Potential for Groundwater Banking on Agricultural Land

by:

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Agricultural groundwater banking = On Farm Recharge

What type of agricultural land is best suited to capture and infiltrate water during times of excess?
Which soils work best?

Claypans

Layered soils

Coarse textured & Homogeneous
Model development using SSURGO data

Fuzzy Logic Rating System

- Deep Percolation
  - Lowest Ksat
  - Fuzzy logic: more is better

- Root zone residence time
  - Harmonic mean of Ksat & Drainage class
  - Fuzzy logic: more is better

- Topographic limitations
  - Slope class SSURGO
  - Crisp ratings

- Chemical Limitations
  - Electrical Conductivity & SAR
  - Fuzzy logic: less is better

- Surface Condition
  - Erodibility Factor Kw
  - Fuzzy logic: less is better

SAGBI rating
SAGBI modified for deep tillage

Optimum & less is better
More is better

(Weights)
(27.5%) Deep Percolation
(27.5%) Root zone residence time
(20%) Topographic limitations
(20%) Chemical Limitations
(5%) Surface Condition

(Weights)
(27.5%) Deep Percolation
(27.5%) Root zone residence time
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(20%) Chemical Limitations
(5%) Surface Condition
### 5.1 million acres suitable for groundwater banking

<table>
<thead>
<tr>
<th>SAGBI group</th>
<th>Extent (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1,477,191</td>
</tr>
<tr>
<td>Good</td>
<td>1,747,712</td>
</tr>
<tr>
<td>Mod. Good</td>
<td>1,786,972</td>
</tr>
<tr>
<td>Mod. Poor</td>
<td>1,343,250</td>
</tr>
<tr>
<td>Poor</td>
<td>4,866,942</td>
</tr>
<tr>
<td>Very poor</td>
<td>6,375,277</td>
</tr>
</tbody>
</table>
Soils Modified by Deep Tillage

Many soils that contain restrictive horizons have been modified by deep tillage. This alteration has not been updated in most soil surveys.
<table>
<thead>
<tr>
<th>SAGBI group</th>
<th>Modified by deep tillage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>acres</td>
</tr>
<tr>
<td>Excellent</td>
<td>1,557,035</td>
</tr>
<tr>
<td>Good</td>
<td>2,020,921</td>
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<tr>
<td>Mod. Good</td>
<td>1,984,414</td>
</tr>
<tr>
<td>Mod. Poor</td>
<td>1,364,066</td>
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<tr>
<td>Poor</td>
<td>4,586,645</td>
</tr>
<tr>
<td>Very poor</td>
<td>6,084,142</td>
</tr>
</tbody>
</table>
Link to SoilWeb
Link to Series Extent Explorer
What does agricultural groundwater banking look like?

How much is too much or too often?

http://www.npr.org
Future Questions:

• What are the most appropriate crops for GW banking?
• What are the challenges associated with annual crops?
• Potential for groundwater contamination?
• Grower concerns?
• What types incentives might be available and how can they be cultivated?
• Could this practice harm soils or infrastructure?
Thank You

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