Boosting soil health in your garden

Master Gardeners Webinar
April 21, 2022

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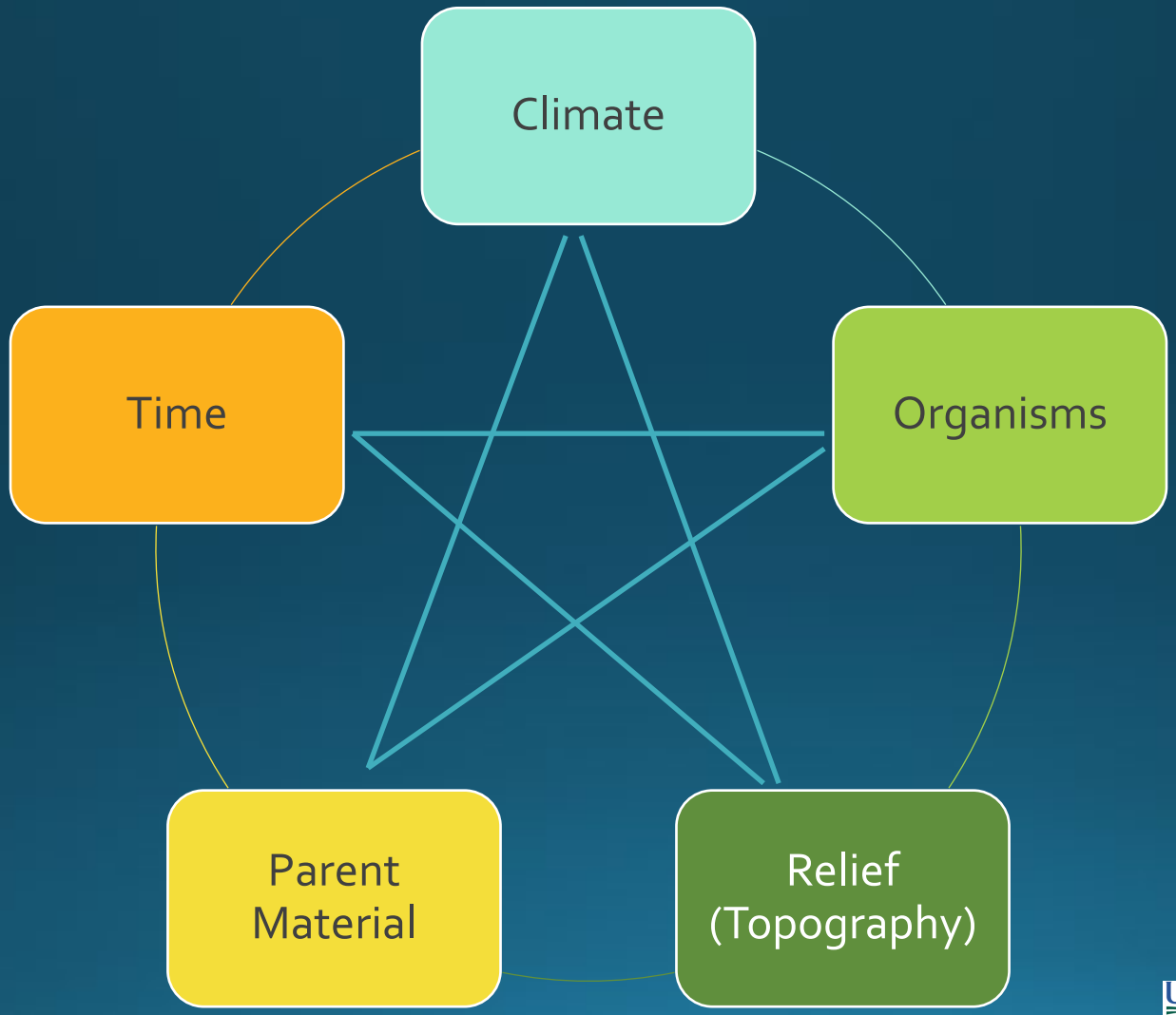
Natural Resources Conservation Service

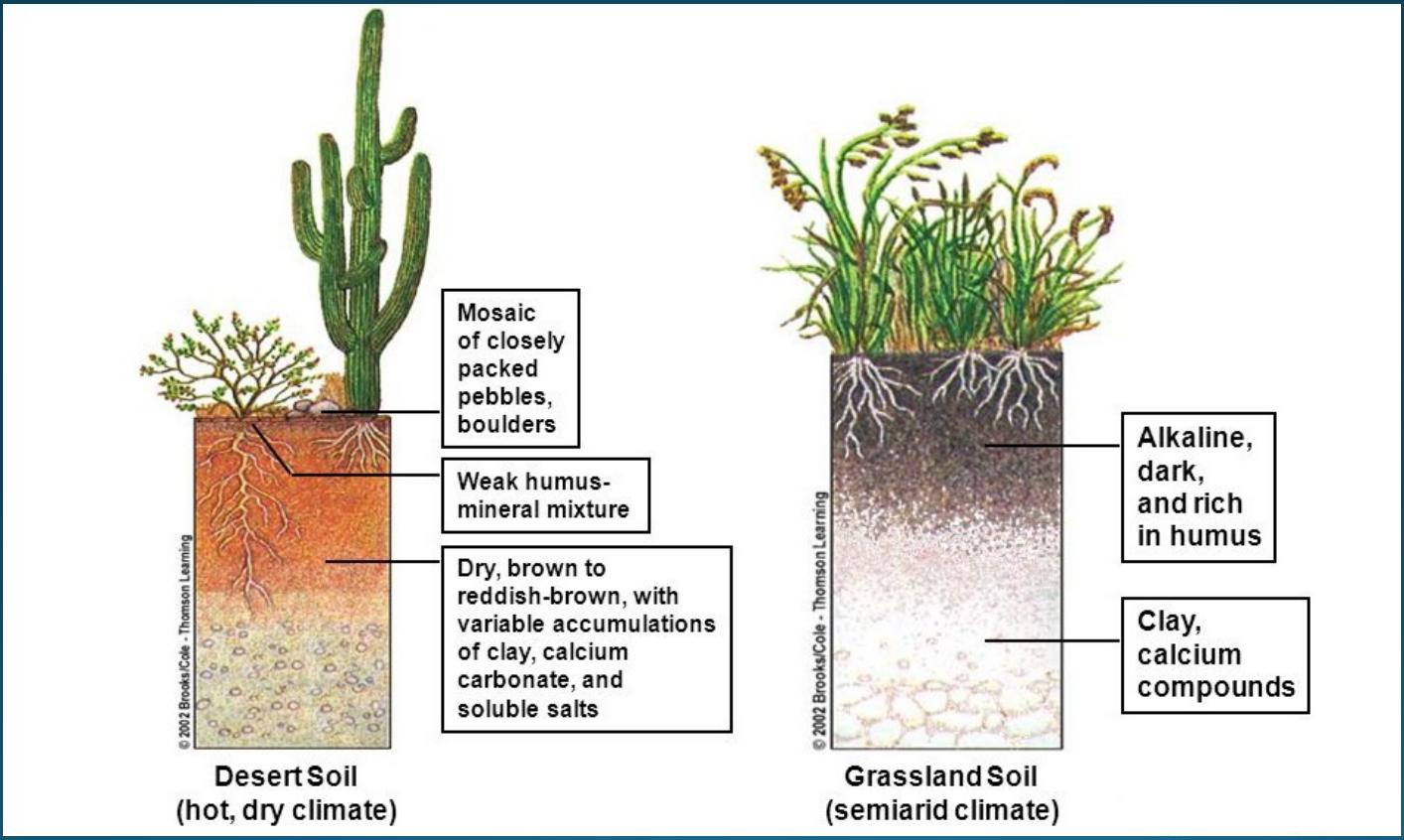
What is soil?

- Today we are talking about natural soil, not a purchased landscape material or "potting soil"
- Think of soil as a natural resource, that varies from place to place

Soil Forming Factors



Soils are unique to their place



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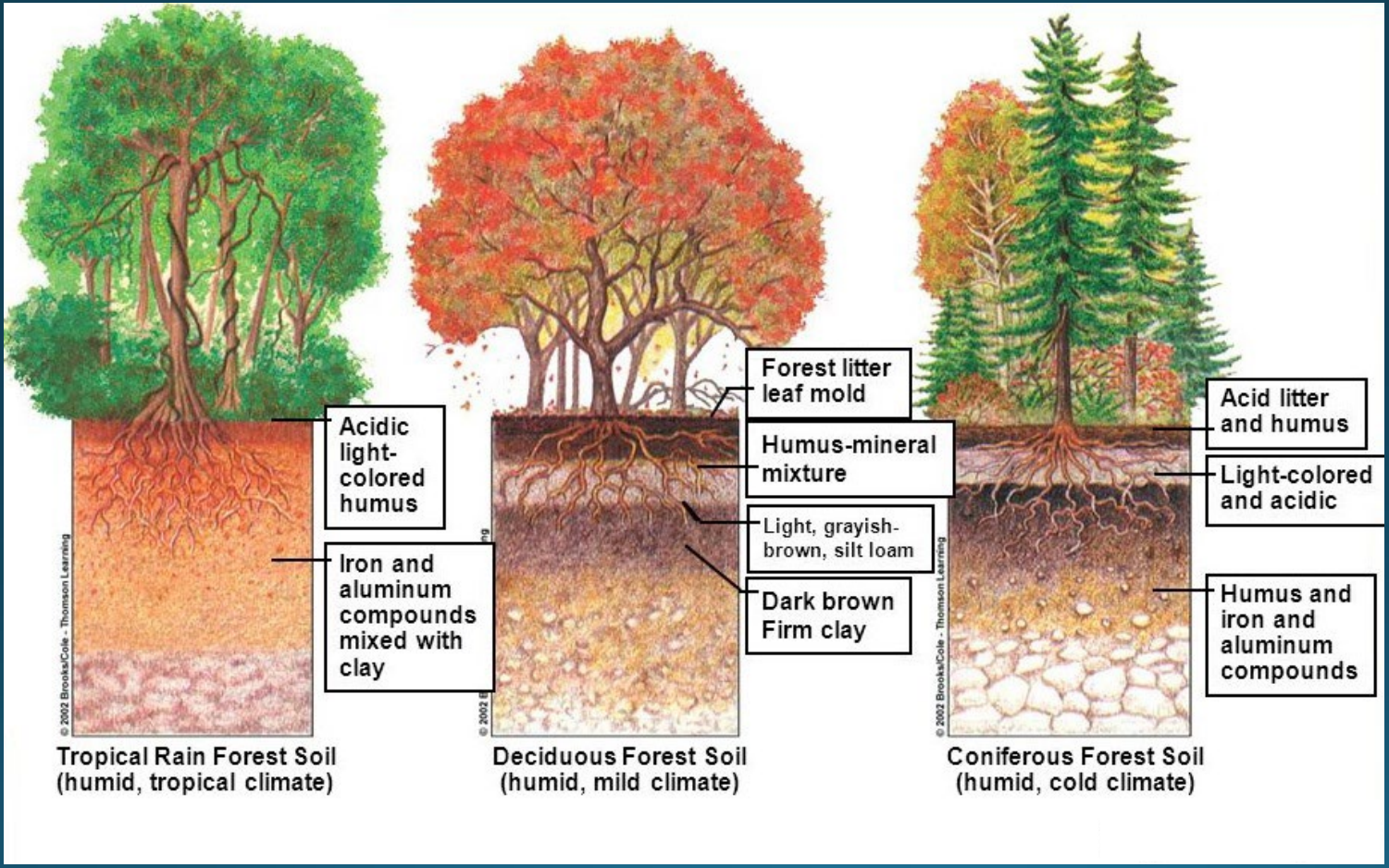

