Natural Resources and Sustainable Agricultural Systems Research

in the

Agricultural Research Service

Steven Shafer

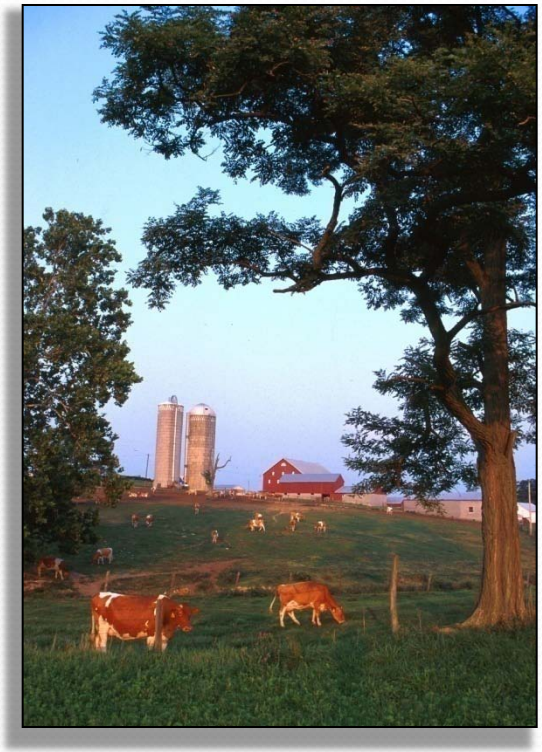
Deputy Administrator

Natural Resources & Sustainable Agricultural Systems

USDA

ARS

American Agriculture's Accomplishments



- 16% of the $9 trillion gross domestic product.
- 8% of U.S. exports.
- 17% of employment.
- < 2% U.S. workforce on farms.
- 100% of the citizens are users.

Benefits of Agricultural Research

- Increased productivity
- Lower food prices
- Increased trade
- Improved quality of life

Research has also helped producers address:

- Natural resource concerns.
- Changing market conditions.
- New technology introductions.
- Solving major problems.

