



**Dr. Greg Ruark**

**A Role for  
Agroforestry  
in  
Sustainable  
Agriculture**

[www.unl.edu/nac](http://www.unl.edu/nac)

United Nations  
CSD-16

May 5, 2008

*Agroforestry is relatively new  
in the temperate U.S.*

**UN CSD-16**  
**Cross-cutting Issues**

**\*Reduce Poverty / Increase Income\***

**\*Sustainable Production Systems\***

**\*Protect Natural Resource Base\***

***Agroforestry isn't ----***

**conversion of agricultural lands  
to forests, rather it leaves them  
in production agriculture**

***Agroforestry is ----***

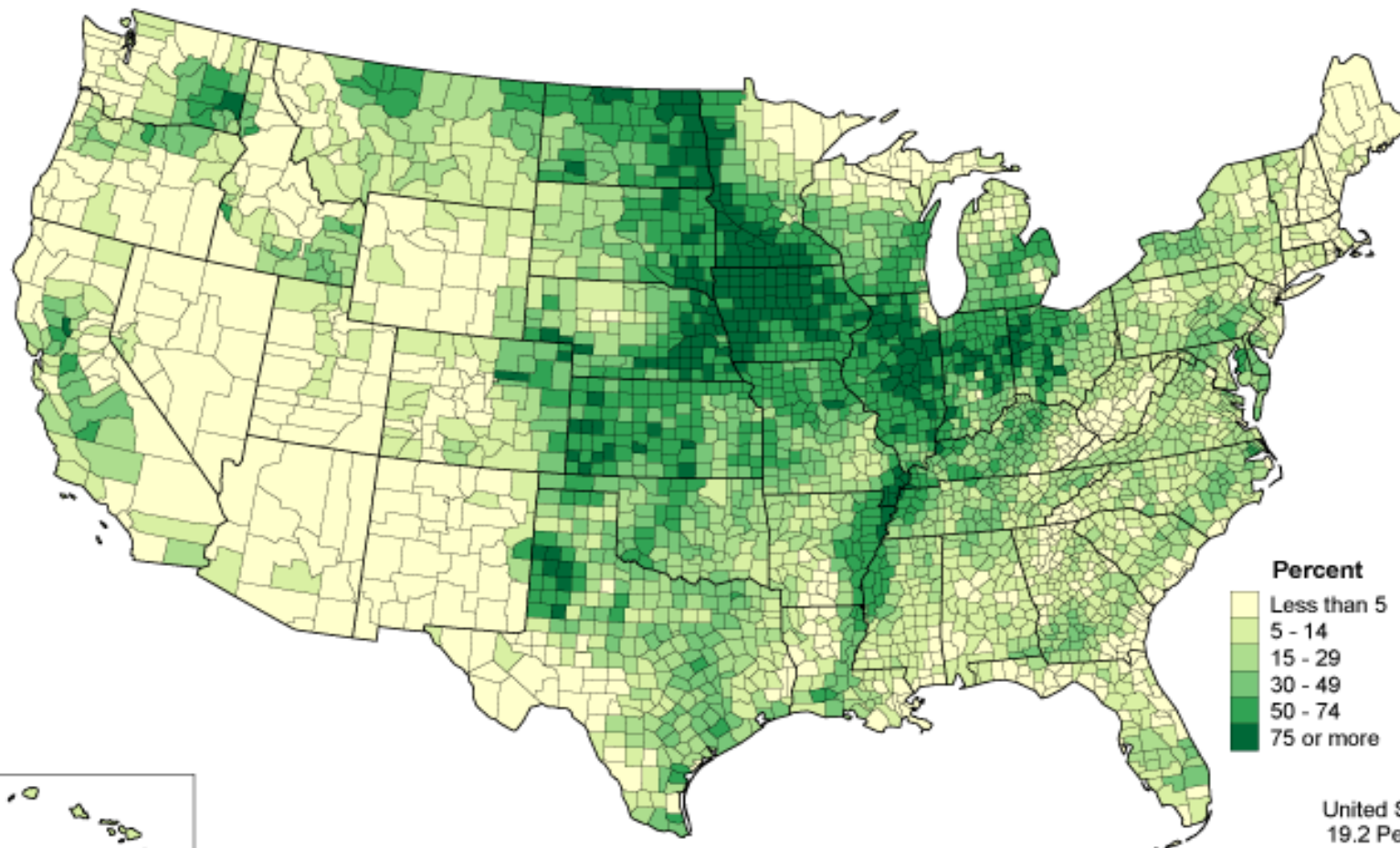
**the integration of agriculture and  
forestry production and  
conservation technologies**