Soil Profiles

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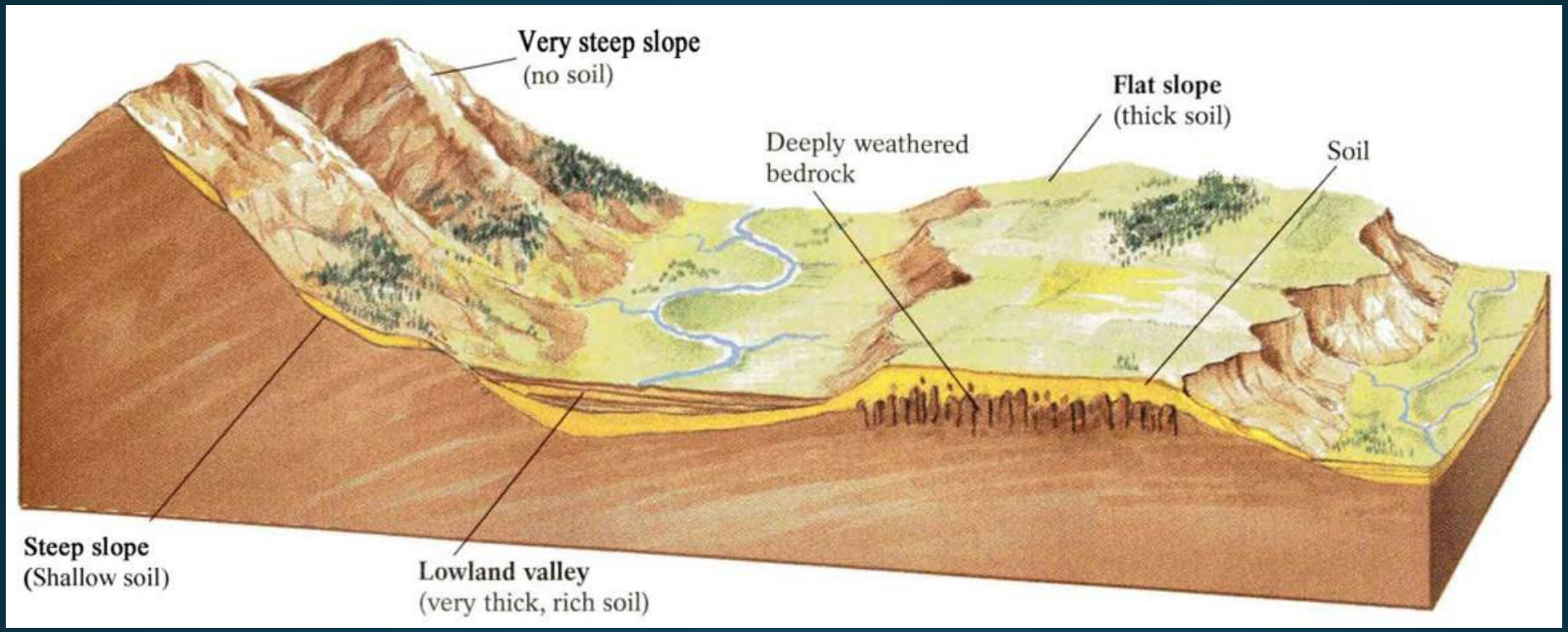

Soil properties affect function

- Soils are a product of their environment
- Soil characteristics vary across landscapes
- Functions (Soil Health) vary across landscapes

Wendy, aren't we here to talk about soil health and our gardens?

Healthy Soil: How does it…

Put your ideas in the chat!

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What is Soil Health?

…the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans.

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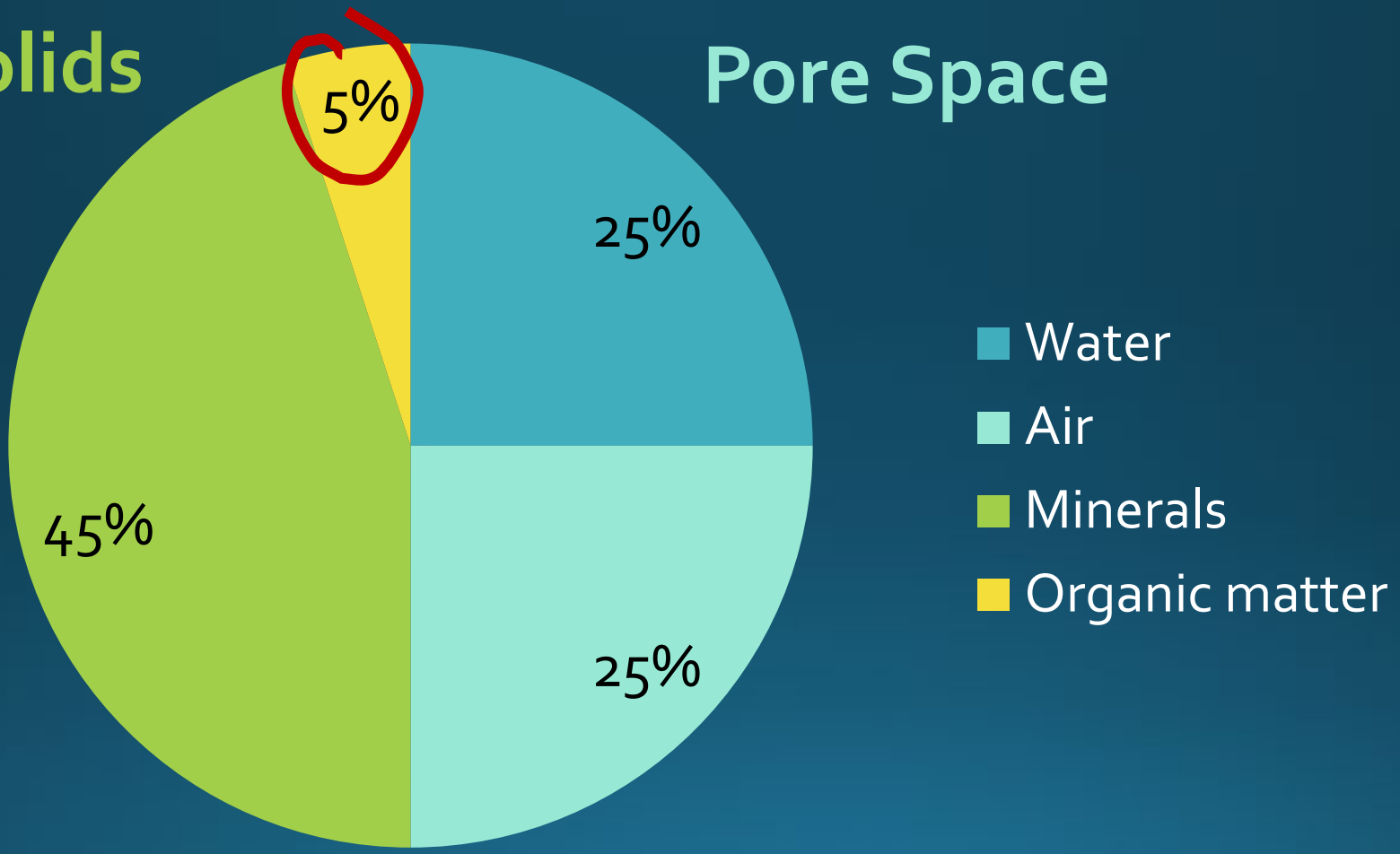
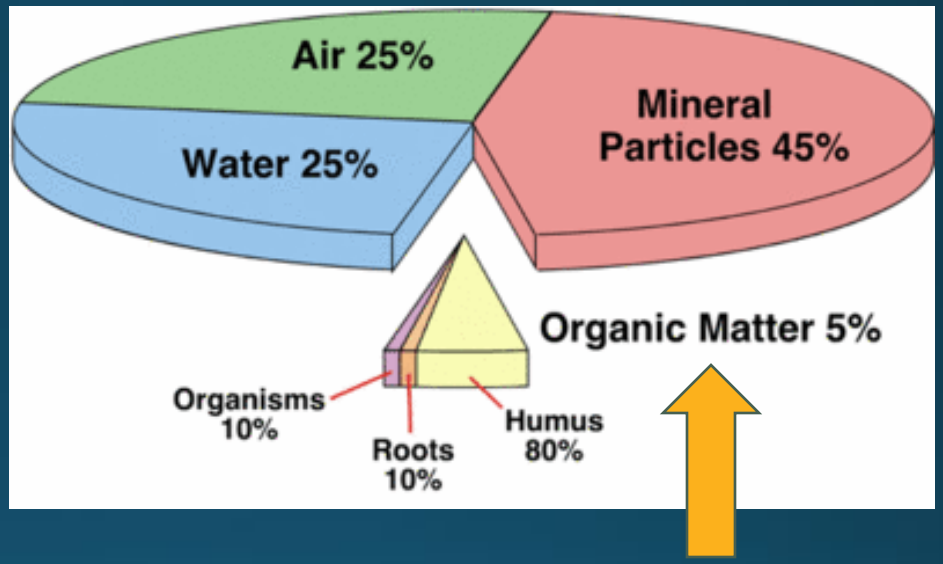
What is soil made of?



Soil Organic Matter

- "Dead" Soil Organic Matter (SOM) measured in soils (Humus)
- Hot, dry climate = low % organic matter



Small increases in organic matter can have HUGE impacts on soil function!

In California, SOM tends to be lower than this ideal.