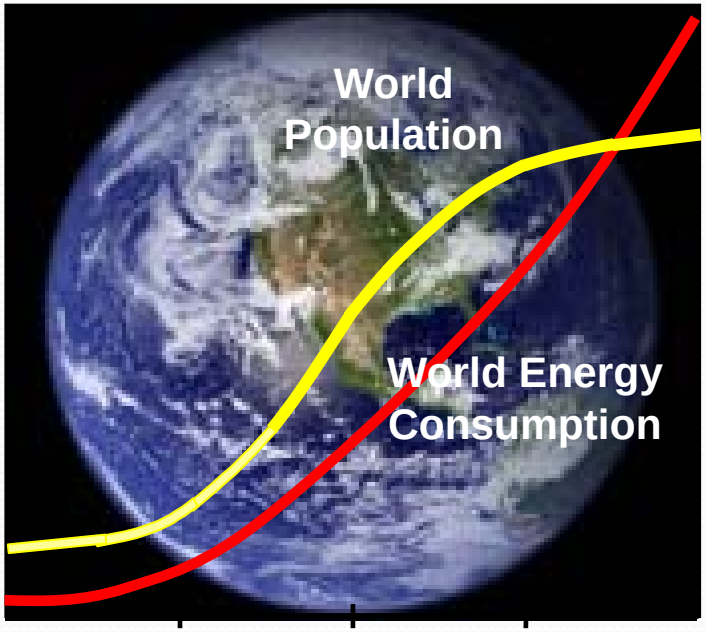
Success of Agricultural Research

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

Agricultural Concerns

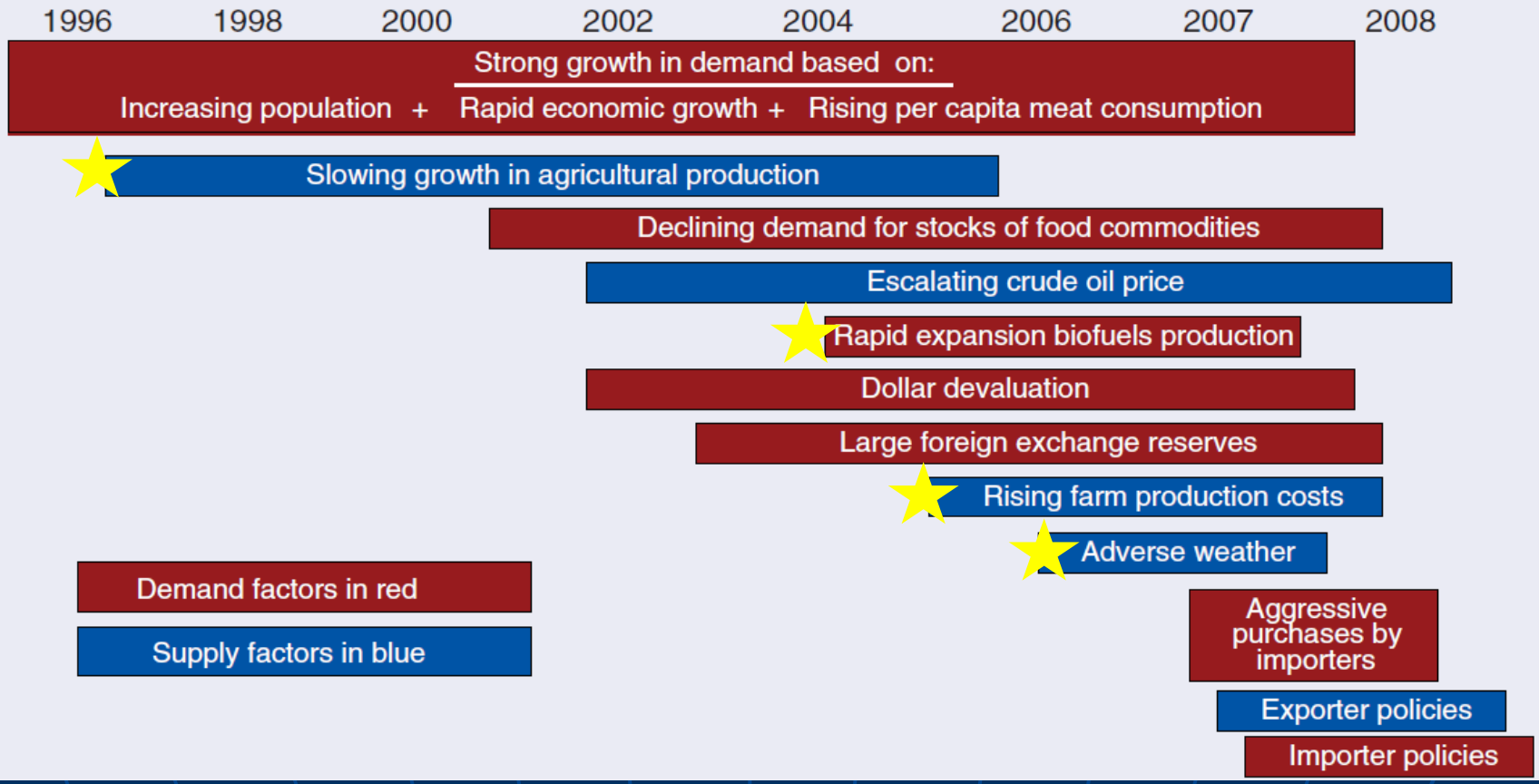
- Intensive agriculture impacts the resource base.
- Reduces capacity and sustainability.

Challenges ahead



- Food, feed, fiber production.
- Bio-based energy production.
- Water availability, drought, and water quality.
- Air quality and regulations.
- Production in a changing climate, while addressing safety and security.

