Carbon and Sustainability Tracking
Speaker Background

- Grant Domke
  - Current position:
    - Research Forester and Group leader, USDA Forest Service
    - Fellow, Institute on the Environment, University of Minnesota
    - Adjunct Assistant Professor, Department of Forest Resources, University of Minnesota
  - Credentials:
    - Ph.D. Forest Ecosystem Science, University of Minnesota
    - M.S. Forest Ecology, University of Toronto
  - Key experiences
    - Lead scientist and UNFCCC inventory compiler for forest land and harvested wood products in the US
    - IPCC, Lead Author
    - National Climate Assessment, Lead Author
    - Second State of the Carbon Cycle, Coordinating Lead Author
Why is this important?

May 18, 2020


Scripps Institution of Oceanography, San Diego
Context within the land sector

2020 NIR: (-753) MMT CO₂ eq. (14%)
National forest inventory (NFI)

- Designed to track change over time
  - Permanent sample plots
  - Remeasurement every 5-10 years
    - ca. 15% of plots remeasured annually

- Multiple approaches for assessing disturbance (e.g., disturbance code), and ecosystem variables (e.g., growth, mortality, removals)

- Observed land cover and land use attributes
Ecosystem C pools

- Aboveground live biomass
- Belowground live biomass
- Dead wood
- Litter
- Soil organic matter
  - Mineral
  - Organic

## Carbon stocks by pool in the US

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</thead>
<tbody>
<tr>
<td>Forest</td>
<td>51,527</td>
<td>52,358</td>
<td>53,161</td>
<td>53,886</td>
<td>54,663</td>
<td>55,746</td>
<td>55,897</td>
<td>56,051</td>
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<tr>
<td>Aboveground biomass</td>
<td>11,833</td>
<td>12,408</td>
<td>12,962</td>
<td>13,484</td>
<td>14,020</td>
<td>14,780</td>
<td>14,884</td>
<td>14,989</td>
</tr>
<tr>
<td>Belowground biomass</td>
<td>2,350</td>
<td>2,483</td>
<td>2,612</td>
<td>2,734</td>
<td>2,858</td>
<td>3,033</td>
<td>3,056</td>
<td>3,081</td>
</tr>
<tr>
<td>Dead wood</td>
<td>2,120</td>
<td>2,233</td>
<td>2,346</td>
<td>2,454</td>
<td>2,568</td>
<td>2,731</td>
<td>2,753</td>
<td>2,777</td>
</tr>
<tr>
<td>Litter</td>
<td>3,662</td>
<td>3,670</td>
<td>3,676</td>
<td>3,647</td>
<td>3,646</td>
<td>3,639</td>
<td>3,640</td>
<td>3,641</td>
</tr>
<tr>
<td>Soil (mineral)</td>
<td>25,636</td>
<td>25,636</td>
<td>25,637</td>
<td>25,639</td>
<td>25,641</td>
<td>25,637</td>
<td>25,637</td>
<td>25,638</td>
</tr>
<tr>
<td>Soil (organic)</td>
<td>5,927</td>
<td>5,928</td>
<td>5,928</td>
<td>5,929</td>
<td>5,929</td>
<td>5,926</td>
<td>5,926</td>
<td>5,926</td>
</tr>
<tr>
<td>Harvested wood</td>
<td>1,895</td>
<td>2,061</td>
<td>2,218</td>
<td>2,353</td>
<td>2,462</td>
<td>2,616</td>
<td>2,642</td>
<td>2,669</td>
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<tr>
<td>Products in use</td>
<td>1,249</td>
<td>1,326</td>
<td>1,395</td>
<td>1,447</td>
<td>1,471</td>
<td>1,505</td>
<td>1,513</td>
<td>1,521</td>
</tr>
<tr>
<td>SWDS</td>
<td>646</td>
<td>735</td>
<td>823</td>
<td>906</td>
<td>991</td>
<td>1,112</td>
<td>1,129</td>
<td>1,148</td>
</tr>
<tr>
<td><strong>Total stocks</strong></td>
<td>53,423</td>
<td>54,419</td>
<td>55,380</td>
<td>56,239</td>
<td>57,124</td>
<td>58,362</td>
<td>58,539</td>
<td>58,720</td>
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## Estimated emissions and removals

