

Soil Security and Clean Air

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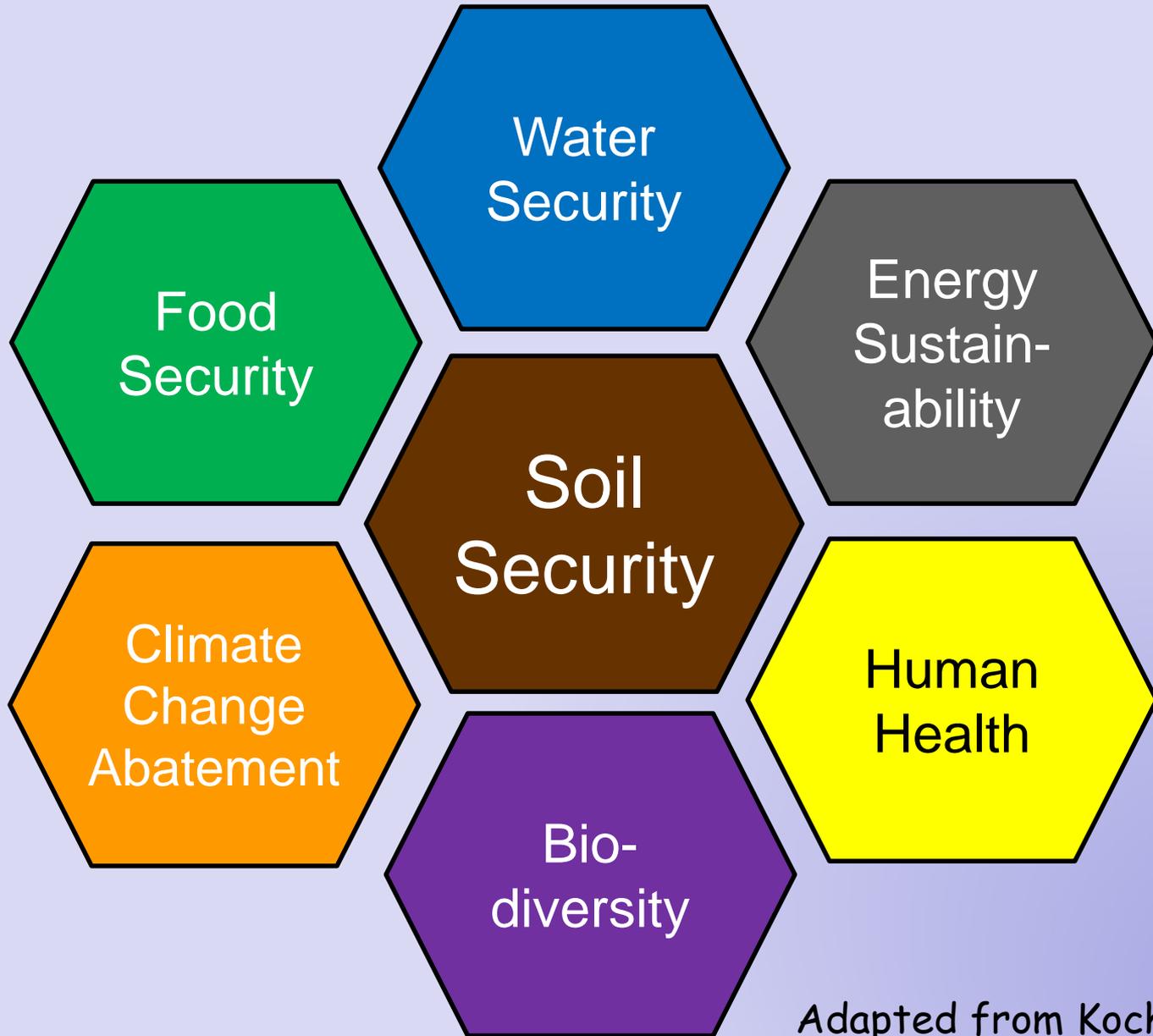
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Soil Security



Maintenance and improvement of the soil resource to produce food, fiber, and fresh water, to contribute to sustainable energy production, adapt to climate changes, and to maintain biodiversity, human health, and function in ecosystems.



Adapted from Koch et al., 2013
Global Policy

5 Dimensions of Soil Security

1. Capability--the intrinsic capacity of a soil to produce products and ecosystem services
2. Condition--the current state of the soil as modified by human activities
3. Capital--economics of soil services to Health, Environment and Food production
4. Connectivity--the social connection of soil managers and custodians and users of soil products and services to the soil (and to each other)
5. Codification-- Policy frameworks to secure soil.