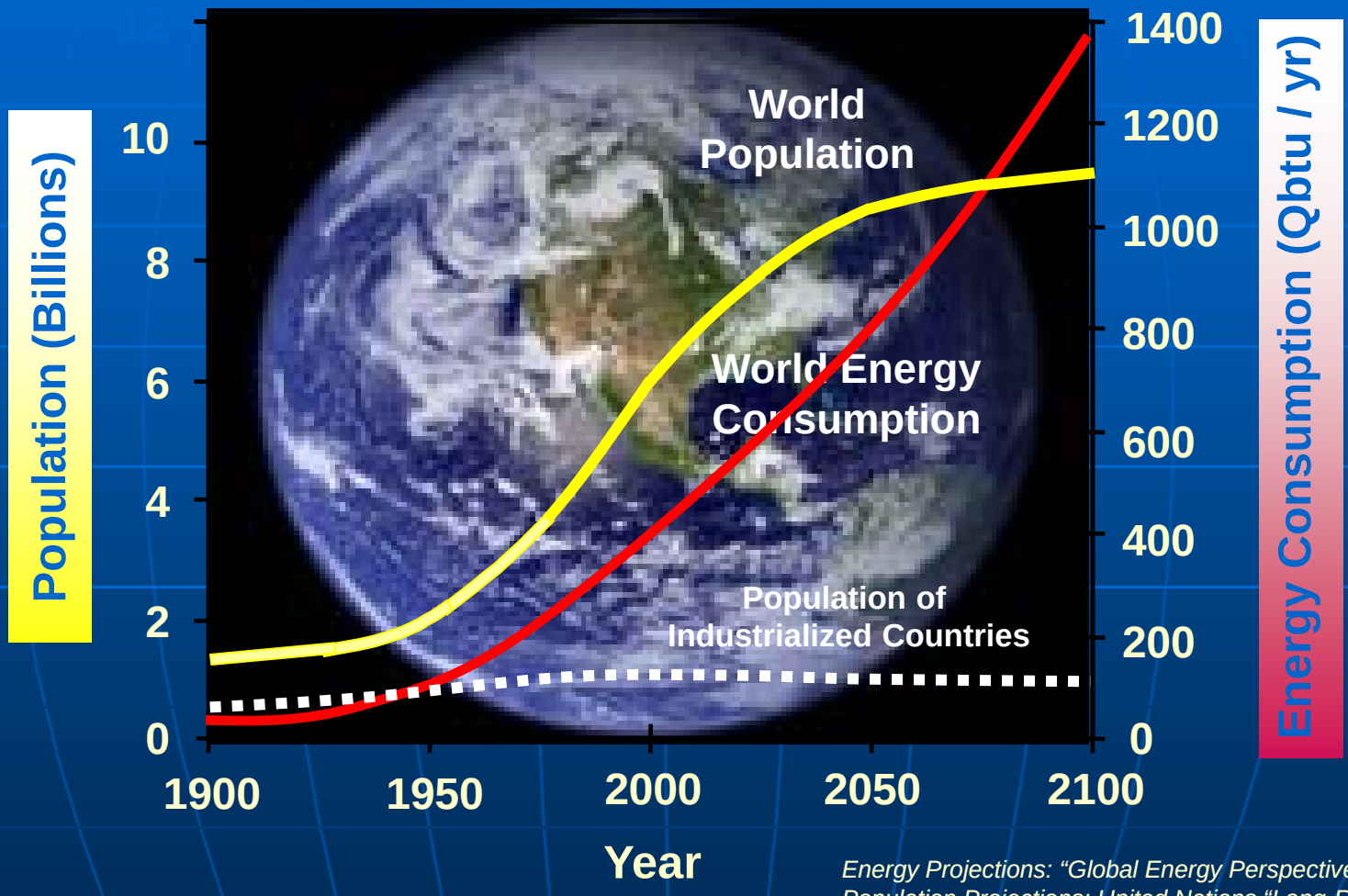
Factors contributing to higher food commodity prices