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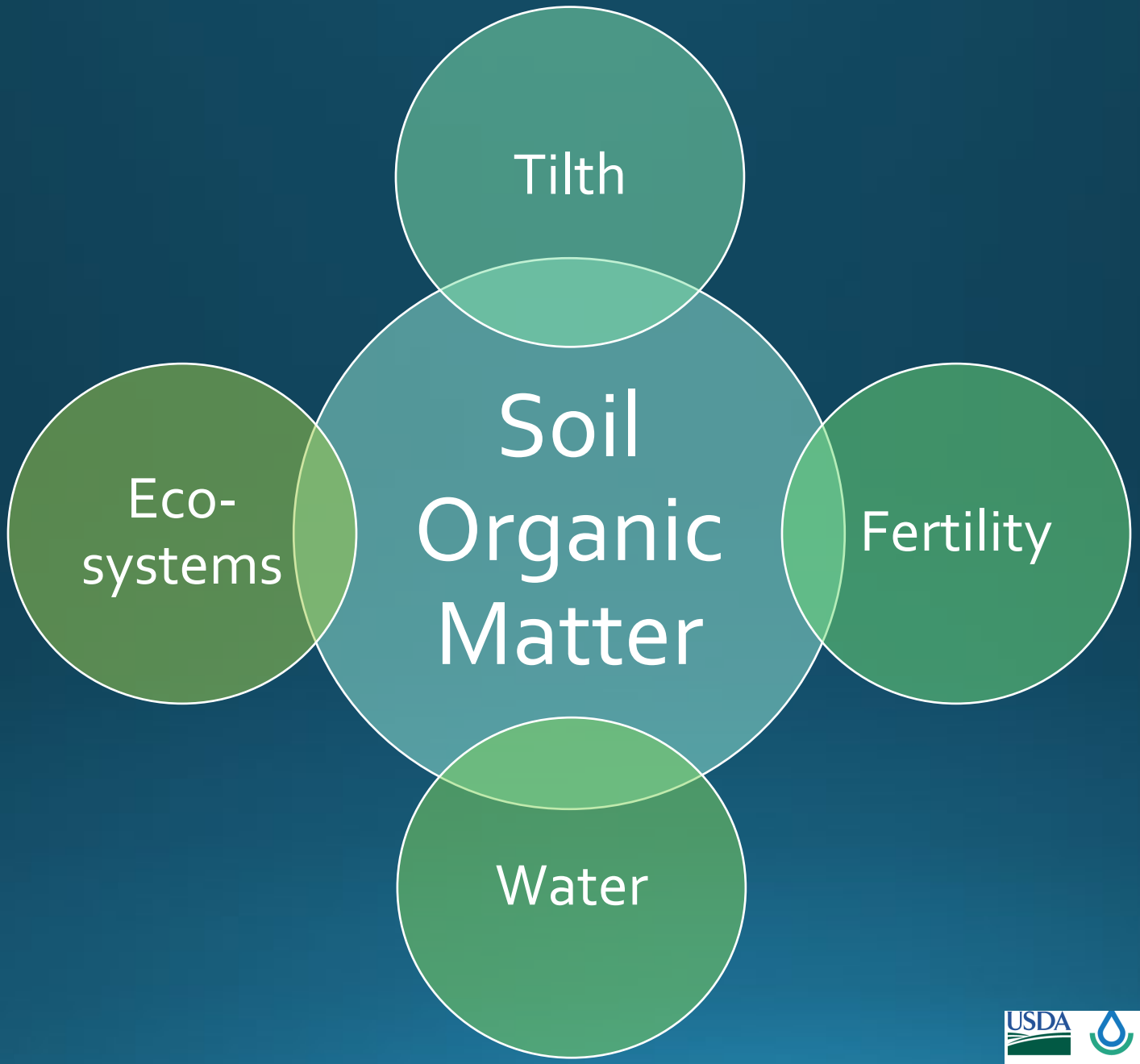

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Would you rather have sandy soil or clay soil? Why?

Raise hand or chat

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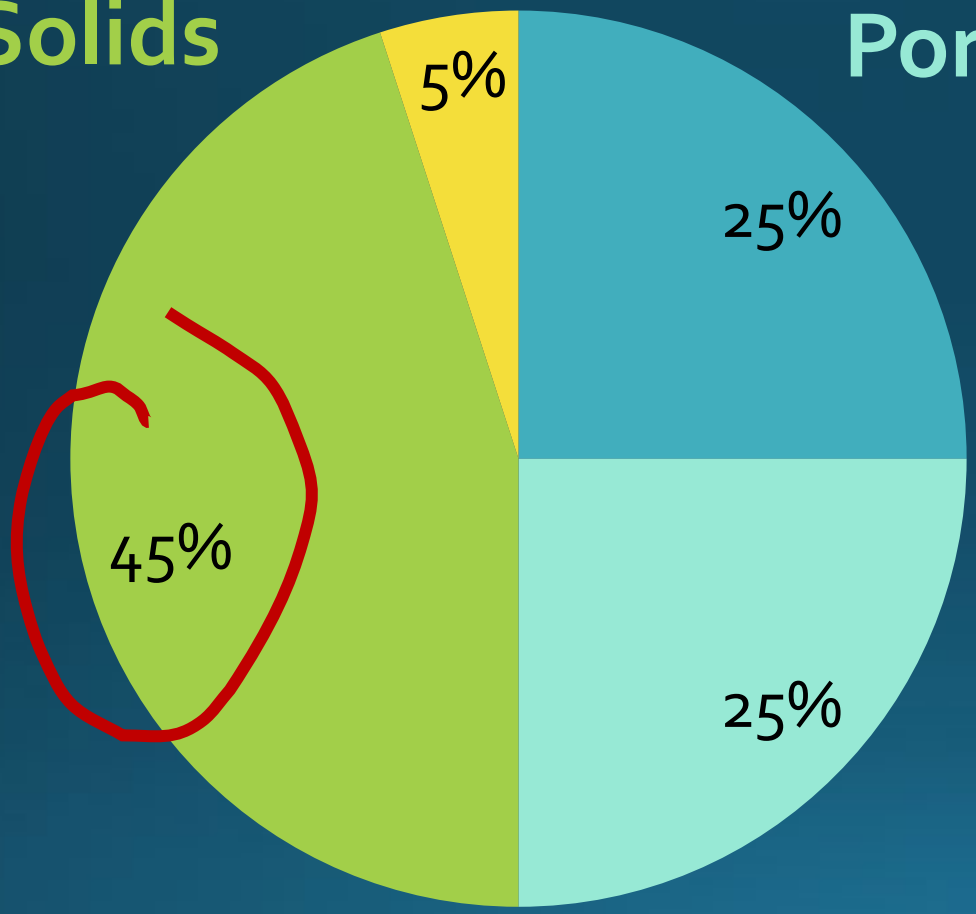
What is soil made of?



Soil Texture

The relative proportion of sand, silt and clay particles in a soil

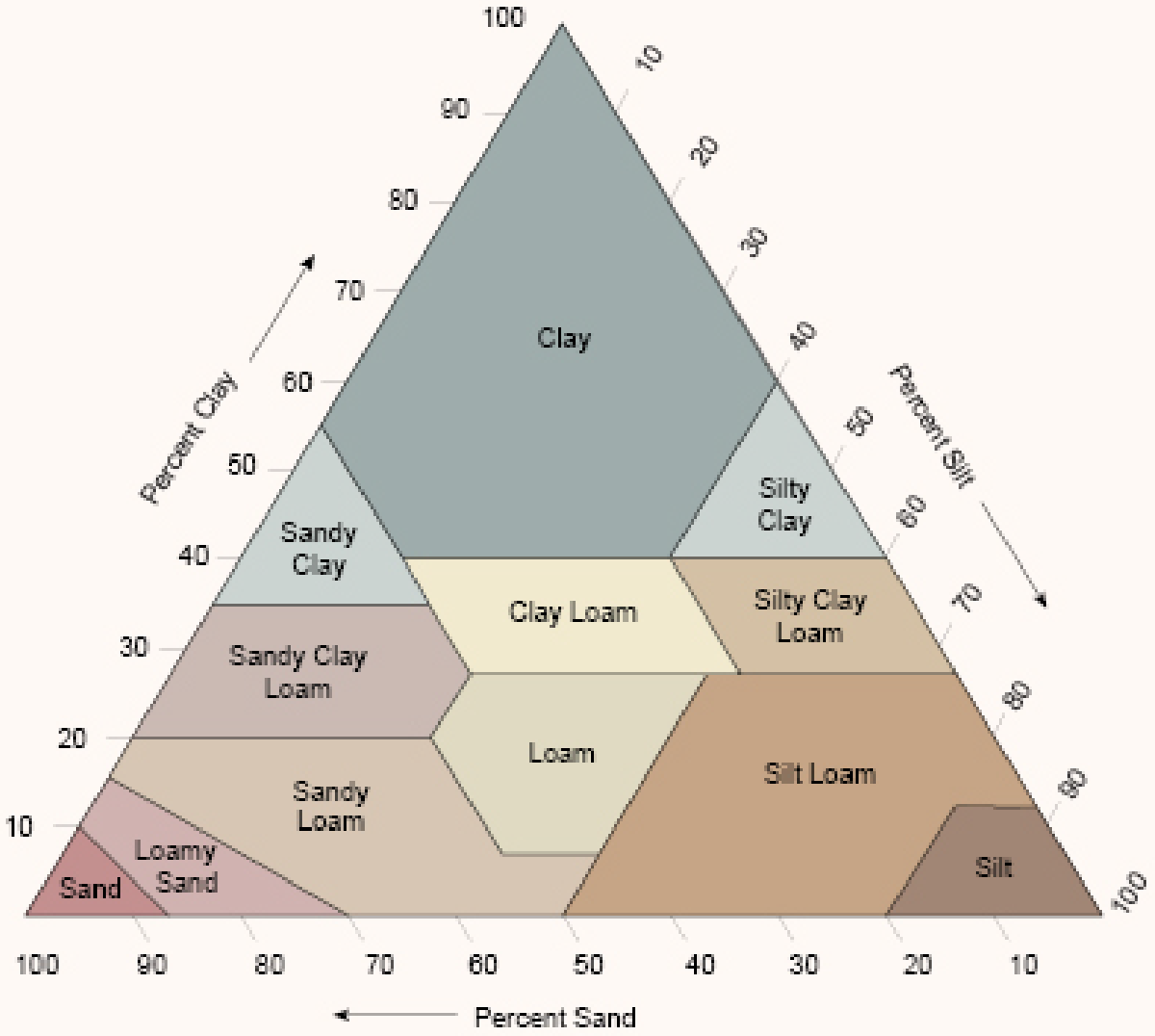
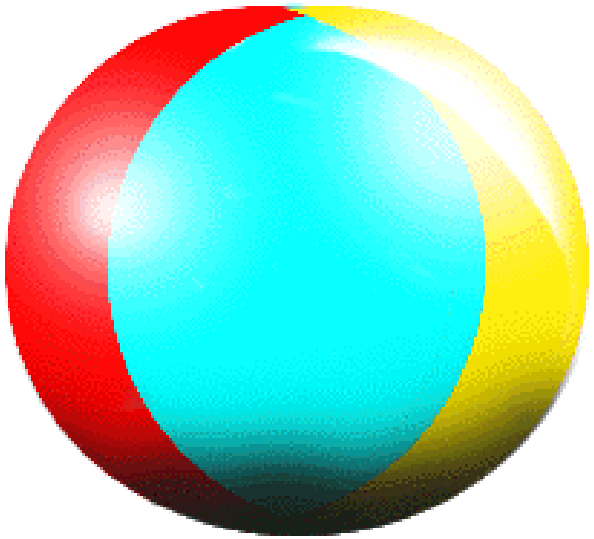


Figure 6.3: The percentage of sand, silt, and clay in the basic textural classes. (Source: USDA Soil Textural Triangle courtesy of United States Department of Agriculture, Natural Resources Conservation Service).

