



The Impact of Demands for Energy and Environmental Services on Kansas Agriculture

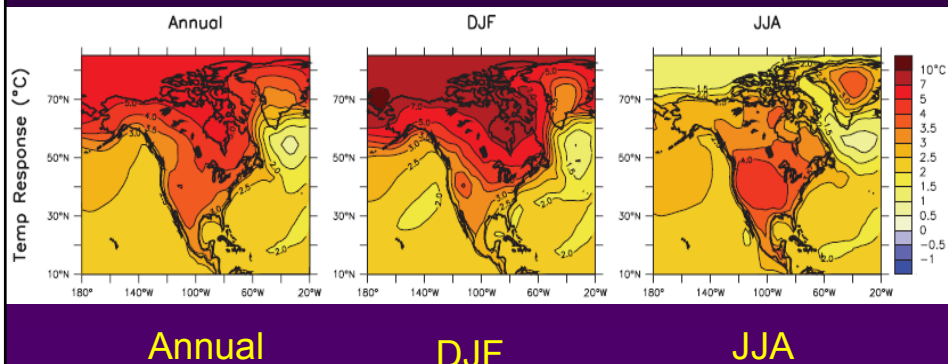
Charles W. Rice
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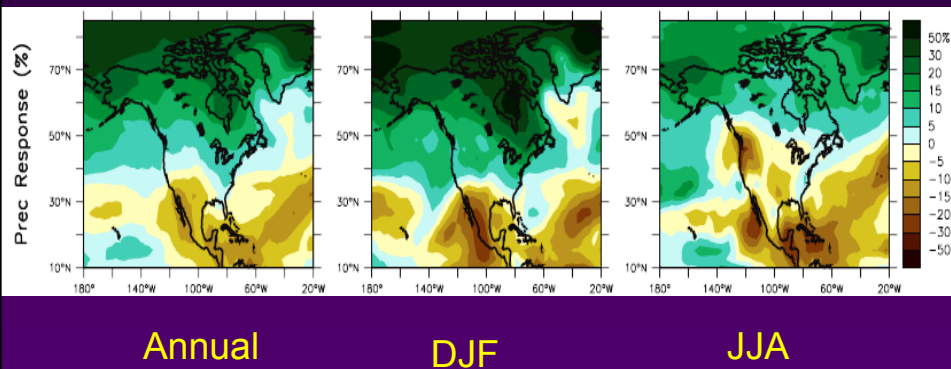


