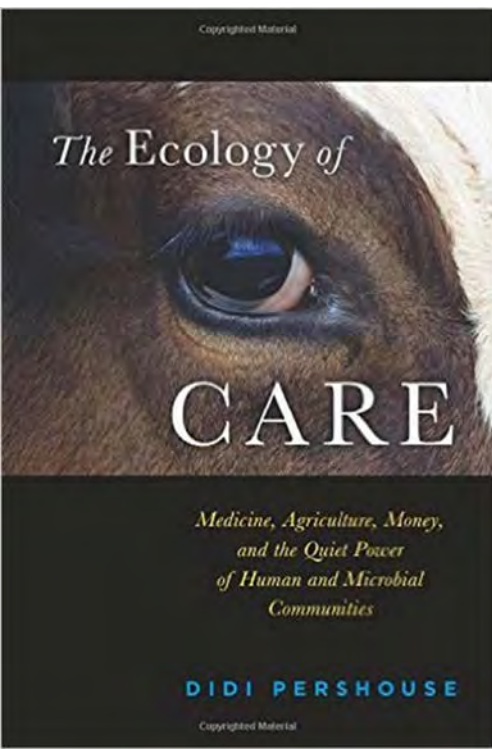
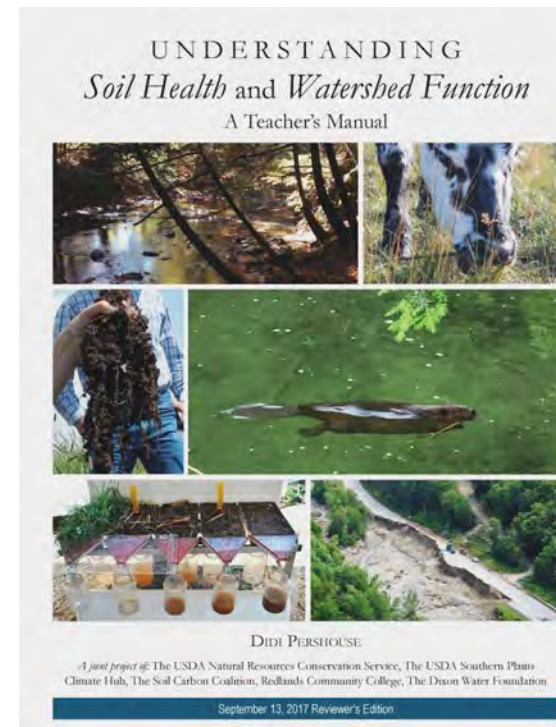


# The Soil Sponge:

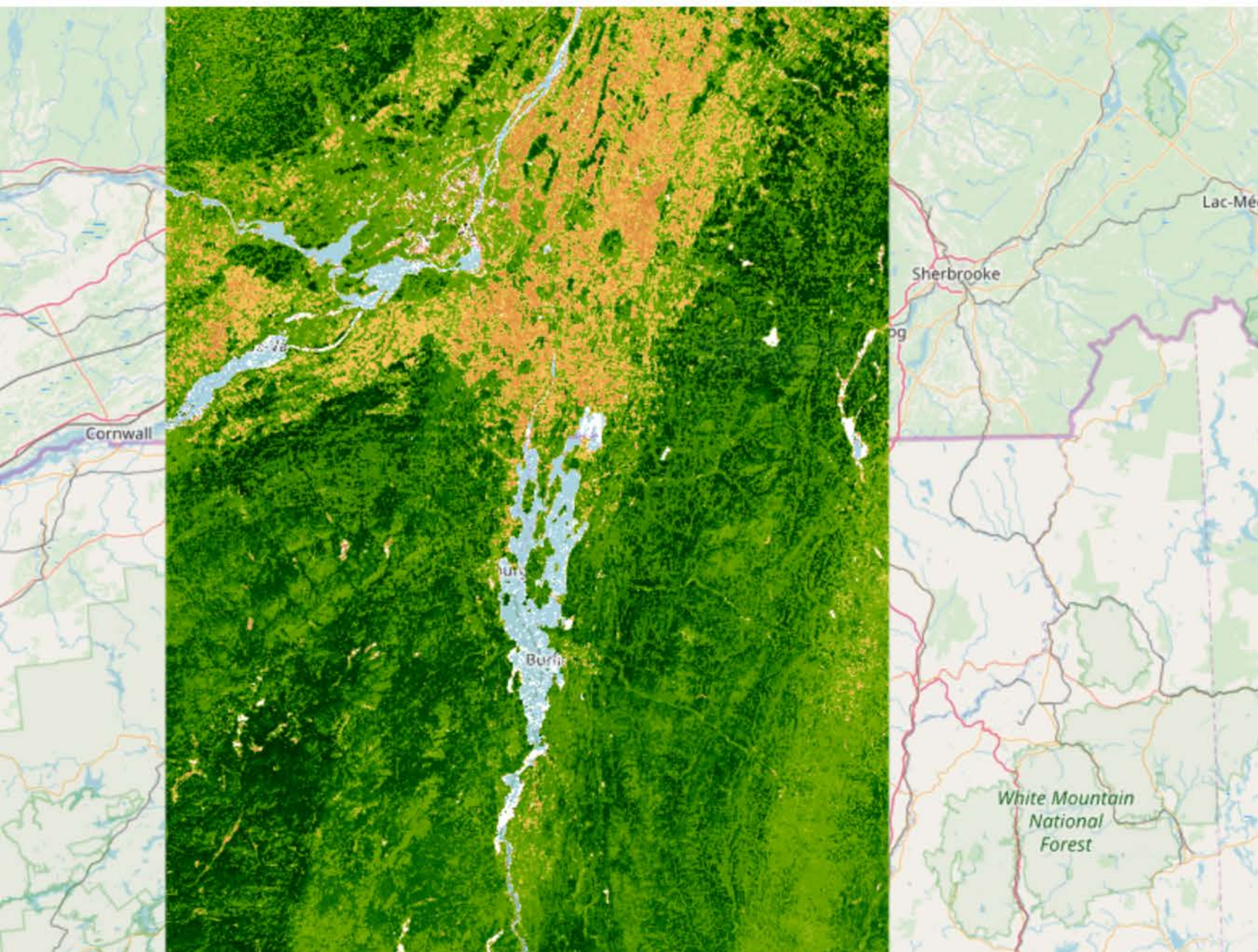
## The living matrix that supports life on Earth