Mineral particle size classes

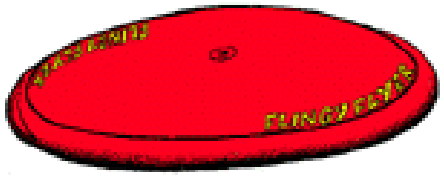
USDA Standard Relative Particle Size

Beachball



Sand

Frisbee



Silt

Dime

Clay

Sand (2.00 - 0.05 mm)

Silt (0.05 mm - 0.002 mm)

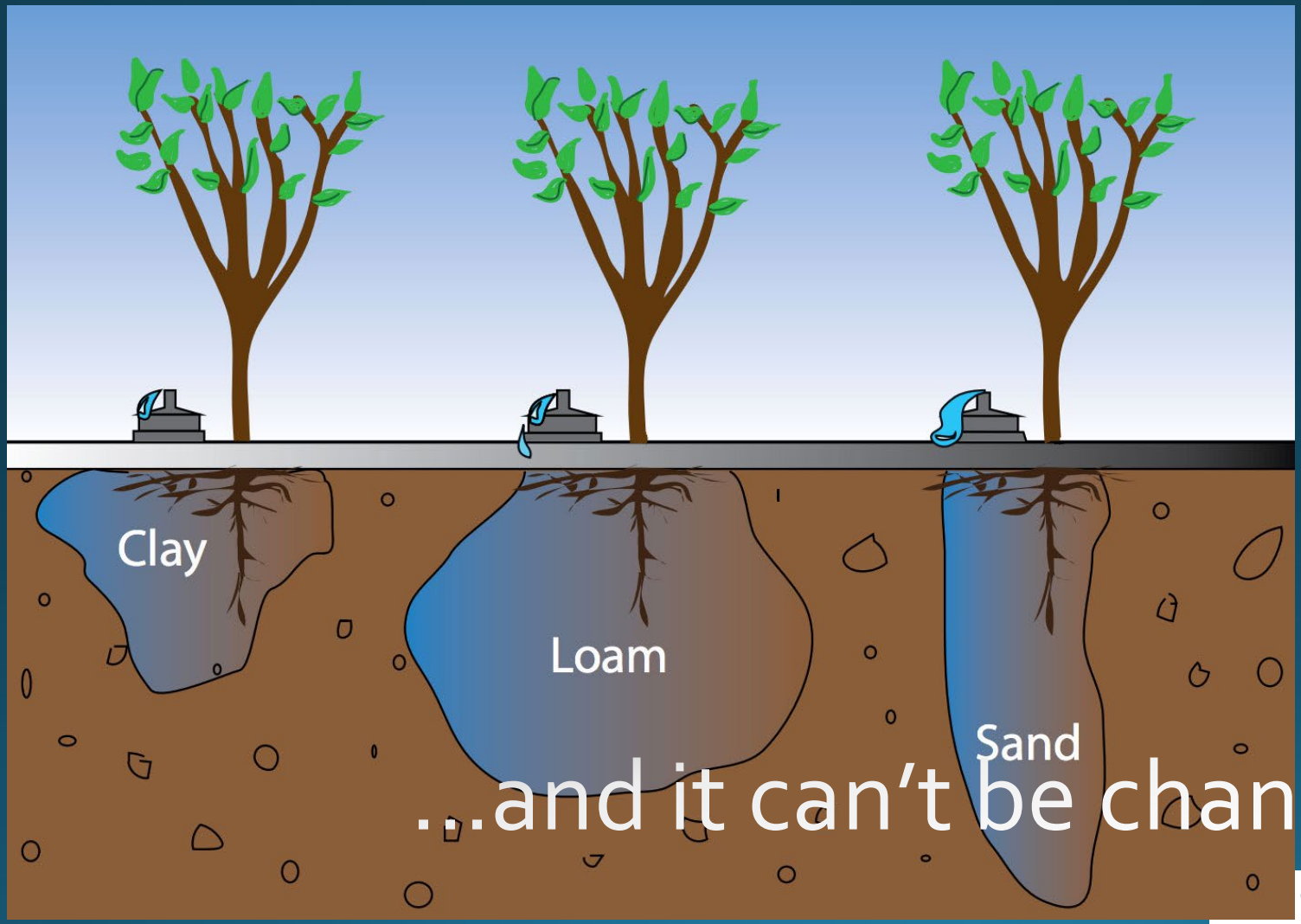
Clay (< 0.002 mm)

2 mm = width of a nickel
0.05 mm = width of a baby hair
0.002 mm = electron microscope needed!

Texture is important

Because it has a big impact on many soil functions

Texture is important



…and it can't be changed

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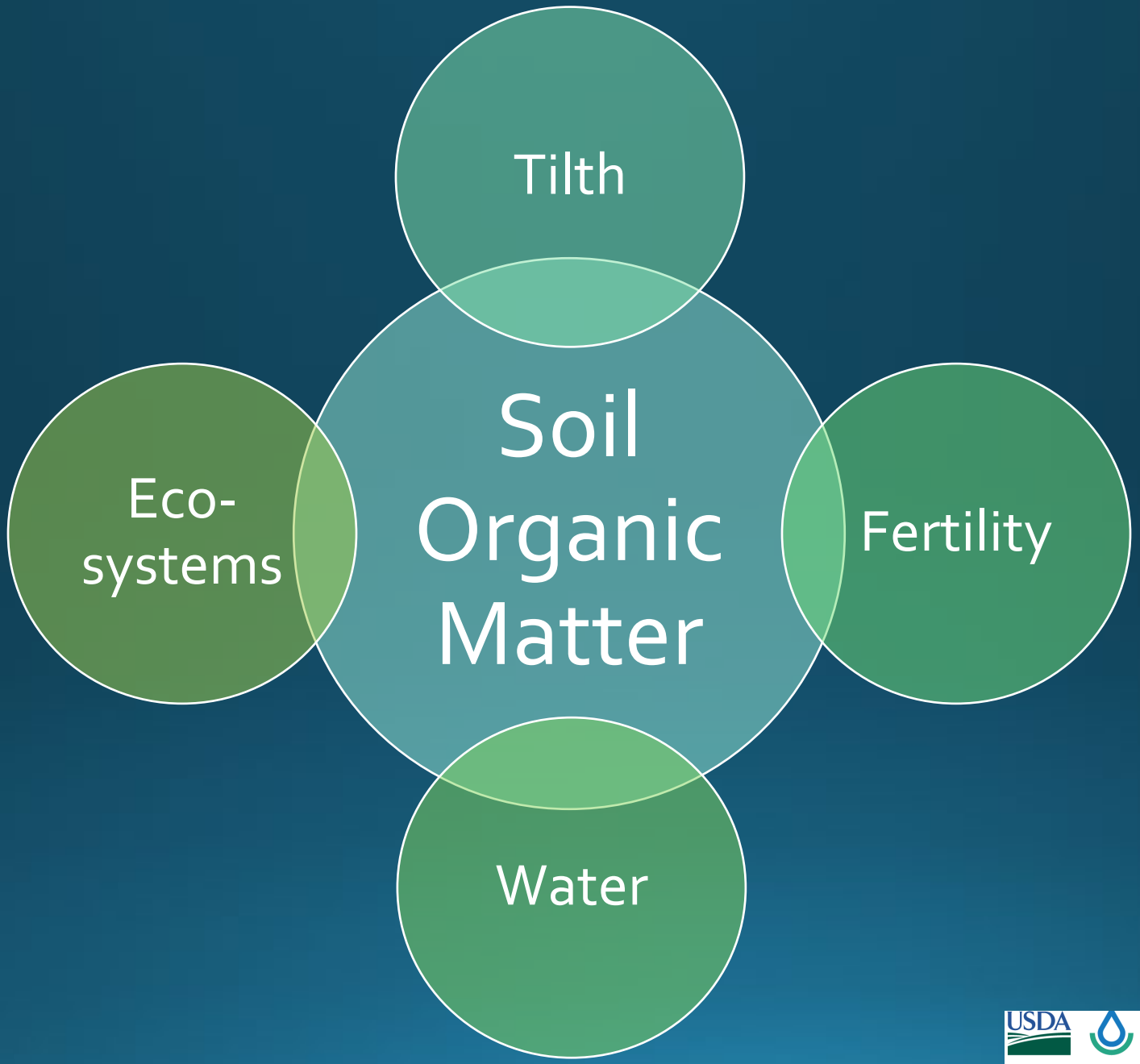
Texture is important

- Big impact on many soil functions
- It can't be changed
- It can be mitigated- with

“Tilth”

How easy is it to work this soil?

Organic matter loosens clay soil, gives body to sands and silts



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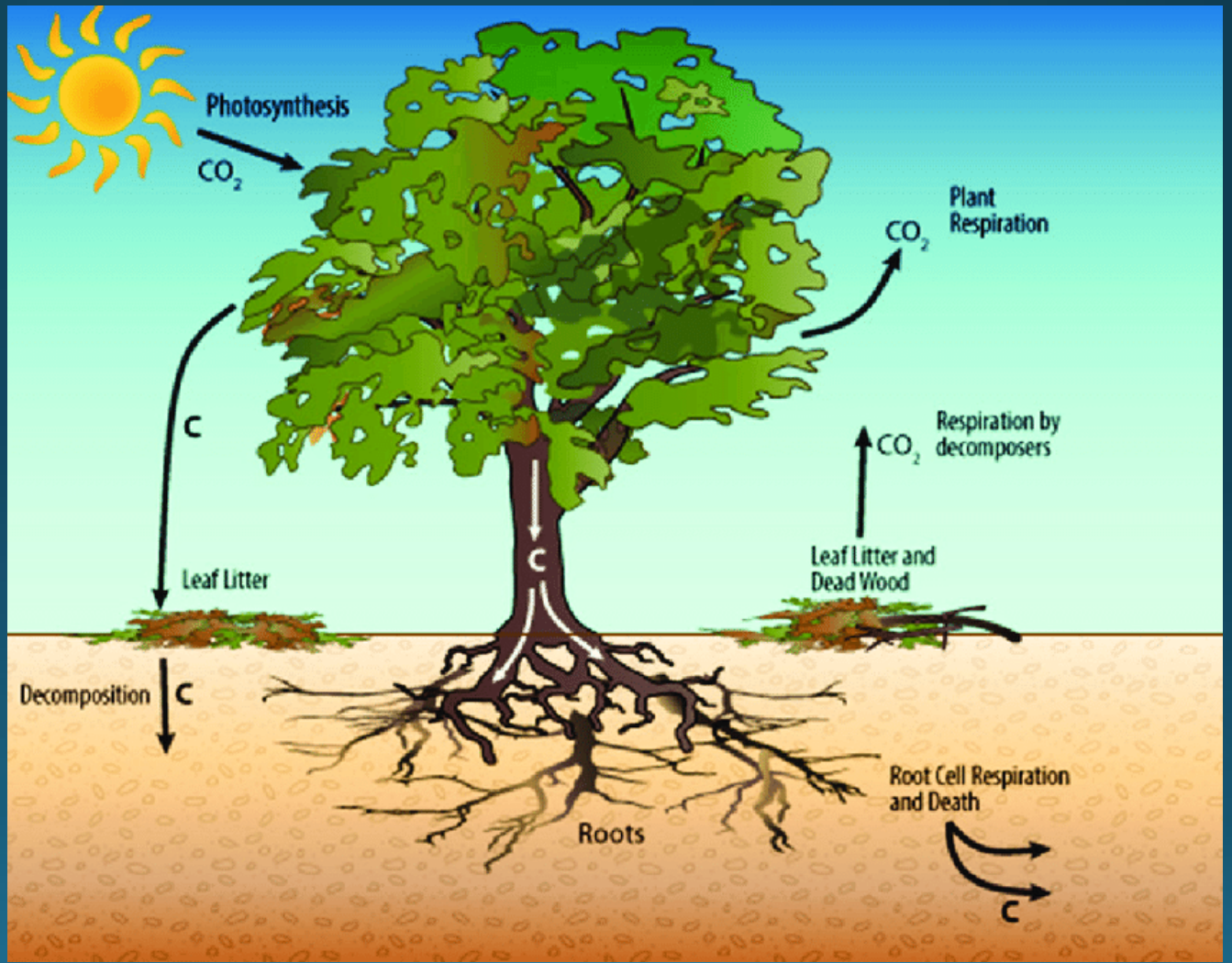
Circle of (soil) Life