# **Sustainable Agriculture**

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**Challenges  
Remain**

# Acres of Total Cropland as Percent of Land Area in Acres: 2002

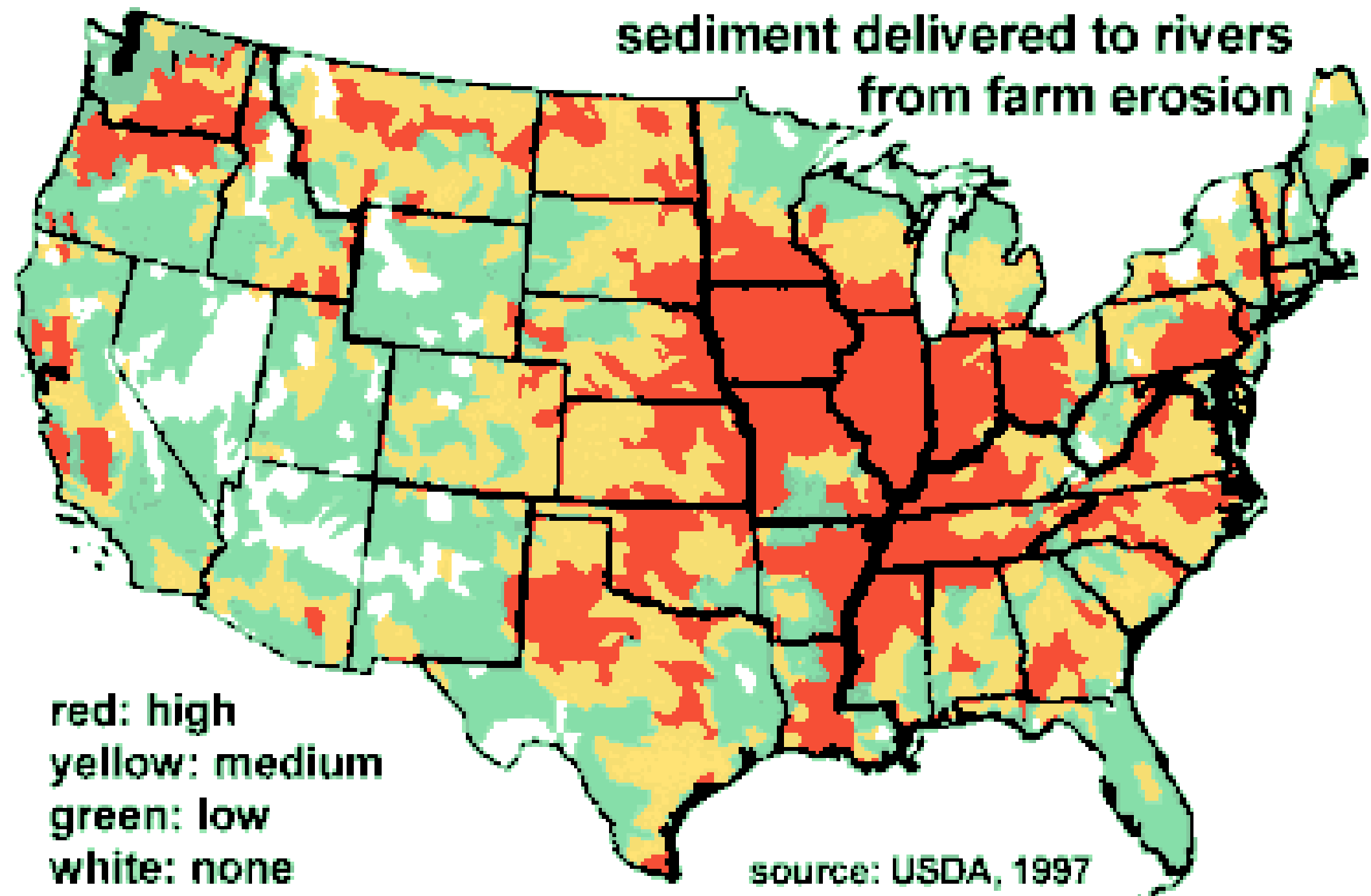


**Percent**  
Less than 5  
5 - 14  
15 - 29  
30 - 49  
50 - 74  
75 or more

United States  
19.2 Percent



# sediment delivered to rivers from farm erosion

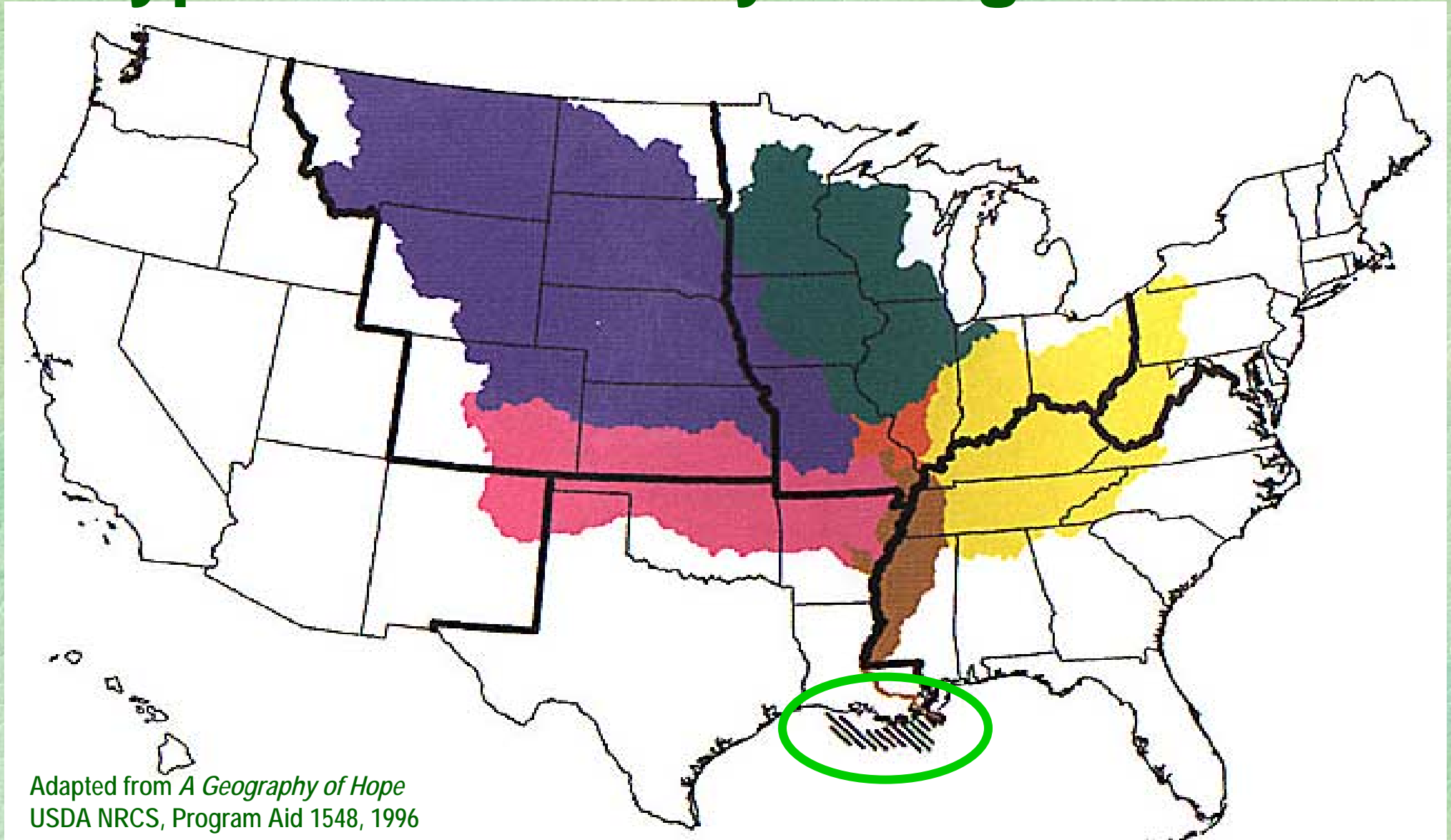


red: high  
yellow: medium  
green: low  
white: none

