

Fire as a Management Tool

- Benefits of controlled burns:
 - Stimulates growth
 - Removes invasive species
 - Increased palatability and nutrition value of recently burned forages
 - Reduces weed pressures and disease infestations
 - Can reduce intensity and frequency of wild fires

Fire as a Management Tool

- Detrimental impacts of wild fires:
 - Increases risk of soil erosion
 - Eliminates stock piled forage
 - Destruction of property
 - Dangerous!

- YouTube Video

Conversion of CRP to Agricultural uses

- Significant improvements in soil physical, chemical and biological properties have occurred during the 10-30 years that soils have been under CRP management
- CRP lands were/are planted to a perennial grass, with grazing or haying only allowed during droughts.
- Periodic controlled fires are utilized within some management plans
- No fertilizer is applied

Conversion of CRP to Agricultural Uses

- Soil properties that are improved include:
 - Total carbon (organic matter)
 - Total Nitrogen
 - Water infiltration
 - Aggregation
 - Porosity
 - Water holding capacity
- Efforts should be made to maintain these improvements during conversion, especially if no-till management is utilized after conversion

Conversion of CRP to Agricultural Uses

- Soil characteristics can be maintained if minimum tillage and/or timely herbicide applications are used.
- Termination of perennial grasses can be very challenging in drought prone areas
- Systemic herbicides such as Glyphosate must be applied during active translocation of carbohydrates to the roots
- This occurs during mid summer for warm season grasses.

Conversion of CRP to Agricultural Uses

- No-till conversion is best option for conservation of improved soil characteristics, However:
 - Under good condition herbicide termination will require multiple applications
 - Especially in far western OK and high plains
 - No-till conversion may result in rough surface.
 - Grassy weeds will be challenging to control during first years
 - Must be considered when developing plan for crop rotation.
 - Utilization of glyphosate resistant crops in the first years will allow for continued applications

Minimum Tillage Conversion

- Use of minimum tillage may be more effective option for dry regions such as the high plains
- Under cut grasses during dry conditions to expose and kill roots and maintain residue on the surface
- This will prevent erosion of highly erodible land
- Much of the improved soil characteristics can be maintained as long as tillage is limited to the first year of conversion

Fertility Management after Conversion

- Soil test to assess pH, K and P
- In sandy soils in old CRP lands, nutritional characteristics of soil may have improved over time due to nutrient cycling.
- Nitrogen requirements will be higher in the first years after conversion due to immobilization during decomposition of grass residues
- Planting leguminous cover crops will aid in building N content in soil and may aid in weed control prior to planting cash crop

Soil Degradation in Forested Systems

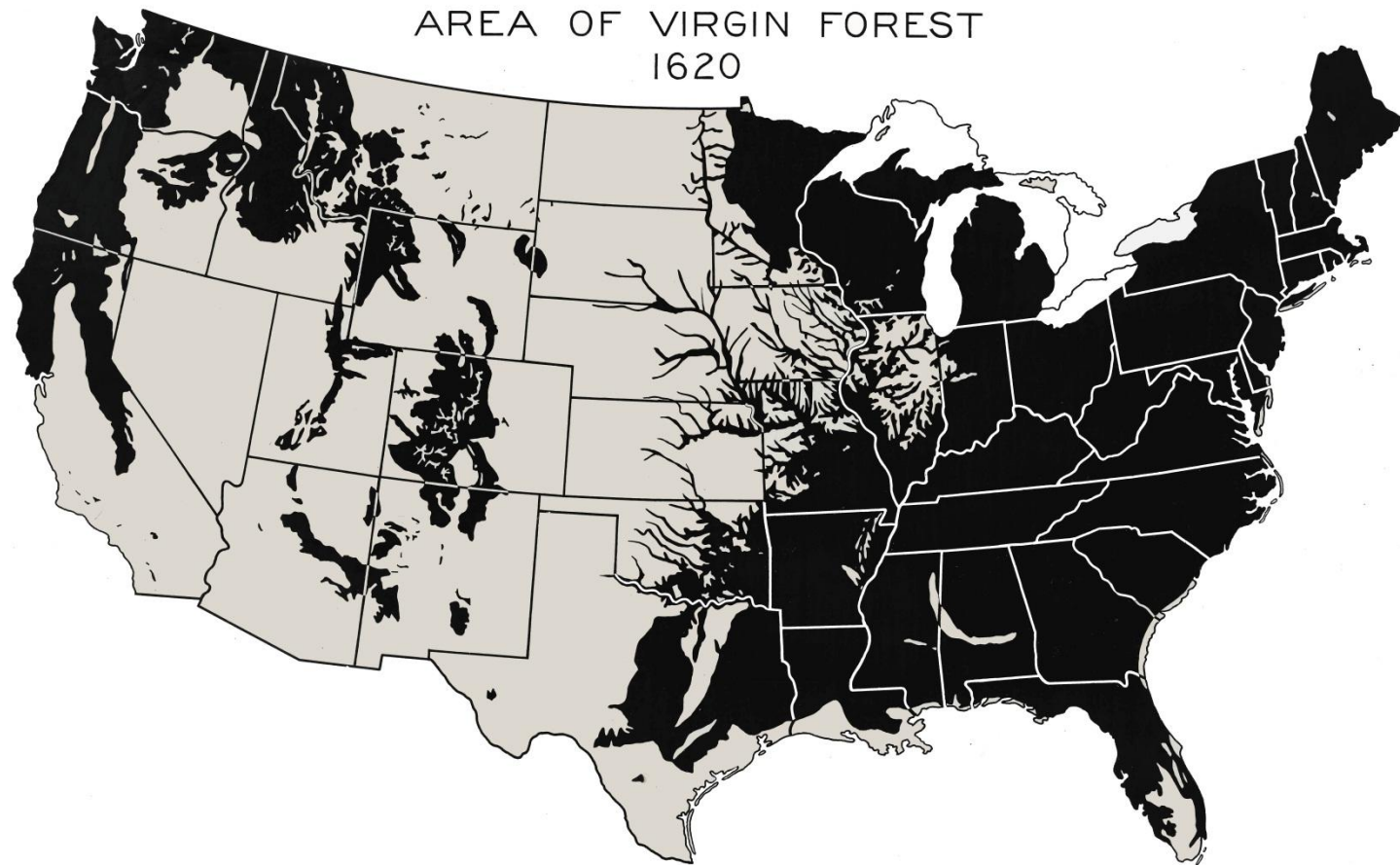
- Natural undisturbed forested systems produce the least runoff and soil erosion among all land uses.
- Therefore, disturbance of forested systems can have significant impacts on the hydrology of watersheds.

