

# Changing the World With Regenerative Agriculture



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A semi-transparent white box is overlaid on the bottom right of the image. It contains the logo for 'UnderstandingAG' on the left, which features a stylized 'UA' in blue with a yellow sun and a green field. To the right of the logo, the name 'Brian Dougherty' is written in bold black text, followed by 'Regenerative Agriculture Consultant' in a smaller black font, and 'UnderstandingAG' in a larger, bold, brown font.



# What is regenerative agriculture?

Regenerative agriculture is farming and ranching *in synchrony with nature* to repair, rebuild, revitalize and restore ecosystem function starting with all life in the soil and moving to all life above the soil.

# What is regenerative agriculture?

Regenerative agriculture uses **biological** principles to reconnect broken nutrient and water cycles.

**Biology:** 'bios' = **life**    'logos' = **logic**

# What is regenerative agriculture?

Regenerative agriculture uses **social** principles to reconnect land to people and communities.

# How do we transition to a regenerative food production system?

**WORK TOGETHER** using the **LOGIC of LIFE** to transform how we support both farmers and local communities.

**This is an incredible opportunity  
for agriculture and for YOU.**

**It all starts with the **soil**.**

**Healthy soil is the foundation of resilient  
farms, healthy people, revitalized  
communities, and a livable planet.**

# What is 'Soil health'?

The continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. – NRCS





# The Six Principles of Soil Health



# Know your context

- Ecological – Environmental constraints
  - Rainfall, season length, terrain, etc.
- Financial – Capital
  - What assets do you have to implement this?
- Community – Family through Society
  - Family involvement, neighbors, landlords.
- Spiritual – Faith
  - Part of something bigger.

## #2 Minimize disturbance



Reduce physical disturbance from tillage



Reduce chemical disturbance from fertilizers and pesticides



# Physical and chemical disturbance disrupts the biological integrity of the soil system



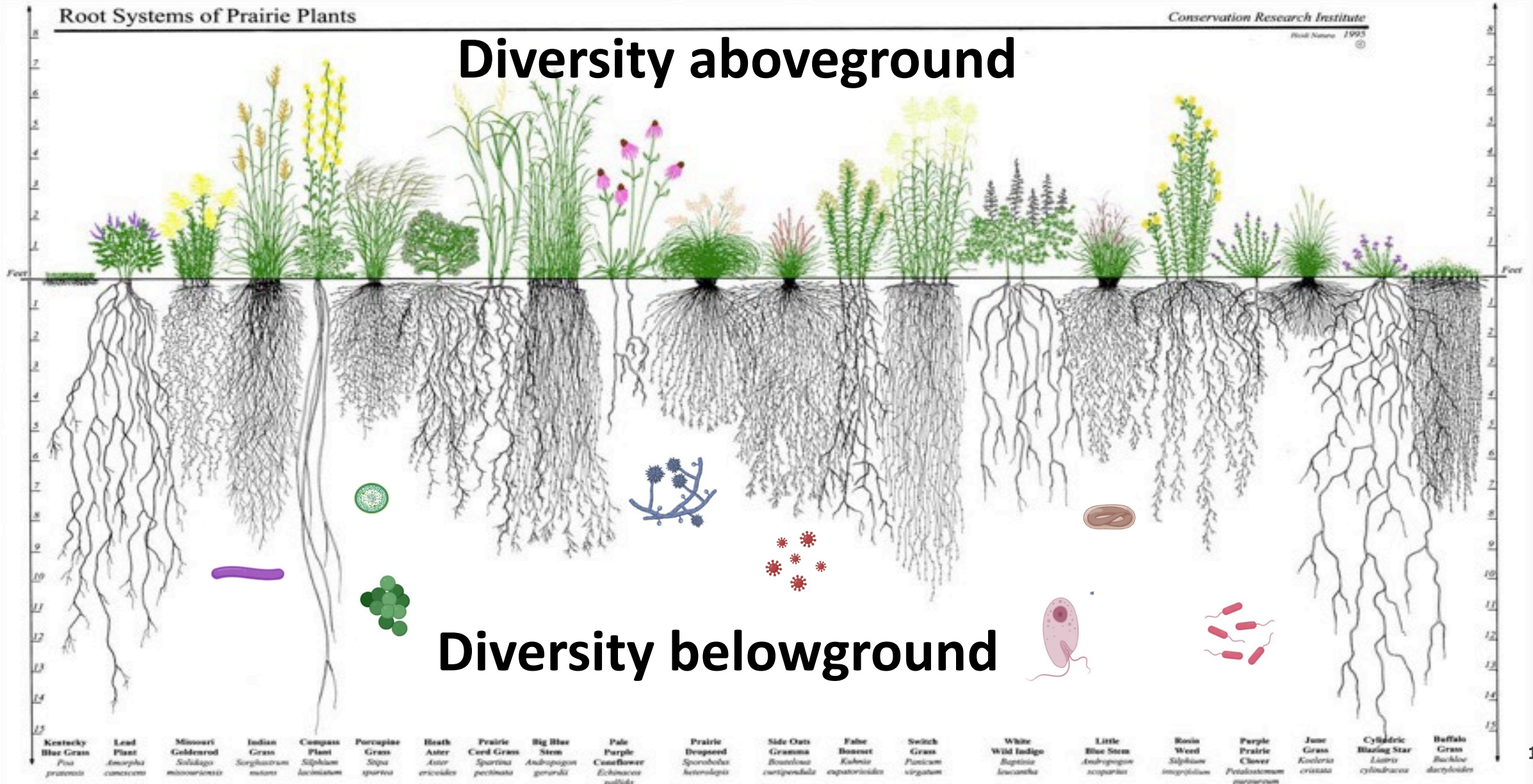
# #3 Keep the soil covered with 'armor'

- ✓ Controls erosion
- ✓ Reduces runoff
- ✓ Reduces evaporation rates
- ✓ Moderates temperature swings
- ✓ Reduces compaction (raindrop impact)
- ✓ Suppresses weeds
- ✓ Provides habitat for the soil food web