source: USDA, 1997

# The “Dead Zone”

## Hypoxia Caused by Nitrogen Runoff



Adapted from *A Geography of Hope*  
USDA NRCS, Program Aid 1548, 1996



**24 %  
of  
U.S.  
Cropland  
Under  
No-Till**

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**but  
76%  
is not**



SOURCE: NRCS

**No-Till**

*Down  
on  
the farm*



**Bank Channel Erosion**



**Fertilizer / Pesticide**



**Soil Erosion**

# Watershed Consequences for Society



- ✓ Polluted water
- ✓ Loss of fish / wildlife
- ✓ Low recreation / aesthetics
- ✓ Sediment & flood damage



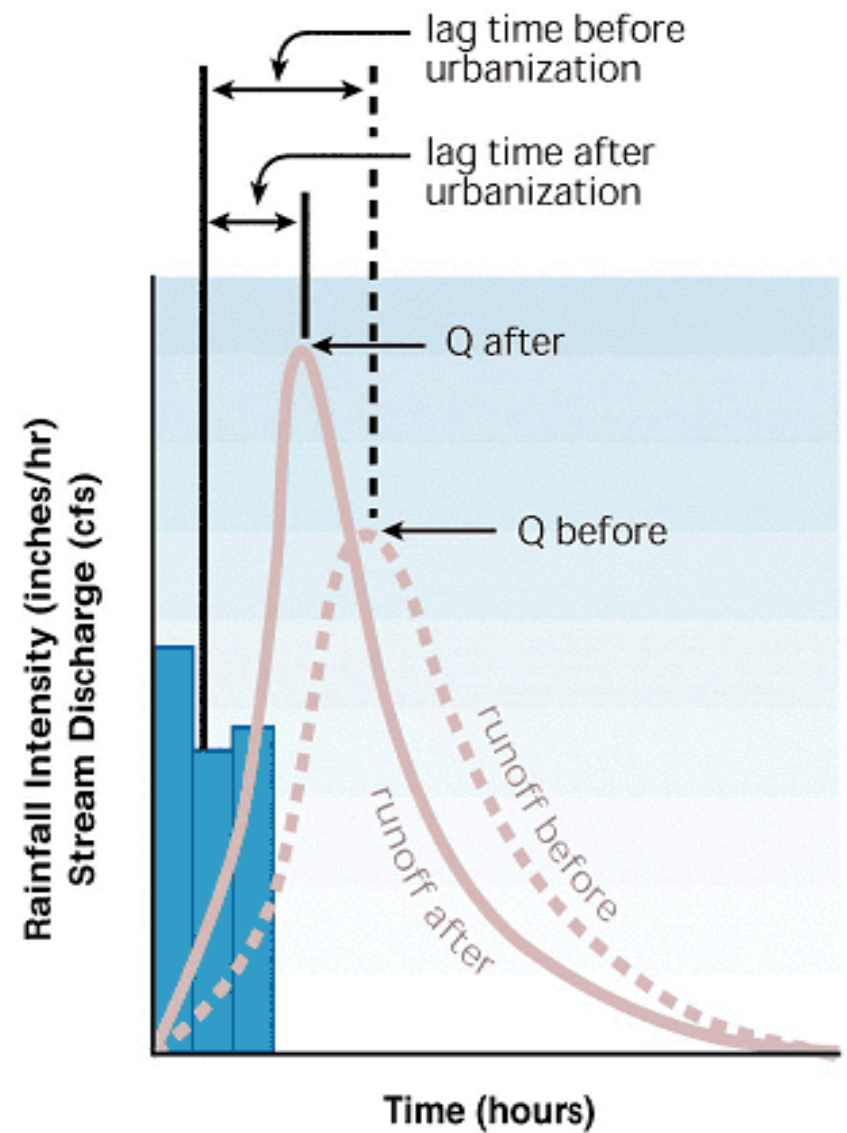


Rural and urban folks are watershed partners  
whether they realize it or not.  
We need to talk...



*stream bank and channel erosion*

# Urban Stormwater Runoff



**\* Rapid Rise \***

**\* More Water \***

**\* Greater Velocity \***



# Agroforestry Working Trees

The right trees...  
In the right place...  
For a purpose...

Working Trees – have jobs to do!