[www.DidiPershouse.com](http://www.DidiPershouse.com)  
Didi.pershouse@gmail.com





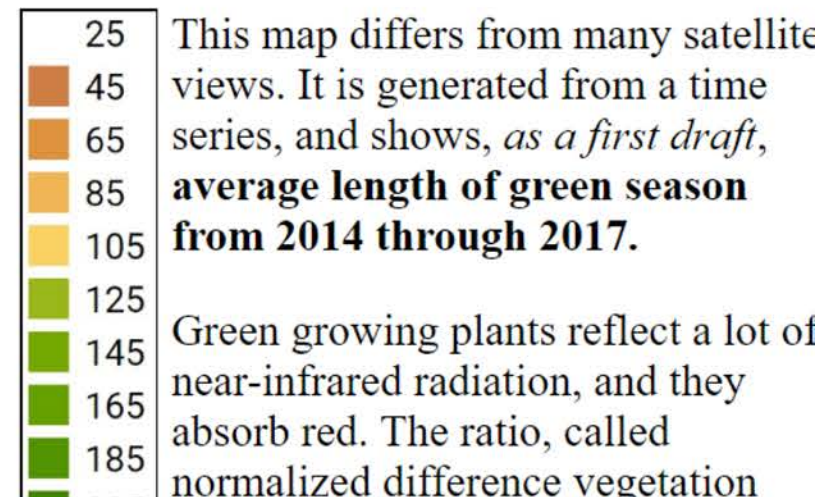


## Champlain Basin: Length of green season

*Zoom control is at upper left. Adjust transparency with this slider, to see road map underneath.*

*Then this slider allows you to see aerial map underneath.*

**days/yr**  
**NDVI > .33**

















UNDERSTANDING  
*Soil Health and Watershed Function*  
A Teacher's Manual



DIDI PERSHOUSE

*A joint project of:* The USDA Natural Resources Conservation Service, The USDA Southern Plains Climate Hub, The Soil Carbon Coalition, Redlands Community College, The Dixon Water Foundation

September 13, 2017 Reviewer's Edition

<http://soilcarboncoalition.org/learn>





healthy topsoil is a  
living  
carbon-rich sponge  
that soaks  
up  
water









Humans cannot build  
the soil sponge infrastructure

The soil sponge requires a  
biological workforce.

Plants  
sip carbon  
out of the air,  
add water  
and sunlight

and turn it into life.











How does nature grow food?

# Soil Health Principles

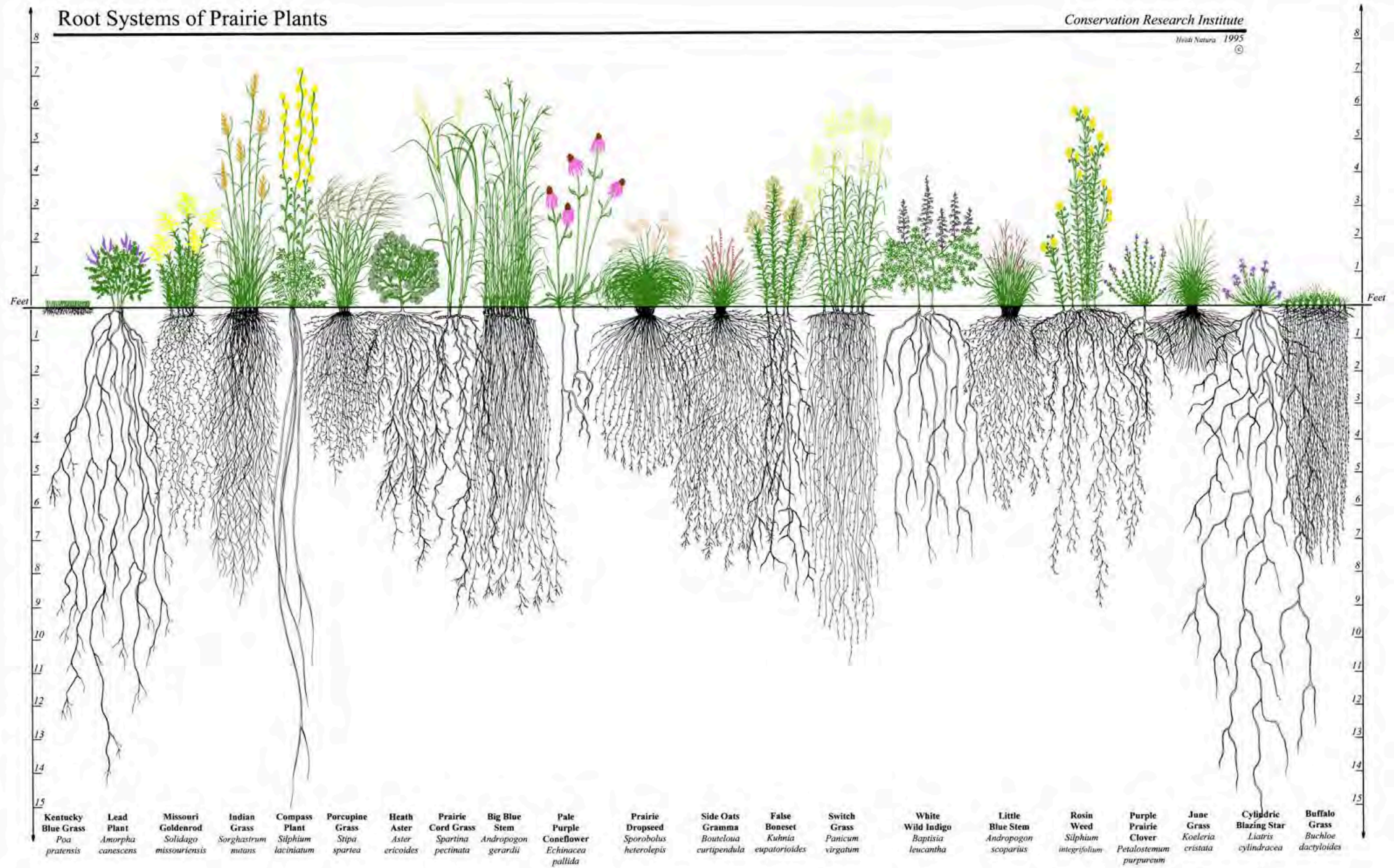
- Provide shelter, moisture, and nutrition for soil life by keeping it covered year round
- Minimize physical, chemical and biological stresses (such as unnecessary tillage, herbicides, fungicides, pesticides, over grazing, under grazing.)
- Create conditions and food for an intelligent microbial network to develop by keeping living roots in the ground year round.
- Use plant diversity above ground to increase biological diversity above and below ground
- Integrate a diversity of animals to move nutrients, microbes, seeds, and pollen, and regulate water flows.
- Get to know the context of the land

