

Soil Health: Why you should care!

CHARLES W. RICE

University Distinguished Professor
Mary L. Vanier Professor
Soil Microbiology, Department of Agronomy

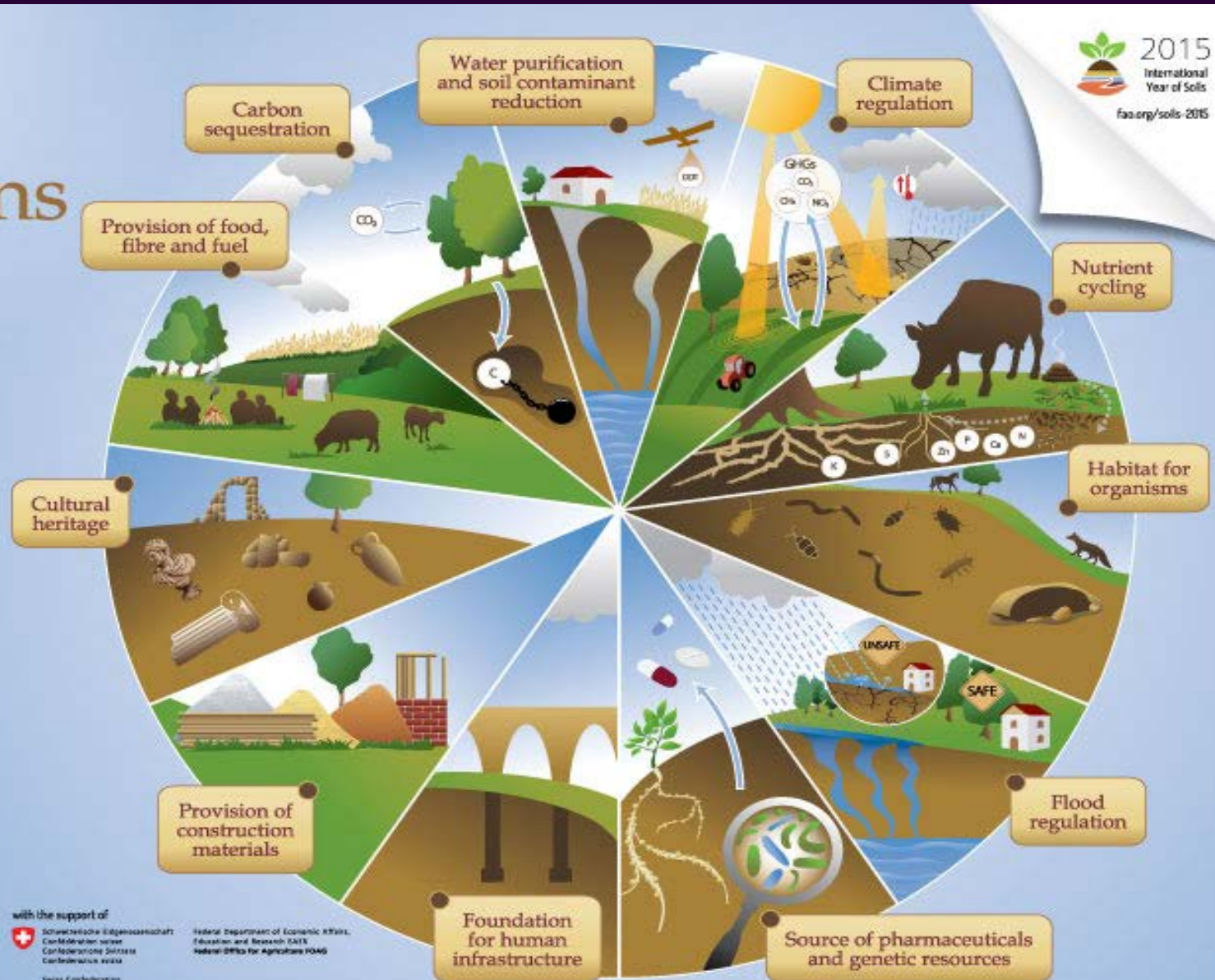
Chair, National Academies Board on Agriculture and Natural Resources