Temperature



IPCC, 2007

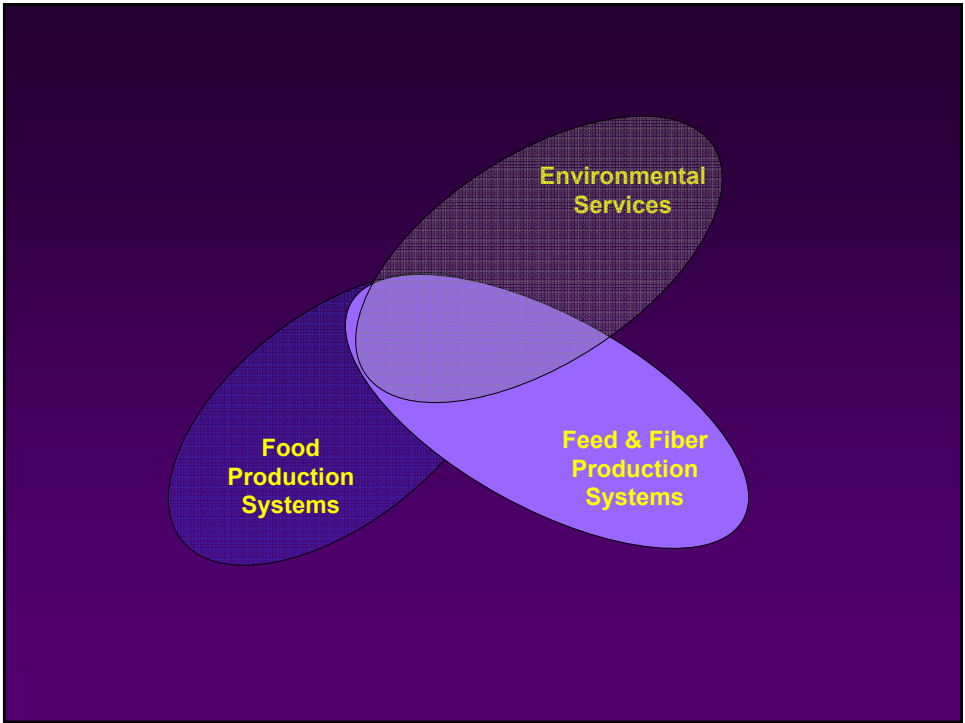
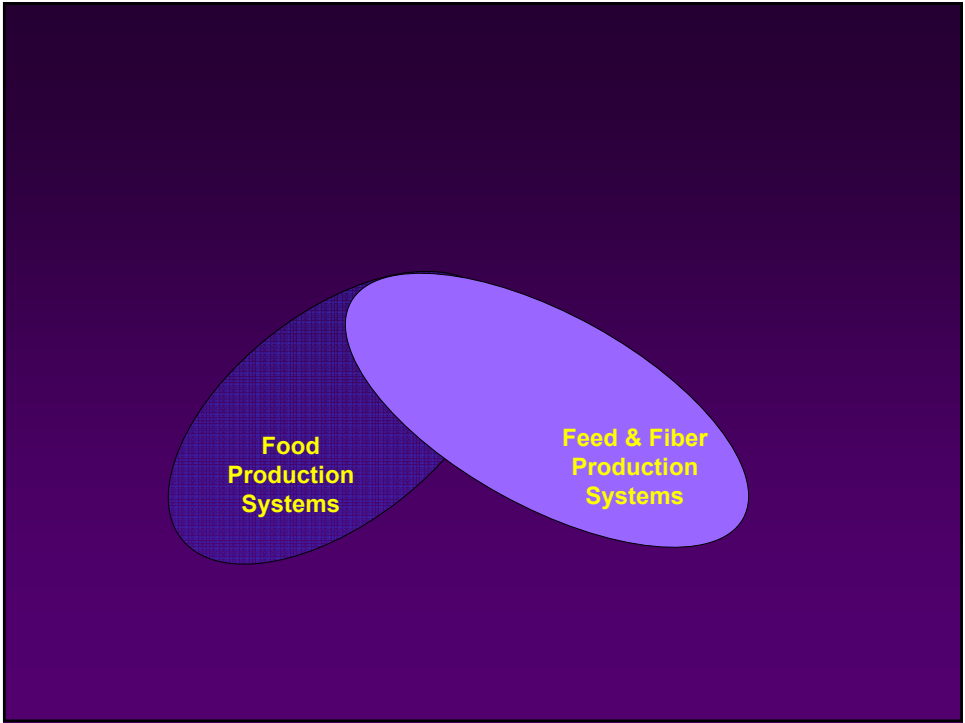
Precipitation Response



