Carbon and greenhouse gas evaluation of conservation practices

COMET-Planner

C-AGG/CSU Workshop
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Evaluating Greenhouse Gas Benefits of Conservation Practices

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1) Aligning GHG reduction estimates with **COMET-Farm** and the USDA entity-scale GHG inventory methods

2) Improving the spatial resolution of estimates from the sub-national scale to multi-county regions

3) Adding options for implementing various interpretations of Conservation Practice Standards
Constructing Conservation Scenarios

**BASELINE**

Intensive tillage

**CONSERVATION PRACTICE**

No tillage or strip tillage
Constructing Conservation Scenarios

**BASELINE**

**CONSERVATION PRACTICE**

**COVER CROP**

**CODE 349**

**DEFINITION**

Grasses, legumes, and forbs planted for seasonal vegetative cover.

**PURPOSE**

This practice is applied to support one or more of the following purposes:

- Reduce erosion from wind and water.
- Maintain or increase soil health and organic matter content.
- Reduce water quality degradation by offering bioactive litter and root residues.
- Suppress competitive weed pressures and insect pests.
- Improve soil moisture use efficiency.
- Minimize soil compaction.

**CONDITIONS WHERE PRACTICE APPLIES**

All lands having substantial vegetation cover for natural resource protection or improvement.

**CRITERIA**

General Criteria Applicable to All Practices:

- Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, fertility requirements, and planting methods will be consistent with applicable federal and state regulations, and soil, climatic, and other site conditions.

- Sustain productive grasses, or cover crops planted in early rotational into production crops. Select species and planting dates that will not compete with the production crop yield or harvest.

- Do not plant cover crops earlier than maturity of the preceding crop.

- Do not plant cover crops in the fall.

- Do not plant cover crops in the spring.

- Do not plant cover crops on soils with the following characteristics:

  - Soil erodibility
  - Field crops

- Additional Criteria to Reduce Erosion from Wind and Water:

- Manage cover crop establishment in conjunction with other practices to adequately protect the soil during the critical erosion period.

- Manage cover crops that will have the physical characteristics necessary to provide adequate erosion protection.

- Use the current erosion prediction technology to...
GHG Estimation Methods

Typical practices/average inputs

<table>
<thead>
<tr>
<th>State</th>
<th>Crop</th>
<th>Non-Irrigated N</th>
<th>Irrigated N</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>alfalfa</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>California</td>
<td>barley</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>California</td>
<td>corn</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>California</td>
<td>cotton</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>California</td>
<td>dry field beans</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
GHG Estimation Methods
Results and Evaluation

GHG Reductions (Mg CO₂ Eq ha⁻¹ yr⁻¹)

Soil Carbon
Soil Nitrous Oxide
Results and Evaluation
Web Tool and Reporting

Step 1
Begin by naming your project and selecting your state and county

Project Name:  
State:  CA  
County:  Alameda

Step 2
Select the class of conservation practices that best describes the practice you would like to evaluate

- Cropland Management
- Grazing Lands
- Woody Plantings
- Cropland to Perennial Cover
- Restoration of Disturbed Lands
- Turf Management

NRCS Conservation Practices included in COMET-Planner are only those that have been identified as having greenhouse gas mitigation and/or carbon sequestration benefits on farms and ranches. This list of conservation practices is based on the qualitative greenhouse benefits ranking of practices prepared by NRCS.
Web Tool and Reporting

Step 3: Select a NRCS Conservation Practice Standard and a Practice Implementation that best describes your system. You may add multiple practices if you would like to add a practice under a different class of practices, return to Step 2.

- Conservation Practice Standard
  - Combustion System Improvement (CPS 372)
  - Conservation Crop Rotation (CPS 328)
  - Cover Crop (CPS 340)
  - Mulching (CPS 494)
  - Multiple Conservation P
  - Nutrient Management ( )
  - Residue and Tillage Ma
  - Residue and Tillage Ma

Step 4: Enter the acreage associated with each conservation practice you selected

- Conservation Practice Implementation
  - Add Legume Seasonal Cover Crop to Irrigated Cropland
  - Add Legume Seasonal Cover Crop to Non-Irrigated Cropland

Enter the acreage associated with each conservation practice you selected

Approximate Carbon Sequestration and Greenhouse Gas Emission Reductions
(tonnes CO₂ equivalent per year)

<table>
<thead>
<tr>
<th>Practice Description</th>
<th>Acreage</th>
<th>Carbon Dioxide</th>
<th>Nitrous Oxide</th>
<th>Methane</th>
<th>Total CO₂-Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover Crop (CPS 340) - Add Legume Seasonal Cover Crop to Non-Irrigated Cropland</td>
<td>100 ac</td>
<td>64</td>
<td>-19</td>
<td>0</td>
<td>45</td>
</tr>
</tbody>
</table>

Total: 64 -19 0 45

Notes:
1. Negative values indicate a loss of carbon or increased emissions of greenhouse gases.
2. Values were not estimated due to limited data on reductions of greenhouse gas emissions from this practice.

Download and Print COMET Planner Results
Status and Future Plans

- Beta version for CA

- Full release late winter 2017
  - Detailed documentation

- Refine livestock manure management practices

- Add practices for rice

- Add practices for orchards/vineyards
  - COMET-Farm improvements

- Organic soils?