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Soil functions

Soils deliver ecosystem services that enable life on Earth



2015
International
Year of Soils
fao.org/soils-2015



Food and Agriculture
Organization of the
United Nations

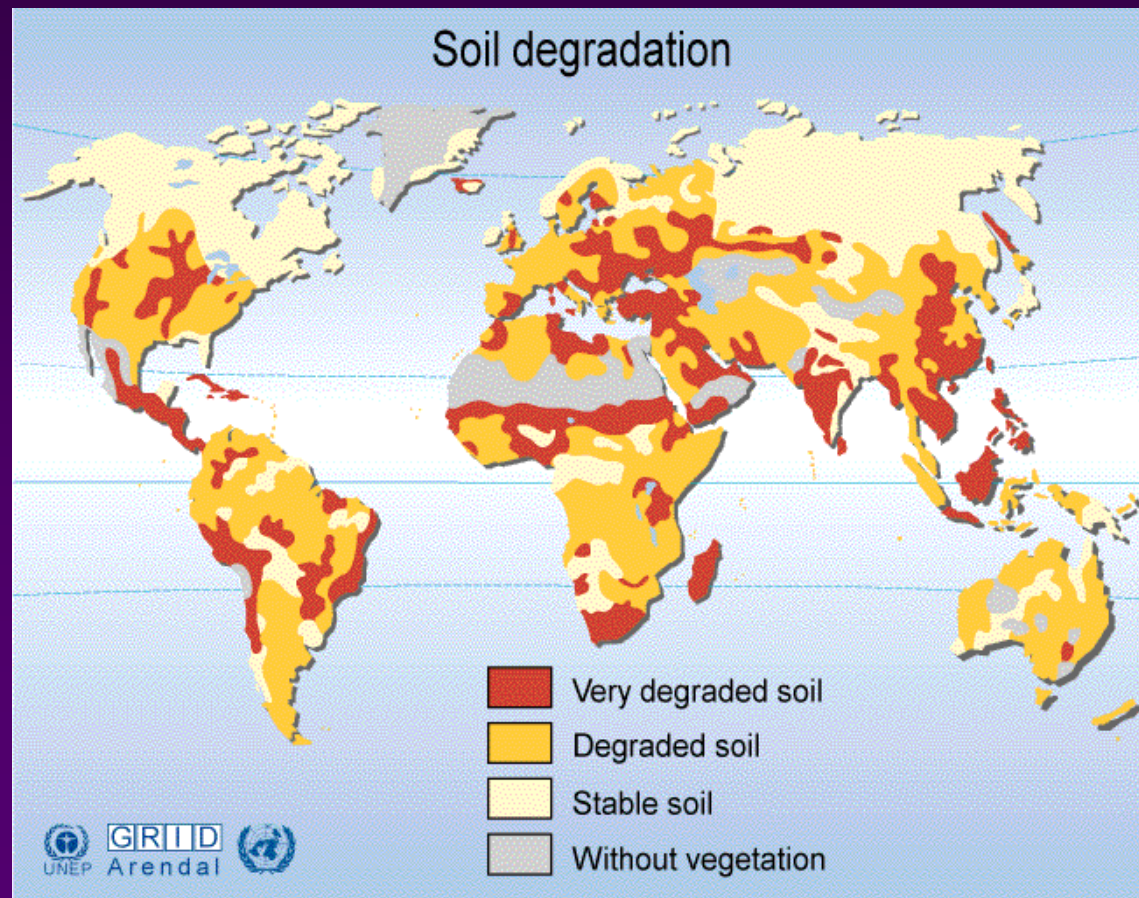
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- Erosion
- Decline in organic matter
- Contamination (local and diffuse)
- Paving
- Compaction
- Loss of biodiversity
- Salinization
- Floods and landslides



Soil loss in 2017

- National average erosion ~2-5 tons/acre/year
- Rate of formation is ~0.1 to 0.5 ton/acre/year
- Some regions lose soil at 30-40 tons/acre/yr
- In years of severe weather, areas of Iowa suffer losses of 100 tons/acre/yr
- One year, thousands of acres in Iowa lost 50 tons/acre in one storm