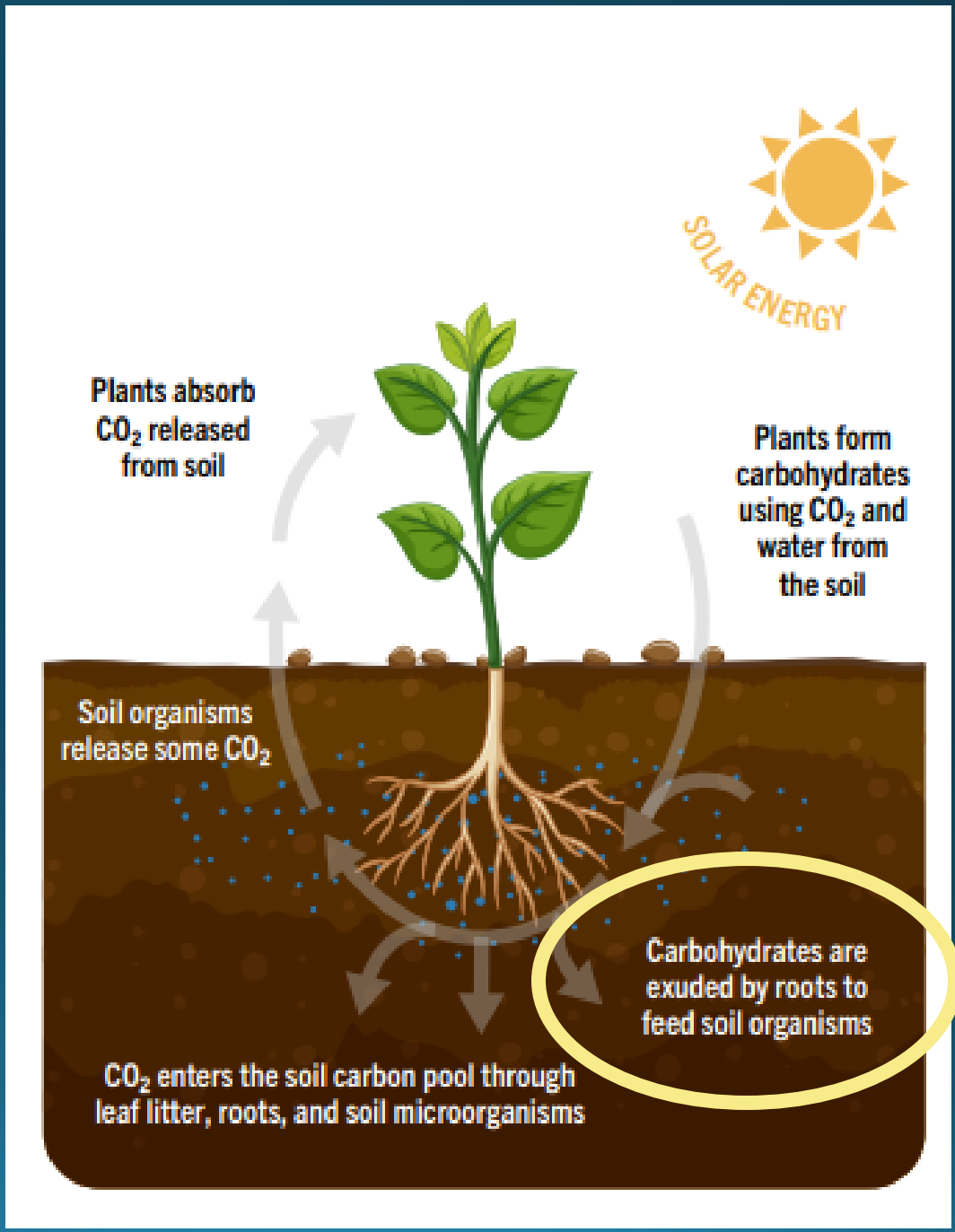
- Plants Grow
- Plants Die
- Dead plant materials become Soil Organic Matter



Circle of (soil) Life- Living organisms

Plants release UP TO 20% of the sugars they make through their roots!

Why?



Soil Ecosystem- Players

- Living roots, root hairs
- "Shredders"
  - Earthworms
  - Arthropods
- Microorganisms
  - Fungi
  - Bacteria
  - Actinomycetes

Soil Ecosystem- Actions

- Decompose organic materials
  - Release soluble nutrients
  - "Exhale" CO_2
- Symbiosis between plants and microbes
  - Mycorrhizae
  - Rhizobia
- Pests and pathogens

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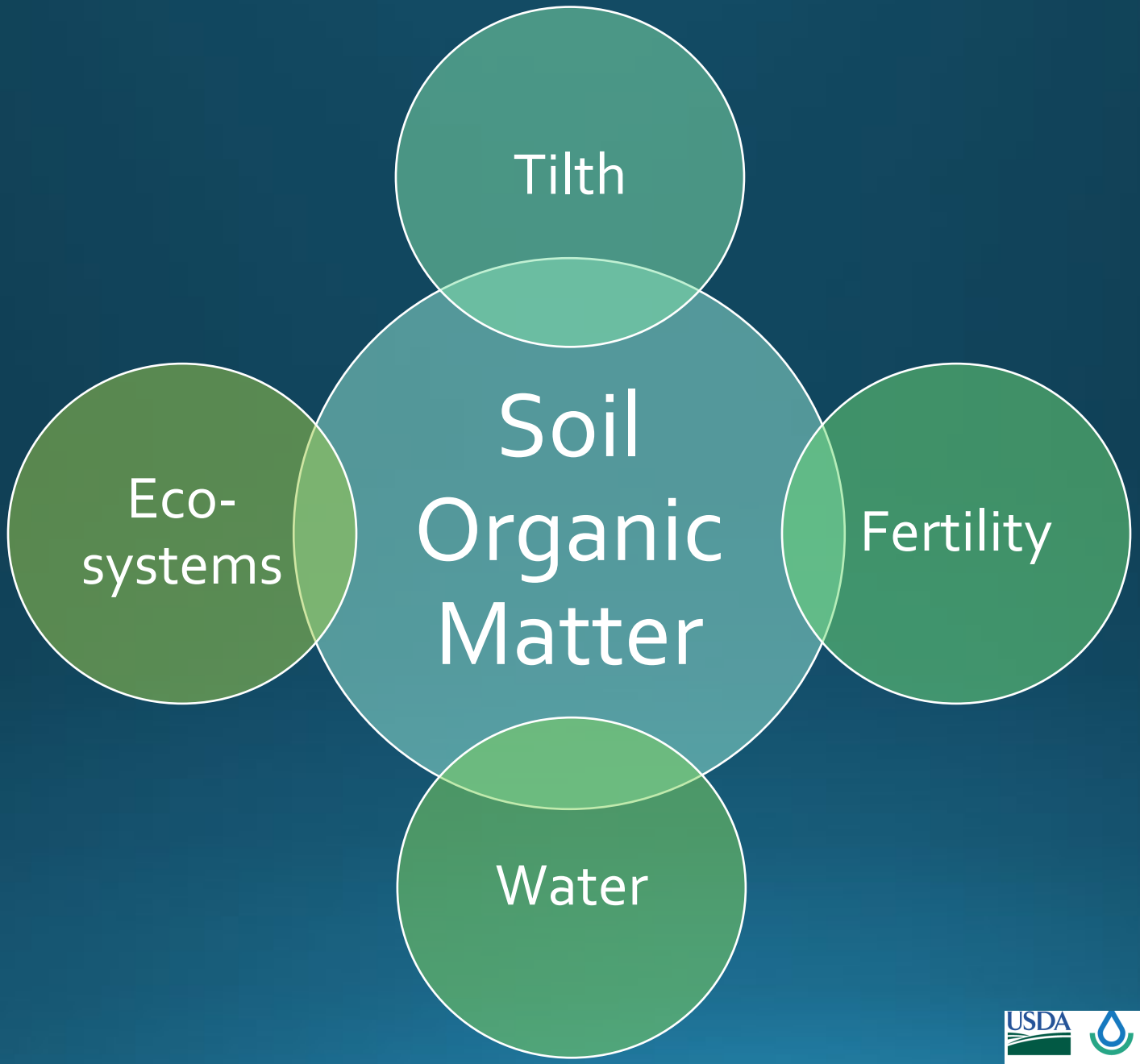

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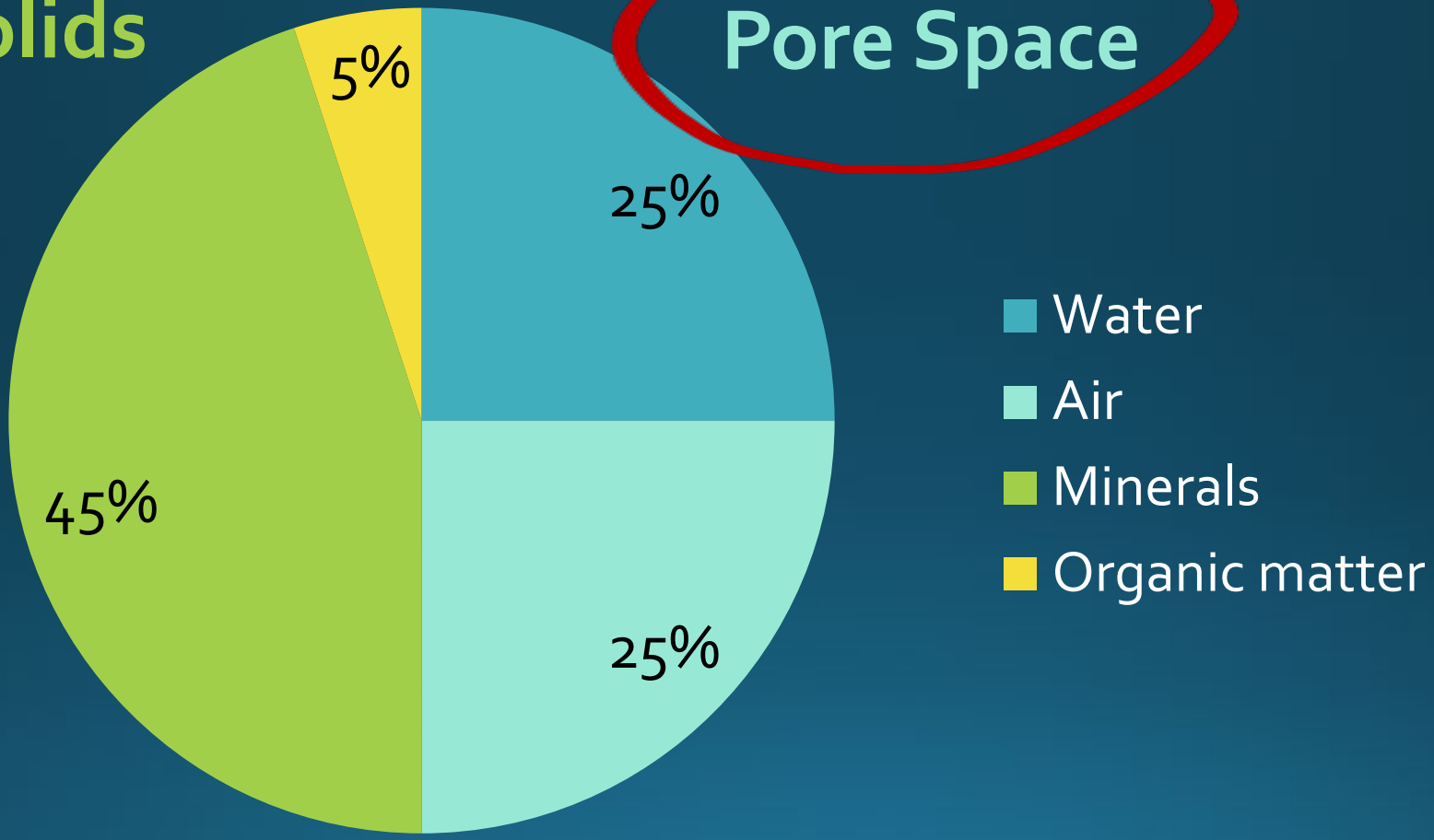
What is soil made of?