Soil Capability to Function

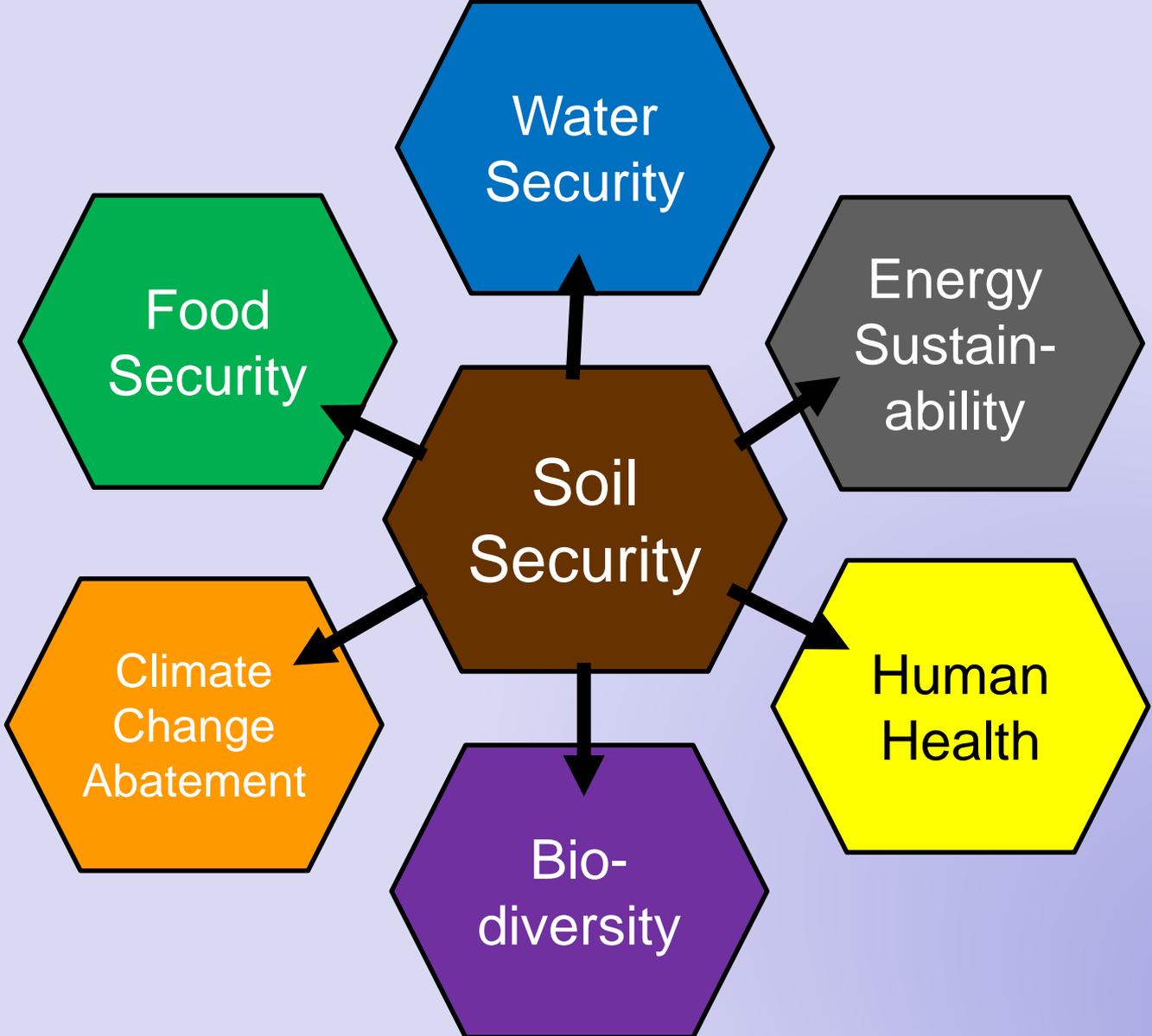
Soil Condition to Function

1. Nutrient cycling
2. Capture, storage, retention of water
3. Biodiversity and habitat
4. Filtering, buffering and transforming compounds



Blum 1993

Soil function links SOIL to Global Issues



What about Soil Security and Air Quality?