Deforestation and Soil Degradation

- Deforestation is responsible for the ongoing decline in the extent of forest
- Currently this decline is most rapid in tropical regions
- Forests are being cleared for crop production, grazing and urbanization.
- Deforestation does not always mean a complete clearing of trees.
- More accurate to say that the structure and function has been altered
- [Google maps](#)

Deforestation and Soil Degradation

- Deforestation in the U.S.



Soil Erosion in deforested areas

- Generally, the soils remaining in forest today are often highly susceptible to erosion
- As mentioned in the beginning of the semester. Continued demand for crop and grazing lands cause deforestation to occur on these highly erodible lands.
- In some systems no-till management can maintain soil characteristic and prevent erosion

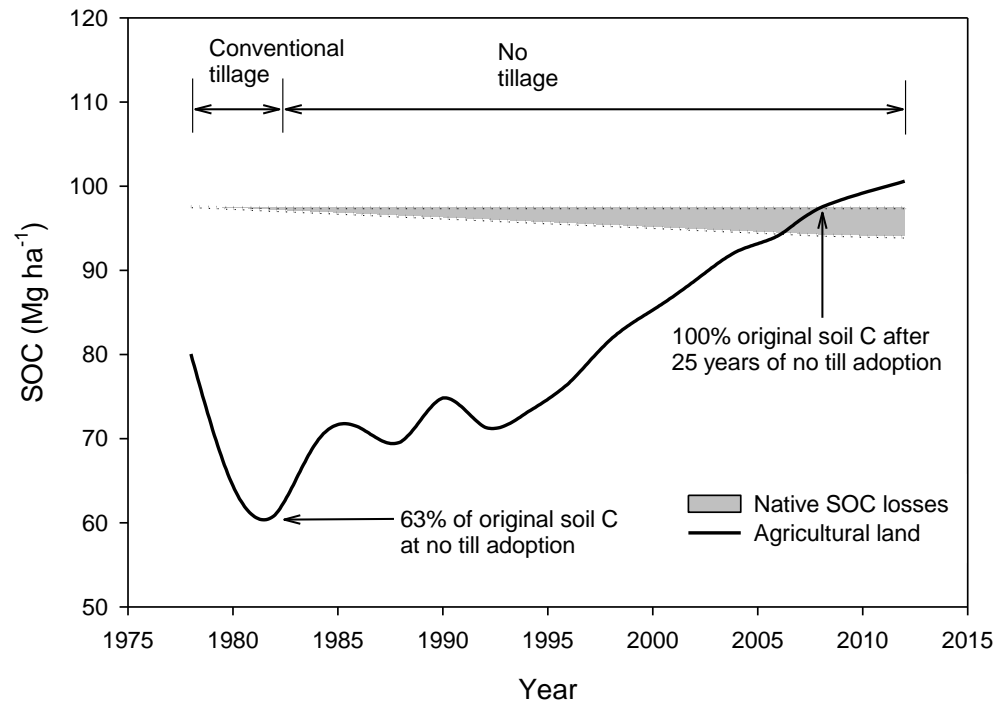
Cropland reclamation in Southern Brazil

- Data provided by Romulo Lollato, Graduate Student in Plant and Soil Sciences
- Soil carbon monitored on cropland since 1978
- Deforested in 1976.
- Converted to no-till management in 1983
- Rotation was corn, edible beans and spring wheat with no fallow period.



Changes in Organic Carbon Concentrations

- Tillage caused a rapid decline
- Conversion to no till allowed for accumulations of SOC to levels equivalent to native forests



No-till Providing Affective Erosion Control



Cultivated to Remove Ruts

Global Implications of Deforestation

- Alters global carbon cycle
- Alters global and regional water cycles
- These factors in turn impact local and global heat and air fluxes.
- Deforestation decreases terrestrial assimilation of atmospheric CO₂

Regional implications of deforestation

- Decreased biodiversity
- Increases runoff quantity and decreased quality can deteriorate regional water supplies
- Will impact the ecosystems of sensitive surface water bodies.