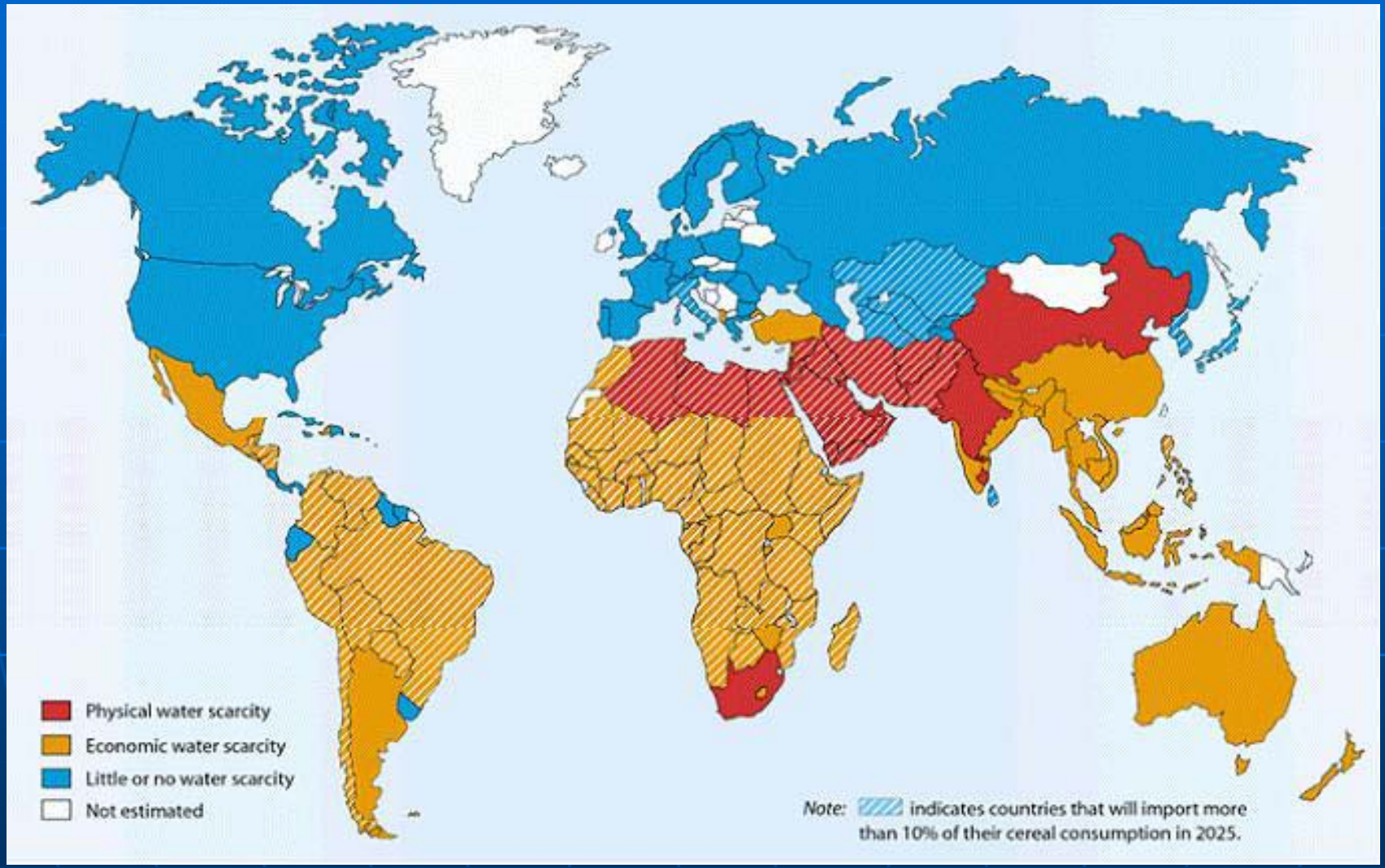
Two ways to increase production

- Put more land under cultivation
- Produce more per unit land area ("ecological intensification")
  - ✓Mechanization
  - ✓Crop/livestock improvement
  - ✓Input use efficiency