- Didi Pershouse, Adapted from Ray Archuleta, NRCS

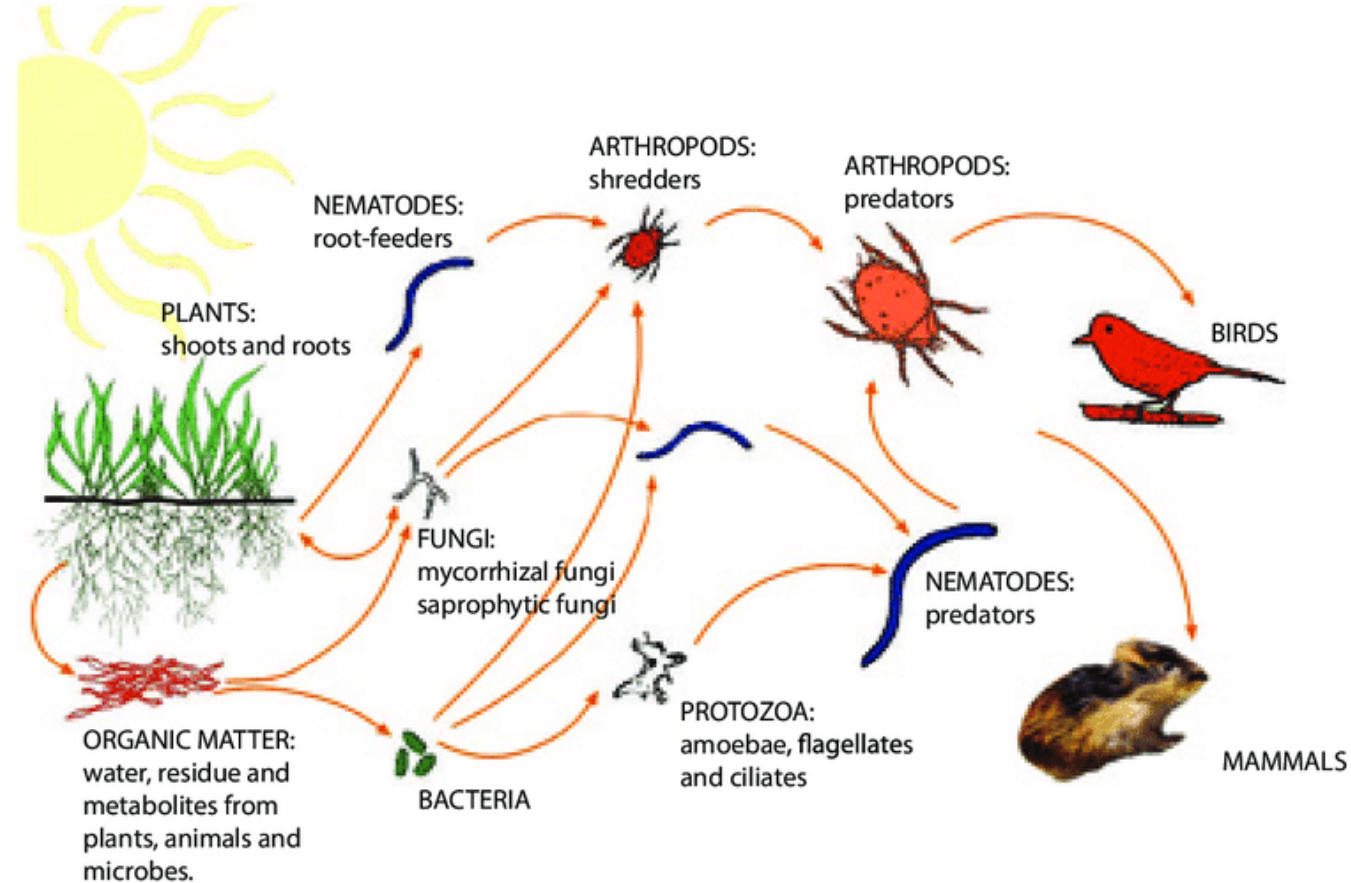
# Root Systems of Prairie Plants

Conservation Research Institute

Heidi Natura 1995



# The Soil Food Web



1st TROPHIC LEVEL:  
photosynthesizers

2nd TROPHIC LEVEL:  
decomposers  
mutualists  
pathogens, parasites  
root-feeders

3rd TROPHIC LEVEL:  
shredders  
predators  
grazers

4th TROPHIC LEVEL:  
higher level  
predators

5th and higher TROPHIC LEVELS:  
higher level  
predators

# Healthy functional landscapes can provide:

- Abundant clean water, for everyone.
- Pleasant livable temperatures and weather, around the world
- Protection from floods, drought, wildfire
- Nutrient dense food to grow healthy people, plants, and animals.
- Strong local economies
- Resilient communities inside and outside our bodies, above and below the ground.