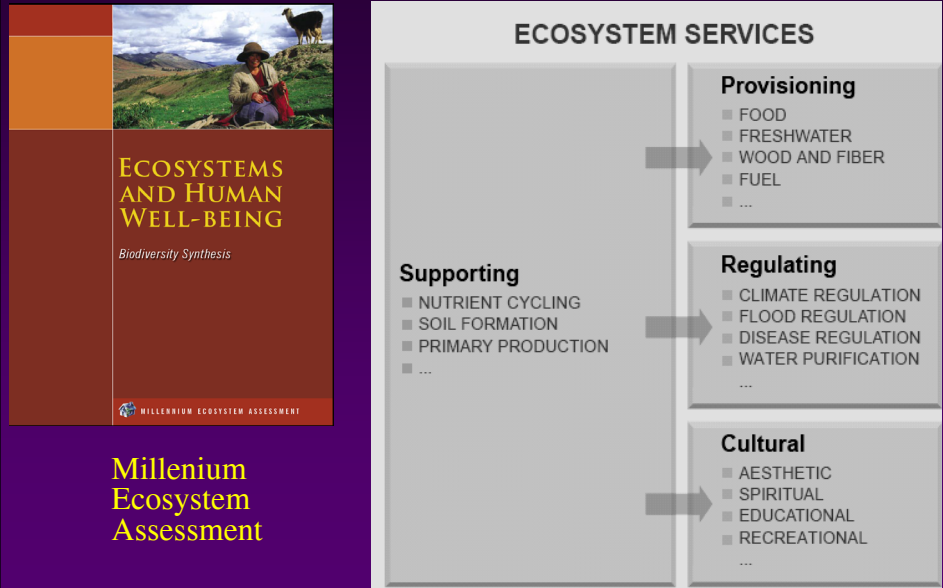
IPCC, 2007

Consequences of Climate Change on Kansas Agriculture

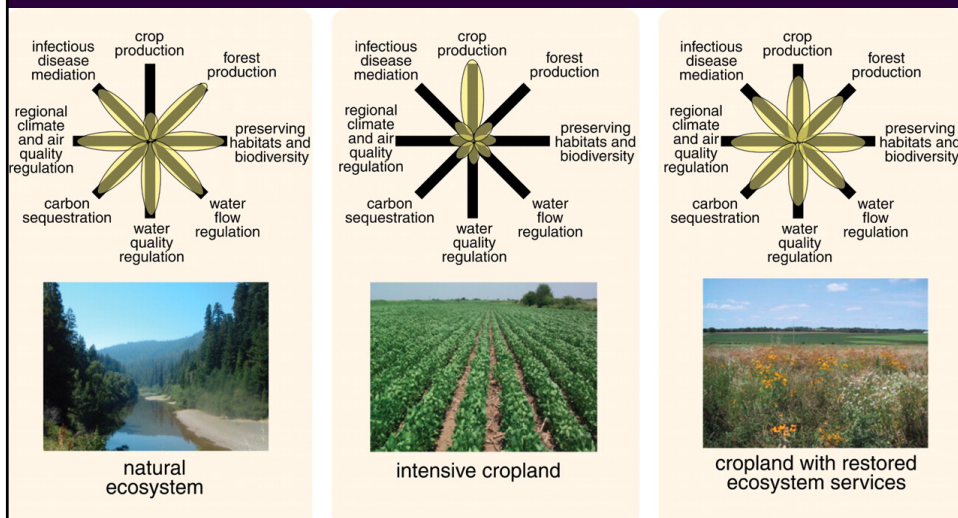
- Increased productivity potential
 - WATER AVAILABILITY
 - Drought
 - Erosion
 - Nitrogen availability
 - Impacts forage quality
 - Grain quality
 - Hasten maturity
 - Shorten growing season
 - Increased pests