World Population and Energy Use

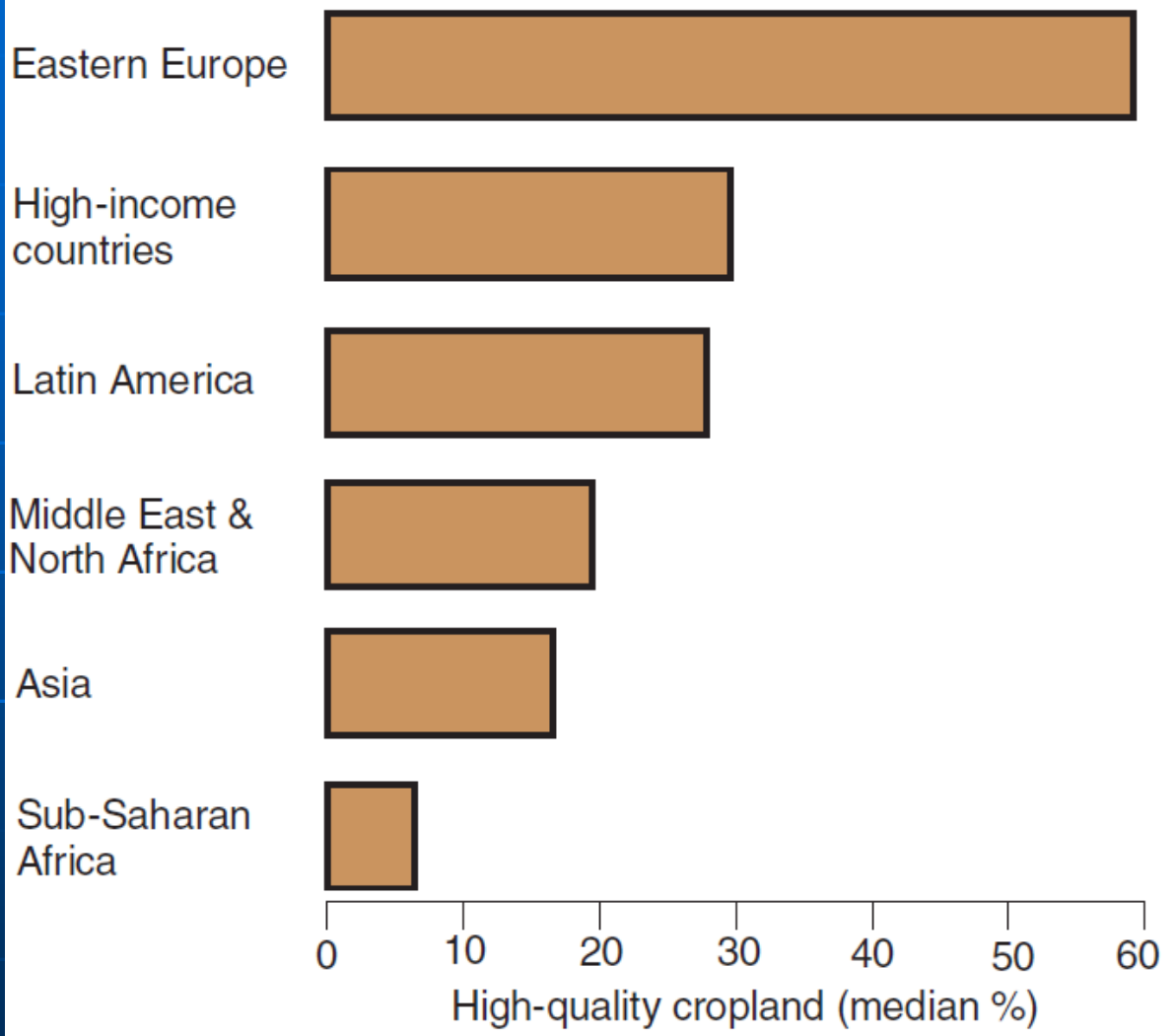


Energy Projections: "Global Energy Perspectives" ITASA / WEC
Population Projections: United Nations "Long-Range World Population Projections: Based on the 1998 Revision"



www.iaea.org/.../water_supply_demand.html

Figure 3.3—Regional cropland quality



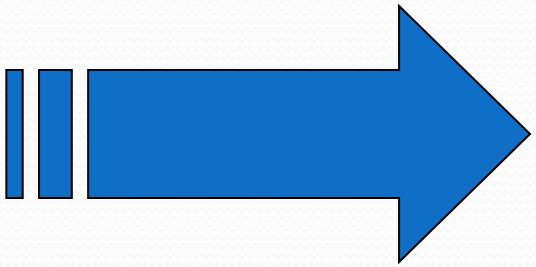
Source: ERS, based on data from the World Soil Resources Office, NRCS, USDA.

Research Models

- Investigator Driven
  - ✓ Typical of Universities
  - ✓ Hired to work in research area
  - ✓ Relevance driven by the investigator
- Mission Driven
  - ✓ ARS
  - ✓ Hired to work in a mission area defined by the Agency, based on broad input
  - ✓ Relevance is driven by a complex process of congressional, stakeholder, and scientist input

Providing a *scientific foundation* for decision making in agriculture

"Our mission is to conduct research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to . . ."