What about Soil Security and Air Quality?

The obvious answer:



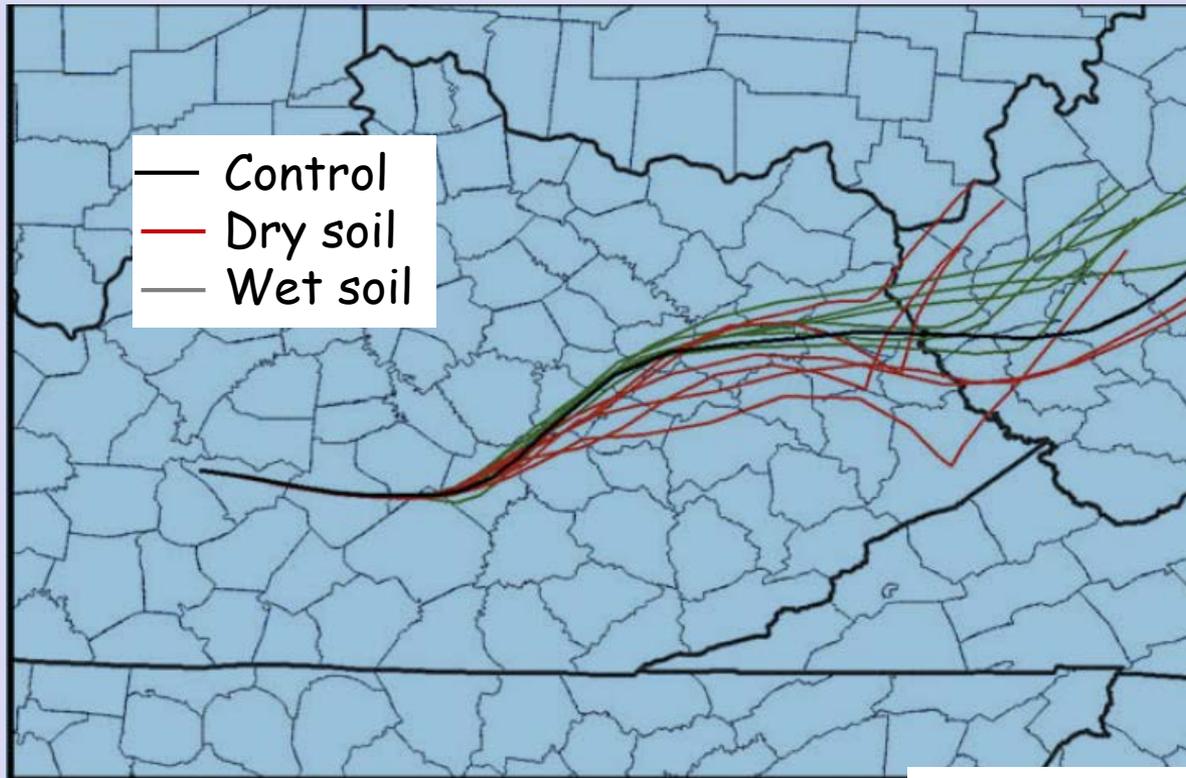
Texas A&M AgriLife Extension Service photo courtesy of Dr. Kevin Appel near Canyon on March 18, 2014.

What about Soil Security and Air Quality?

The less obvious answer:

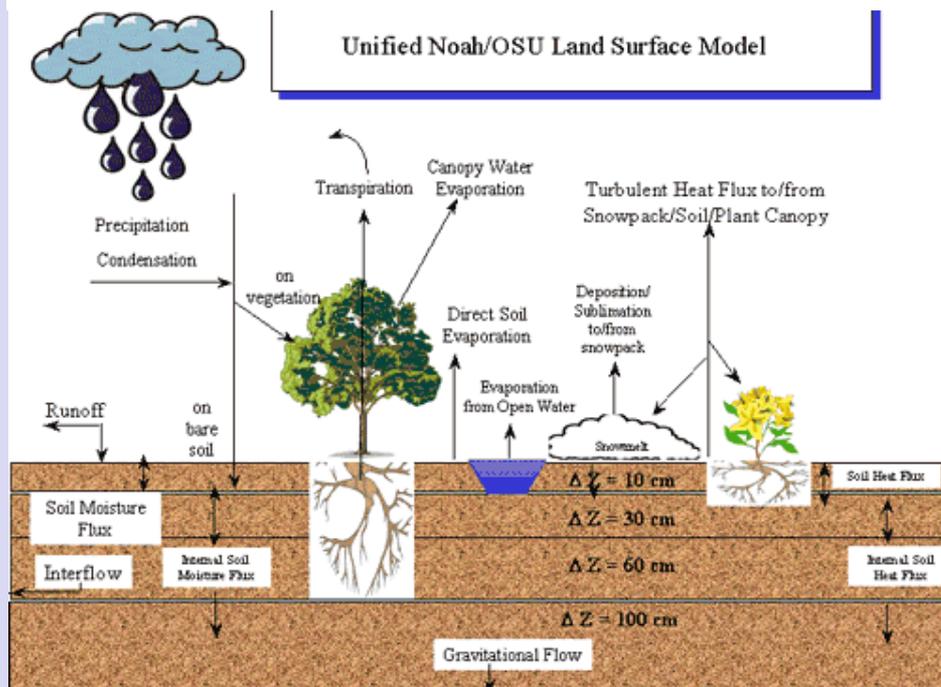
Capability of soil to capture, store, and release water into the atmosphere drives mass and energy fluxes

Significant effect of soil moisture on trajectories of air pollution

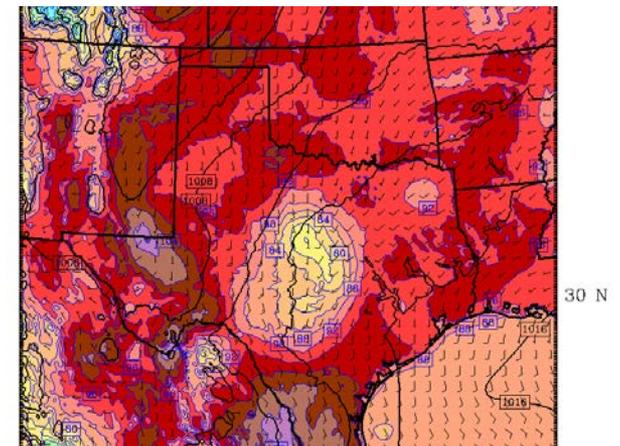


Soil capability and condition are important components of biophysical processes

NOAH Land Surface Model



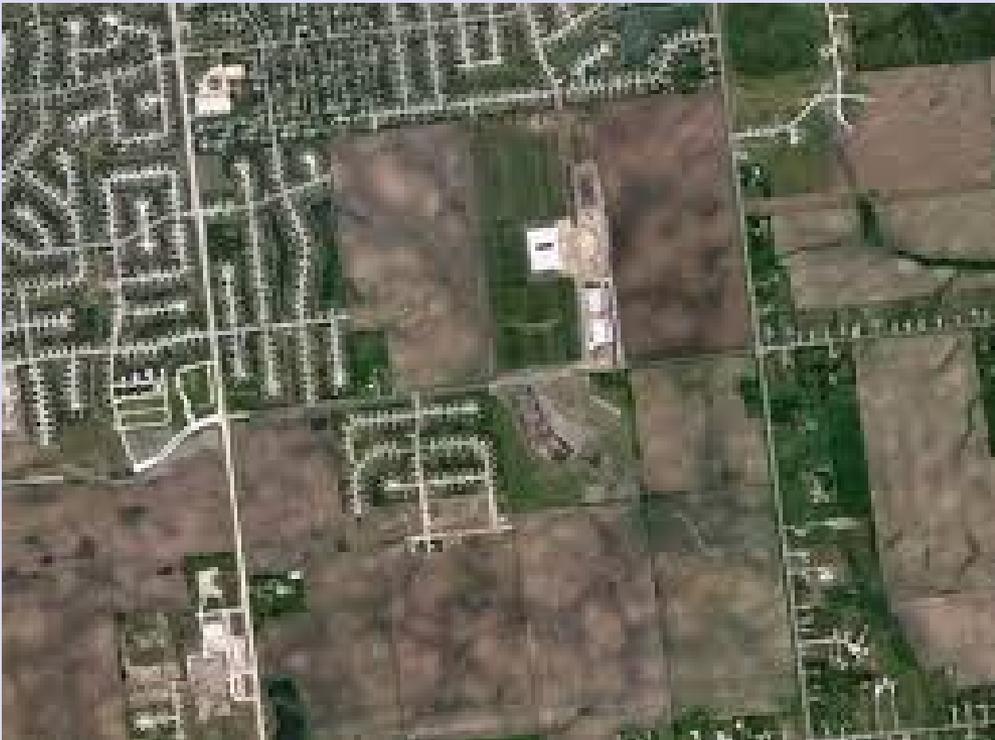
WRF predicted surface temperature



[image www.atmo.ttu.edu](http://www.atmo.ttu.edu)