# #4 Mix it up with added diversity

## Diversity aboveground

## Diversity belowground



## #5 Keep a living root in the soil

- Feeds the soil microbiome
- Cycles carbon through the soil



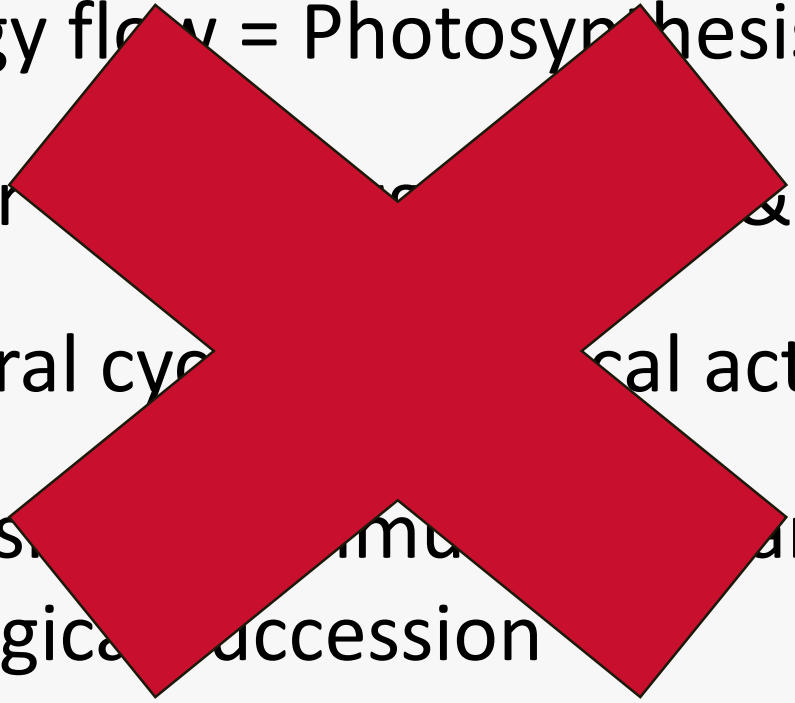
# #6 Grow healthy animals and soil together



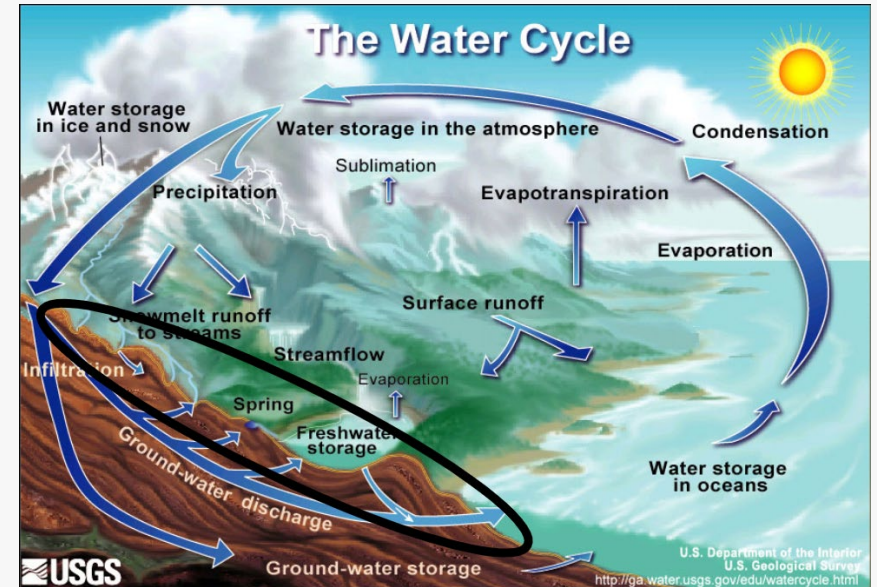
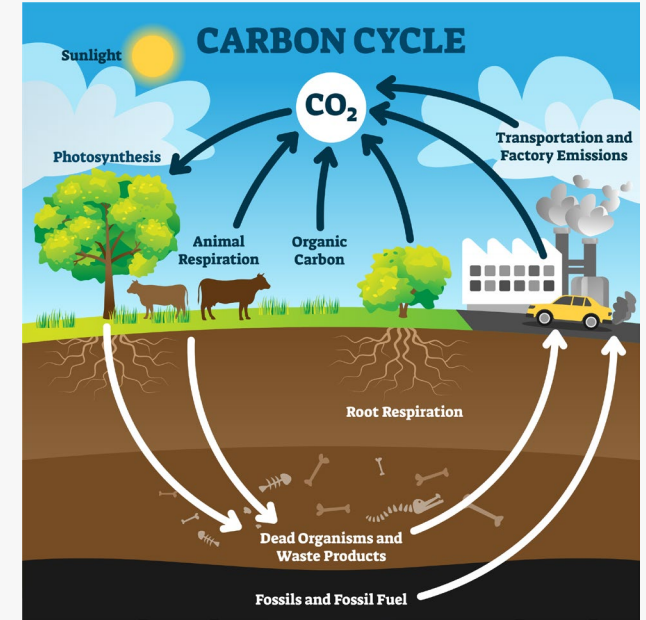


# The four ecosystem processes

1. Energy flow = Photosynthesis & carbon
2. Water cycle = Evaporation & infiltration
3. Mineral cycle = Chemical activity
4. Diversity = Community dynamics & ecological succession