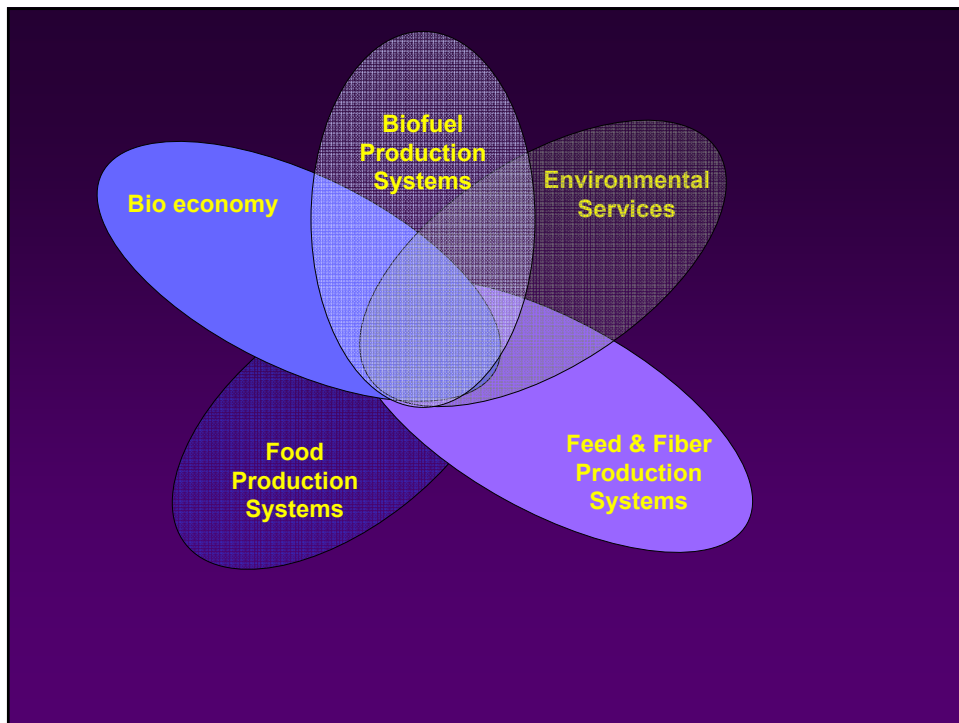
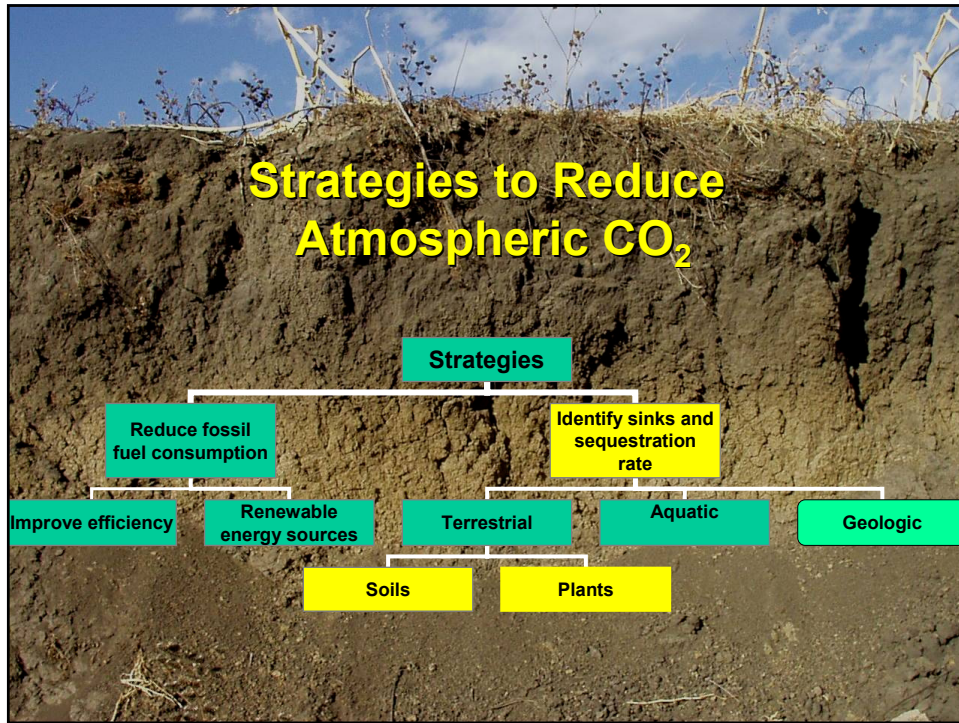
Some functions are “ecosystem services” defined as conditions and processes through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life