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</thead>
<tbody>
<tr>
<td>Forest land remaining forest land(^b)</td>
<td>(610.1)</td>
<td>(598.7)</td>
<td>(572.1)</td>
<td>(572.6)</td>
<td>(556.2)</td>
<td>(565.5)</td>
<td>(552.0)</td>
<td>(564.5)</td>
</tr>
<tr>
<td>Non-CO(_2) emissions from fire</td>
<td>1.5</td>
<td>0.6</td>
<td>2.9</td>
<td>8.2</td>
<td>4.6</td>
<td>5.6</td>
<td>18.8</td>
<td>18.8</td>
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<tr>
<td>N(_2)O emissions from forest soils</td>
<td>0.1</td>
<td>0.3</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Non-CO(_2) emissions from drained organic soils</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
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<td>0.1</td>
</tr>
<tr>
<td>Forest land converted to non-forest land(^b)</td>
<td>119.1</td>
<td>120.8</td>
<td>122.5</td>
<td>124.4</td>
<td>126.0</td>
<td>127.4</td>
<td>127.4</td>
<td>127.4</td>
</tr>
<tr>
<td>Non-forest land converted to forest land(^b)</td>
<td>(109.4)</td>
<td>(109.7)</td>
<td>(109.9)</td>
<td>(110.2)</td>
<td>(110.4)</td>
<td>(110.6)</td>
<td>(110.6)</td>
<td>(110.6)</td>
</tr>
<tr>
<td>Harvested wood products</td>
<td>(123.8)</td>
<td>(112.2)</td>
<td>(93.4)</td>
<td>(106.0)</td>
<td>(69.1)</td>
<td>(92.4)</td>
<td>(95.7)</td>
<td>(98.8)</td>
</tr>
<tr>
<td>Woodlands remaining woodlands(^c)</td>
<td>5.0</td>
<td>4.9</td>
<td>4.8</td>
<td>4.6</td>
<td>4.4</td>
<td>4.1</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Urban trees in settlements(^d)</td>
<td>(96.4)</td>
<td>(103.3)</td>
<td>(110.4)</td>
<td>(117.4)</td>
<td>(124.6)</td>
<td>(129.8)</td>
<td>(129.8)</td>
<td>(129.8)</td>
</tr>
<tr>
<td><strong>Total Emissions and Removals</strong></td>
<td>(813.9)</td>
<td>(797.2)</td>
<td>(755.0)</td>
<td>(768.4)</td>
<td>(724.7)</td>
<td>(760.6)</td>
<td>(737.3)</td>
<td>(752.9)</td>
</tr>
</tbody>
</table>

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\(^{c}\) Data from [Carlon Leadership Forum](https://www.carlonleadershipforum.com)

\(^{d}\) Data from [Carbon Leadership Forum](https://www.carlonleadershipforum.com)
Emissions and removals, 2018
Aboveground live carbon by ownership

![Bar graph showing aboveground live tree carbon density and mean annual net change by ownership and stocking level.]

- **Federal**, **State and local**, and **Private** ownership categories are compared.
- Stocking levels include Overstocked, Fully stocked, Medium stocked, Poorly stocked, and Nonstocked.
- The graph indicates differences in carbon density and net change across these categories.
Harvested wood products estimation

1. Stock change methods
   - All HWP consumed in the area, regardless of origin
   - Imports are included, exports are excluded

2. Production methods
   - All HWP produced from timber harvested in the area
   - Exports are included, imports are excluded

3. Atmospheric flow methods
   - Direct estimation of annual atmospheric flux within domain boundaries

4. Combined methods

Final thoughts

- Forest Service continues to expand role in GHG estimation and reporting
- FIA data serves as the foundation
- Developing more spatially and temporally resolved information
- Continue to improve and expand capabilities - collaboration and partnerships are essential
- Inform policy and land management practices across scales
Thank you

Grant Domke: grant.m.domke@usda.gov

FIA program: www.fia.fs.fed.us

FIA carbon: http://www.fia.fs.fed.us/forestcarbon/