Historical Perspectives on Soil Loss

Francisco J. Arriaga¹ and Greg Andrews²
1-Assistant Professor, Dept. of Soil Science, UW-Madison
2-Professor, Agriculture Agent and Department Head, UW-Extension
Pierce County

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Soil Erosion was a Problem

Providence Canyon

(http://www.thebluetrail.com)
The Dust Bowl

• Started around 1931 due to severe droughts
• Number of storms in 1932: 14
• Number of storms in 1933: 38
  – Franklin Roosevelt takes office
  – Soil Erosion Service (SES) starts Sept. 13

(http://www.english.illinois.edu/maps/depression/dustbowl.htm)
The Dust Bowl

- In 1934 drought covers 75% of the country, affecting 27 states severely
- Worst dust storm, Black Sunday, occurs in 1935
- Foundation for the soil conservation districts program passed in 1936
- In 1937 the Shelterbelt Project begins (trees planted across the Great Plains to protect the soil from erosion)
- Several conservation approaches in combination helped reduce wind erosion by 65% in 1938
- Rains bring an end to the drought in 1939

(http://www.english.illinois.edu/maps/depression/dustbowl.htm)
Early Conservation Work in WI

• The 1\textsuperscript{st} specific recommendations to control wind erosion damage were made by F.H. King in the late 1800’s.

• For the Plainfield sand area King recommended
  – tree shelter-belts in north and west side of fields
  – cropping fields to alternate strips of dense growing and open crops
  – “Destructive Effects of Winds on Sandy Soils and Light Sandy Loams, and Methods of Protection”, published in October 1894

(Zeasman and Hembre. A Brief History of Soil Erosion Control in Wisconsin, 1963)
Early Conservation Work in WI

• Professor O.R. Zeasman pioneered erosion control started in 1922
  – Gully control in Buffalo County (20 to 50ft deep)
  – Introduced diversion terraces
  – Soil Conservationist appointment jointly with SCS and UW-Extension starting in 1936
  – Introduced air tours to provide aerial view of erosion damages to farmers

(Zeasman and Hembre. A Brief History of Soil Erosion Control in Wisconsin, 1963)
Coon Creek Watershed Project

• Established in 1933 by SES (later SCS and then NRCS) to demonstrate the value of soil conservation practices.

• From late 1933 until 1935 418 of the 800 farmers in the valley signed cooperative agreements.

• Practices started to spread to other areas

• Trimble and Lund (1982) estimated a 75% reduction in erosion in 48 years, with only a 6% reduction in cropland. Trout returned to area streams.

(“Coon Valley, Wisconsin: A Conservation Success Story” by Douglas Helms)
## WI Accomplishments 1937-1962

- 71 conservation districts (35,017,600 acres)

<table>
<thead>
<tr>
<th>Practice</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contour strip cropping</td>
<td>1,1069,013 acres</td>
</tr>
<tr>
<td>Terraces</td>
<td>3,885 miles</td>
</tr>
<tr>
<td>Diversions</td>
<td>2,370 miles</td>
</tr>
<tr>
<td>Land smoothing</td>
<td>14,369 acres</td>
</tr>
<tr>
<td>Tile drains</td>
<td>6,520 miles</td>
</tr>
<tr>
<td>Pasture/hay renovation</td>
<td>349,815 acres</td>
</tr>
<tr>
<td>Tree planting</td>
<td>151,251 acres</td>
</tr>
<tr>
<td>Windbreaks</td>
<td>4,496 acres</td>
</tr>
<tr>
<td>Wildlife wetland development</td>
<td>18,006 acres</td>
</tr>
<tr>
<td>Hedgerow planting</td>
<td>711 miles</td>
</tr>
</tbody>
</table>

(Zeasman and Hembre. A Brief History of Soil Erosion Control in Wisconsin, 1963)
Soil Erosion was a Problem

Maiden Rock, WI circa 1975
Cropland Erosion Rate
Five County Area in IA, MN & WI
Clayton (IA); Houston and Winona (MN); Crawford and Vernon (WI)

Soil Erosion IS a Problem

May 7, 2012

May 2, 2012

June 16, 2012
Reduction in CRP Acreage (Oct. 2012)

(Data were provided by Scott Walter, Wisconsin DNR)
Soil erosion continues to be a problem.

What can be done?
Soil Erosion Management Practices

• Contour planting
• Contour buffer strips
• Terraces
• Grassed waterways
• Riparian buffers

• No-till and reduced tillage
  – Cover crops
Erosion Management Practices

Contour strips
Crawford Co.

Courtesy: R.P. Wolkowski
Contour buffer strips
Chippewa Co.

Erosion Management Practices

Courtesy: R.P. Wolkowski
Erosion Management Practices

Terraces
Grant Co.

Courtesy: R.P. Wolkowski
Riparian buffer
Waupaca, Co.

Erosion Management Practices

Courtesy: R.P. Wolkowski
Erosion Management Practices

Grass waterway
Grant Co.