# Alley Cropping

**Growing an annual or perennial crop  
between rows of high value trees.**







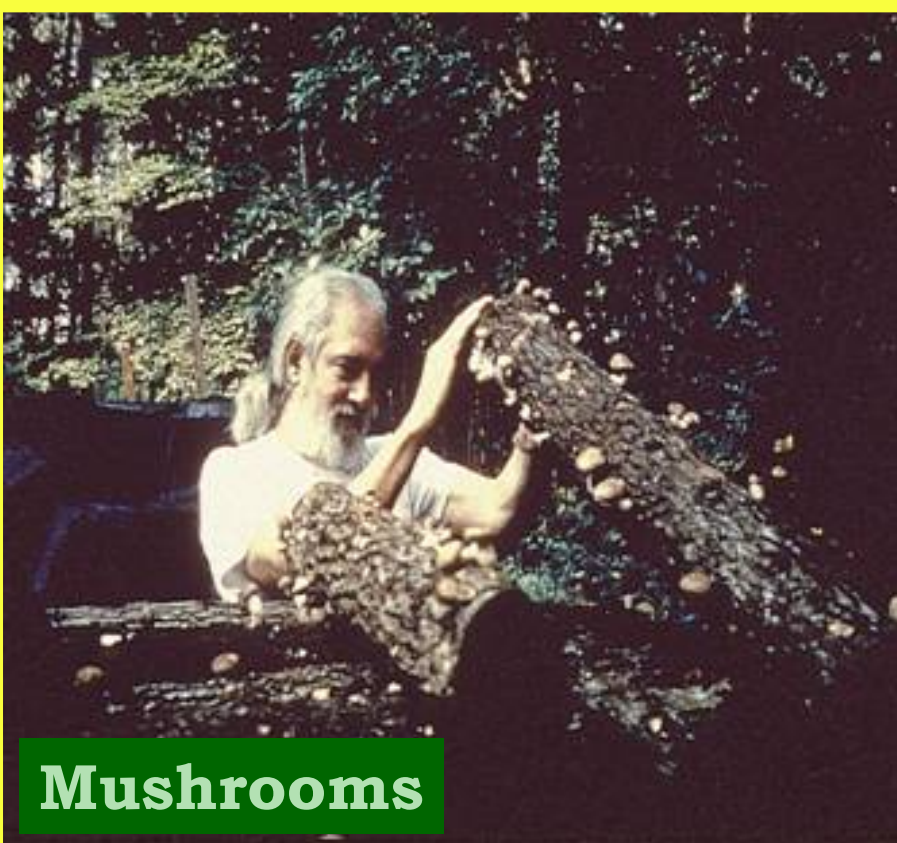
- **Crop Protection**
- **Crop Production**
- **Economic Stability**
- **Nutrient Utilization**
- **Soil Erosion Control**



# Multi Story Cropping

**Cultivation of high-value specialty crops  
under a modified forest canopy**





**Mushrooms**



**Ginseng**



**Ornamentals**

# **Non-Timber Forest Products**

*Diversify  
and  
increase  
income*

# Windbreaks

Used to reduce wind erosion of soil and lower crop evaporation and transpiration loss...





## Weighted Average Yield Increase

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<b>Corn</b>	<b>12 %</b>
<b>Soybean</b>	<b>13 %</b>
<b>Winter Wheat</b>	<b>23 %</b>
<b>Spring Wheat</b>	<b>8 %</b>
<b>Hay</b>	<b>20 %</b>

# Riparian Forest Buffers

*perform a disproportionately high number of biological and physical functions on a unit area basis...*