Mission Driven Research

Ensure high-quality, safe food and other products

Assess the nutritional needs of Americans

Sustain a competitive agricultural economy

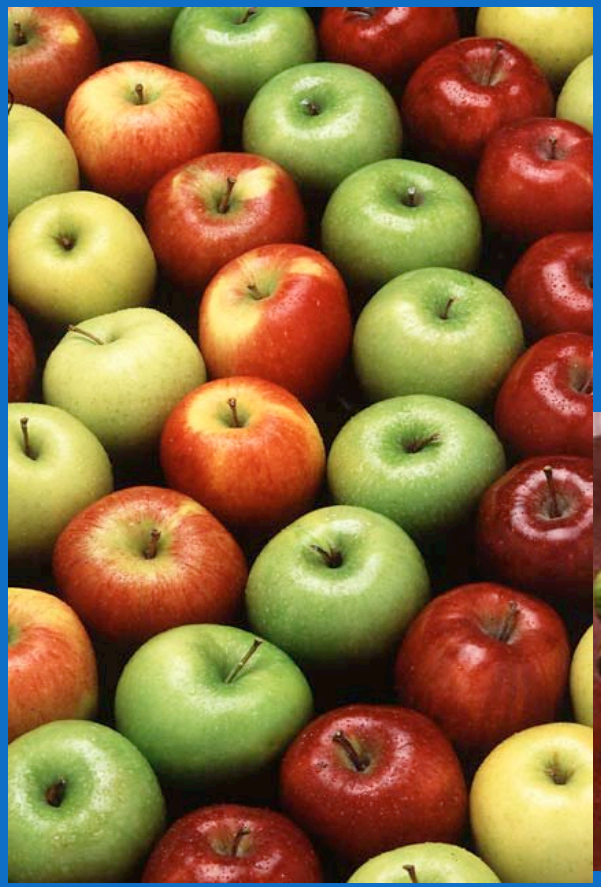
Enhance the natural resource base and the environment

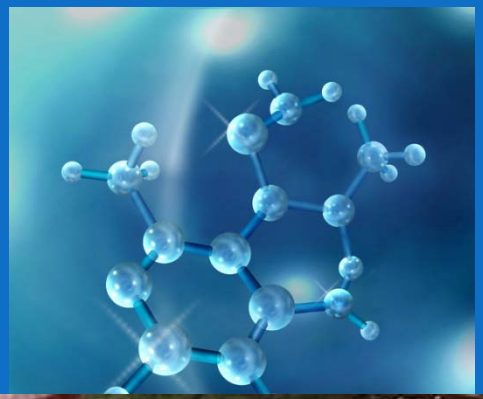
Provide economic opportunities for rural citizens, communities, and society as a whole

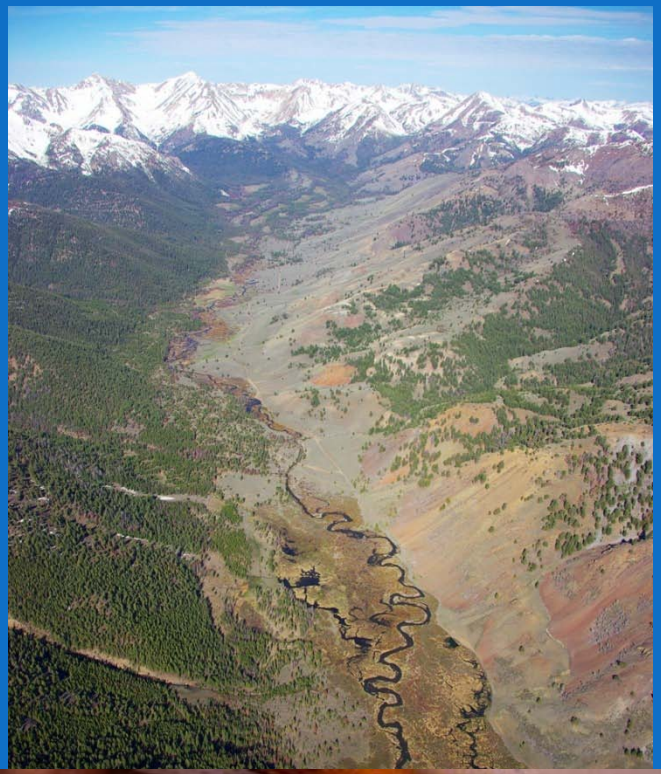
Research that *Explains*

Comprehensive Research and Development Programs

- Apples to Zucchinis
- Molecules to Watersheds







ARS National Programs

Judy St. John

Associate Administrator

Natural Resources & Sustainable Agric. Sys.