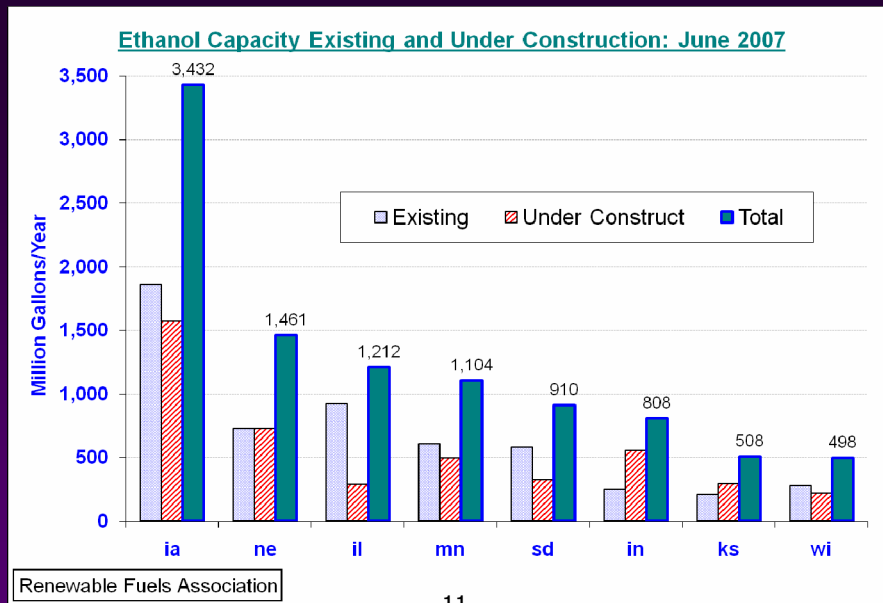


Comparing land use and trade-offs to ecosystem services



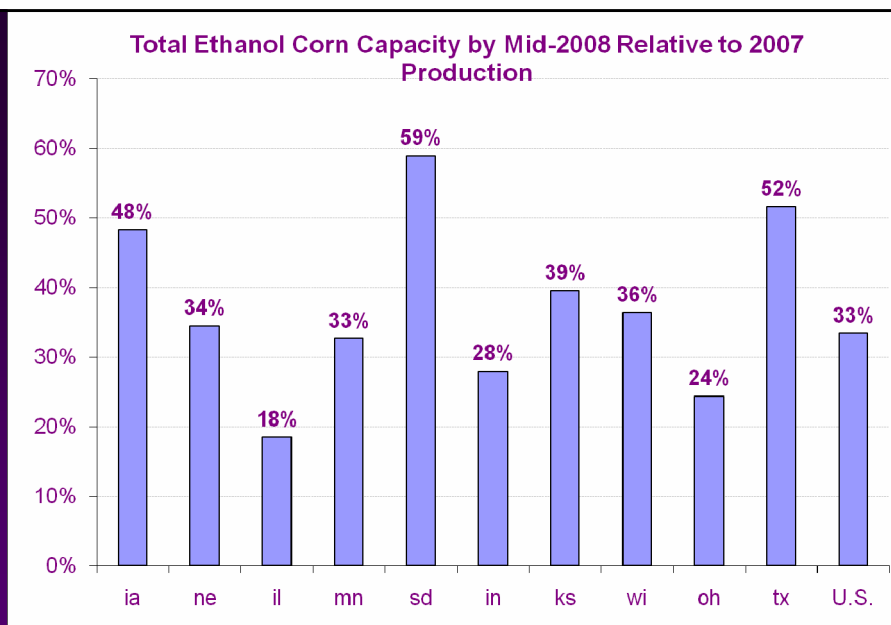
Foley et al. 2005





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Purdue University



