A Role for Agroforestry in Sustainable Agriculture

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United Nations
CSD-16
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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 the 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 Challenges Remain
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 but 76% is not 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...
Urban Stormwater Runoff

stream bank and channel erosion
Severe 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
Non-Timber Forest Products

Diversify and increase income

Mushrooms

Ginseng

Ornamentals
Windbreaks

Used to reduce wind erosion of soil and lower crop evaporation and transpiration loss...
<table>
<thead>
<tr>
<th>Crop</th>
<th>Yield Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>12 %</td>
</tr>
<tr>
<td>Soybean</td>
<td>13 %</td>
</tr>
<tr>
<td>Winter Wheat</td>
<td>23 %</td>
</tr>
<tr>
<td>Spring Wheat</td>
<td>8 %</td>
</tr>
<tr>
<td>Hay</td>
<td>20 %</td>
</tr>
</tbody>
</table>
Riparian Forest Buffers perform a disproportionately high number of biological and physical functions on a unit area basis…
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”
Different Goals / Different Scales

Income
Soil erosion
Fishing/hunting
Clean water
Less flooding
Wildlife
In an effort to simplify the environment for humans, we often create a world that is too complex for wildlife.
Before

New Windbreaks
Field Buffers
Restored Riparian Zone
Filter Strip

After

Field Buffers
New Windbreaks
Filter Strip
Restored Riparian Zone