**3 Years**



# Riparian Forest Buffers



## Ecological Services

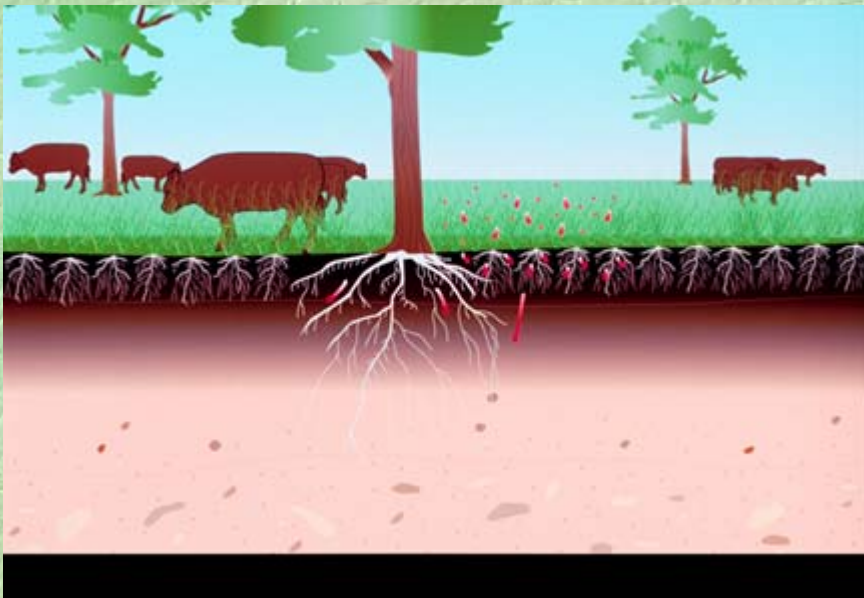
- **Filter Nutrients & Pesticides**
- **Sediment Trapping**
- **Aquatic & Terrestrial Habitat**
- **Streambank Stability**
- **Flood Protection**
- **Carbon cycle**

# Silvopasture

Trees provide longer-term returns, while grazing generates an annual income







**Annual Grazing Income**

**Long-Term Timber Income**

- **Lower Animal Stress**
- **Efficient Nutrient Use**
- **Resistant to Wildfire**
- **Resistant to Insects**
- **Wildlife Benefits**



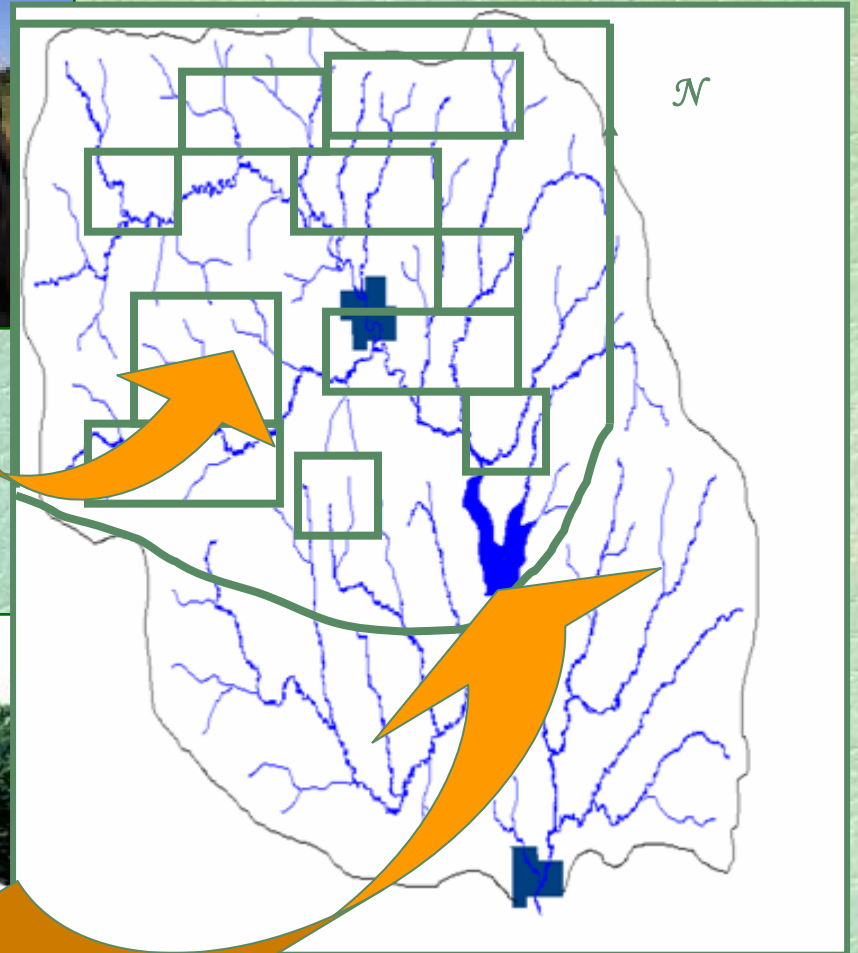
# Landscape Perspective

“Green Infrastructure”