Solids

Pore Space



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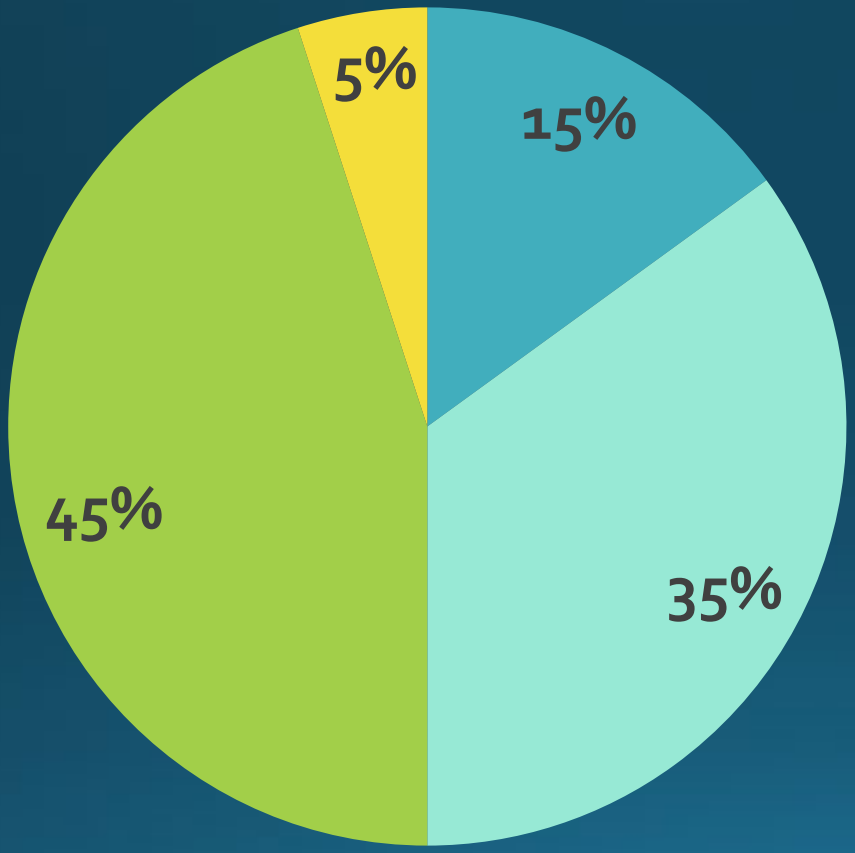
Soil Components



- Water
- Air
- Minerals
- Organic matter

Dry soil

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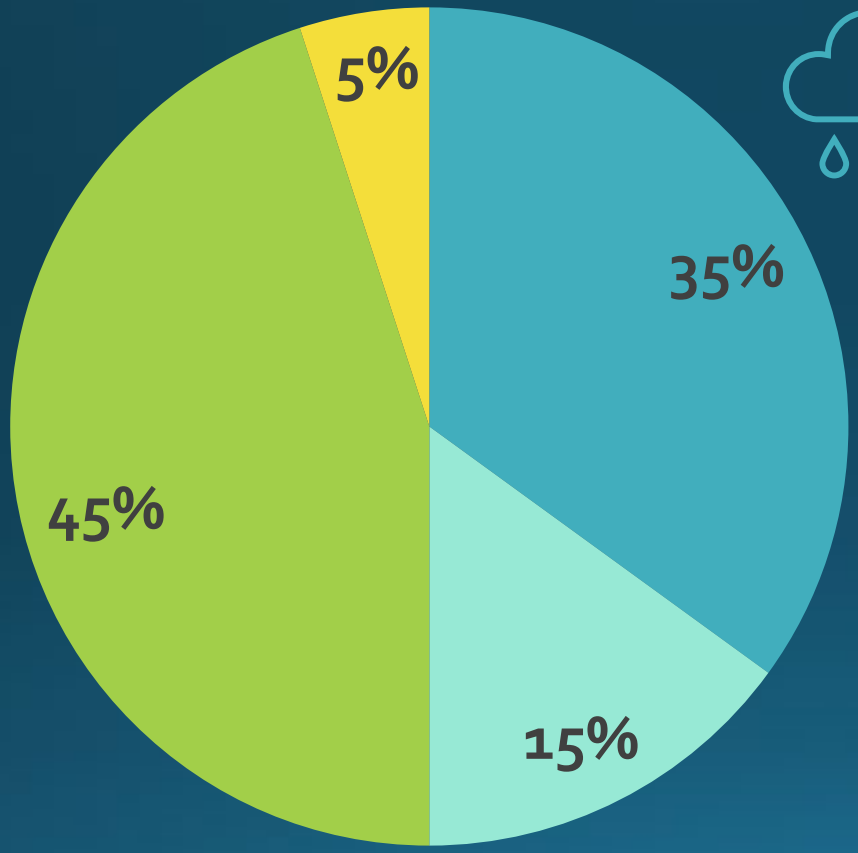
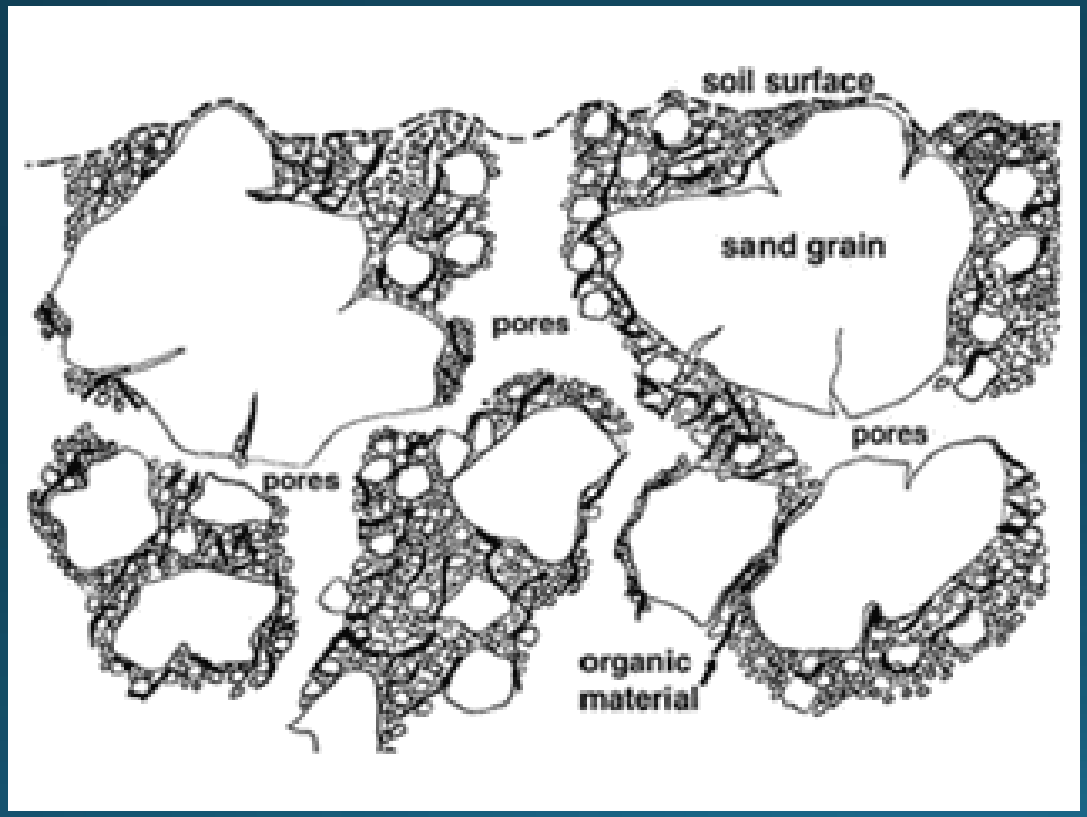
Soil Components



Wet soil

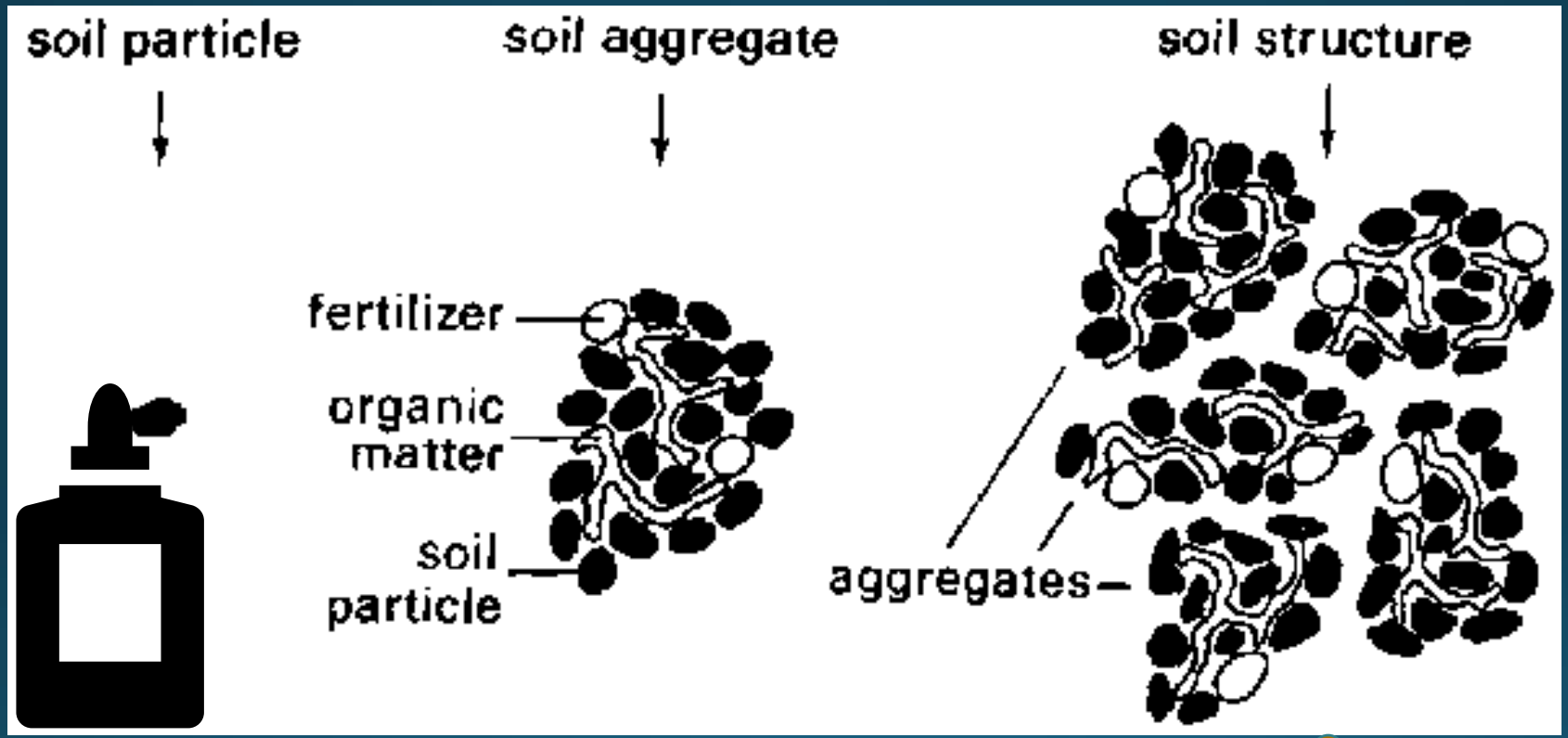
- Water
- Air
- Minerals
- Organic matter