Steven Shafer

- Water Availability and Watershed Management
- Global Change, Soil and Emissions
- Bioenergy and Bioproducts
- Agricultural Waste and Byproduct Utilization
- Pasture, Forage and Range Land Systems
- Agricultural System Competitiveness and Sustainability

Crop Production & Protection

Kay Simmons

- Plant, Microbial & Insect Germplasm Conservation & Development
- Plant Biological & Molecular Processes
- Plant Diseases
- Crop Protection & Quarantine
- Crop Production
- Methyl Bromide Alternatives

Animal Production & Protection

Steven Kappes

- Food Animal Production
- Animal Health
- Arthropod Pests of Animals and Humans
- Aquaculture

Nutrition, Food Safety & Quality

Molly Kretsch

- Human Nutrition
- Food Safety
- New Uses, Quality & Marketability of Plant & Animal Products

Benefits of National Programs

- Coordination
- Communication
- Efficient use of resources
- Results

ARS Research in Natural Resources & Sustainable Agricultural Systems

- 550 Scientists
- 192 Research Projects
- >72 Locations

- Water Availability & Watershed Management
- Climate Change, Soils, and Emissions
- Bioenergy and Energy Alternatives
- Agricultural and Industrial Byproducts
- Pasture, Forage, and Rangeland Systems
- Agricultural System Competitiveness and Sustainability

Water Availability & Watershed Management

Total Projects: 51
Total Locations: 33
Total Scientists: 153

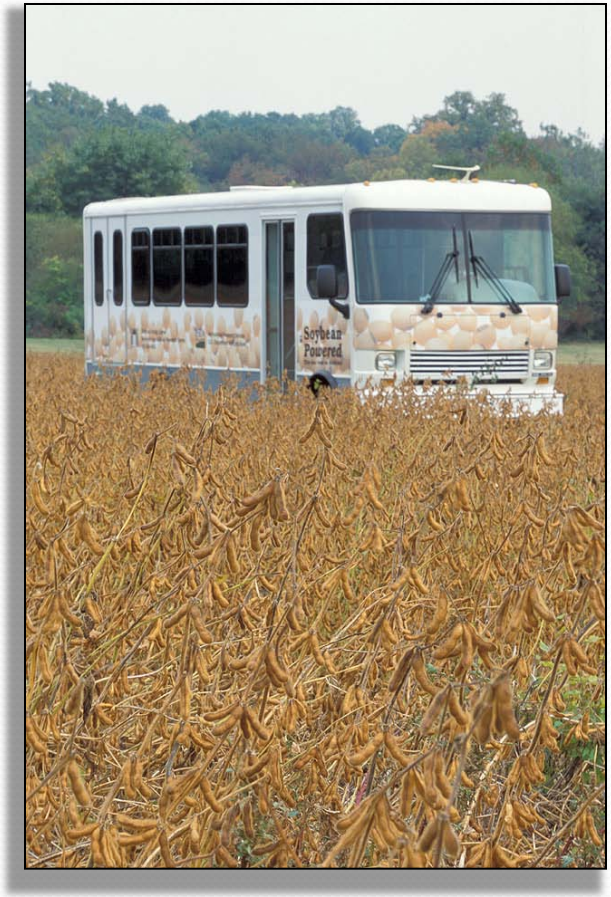
- Effectiveness of Conservation Practices
- Irrigation Water Management
- Drainage Water Management Systems
- Integrated Erosion and Sedimentation Technologies
- Watershed Management, Water Availability, and Ecosystem Restoration
- Water Quality Protection Systems

Climate Change, Soils, and Emissions

Total Projects: 42
Total Locations: 32
Total Scientists: 103

- **Enable Improvements of Air Quality via Management and Mitigation of Emissions from Agricultural Operations**
- **Develop Knowledge and Technologies for Reducing Atmospheric Greenhouse Gas Concentrations Through Management of Agricultural Emissions and Carbon Sequestration**
- **Enable Agriculture to Adapt to Climate Change**
- **Maintain and Enhance Soil Resources**

Bioenergy and Energy Alternatives



Total Projects: 16
Total Locations: 7
Total Scientists: 48

- **Feedstock Development (*Enable new varieties and hybrids of bioenergy feedstocks with optimal traits)***
- **Sustainable Feedstock Production Systems (*Enable new optimal practices and systems that maximize the sustainable yield of high-quality bioenergy feedstocks)***
- **Biorefining (*Enable new, commercially preferred biorefining technologies)***