**No principles = no function**



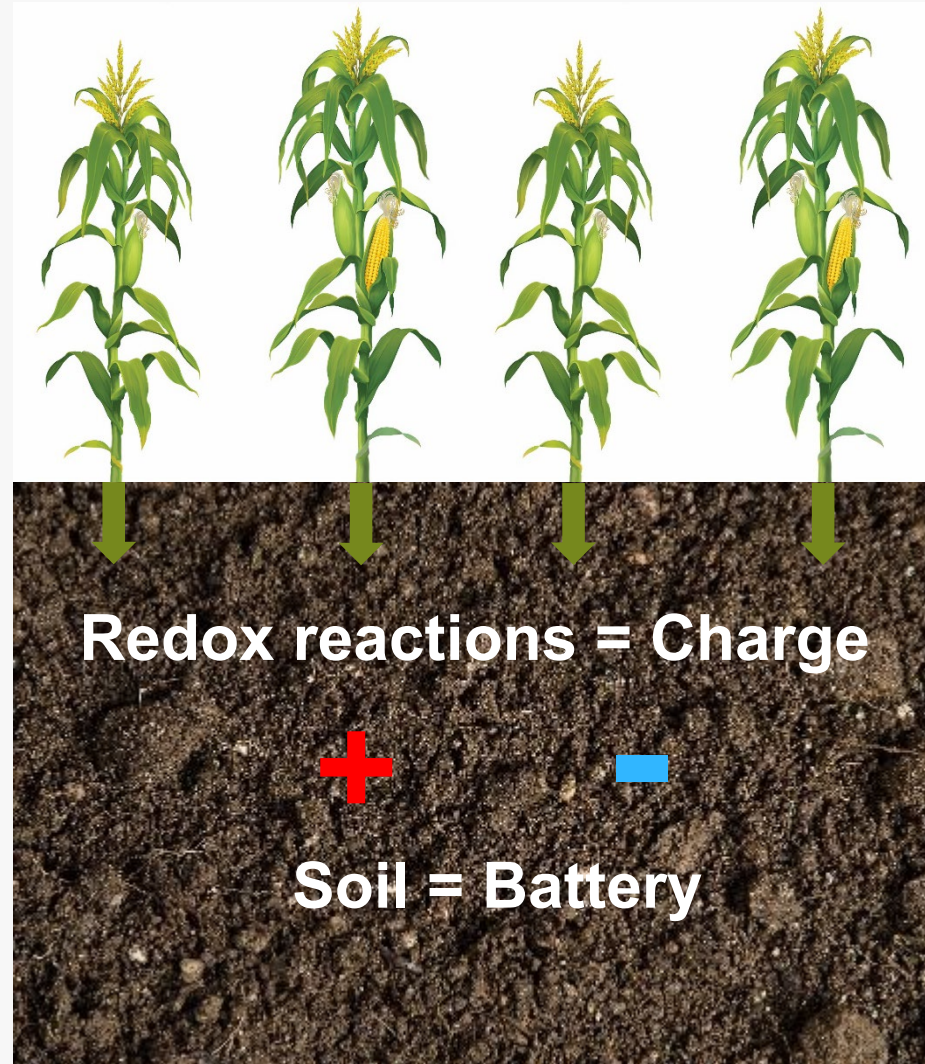
# Soil is the battery of life – recharge it



**Plants = Solar panels**

**Accessible carbon + biological activity = charge level**

**Stable carbon = charge storage**



Adapted from Husson et al. (2016) Practical improvements in soil redox potential (Eh) measurement for characterization of soil properties.

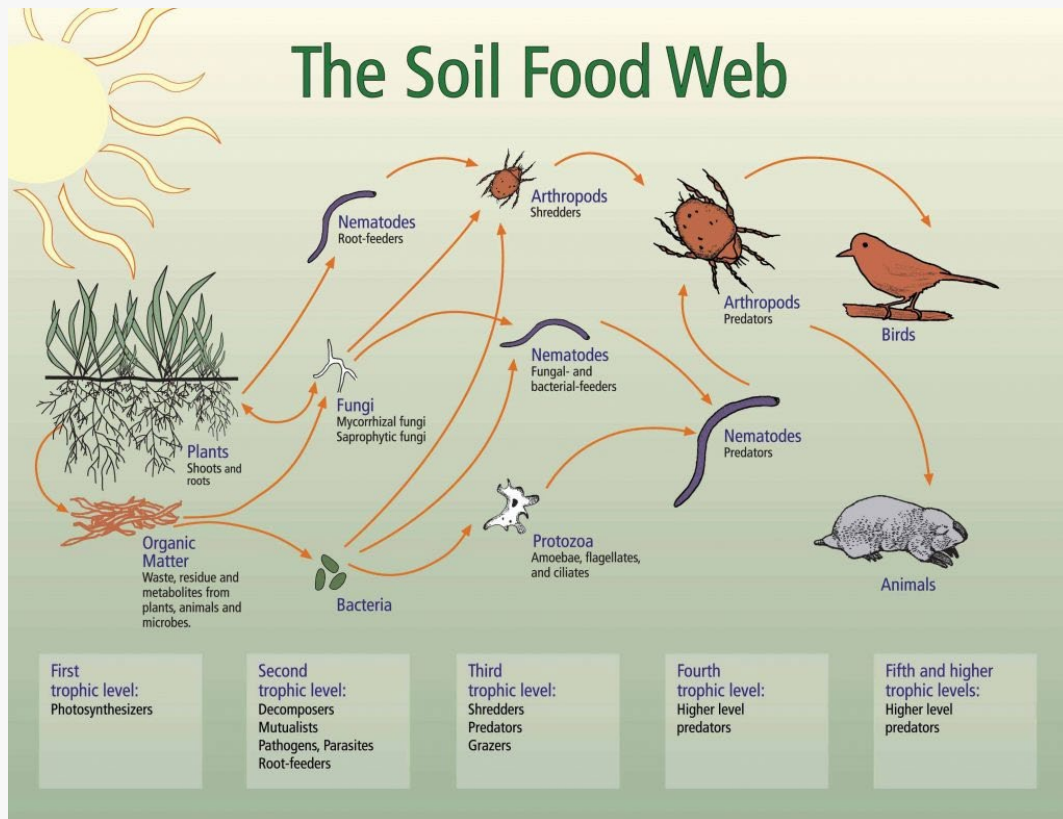
# Soil is the engine of life – rebuild it