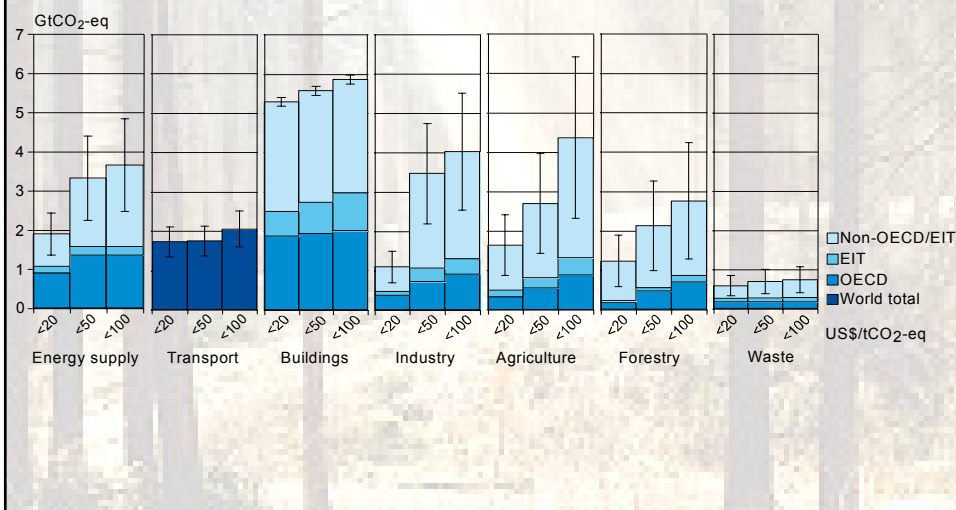
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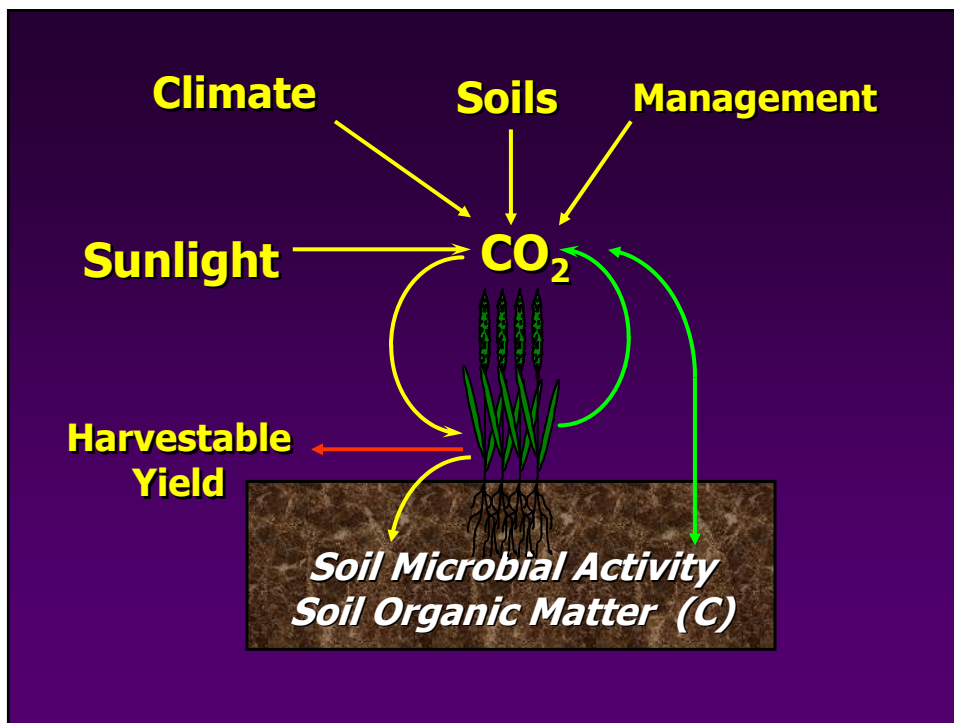
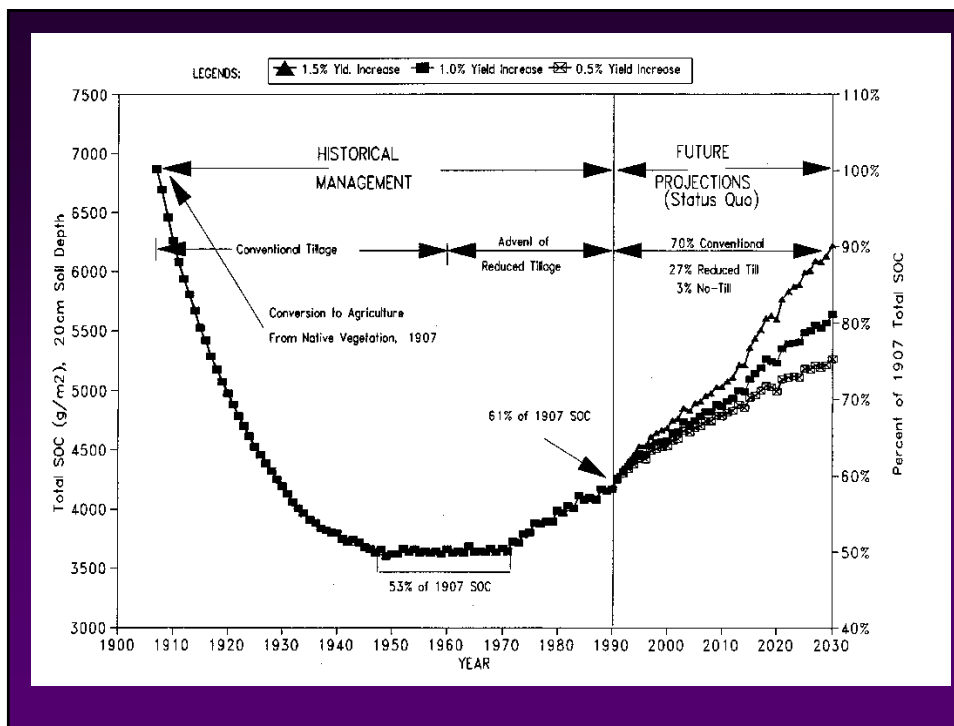
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Biofuel Production Concerns

