Toward a Sustainable Agriculture

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Alabama Cattle Truck
Oklahoma Cattle Truck
Tough Row to Hoe

Unable to afford draft animals or machinery, two retired Russian schoolteachers pulled a plow to prepare their land for potato planting.

The teachers, who run a small farm in the Pskov area, near the Estonian border, earn pensions of about $4 a month.
Objective of a Grazing System

- To modify the landscape for
  - Increased soil microbial activity
  - Enhanced soil organic carbon
  - Increased water infiltration rate
Trends within U.S. agriculture
Agricultural Success

- Feeds a population in excess of 6 billion
- Uses only 0.2 ha (0.5 ac) of land per person

Agricultural Concerns

- Intensive agriculture impacts the resource base
- Reduces: Capacity & Sustainability
Great Plains Agriculture

- Characterized by:
  - Lack of diversity
  - Declining levels of soil organic carbon

- Beef production:
  - Supplying meat acceptable for human consumption
  - Heavily dependent on fossil fuels
Carbon Dioxide Equivalents for Agricultural Products

(Weber and Matthews 2008)
Recent Trends

- 1930—2002: Agricultural workforce decreased from 22% to 2%
- Agriculture as part of total gross domestic product: decreased from 7.7% to 0.7%
- Farmers working off-farm: increased from 30% to 93%
- Farming dependent non-metro counties decreased (became a minority)
Current Trends in Agriculture

- Increased land degradation
- Competing land uses
- Focus on single ecosystem service
- Increase in farm size
- Movement toward industrialization
- Genetic engineering
- Global marketing
- Changing social structure
Future Concerns

- Dominant concern: Sustainability
  - Food Safety
  - Food Security
- Industrialization
- Globalization
- Energy
- Water
Sustainable Agriculture

Purpose: to producing food and fiber

► Profitable

► Uses on-farm resources efficiently to minimize adverse effects on the
  ▪ environment
  ▪ people

► Preserves the natural productivity and quality of land and water

► Sustains vibrant rural communities
Benefits of Sustainable Agriculture

► Long-term economic viability and resilience
► Conservation and enhancement of the natural resource base
► Minimization of off-site environmental impacts
► Improved quality of farm level management skills
► Enhanced socioeconomic viability of rural communities
Impact of Industrialization

- Increasing farm consolidation and vertical integration

Benefits (purported):
- Highly competitive in global markets
- Increased efficiency
- Responsive to consumer demands
- Less dependent on government assistance
- Rapid adoption of new technologies
Industrialization: A Dose of Reality

► Meatpacking: four-firm concentration ratio increased from 26% in 1972 to 57% in 1997 (similar in poultry and soybean)

► The ratio was 80% in fed beef slaughter by the year 2000 (it was 58% within the top two companies)

► Trend toward supply-chain consolidation (all stages of production, processing and distribution are woven tightly together)
The Industrialization Philosophy

- Nature is a resource to be exploited and variation is to be suppressed.
- Natural resources are not valued except when a necessary expense in production is incurred.
- Progress is equivalent to the evolution of larger farms and depopulation of farm communities.
- Progress is measured primarily by increased material consumption.
- Efficiency is measured by looking at the bottom line.
- Science is an unbiased enterprise driven by natural forces to produce social good.

Not Sustainable!
Concerns Regarding Industrialization

- Ecological impacts
- Economic and social impacts
- Human health concerns

- Viewed as negative impacts only if they have a direct cost to the production system
- Negative consequences are traditionally handled by reactive rather than proactive approaches
An Approach in Grazingland Management

- Quivira Coalition in New Mexico
- Education, Innovation, and Restoration
- Water management as a priority
Impact of Global Markets

“Twenty-first century agriculture is likely to be characterized by: more global competition; expansion of industrialized agriculture; production of differentiated products; precision (information intensive) production; emergence of ecological agriculture; formation of food supply chains; increasing risk; and more diversity.”

Michael Boehlje (2008)
The Problem with Globalization

- Bottom-line economics don’t always favor U.S. producers
- Other countries can generally produce agricultural commodities cheaper
- U.S. agricultural imports are increasing and the overall U.S. agricultural trade balance has decreased since 2001
Globalization Pitfalls

► Assumption: Trade liberalization and globalization are assumed to increase food production and improve economic conditions

► Reality: Decline in food production, a decline in economic conditions, and a decline in food security for consumers
Globalization and the Small Farm

- Bad domestic policies
- Disappearance of middle sized farms
- Mergers, acquisitions, and concentration
- More control by fewer representatives
- Increased agricultural industrialization and overproduction
- Shift in land ownership and land availability
- Domination of U.S. agriculture by WTO
Impact of Fossil-Fuel Energy

- Escalating price of fuel has increased all expenses:
  - Transportation
  - Fertilizer
  - Feed costs
- U.S. in cyclonic turn toward renewable fuel
- Food & feed markets + generation of biofuels
- Fuel or Food?
What About Biofuels?

- Opportunity for producers (another alternative crop)
- Potential to enhance rural communities
- Facilities must be developed
- Increase the cost to produce animal-based products
- Increase grass farming (feeding and finishing)
Impact of Water Shortages

- Water quantity and quality
- Increasing global population ⇒ decreasing water availability
- Yemen: Water table falling 2 m per year
- Iran: Water table falling 2.8 m per year
- U.S. Southern Plains: Ogallala aquifer depleted
- Lake Chad: down 94% since the 1960’s
Potential Solution

- Be a steward of the land
- Be creative
- Adapt quickly
- Apply management principles that are ecologically sound
- Increase diversity to reduce overall risk
- Keep the soil covered with crops and mulches
Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning.

Albert Einstein