- **Soil aggregates** are the engine of **functional, healthy soil**.
- **The soil microbiome/food web** is what builds and fuels the engine.
  - Soil communications system
  - Soil transportation network
  - Plant digestive system
  - Plant immune system
  - Recycles death into life



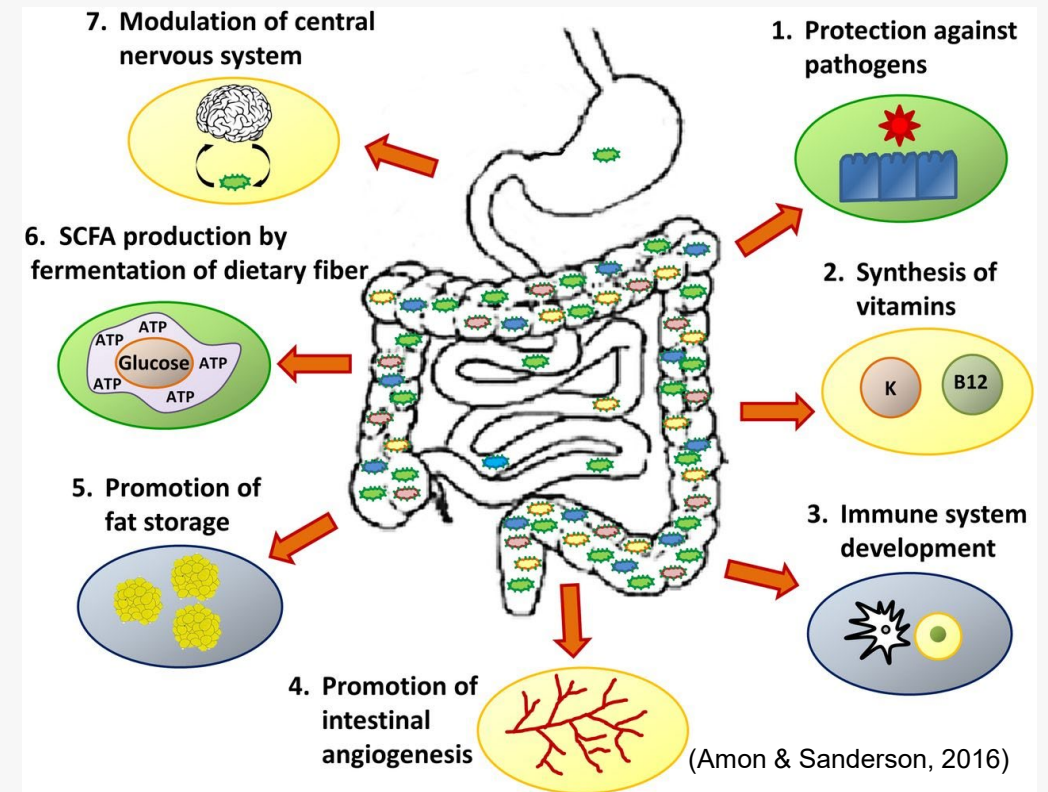
# Soil is the web of life – reweave it

## Soil microbiome

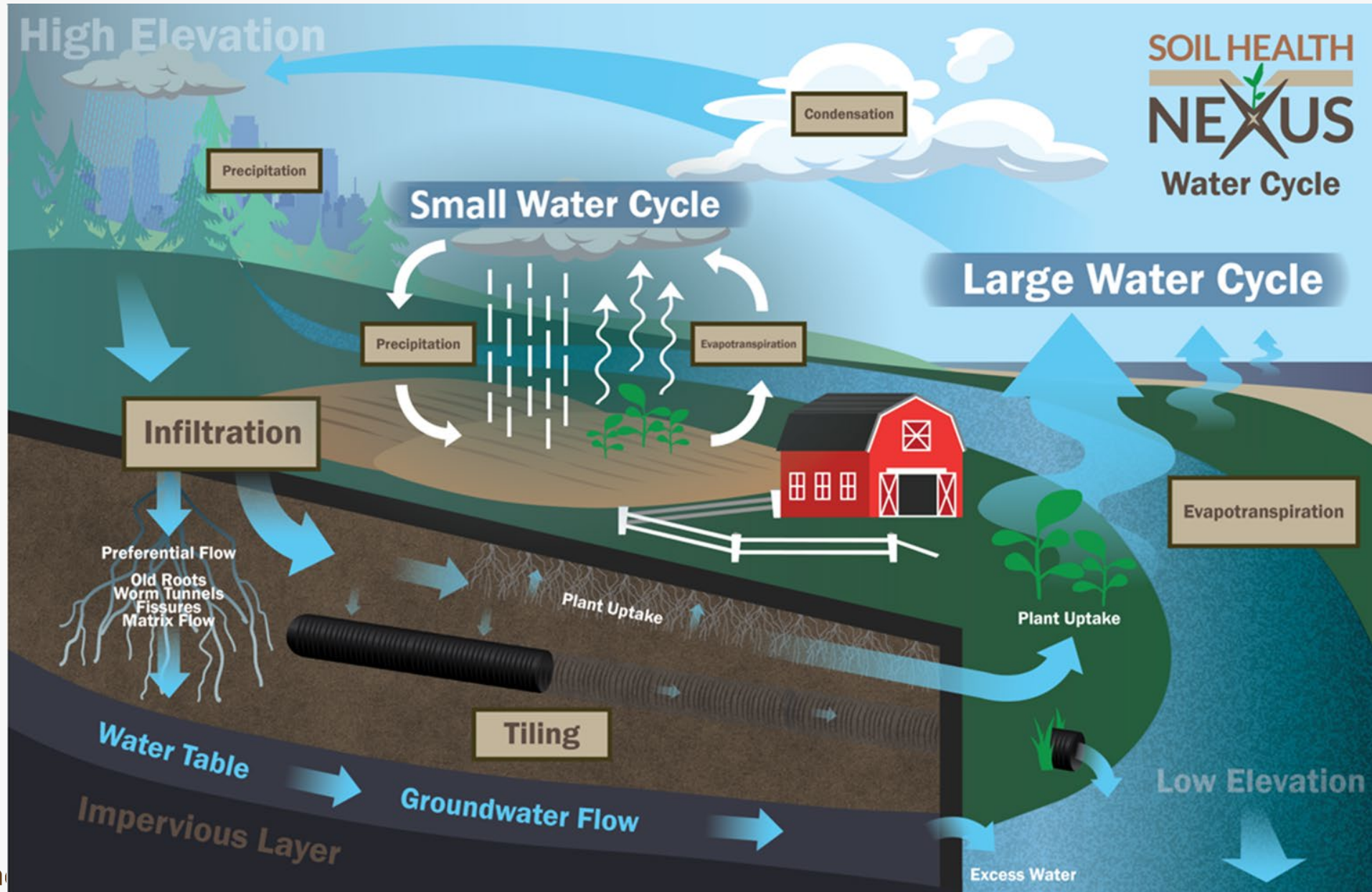


## Human gut microbiome

=