Economic impact of drought and heat stress

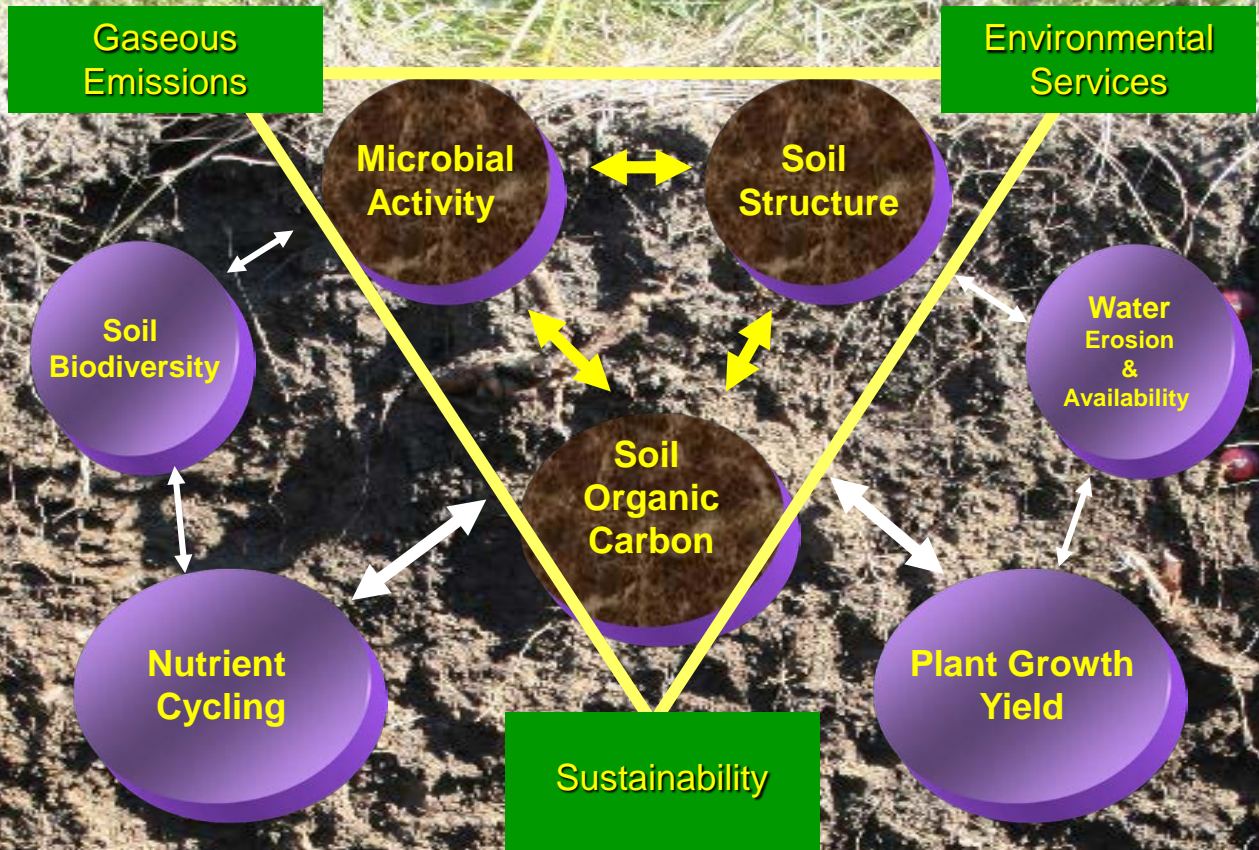
Heat and drought stress are major environmental concerns.

Year 2011: Kansas — \$1.8 billion (insurance claims); Texas — about \$5 billion. Most yield losses were related to drought and high temperatures.

CROPS	Crop grain yield loss (million)	
	2011	2012
1. Wheat	\$286	\$387
2. Sorghum	\$214	\$272
3. Corn	\$966	\$261
4. Soybean	\$310	\$97

Source: Economic impact of 2001–2003 drought; income and financial condition of Kansas farmers. Kansas Farm Management Association.

Source: Associated Press, September 14, 2011. Kansas crop losses from drought reach \$1.7 billion.



Priorities for the United States' Soil Strategy

1. Study human behavior and ways to change it with respect to soil.
2. Create infrastructure for soil data.
3. Coordinate & support research on soil-climate interaction.
4. Support research to understand and manage land-use change.
5. Create incentives for sustainable land-management practices.

THE STATE AND FUTURE OF U.S. SOILS

*Framework for a Federal
Strategic Plan for Soil Science*

PRODUCT OF THE
Subcommittee on Ecological Systems,
Committee on Environment, Natural Resources, and
Sustainability
OF THE NATIONAL SCIENCE AND TECHNOLOGY
COUNCIL



December 2016

Inherent soil differences vs differences due to management.