Agricultural and Industrial Byproducts

Total Projects: 22
Total Locations: 17
Total Scientists: 58

- **Management, Enhancement, and Utilization of Manure**
- **Nutrients and Resources**
- **Manure Pathogens and Pharmaceutically Active Compounds (PACs)**
- **Atmospheric Emissions**
- **Developing Beneficial Uses of Agricultural, Industrial and Municipal Byproducts**

Pasture, Forage, and Rangeland Systems

Total Projects: 35
Total Locations: 25
Total Scientists: 110

- **Rangeland Management Systems to Improve Economic Viability and Enhance the Environment**
- **Pasture Management Systems to Improve Economic Viability and Enhance the Environment**
- **Sustainable Harvested Forage Systems for Livestock,**
- **Bioenergy and Bioproducts**
- **Sustainable Turf Systems**

Agricultural System Competitiveness and Sustainability

- Agronomic Crop Production Systems
- Specialty Crop Production Systems
- Integrated Whole Farm Production Systems
- Integrated Technology and Information to Increase Customer Problem Solving Capacity

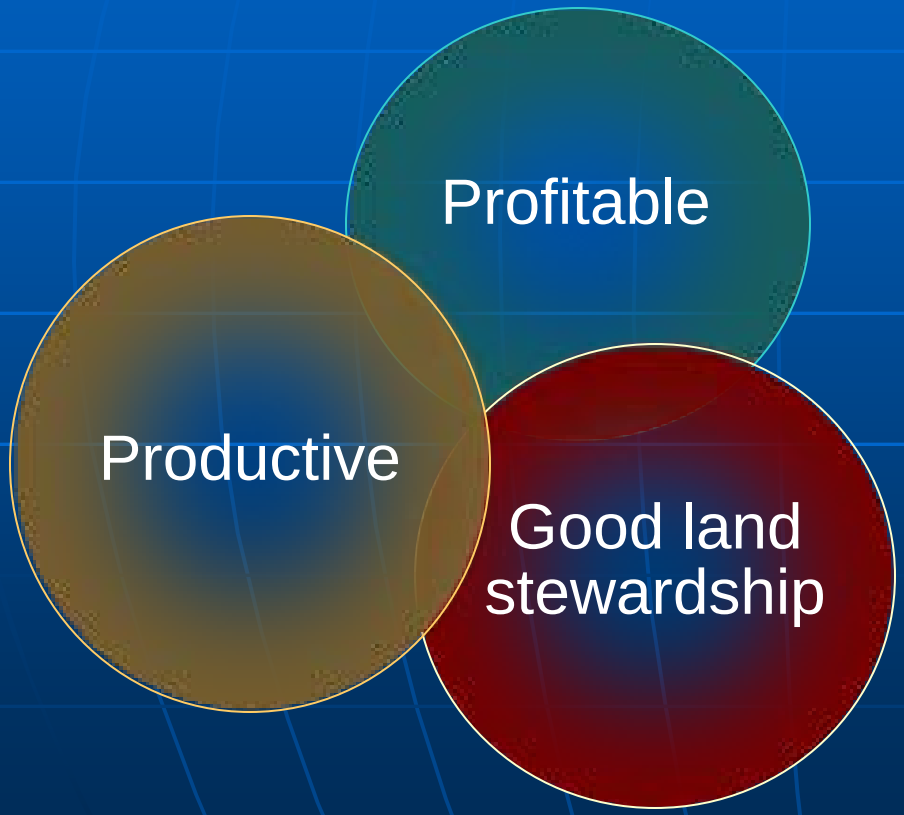
Total Projects: 20
Total Locations: 19
Total Scientists: 68

ARS Partners In Research

- USDA
- Other Government Agencies
- State Universities
- International Organizations
  - U.N. Food and Agriculture Organization
  - World Bank
  - Consultative Group of International Agricultural Research
  - Tropical Ag Research & Highe Ed Center
  - U.S./Israel BARD

A Working Understanding of Sustainability

Perspectives of sustainability for…



... those who produce food & fiber

….and everybody else, too.




Leading America towards a better future through agricultural research and information.