Pore Space



Pores are defined by soil aggregates

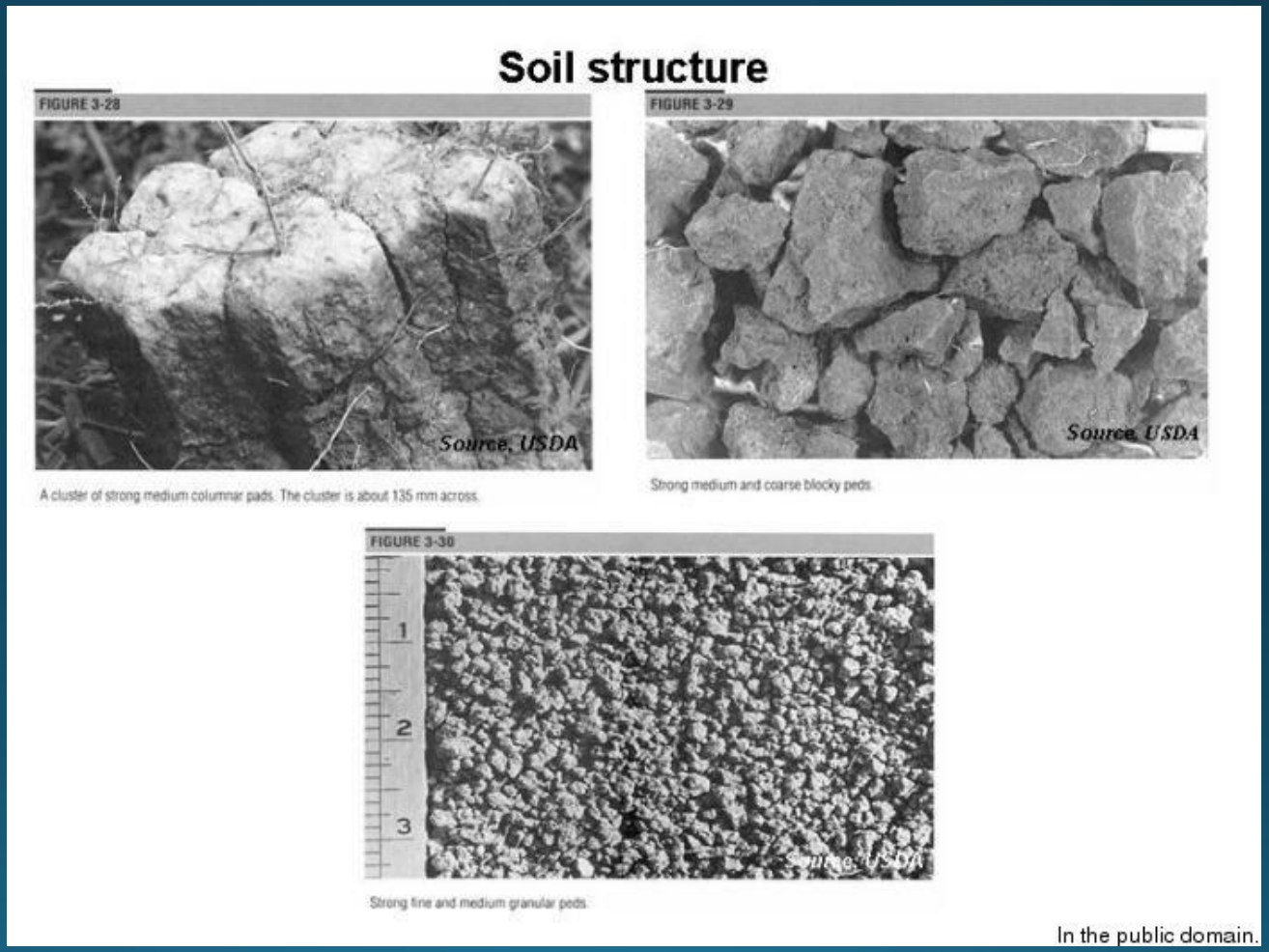
Soil Structure



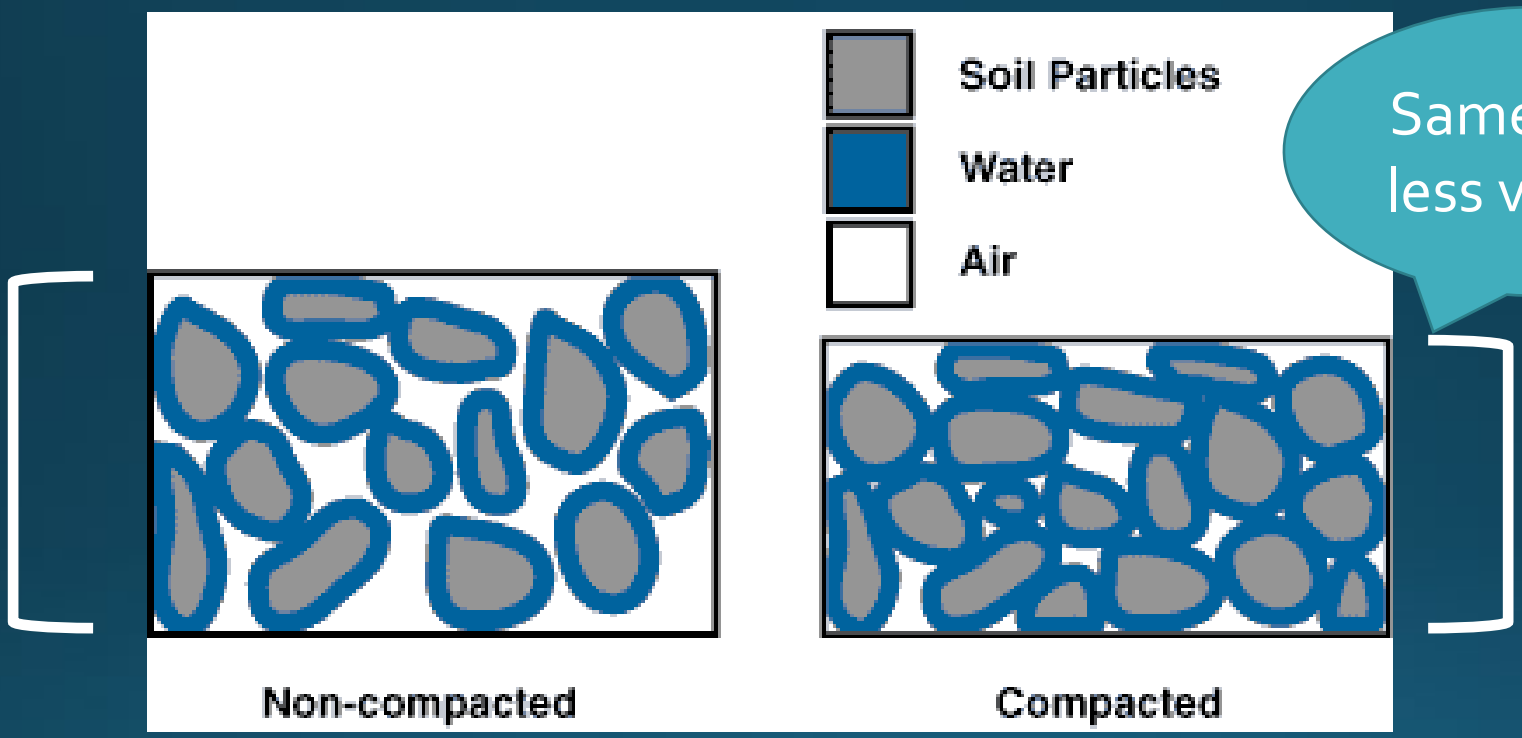
Soil aggregates are held together by organic glues