# RURAL

income  
soil erosion  
fishing/hunting



*Different Goals/  
Different Scales*



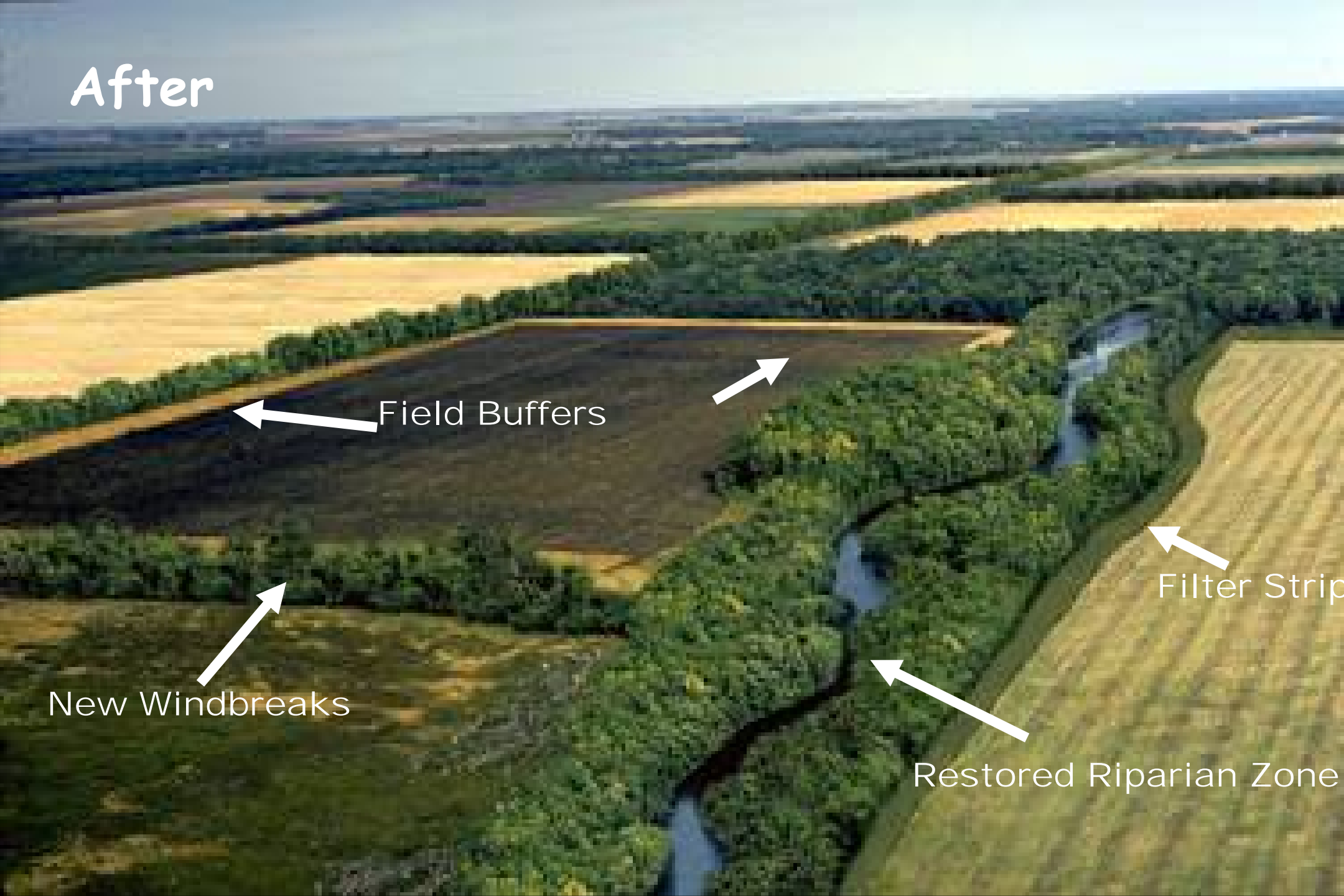
clean water  
less flooding  
wildlife

# COMMUNITY

**In an effort to simplify the environment for humans, we often create a world that is too complex for wildlife.**



After



Field Buffers

New Windbreaks

Filter Strip

Restored Riparian Zone





USDA **NATIONAL AGROFORESTRY CENTER**



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