MICROBES

the quiet

working class of the world

providing our goods and services

how do we support their work and  
give them a voice?

## **SOIL CARBON**

**Ralph and Lynda Corcoran:**

**13.19 tons of carbon per hectare per year.**

**One square mile= 800 people's annual CO2 emissions.**



How do you measure  
biological work?









Why not provide people  
opportunities  
to observe and think about

whole systems

landscape function

while they upload observations to a shared  
map of data?

[www.atlasbiowork.com](http://www.atlasbiowork.com)









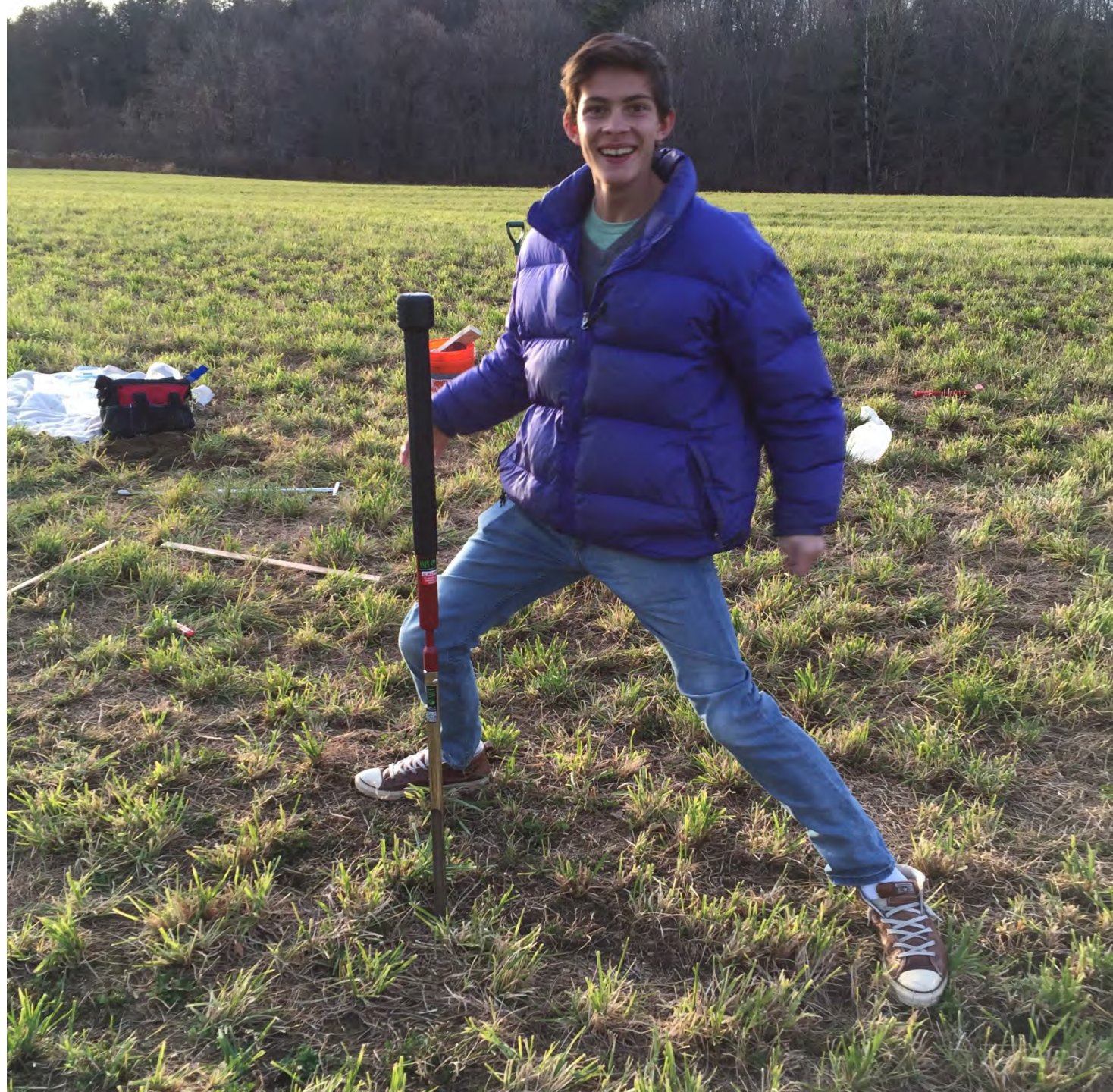










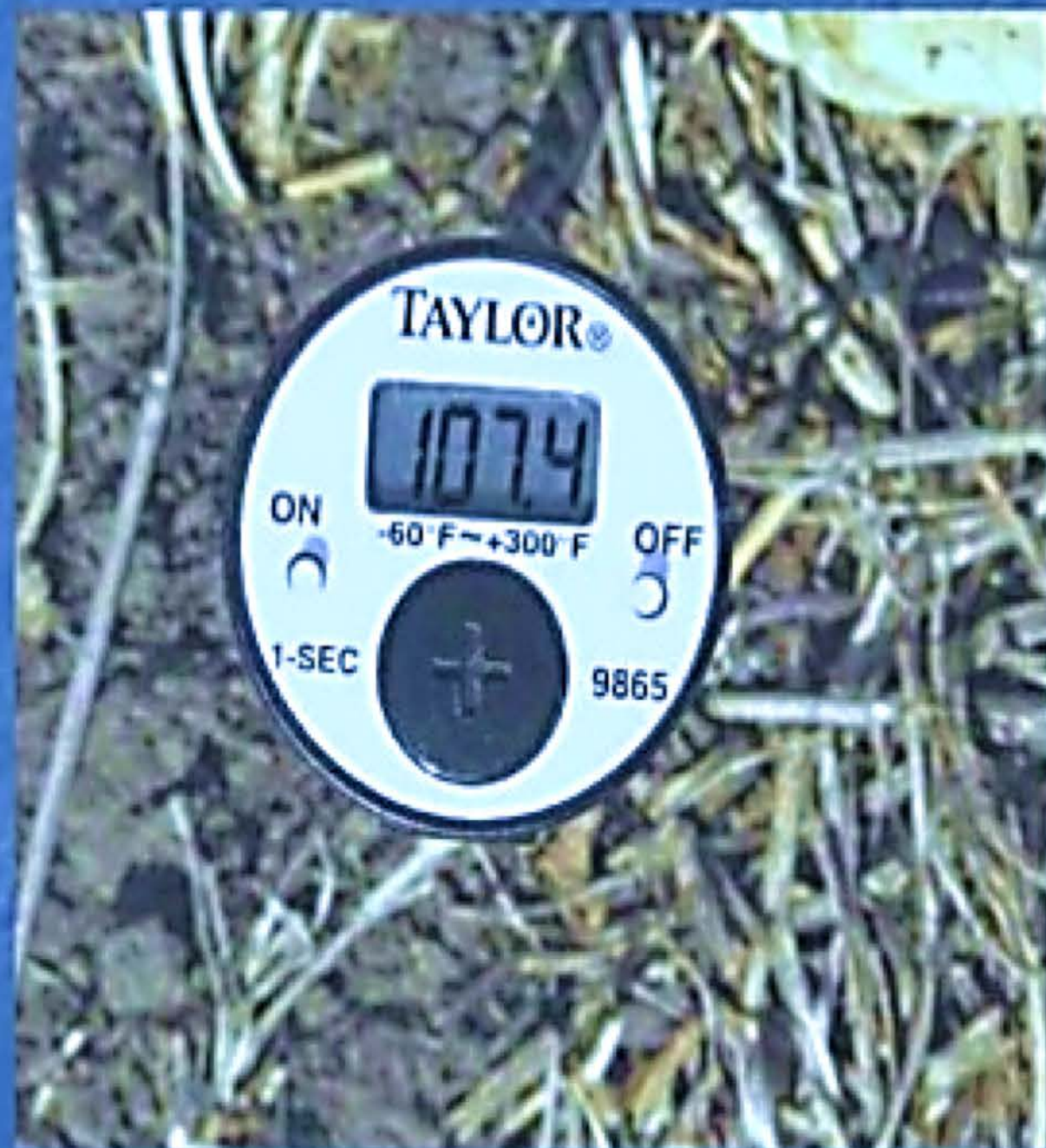












When we worry about climate change,  
what kinds of things are we worried about?

Walter Jehne,  
CSIRO Soil  
Microbiologist



An aerial photograph showing a vast expanse of white, puffy clouds. The clouds are dense and appear to be rising from the ground, creating a textured, undulating surface. The sky above the clouds is a deep, clear blue. The overall scene conveys a sense of scale and natural beauty.

# **The Biotic Climate Cycle**

(how landscapes create their own climates  
and gentle rain)

## *How to make rain, soil, and good weather:*

- Soil sponge soaks up more rain preventing floods and droughts
- Green season lengthens: more transpiration and cooling via latent heat fluxes
- Low pressure zones over cooler moister greener landscapes pull in moist air from coast
- Airborne microbes create rain and snow
- Sponge soaks it in and slowly releases
- More moderate temperatures from soil moisture.
- More moisture in ground, more plants can grow.

**The “Anti-Biotic” Climate Cycle:  
how humans have created their own deserts and  
droughts.**



*Sunday April 14, 1935.  
Dust Clouds Rolling Over The Prairies*

## *How to make deserts, droughts, and dust storms:*

- Human decisions lead to poorly covered and/or deforested soils
- Without adequate plants to feed underground life, no soil sponge is created
- Fewer precipitation nuclei, so less rain.
- Storms on coasts, drought in center.
- Rain is not absorbed, and water moves sideways and/or evaporates.
- Without biological glues, soil erodes from force of wind and water.
- Water tables drop, soil moisture decreases
- Green season shortens, less transpiration.

It's all about the soil sponge!



