Soil Mapping, Classification and Land Use Planning

Environmental Management Branch
Ontario Ministry of Agriculture, Food and Rural Affairs

Farmland Forum - March 2017
Ontario has about 4.1 million ha of prime agricultural land (4.4% of Ontario’s land).

In 2011, AAFC estimated 57% of Ontario farmland was in a moderate-very high erosion risk category and 82% was losing organic matter.
Soil Health & Conservation Strategy

Theme Areas

- Soil Management
- Soil Information and Mapping
- Soil Monitoring and Modeling
- Soil Knowledge and Innovation

Benefits

- Environmental Benefits
- Economic Benefits
- Social Benefits

Theme Inter-relationships
Soil mapping and classification project

Soil map renewal is required for a number of reasons:

• Land-use pressures
• Current information is not able to support evidence-based decision-making – policy, gov’t initiatives
• New technology (LiDAR, geophysical tools) and software (GIS, eCognition, etc.) and methods e.g. predictive mapping
• County boundary changes
• Original map creation left soils misaligned with true landscape position
• Classification of areas not previously mapped
Planned Mapping Areas

• Initial 2 year window of funding support from GF2.

Year 1 – 2016/17

• City of Ottawa
• County of Peterborough
• Northeastern Ontario: Cochrane – Hearst

Year 2 - 2017/18

• City of Ottawa
• County of Peterborough
• Northeastern Ontario: Cochrane – Hearst
• Grand River Conservation Authority – north
• Temiskaming Shores
Data to Support Mapping

LiDAR (Light Detection And Ranging) acquisition

- 2 year project – 2016-2018
- 3 planned capture areas
  - Leaf off: Fall 2016 and Spring 2017
- Cochrane - Hearst and Peterborough - 2016/17
- Lake Erie watershed – 2017
- Total planned acquisition area - 30,000 km²
- Develop detailed surface topography and elevation models.
Soil Classification

- Canada Land Inventory Soil Capability Classification for Agriculture (Ontario Version)
  - Climate limitation (C)
  - Soil limitations (S)
  - Topographic limitations (T)

\[ \text{CLI} = f(C, S, T) \]

http://www.omafra.gov.on.ca/english/landuse/classify.htm
Agricultural Capability – Climate Factor

- Climate (C) – based on Crop Heat Units
Agricultural Capability – Soil Factors

Soil Profile Characteristics

- Soil structure/permeability (D)
- Soil erosion (E)
- Soil fertility (F)
- Risk of flooding (I)
- Moisture deficiency (M)
- Excess water (W)
Agricultural Capability – Landscape Factors

- Surface stoniness (P)
- Shallowness to bedrock (R)
- Topography (T)
Agricultural Capability

- CLI is designed for common field crops
- 7 class system from least to most limiting
- CLI can be found on Agricultural Information Atlas

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>No significant limitations</td>
</tr>
<tr>
<td>Class 2</td>
<td>Moderate limitations</td>
</tr>
<tr>
<td>Class 3</td>
<td>Moderately severe limitations</td>
</tr>
<tr>
<td>Class 4</td>
<td>Severe limitations</td>
</tr>
<tr>
<td>Class 5</td>
<td>Very severe limitations</td>
</tr>
<tr>
<td>Class 6</td>
<td>Uns suited for cultivation, ok for pasture</td>
</tr>
<tr>
<td>Class 7</td>
<td>No capability for arable culture</td>
</tr>
</tbody>
</table>

Thanks!
Role of Soils Information in Planning

- Soils
- Fragmentation
- Land use
- Other Factors

Prime agricultural areas and rural lands

Soils Information

Role of Soils Information in Planning
Prime Agricultural Land

“means lands that include specialty crop areas and/or Canada Land Inventory Classes 1, 2 and 3 soils, in this order of priority for protection.”
Prime Agricultural Area

“means an area where prime agricultural lands predominate. This includes areas of prime agricultural land and associated Canada Land Inventory Class 4-7 soils, and additional areas where there is a local concentration of farms which exhibit characteristics of ongoing agriculture.”
Identifying Prime Agricultural Areas

- Easier to identify where large areas of prime agricultural land predominate (poor pockets are limited to ravines, wetlands, etc.)

- But some landscapes of Ontario are characterized by:
  - Important agricultural activity on class 4-7 lands
  - Diverse soil classifications with large pockets of lower capability soils
  - Extensive fragmentation and non-farm development
When the situation is complex - there is a need for a collaborative and rigorous decision making process for large regions (not sites)
Common Elements of Agricultural Studies

- **Soils (Land Capability)**
  - CLI for Common Field Crops (areas where Class 1, 2 and 3 soils predominate)

- **Size**
  - Identify in large blocks (approximately 250 hectares in size).

- **Other Criteria**
  - Existing uses (fragmentation, agricultural vs. non-agricultural uses).

- **Identifiable Boundaries**
  - i.e. roads, property lot lines, large water bodies
Impacts of new soil information

• Updated soil information will be used by the province and municipalities as they review their official plans to determine which areas are most suitable for agricultural protection.

• New soil classifications could grow, reduce, or maintain the total area of prime agricultural areas, depending on the identification methods used.
• Ontario is investing in improved soils information to better protect the agricultural land base and support agri-food economic development.
• Soils and land classification are the primary driver of whether an area is considered a prime agricultural area, along with evaluating agricultural production and other factors affecting ongoing agriculture.
• Identification of prime agricultural areas is based on the best information available, drawing from many factors based on policy and a collaborative process.