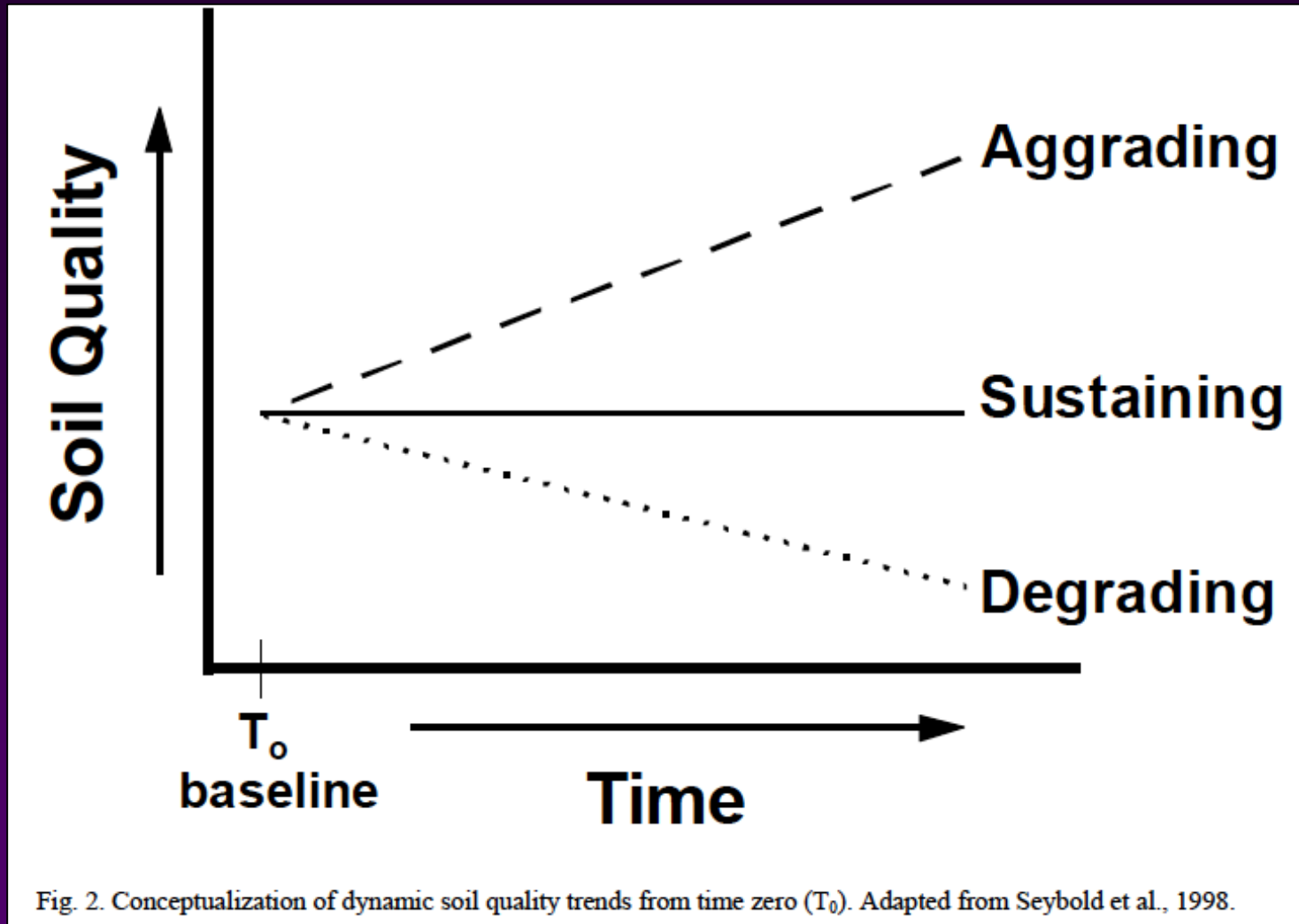


Fig. 2. Conceptualization of dynamic soil quality trends from time zero (T_0). Adapted from Seybold et al., 1998.

Use of “baseline conditions” to assess response of soil to subsequent soil management decisions.

Soil Monitoring System

- Quantify changes in soil properties at the resolution of individual agricultural management units for diverse environmental conditions and cropping systems.
- Evaluate the relative contributions of management factors, environmental conditions, and cropping systems for changes in soil.