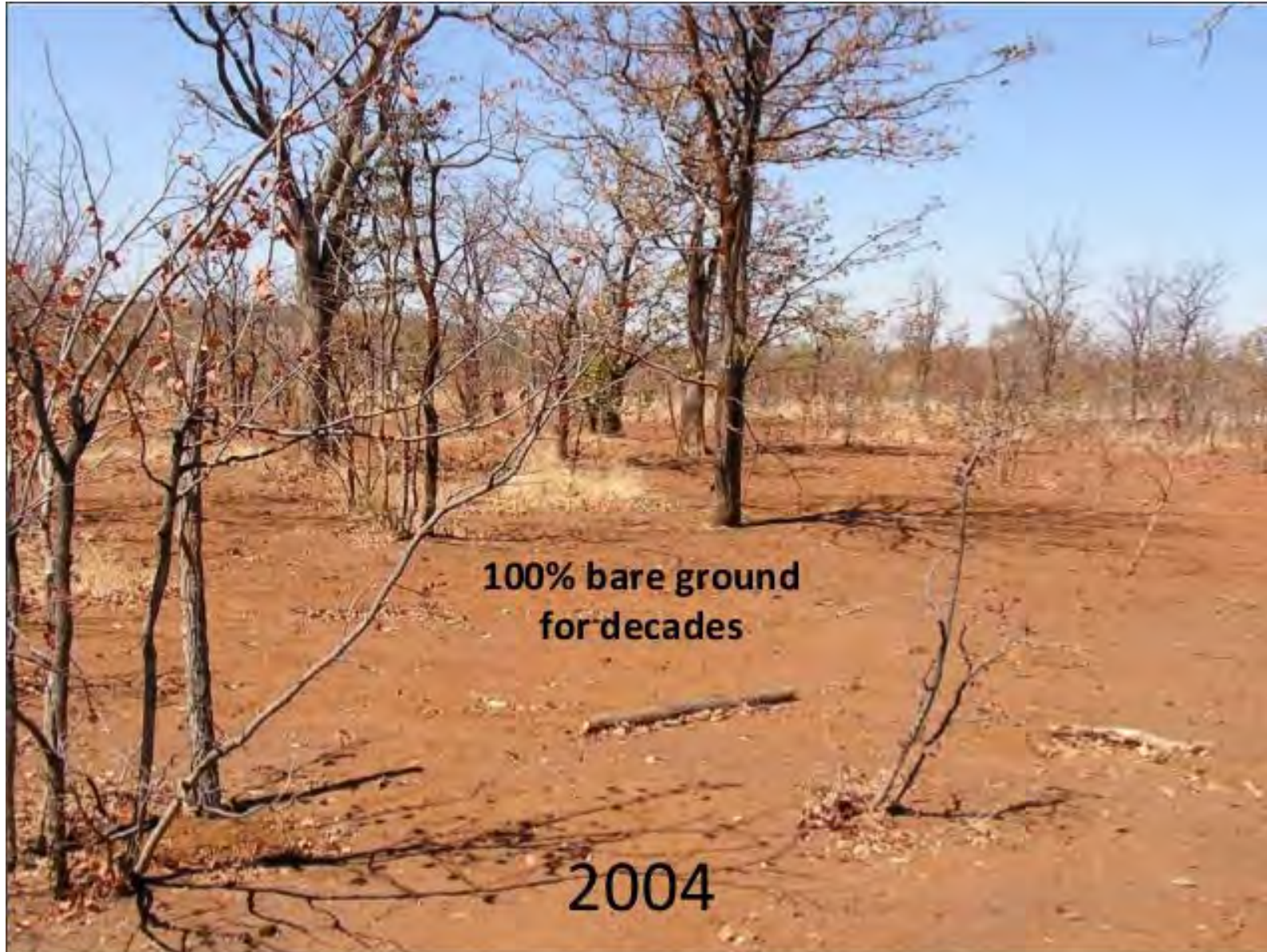
2006



**2009**



Tuesday, January 13, 15

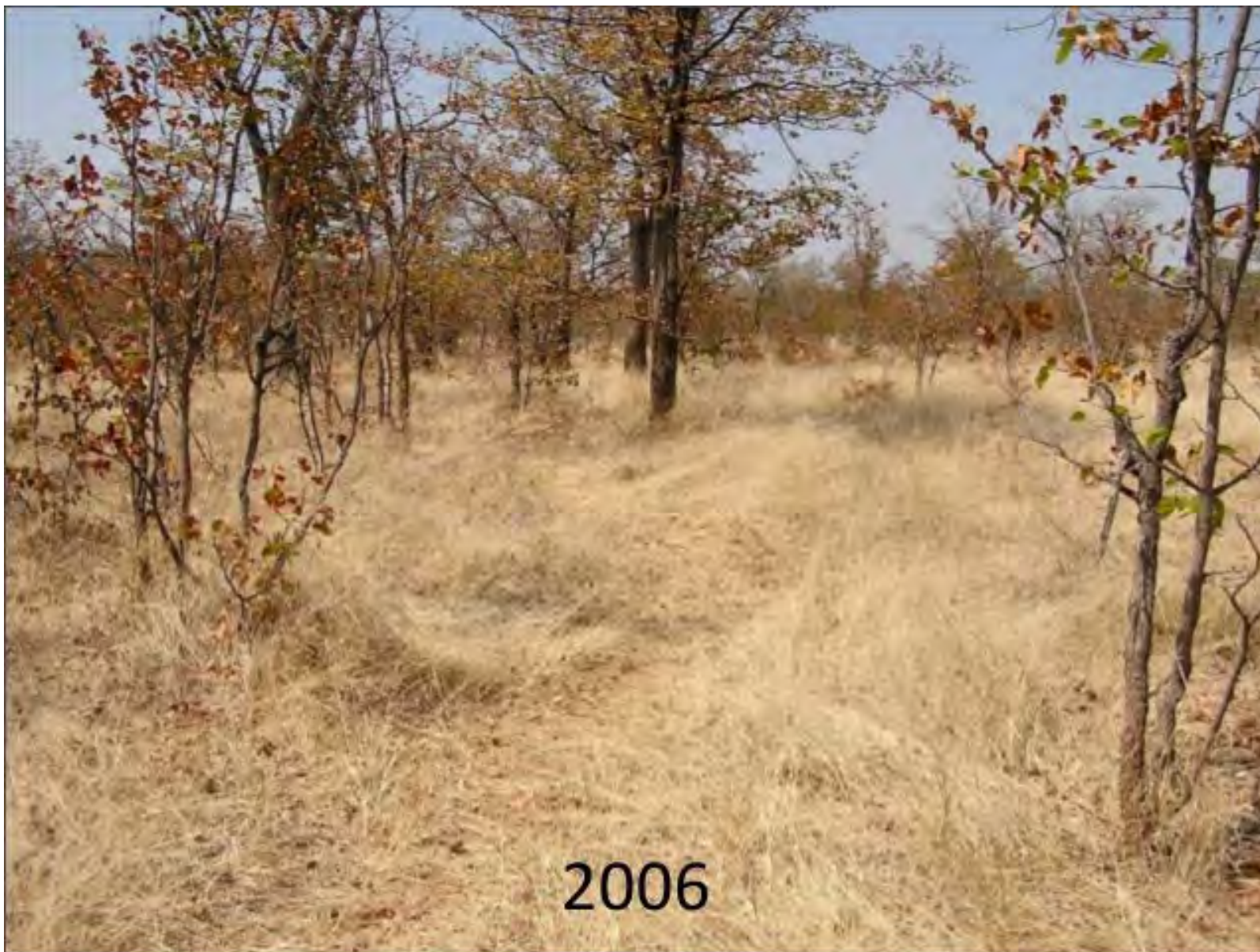


**100% bare ground  
for decades**

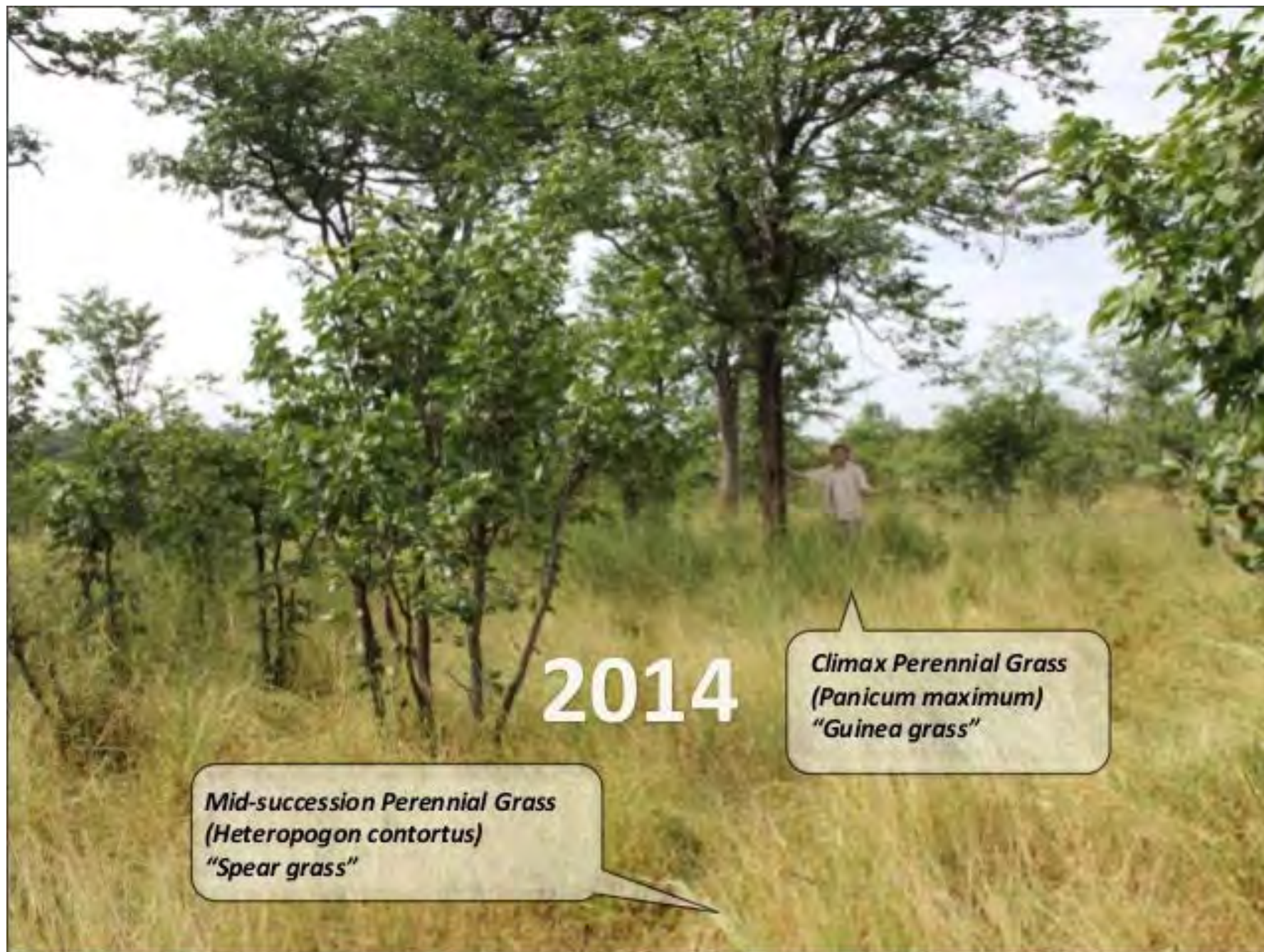
**2004**



Tuesday, January 13, 15



Tuesday, January 13, 15



2014

*Mid-succession Perennial Grass*  
*(Heteropogon contortus)*  
*"Spear grass"*

*Climax Perennial Grass*  
*(Panicum maximum)*  