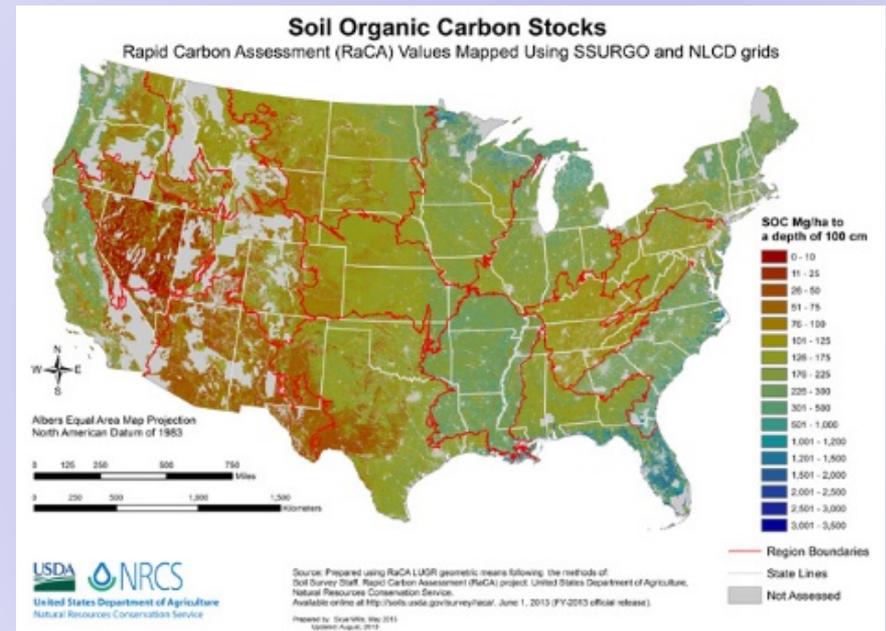
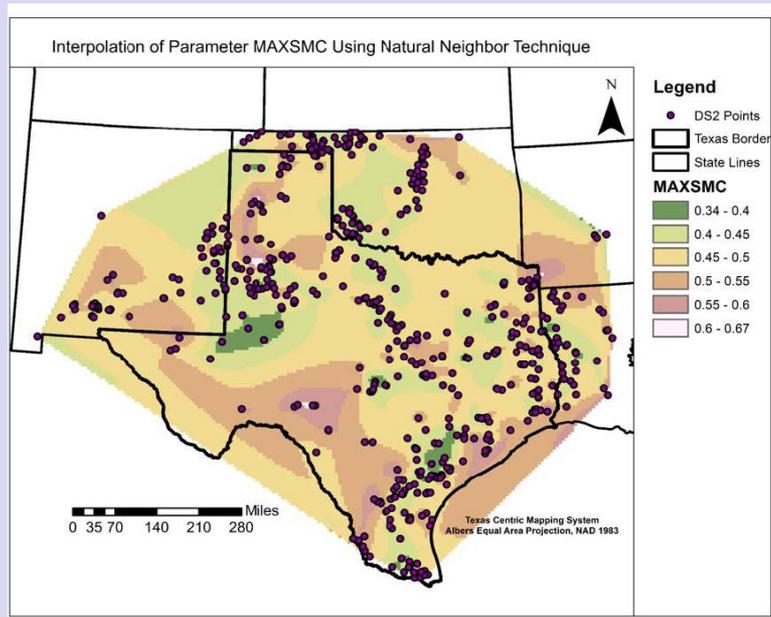
Biophysical processes are coupled in space

