From Know-How to Do-Now
Protecting Iowa’s Soil & Water through Science

Kamyar Enshayan
University of Northern Iowa
Looking East over Northern Cedar Falls
Big Problem

• Current law allows filling and degrading, and floodplains, especially in urban areas
• Current law allows re-building in the floodway
• Local Boards of Adjustments routinely grant variances
Common urban floodplain to be developed
Brand new homes built in the floodplain by current rules, all had 4 feet of water in their living rooms.
Cedar Falls’ Floodplain Ordinance  Effective Jan 1, 2010

• 500-year flood event as the regulatory flood elevation
• No new subdivisions in the 500-year floodplain
• Limits amount of fill
• Floodplain Task Force to recommend fine-tuning minor changes to the ordinance
The Root River drains two SE MN counties into the Mississippi River after a 2” rain. July 4, 2005
### Nitrate-nitrogen loss to tile drains

(Randall et al., 1997)

<table>
<thead>
<tr>
<th>Cropping system</th>
<th>NO$_3$-N loss (kg ha$^{-1}$ yr$^{-1}$)</th>
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</thead>
<tbody>
<tr>
<td>Continuous corn</td>
<td>55</td>
</tr>
<tr>
<td>Corn-soybean rotation</td>
<td>52</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>2</td>
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<tr>
<td>CRP (perennial grasses and alfalfa)</td>
<td>1</td>
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</tbody>
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Maintaining simple vegetation systems requires active intervention.

Atrazine is the second most heavily used herbicide in U.S. agriculture (~70 million lbs a.i. per year = ~32 million kg a.i. per year).
May 2004, Marshall County, Iowa

Need for diverse cropping systems

Photo: Kamyar Enshayan
Dr. Matt Helmers, ISU
Associate Professor and Extension Engineer
Department of Ag. and Biosystems Engineering
Perennial vegetation can be placed into annual cropland to provide conservation benefits that are disproportionately greater than the land area occupied.
Visual Examples (4 inch rain in June 2008)

100% Crop

10% Perennial
90% Crop

100% Perennial
Impacts of biodiversity in agricultural systems: Results from two field experiments in Iowa

Matt Liebman
Iowa State University
ISU Marsden Farm, Boone Co., Iowa
The plots are 18 m x 85 m. The experiment was initiated in 2001.

Diverse rotations have higher yields
88% less herbicides -- 200 times less freshwater toxicity
80% less synthetic nitrogen

Substantially less soybean disease
Diverse rotations used 48-51% less energy
Similar profit to corn-bean
Cropping System Effects on Soil Physical Properties

Soil Bulk Density in Corn, October 2011

<table>
<thead>
<tr>
<th>Depth</th>
<th>2-year</th>
<th>3-year</th>
<th>4-year</th>
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<tr>
<td>0-15 cm</td>
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<tr>
<td>15-30 cm</td>
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<tr>
<td>30-60 cm</td>
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<td>Average</td>
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Bulk density (g cm$^{-3}$)
We have a way...

to blur the lines between working and conservation lands
Hogs on pastures, Tom Frantzen, Chickasaw County

Photo: Kamyar Enshayan
Native pastures, grass-fed beef