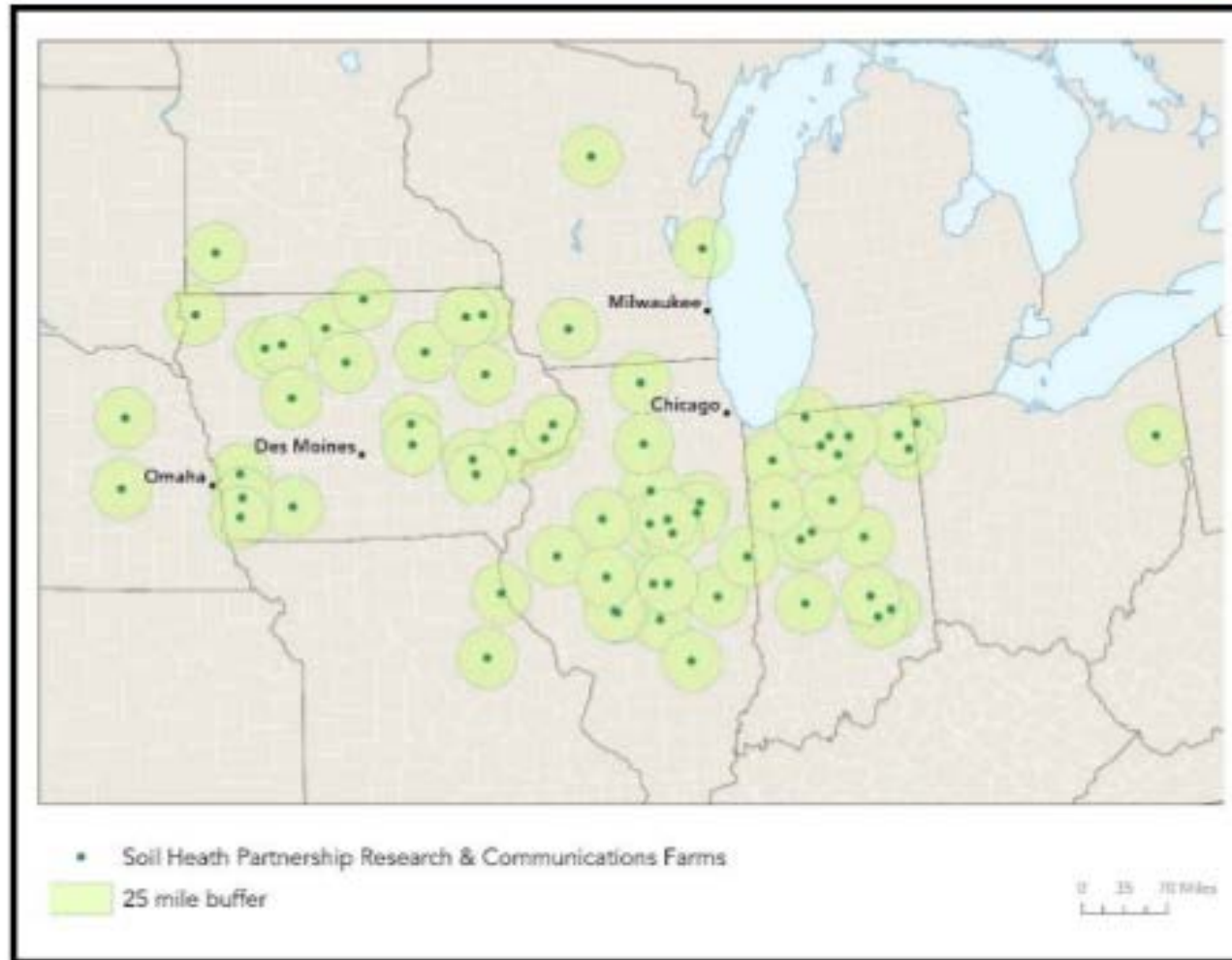
Soil Health Partnership

- National Corn Growers Association's initiative to demonstrate the economic and environmental benefits of soil health practices including:
 - Cover crops
 - Reduced tillage
 - Nutrient management

Monsanto
Natural Resources Conservation Service
The Walton Family Foundation
Midwest Row Crop Collaborative
The General Mills Foundation



Network Coverage



Our ultimate goal is to measure and communicate the economic and environmental benefits of different soil management strategies, and provide a set of regionally specific, data-driven recommendations that farmers can use to improve the productivity and sustainability of their farms

- **Recruit a network of demonstration farms** that will serve as showcases for other farmers to investigate innovative soil management practices, including reduced tillage systems, cover crops and advanced nutrient management.
- **Establish research protocols** that will allow us to measure the connection between a diverse range of soil management practices and soil health.
- **Publish findings and recommendations** that highlight the economic and environmental benefits of healthy soil.
- **Support networking and technical assistance** that will help growers and their advisors make decisions that will result in positive changes for the profitability of their operation and the sustainability of the soil.

We need to articulate to the public and policy makers the importance and value of soils to society

- Value of ecosystem services

value (\$trillion)

- soil 20
 - clean water 2.3
 - food etc. 0.8
 - genetic resources 0.8
- Total (£24T) is about twice global GNP
 - Single most valuable ecosystem





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CHUCK RICE
office 785-532-7217
cell 785-587-7215
cwrice@ksu.edu
www.soilcarboncenter.k-state.edu

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