*"Guinea grass"*















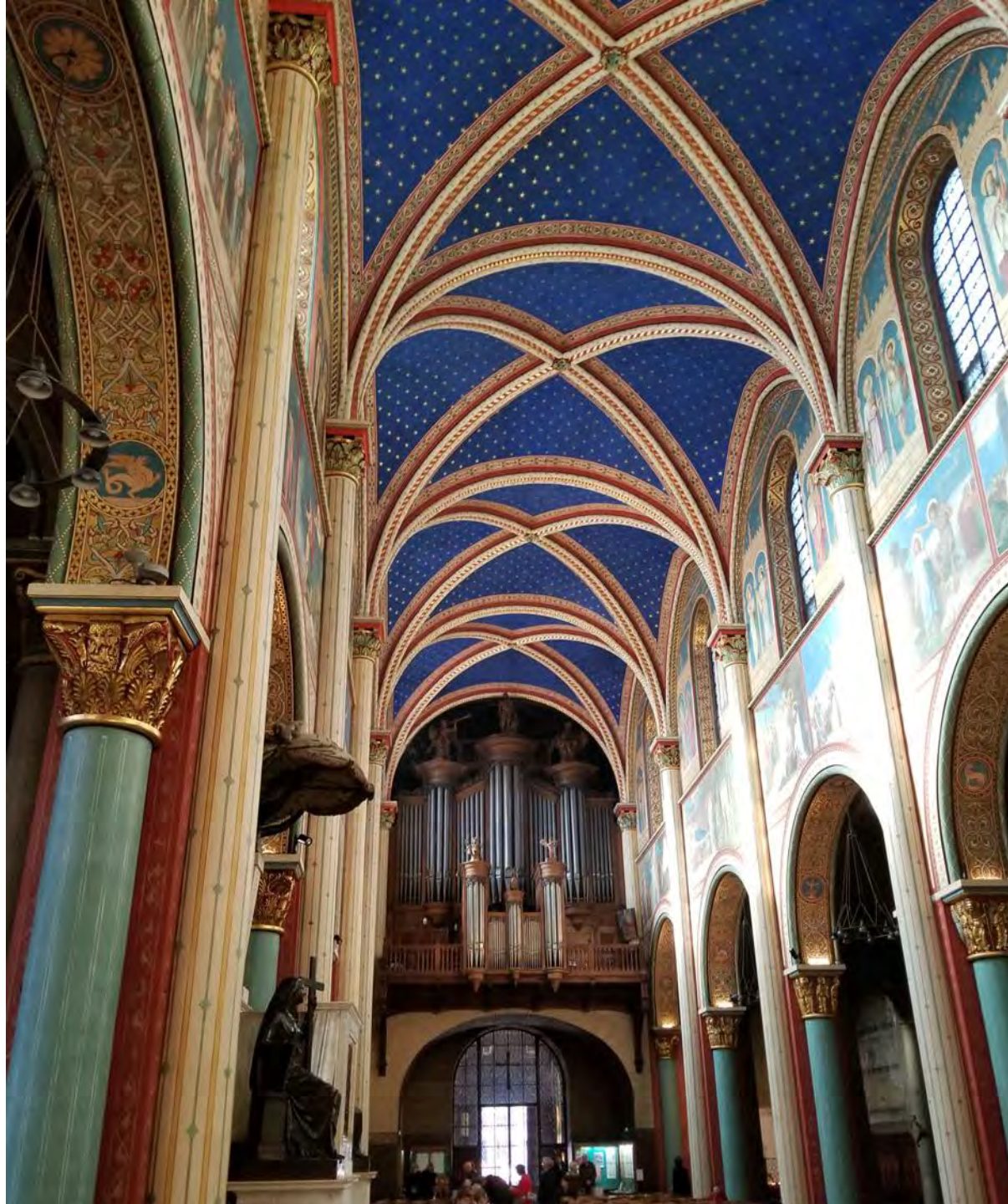






Sacred Space

























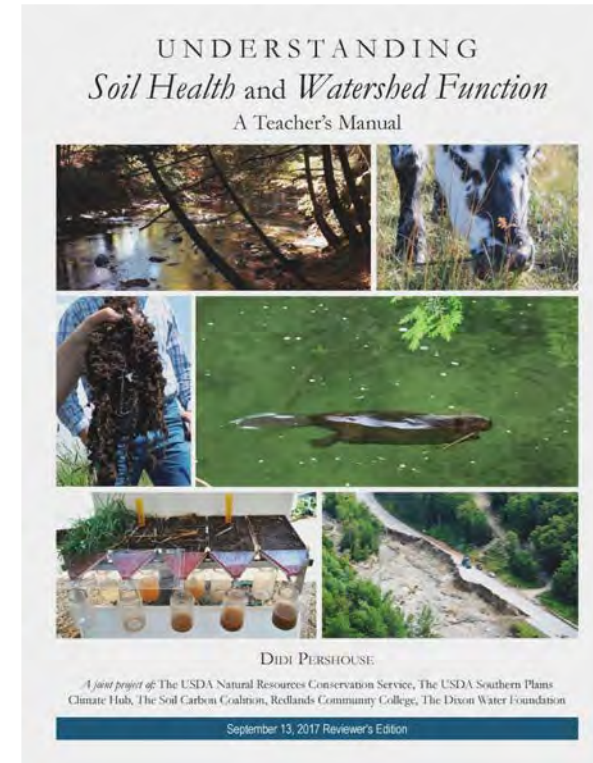
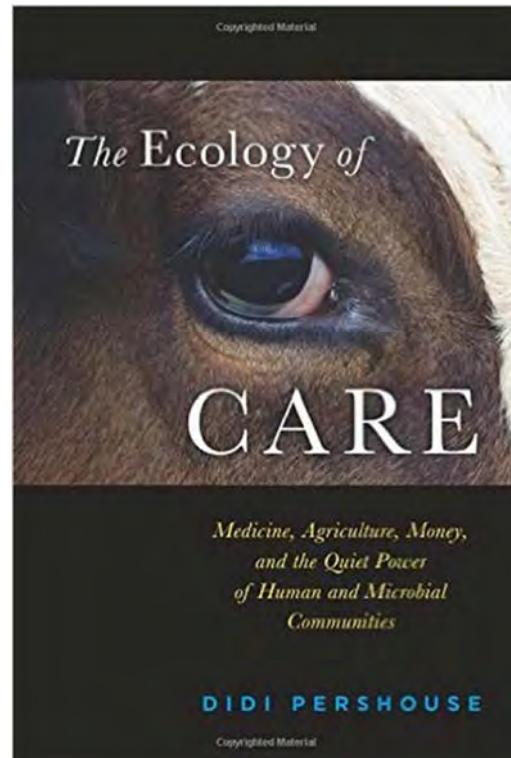








Online classes at:  
[www.LandandLeadership.org](http://www.LandandLeadership.org)



[www.DidiPershouse.com](http://www.DidiPershouse.com)  
Didi.pershhouse@gmail.com





In the fertile paradigm of care for people and land,  
we respect and collaborate with  
the quiet work of  
complex  
self-organizing systems.



# Whiskey Cows and Louis Pasteur



*“Bacteria are not **germs**, but the **germinators**—and fabric—of all life on Earth.*

*In declaring war on them we declared war on the underlying living structure of the planet—on all life-forms we can see—on ourselves.”*

—Stephen Harrod Buhner, *The Lost Language of Plants*