# Soil is the sponge of life – rehydrate it





**10,000 years ago**

8 billion ha forest

5 billion ha grassland



**Today**

4 billion ha forest

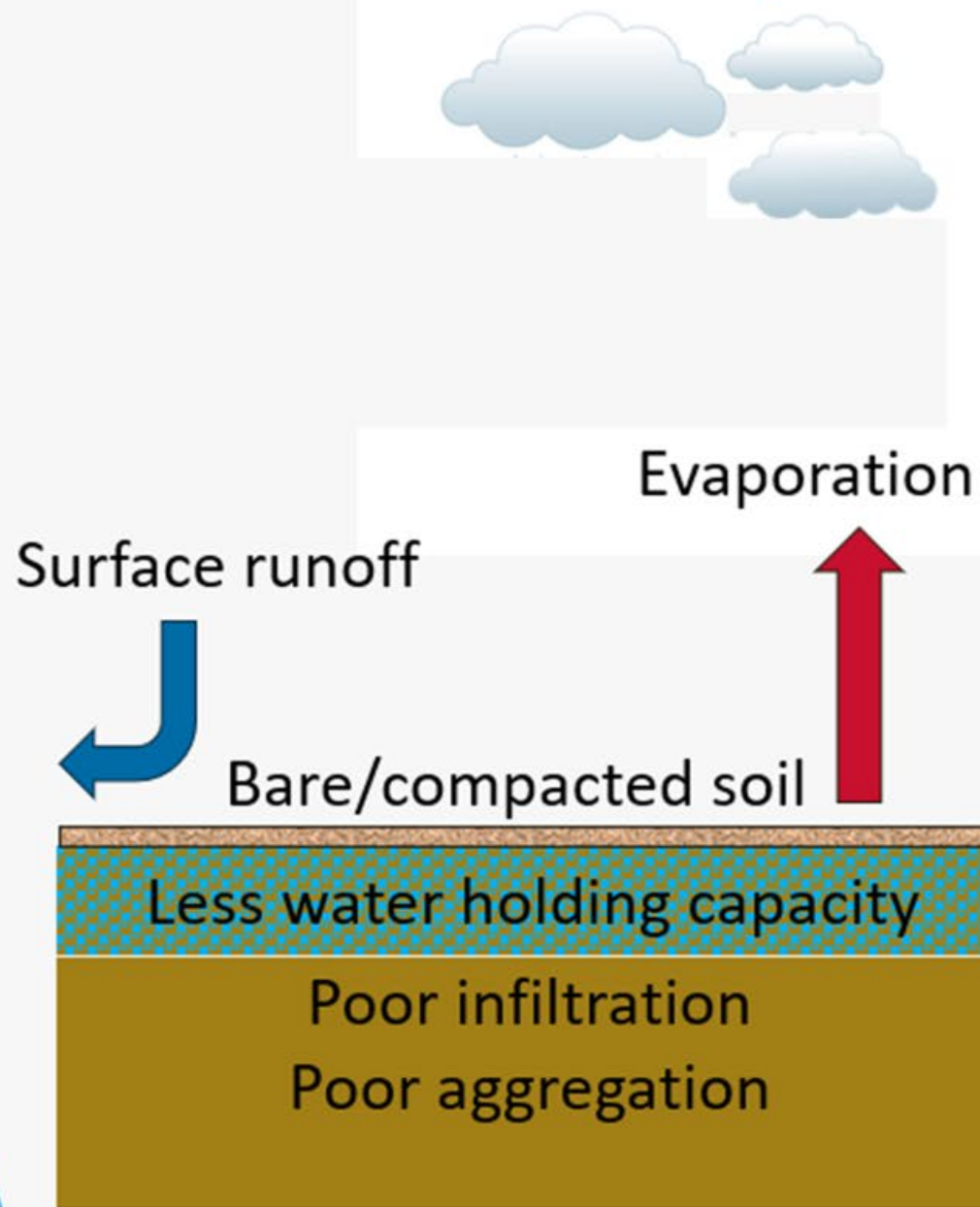
3.5 billion ha grassland

1.9 billion ha cropland

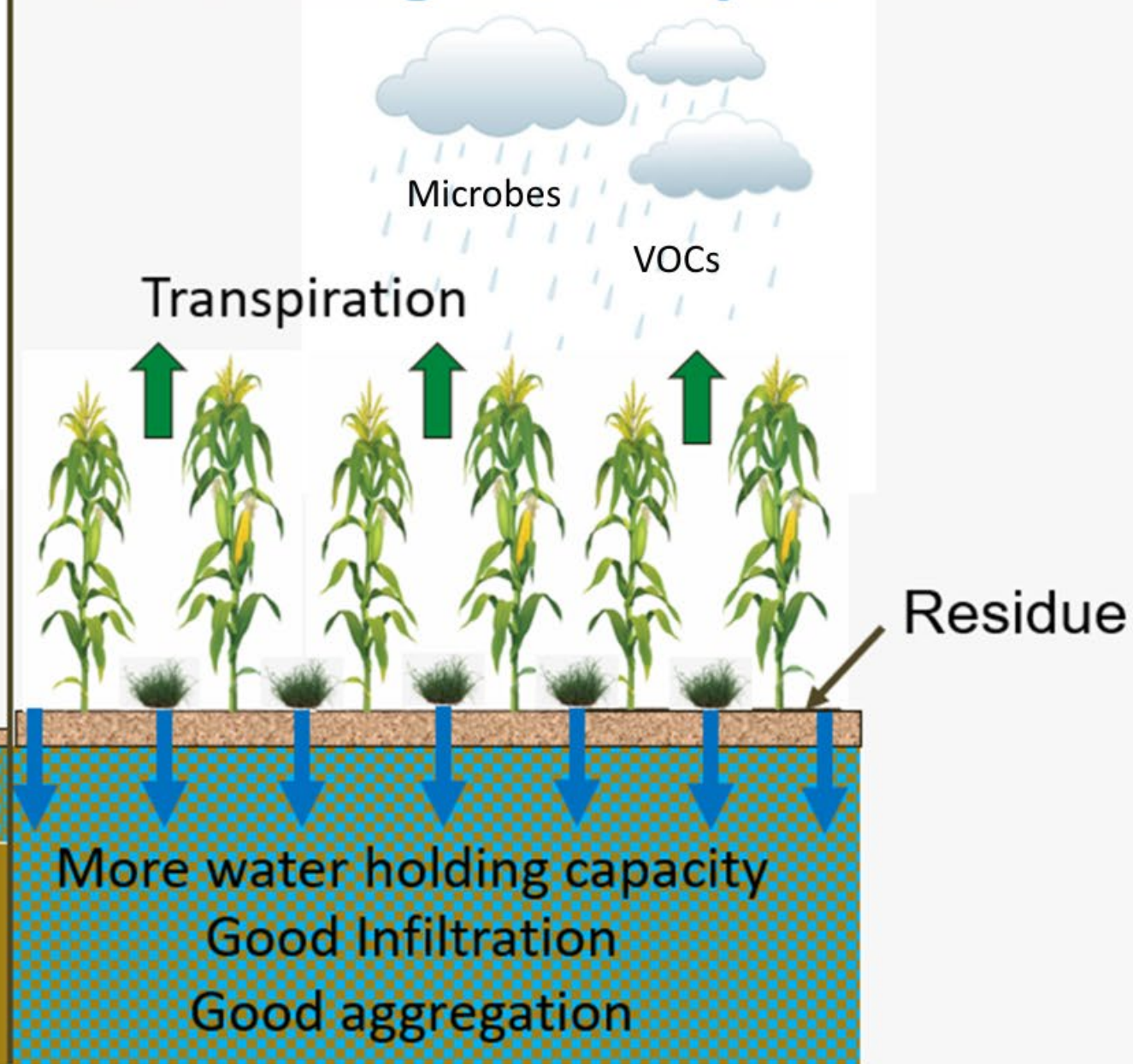
3.6 billion ha desert

A majority of land is degraded due to humans breaking the water cycle.

# Broken water cycle



# Functioning water cycle



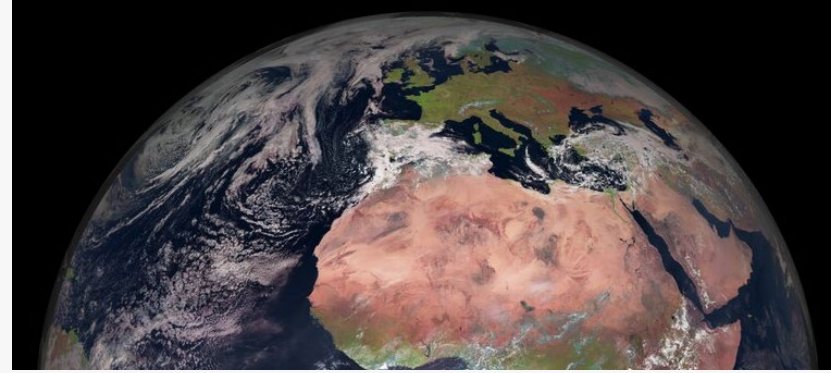
# Earth's bio-hydrological cycles govern 95% of the heating and cooling dynamics of the planet

- **SOIL AGGREGATION** is **CRITICAL** for a functional water cycle.
- **Biology** (microbial glues and root exudates) builds aggregates.
- **Biology** drives the water cycle over most land areas.
- Microbes and VOCs from plants drive ~60%+ small water droplet formation over land areas.
- Lack of vegetation due to **poor land management** creates wet/dry extremes and desertification.



