.8</td>
</tr>
<tr>
<td>Biofuels</td>
<td>84</td>
<td>83</td>
<td>-1</td>
<td>0.2</td>
</tr>
<tr>
<td>Agricultural management</td>
<td>230</td>
<td>231</td>
<td>1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Agricultural soil carbon</td>
<td>154</td>
<td>145</td>
<td>-9</td>
<td>5.7</td>
</tr>
</tbody>
</table>

* Indirect effects: \( C = (B - A) \).

* Leakage rate: \( D = -(C/A) \times 100; \) rounding occurs in table.

Note: Negative leakage rate in D refers to beneficial leakage (i.e., additional mitigation outside the selected activity region, also called positive leakage).
Leakage Myths

• Leakage is the same as “activity shifting”
  – Only if it causes the emissions to shift outside of the accounting/policy boundaries

• All leakage is bad
  • You can get positive spillover effects (but they seem rarer)

• Leakage does not occur if projects are too small to affect the market price
  – Other way around
  – Small projects don’t affect market price because of leakage
    • there are a lot of other market participants who can replace the project’s contribution to the market without disruption
What we do not know?

- Where leakage is actually happening
  - Leakage cannot be directly observed, only estimated and inferred
    - Not a simple “before/after” inference
    - Like additionality, it is tied to a baseline
      - Emissions induced beyond BAU
    - Makes leakage management difficult
- A general precise prediction of its magnitude
  - Ranges from 0 – 90%+ depending on activity, location, program design, etc...
What can we do about leakage?

- **Manage locally**
  - Improve monitoring
  - Minimize through project design

- **Discount projects for it**
  - Estimate leakage (e.g., econometrically)/hold back credits
  - No discounts if participation is sufficient

- **Systemwide accounting**
  - Expand the scale and scope of accounting to sector/national level
  - System-wide true-up

- **Adjust the cap**
  - Tighten to make up for leakage
  - Expand the cap to include more uncapped sectors

- **Forgive and Forget**
  - Ignore the leakage

- **Decouple from compliance system**
  - Exclude offset compensation from GHG target compliance
Up until now, focus has been on discounts based on predictive leakage estimates.
Another Way I: Systemwide True-up

- Set aside a leakage buffer for offsets
- Measure net changes nationally
- Reconcile project and national accounts
- Challenge:
  - Separating out leakage from natural variation of carbon in the system
  - Work in progress
Another Way II: Deal Indirectly – Tighten the Cap

• **Quantify it and adjust cap accordingly**
  – Essentially shifts the burden back to the capped sectors (explicitly)

• **Retrospectively**
  – Like with system true-up

• **Prospectively**
  – Based on predictive leakage estimates

• **Challenges**
  – Empirical
  – Political
Questions?

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