Soil is managed at field and landscape scales



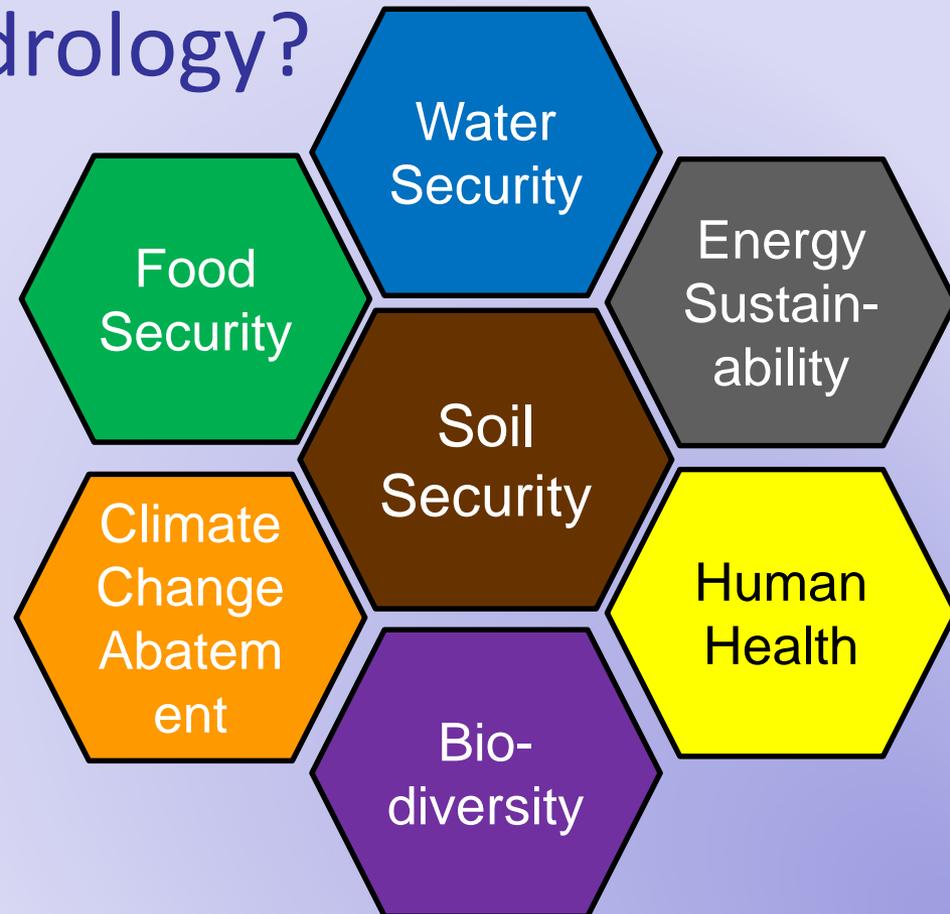
What do we need to know about Soil Capacity and Condition?

1. Soil Physical Properties
2. Spatial Location of Soil
3. Effect of Land Use on soil properties

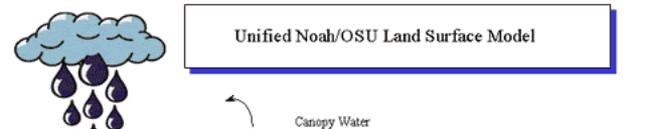


Global Issue

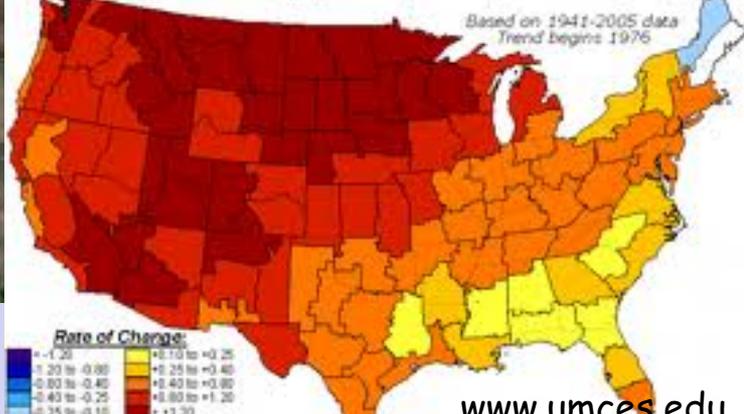
How will Climate Change, Policy, and Land Use affect changes in
air quality?
landscape hydrology?



To address global issues, science-based & effective policy requires management-scale knowledge of soil capacity and how changes in soil condition contribute to mass and energy fluxes in the environment



Rate of Long-Term Trend Temperature Change (top; °F per decade) & Precipitation Change (bottom; inches per decade) – JFM





Texas A&M University

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1. Capacity
2. Condition
3. Capital
4. Connectivity
5. Codification

Acknowledgements

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Texas NRCS Soil Survey

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Thanks for your attention