- *Changes in land use, and potential conversion of conservation lands to biomass production.*
- *Changes in water needs, availability, and water quality impacts.*
- *Competition for grains and oilseeds and impacts on food and feed availability and prices.*
- *Lifecycle analyses and GHG/C accounting for biofuels production.*
- *Assessing co-benefits of biofuel production, such as soil quality, reduced erosion from marginal crop lands, and enhanced wildlife benefits.*

Global economic mitigation potential for different sectors at different carbon prices



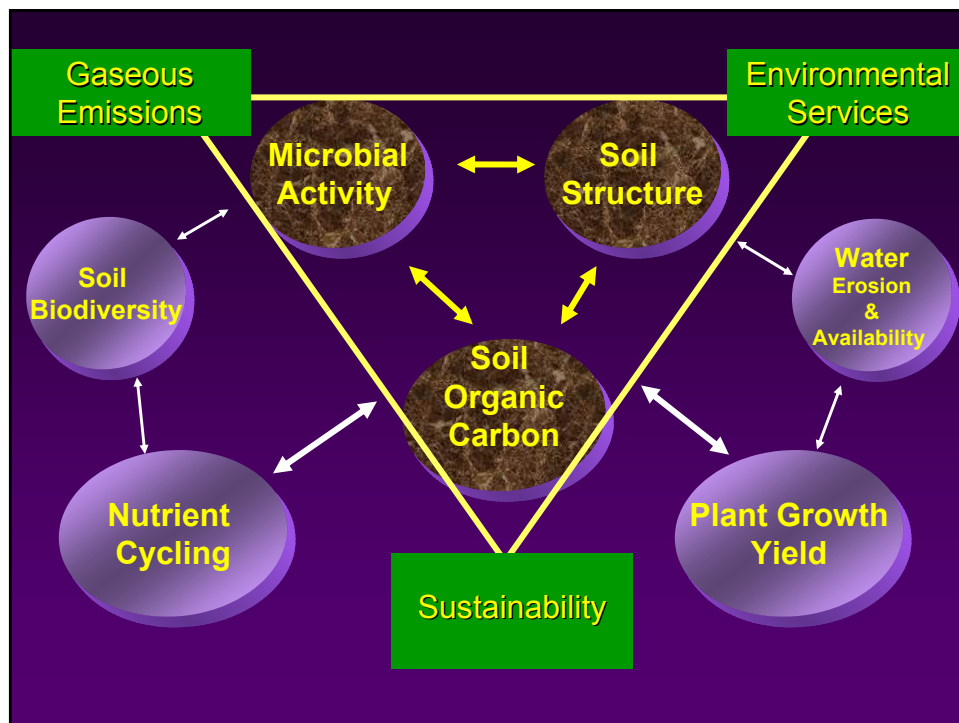


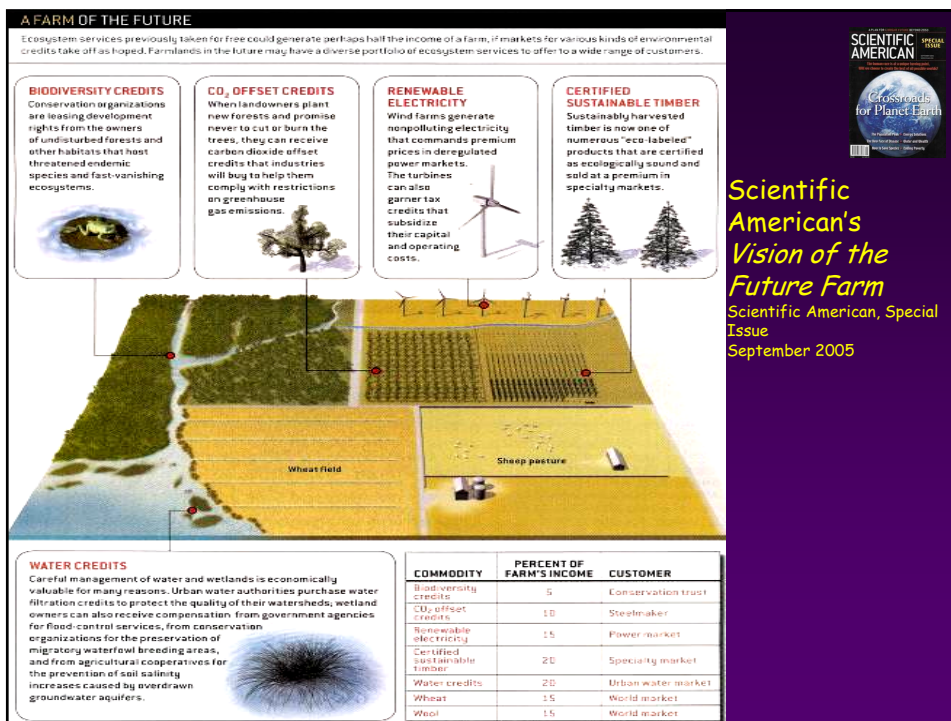
No-Tillage Cropping Systems



Photo courtesy of R. Lal

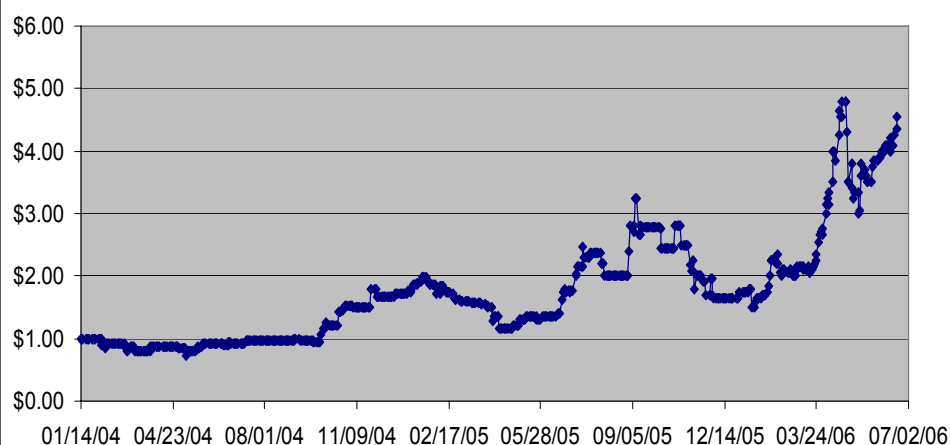
- Restores soil carbon
- Saves fuel
- Saves labor
- Reduces erosion
- Conserves moisture
- Improved soil fertility
- Controls weed
- Planting on the best date
- Lowers machinery costs
- Improves wildlife habitat





Contracts: 2 million acres CCX Carbon Offset Prices

Vin 2003



Summary

- Agricultural soil C sequestration
 - Keeps land in production
 - Improves soil quality
 - In many cases increases profitability for the farmer
 - Provides other environmental benefits to society
 - Water quality (less runoff, less erosion)
 - Flood control
 - Wildlife habitat
 - May help adapt to climate change as well as mitigate

Summary

- Design Agricultural Systems
 - Improved energy output per water/energy input
 - Long term sustainability life cycle based
 - Maintain soil carbon
 - Balance nutrients, pesticides
 - Lower net Carbon emissions

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- Websites

www.oznet.ksu.edu/kccm

www.soilcarboncenter.k-state.edu/

www.oznet.ksu.edu/ctec

www.casmgs.colostate.edu/



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