# The other energy problem

342 W/m<sup>2</sup> in →



→ 339 W/m<sup>2</sup> out

CO<sub>2</sub> emissions are  
only part of the picture

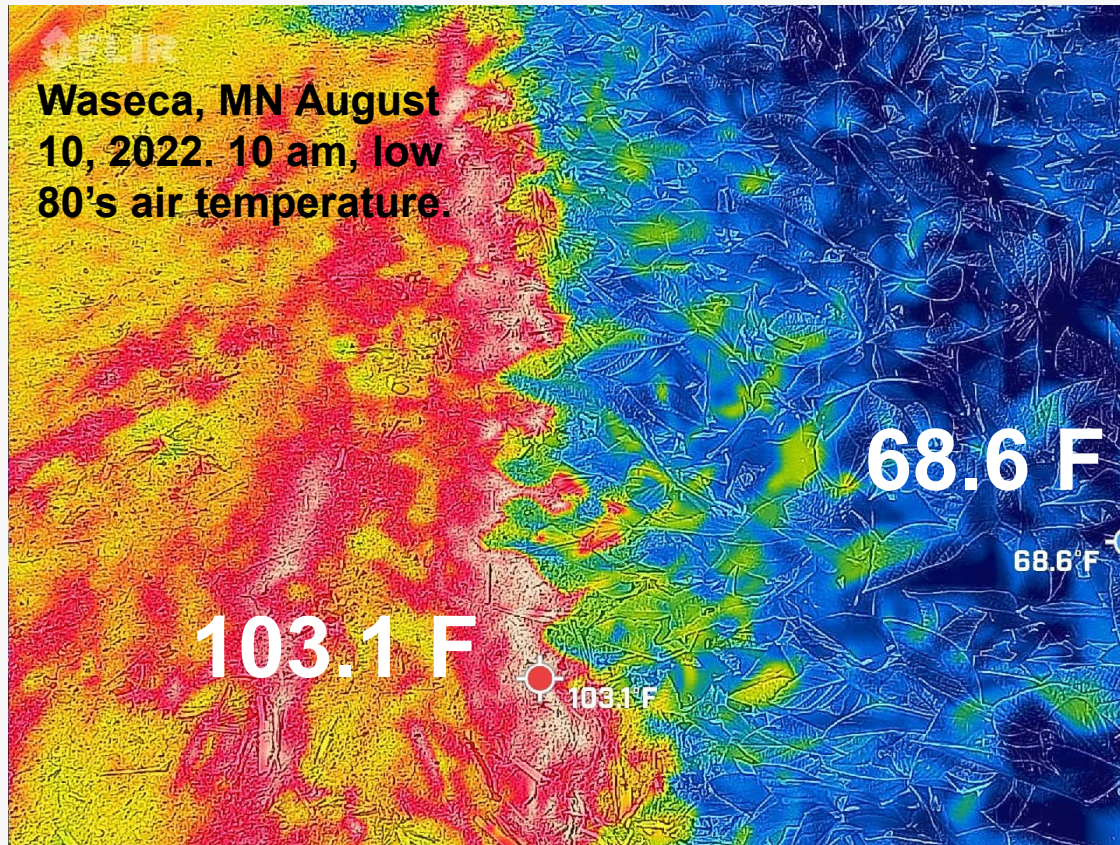
1/3 of cumulative CO<sub>2</sub> emissions are from soil & LUC