Courtesy: R.P. Wolkowski
Crop residue is still the farmer’s best erosion prevention tool

- Reduced detachment
- Hinders overland flow
- Improved infiltration

Courtesy: R.P. Wolkowski
Strip tillage offers compromise between full width tillage and no-till

Courtesy: R.P. Wolkowski
Crop Residue Cover

- **Conventional Tillage**
  - (<15% residue)
- **Reduced Tillage**
  - (15-30% residue)
- **Conservation Tillage**
  - (>30% residue)
Line Transect Method of Measuring Residue

Stretch tape diagonally

Count “hit” per tape length

Courtesy: R.P. Wolkowski
Surface Residue in Corn After Soybean

55-70%

~15%

(NHSS issue #2 2008, Wolkowski, Cox and Leverich)
Soil Temperature & Tillage

Measured at a 2” Depth between 4:00-5:00pm in Arlington, WI

- On average, soil temperature under no-till was 6 to 8°F cooler.
- In other words, it took approx. 1 week longer for temps. in no-till get above 60°F.
- Minimal use of row cleaners in this case.

Courtesy: R.P. Wolkowski
Corn Yield 1997-2007

CONTINUOUS CORN

Yields with Chisel:
4% > Strip-till
8% > No-till

CORN AFTER SOYBEAN

Yields with Chisel:
= Strip-till
5% > No-till

(NHSS issue #2 2008, Wolkowski, Cox and Leverich)
<table>
<thead>
<tr>
<th>System</th>
<th>Corn Yield *</th>
<th>Cost per acre</th>
<th>Cost per bu</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONTINUOUS CORN</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chisel</td>
<td>182.0</td>
<td>$ 463.85</td>
<td>$ 2.55</td>
</tr>
<tr>
<td>Strip-till</td>
<td>174.4</td>
<td>$ 440.65</td>
<td>$ 2.53</td>
</tr>
<tr>
<td>No-till</td>
<td>166.7</td>
<td>$ 437.95</td>
<td>$ 2.63</td>
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</tbody>
</table>

**Difference from Chisel**

<table>
<thead>
<tr>
<th>System</th>
<th>Difference</th>
<th>Cost per acre</th>
<th>Cost per bu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip-till</td>
<td>-7.6</td>
<td>-$ 23.20</td>
<td>-$ 0.02</td>
</tr>
<tr>
<td>No-till</td>
<td>-15.3</td>
<td>-$ 25.90</td>
<td>$ 0.08</td>
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<th>Cost per bu</th>
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<tr>
<td><strong>CORN AFTER SOYBEAN</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chisel</td>
<td>194.1</td>
<td>$ 463.85</td>
<td>$ 2.39</td>
</tr>
<tr>
<td>Strip-till</td>
<td>194.2</td>
<td>$ 440.65</td>
<td>$ 2.27</td>
</tr>
<tr>
<td>No-till</td>
<td>185.4</td>
<td>$ 437.95</td>
<td>$ 2.36</td>
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**Difference from Chisel**

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<th>Cost per bu</th>
</tr>
</thead>
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<tr>
<td>Strip-till</td>
<td>0.1</td>
<td>-$ 11.20</td>
<td>-$ 0.12</td>
</tr>
<tr>
<td>No-till</td>
<td>-8.7</td>
<td>-$ 25.90</td>
<td>-$ 0.03</td>
</tr>
</tbody>
</table>

* - yield is an average from 1997-2007.

(NHSS issue #2 2008, Wolkowski, Cox and Leverich)
New Technologies

• Better equipment designed to handle residue

• Precision agriculture tools, such as auto-steer, VRT controls, etc.

• New crop varieties more resistant to drought, heat, and pest pressure
Precision Agriculture Tools

• GPS and precision agriculture tools have facilitated the establishment, maintenance, and record keeping of soil conservation practices
  – System of satellites controlled by Dept. of Defense (DOD)
  – Fast, accurate, on-the-go positioning
  – Reliable and consistent
  – Different corrections depending on needs
How Does the Future Look?

- At the December 2012 Wisconsin Farm Bureau Federation Annual Meeting and Conference in WI Dells two key policy decisions were made:
  - Wisconsin Farm Bureau reaffirmed its policy to support cross-compliance between federally subsidized crop insurance and conservation compliance under Federal Farm Bill legislation. *Wisconsin Farm Bureau also honors 4 members each year with their Aldo Leopold conservation award program.*
  - Wisconsin Farm Bureau also reaffirmed its support for base funding by the Wisconsin Department, Trade and Consumer Protection agency (WDATCP) to County Land Conservation Departments.
Closing Remarks

• Many challenges have been conquered, but hurdles still exist in soil erosion control.

• Lessons can be learned from history as we look at the present and into the future.

• “Older” techniques are still useful and very effective in controlling soil erosion, however new opportunities, needs, and circumstances should be kept in mind as we continue the constant fight against soil erosion.
“Not until tillers of soil grew more food than they themselves required were their fellows released to do other tasks than the growing of food—that is, to take part in a division of labor that became more complex with the advance of civilization.”