5% more green land area = 3 W/m<sup>2</sup> heat absorbed via transpiration\*

(23% if we do it all on ag land) \*Walter Jehne, Soil Carbon Sponge concept

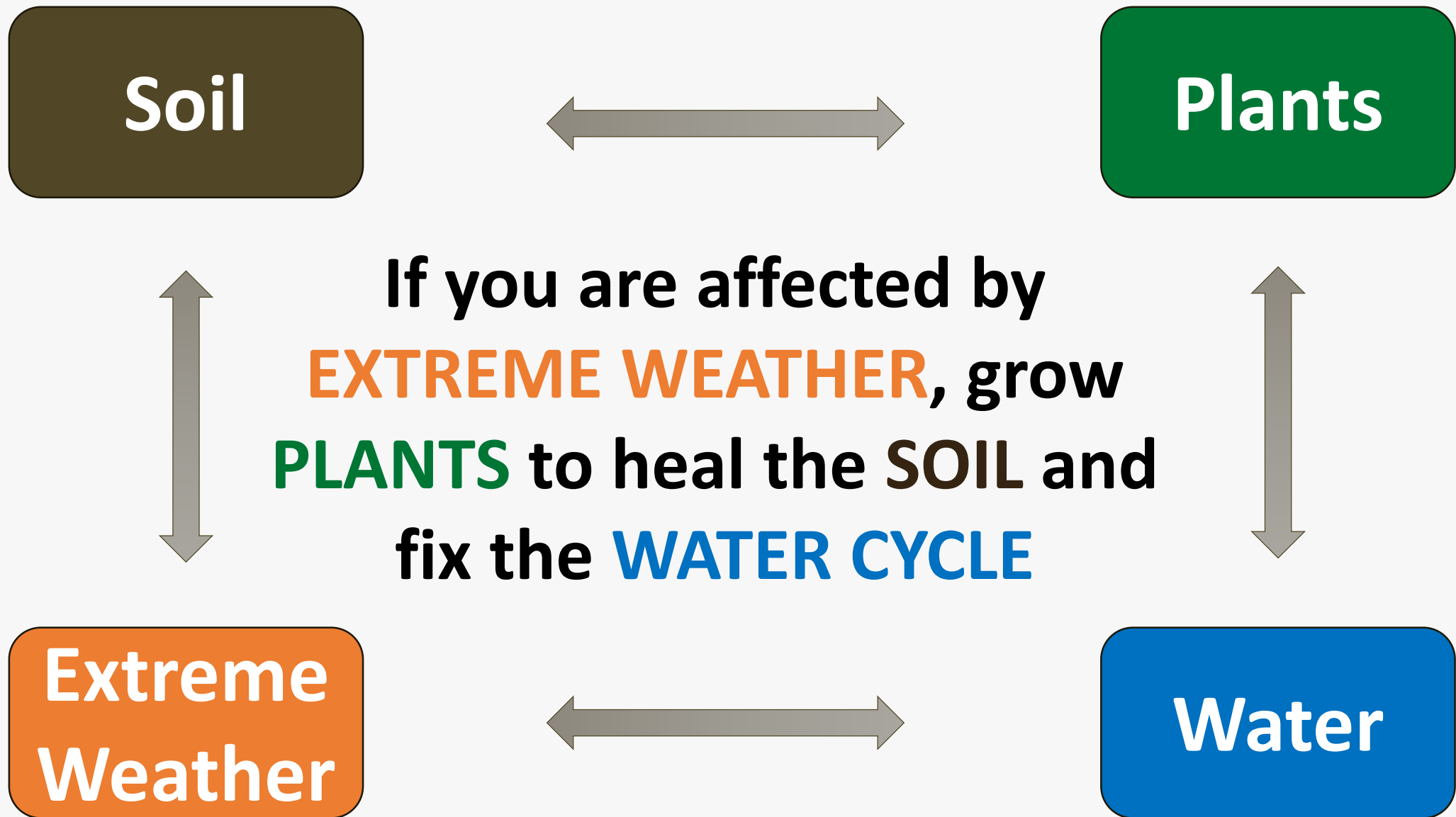
Bare soil gets **HOT**

Vegetation stays **COOL**

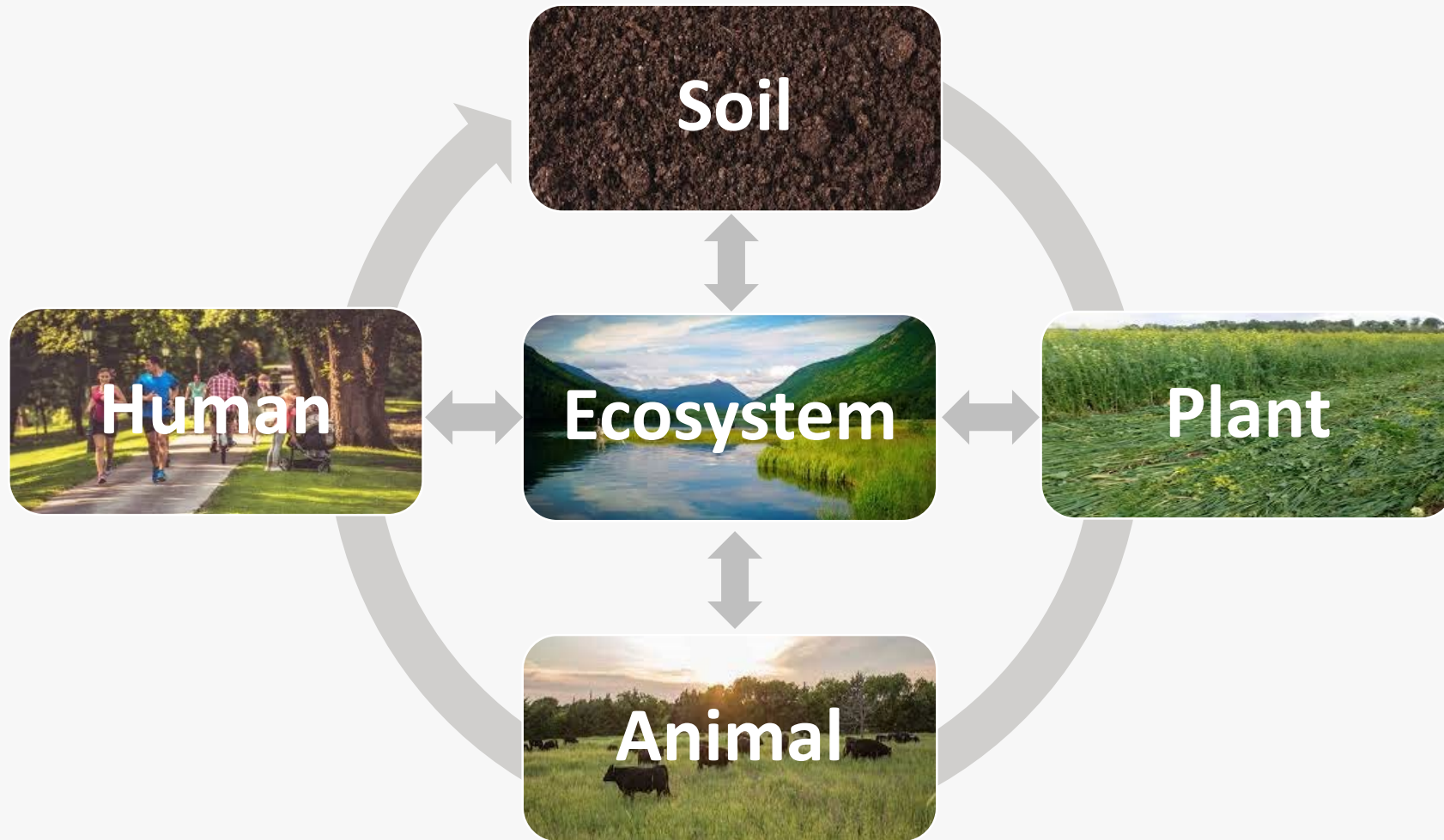


**The power of plant transpiration**

Hotter surfaces reradiate exponentially more heat



# Circular soil-plant-animal-human ecosystem



**Soil, plant, animal, and human health are inseparable**

# We need to reconnect the circle of life



# Soil health principles help reconnect the links!

- ✓ Improves soil function
- ✓ Fixes broken water cycles and improves water quality
- ✓ Provides & cycles nutrients
- ✓ Grows healthier plants to make healthier feed and food!



# What can consumers do?

- ✓ Purchase from local farmers who are working to regenerate soil
- ✓ Invest in local processing capacity
- ✓ Plant a garden
- ✓ Re-wild your yard
- ✓ Make your own compost
- ✓ Use non-toxic household/lawn products
- ✓ Advocate for healthy soil and clean water



# What does a regenerative future look like?

- ✓ Healthy, well aggregated soil on every farm.
- ✓ Functioning soil-plant connections and biological N cycling.
- ✓ Soil battery charged by continuous plant growth.
- ✓ Livestock managed for maximum ecosystem health.
- ✓ Renewable energy / bioenergy generated locally.
- ✓ Nutrients recycled locally.
- ✓ Farms fully integrated with their local communities.
- ✓ Farms and people are part of nature, not separate from it.



**YOU** **can** **do** **this!!**

Learn about **SOIL**

Grow **PLANTS**

Think in **SYSTEMS**

# WE can do this!!

**Healthy soil is a solution to the food/water/energy polycrisis**

- Human health – more nutrient dense food, healthier people
- Community health – relocalized food systems
- Ecosystem health – fixes broken carbon and water cycles
- Planetary health – recycle CO<sub>2</sub> and cool the earth with plants

A close-up photograph of a person's hands cupped together, holding a small, vibrant green seedling with several leaves growing out of a mound of dark, rich soil. The background is a soft-focus outdoor setting with green foliage and brown earth.

**You hold the future in your hands**

**Use the power of regenerative  
agriculture to change it**

**Thank you!**

**Questions**

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