Soil Structure

Soil aggregate shape, size, and strength determine soil structure



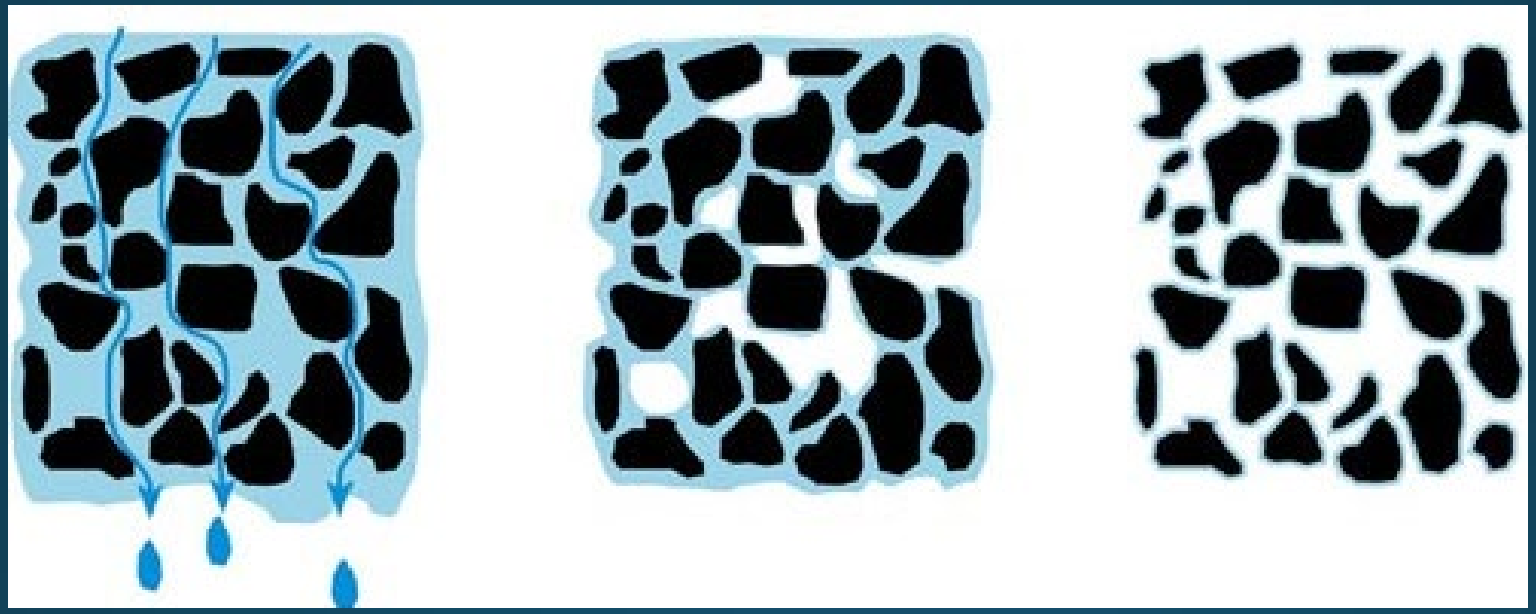
Pore Space- Compaction



More pore space

Less pore space

Water Holding Capacity



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Stable aggregates

Stable pores

Less compaction

Resists erosion

Good infiltration

Water holding capacity

Aeration and drainage

Root penetration

Easy to work

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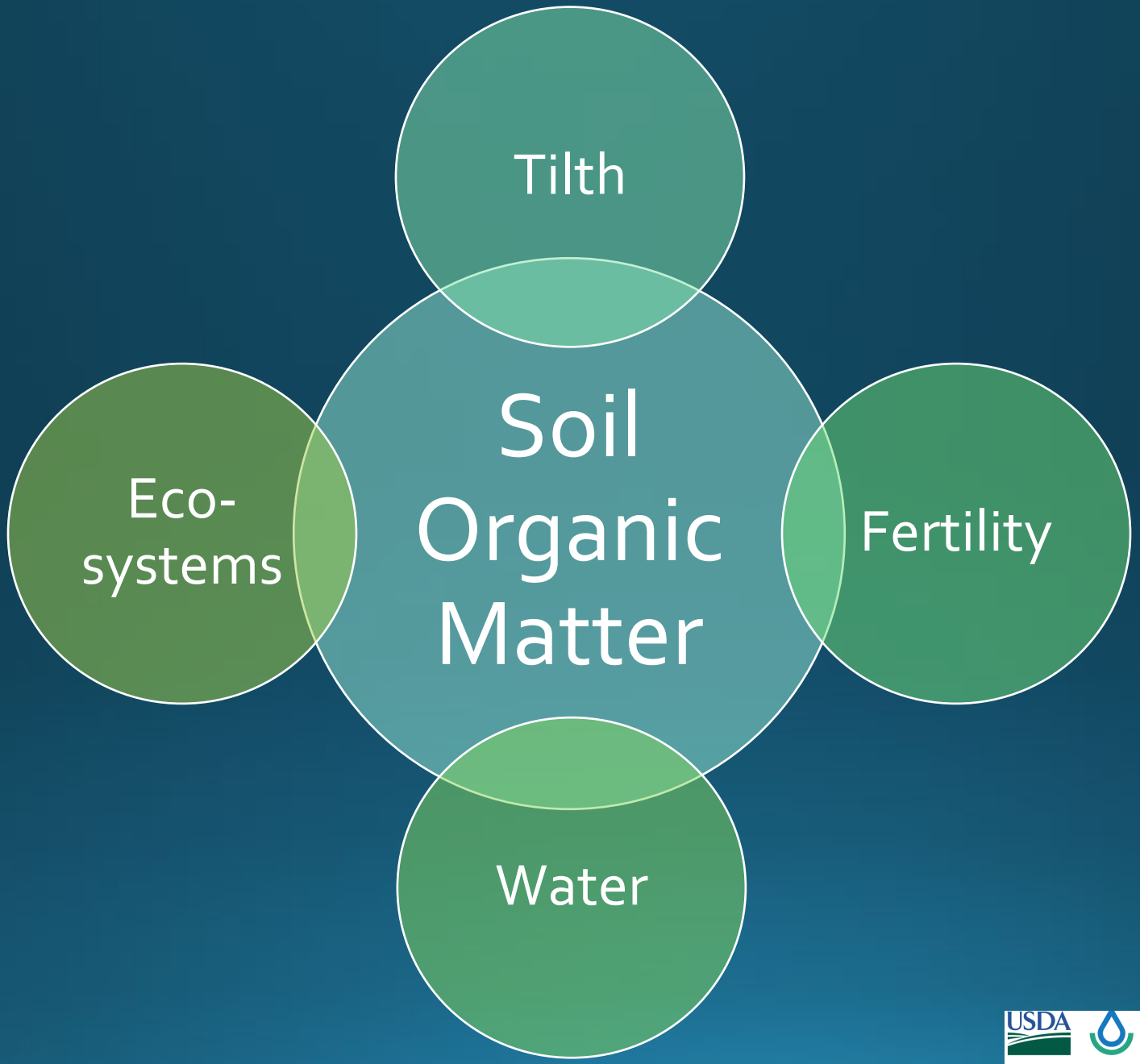

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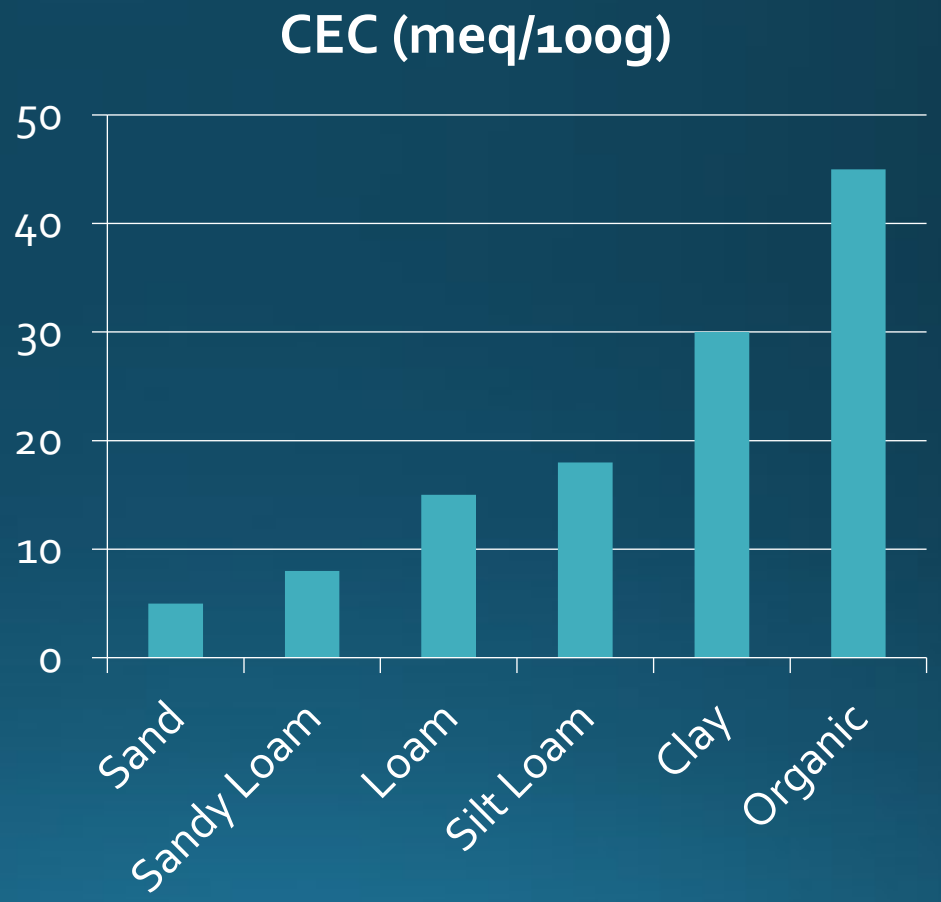
Native Soil Fertility

Influenced by:

- Minerals present in rocks
- Ability of soil to hold nutrients
- Cation Exchange Capacity
  - Clays (amount and type)
  - Soil Organic Matter



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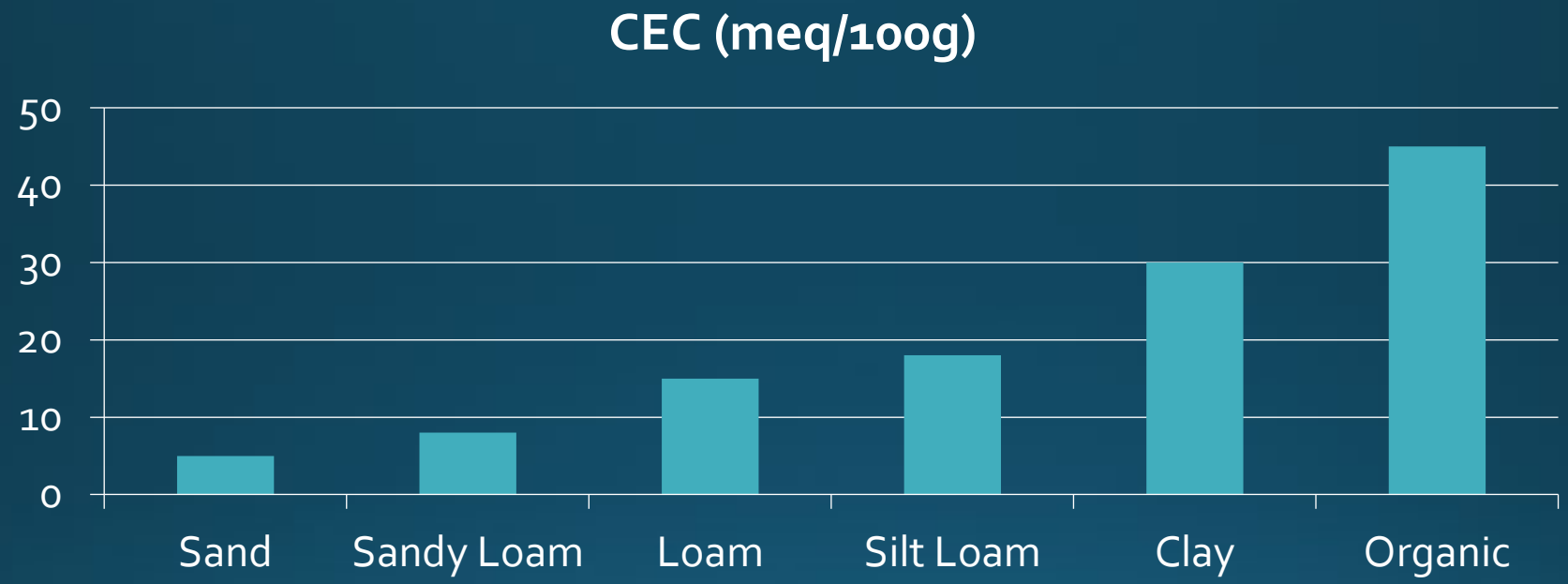
Native Soil Fertility



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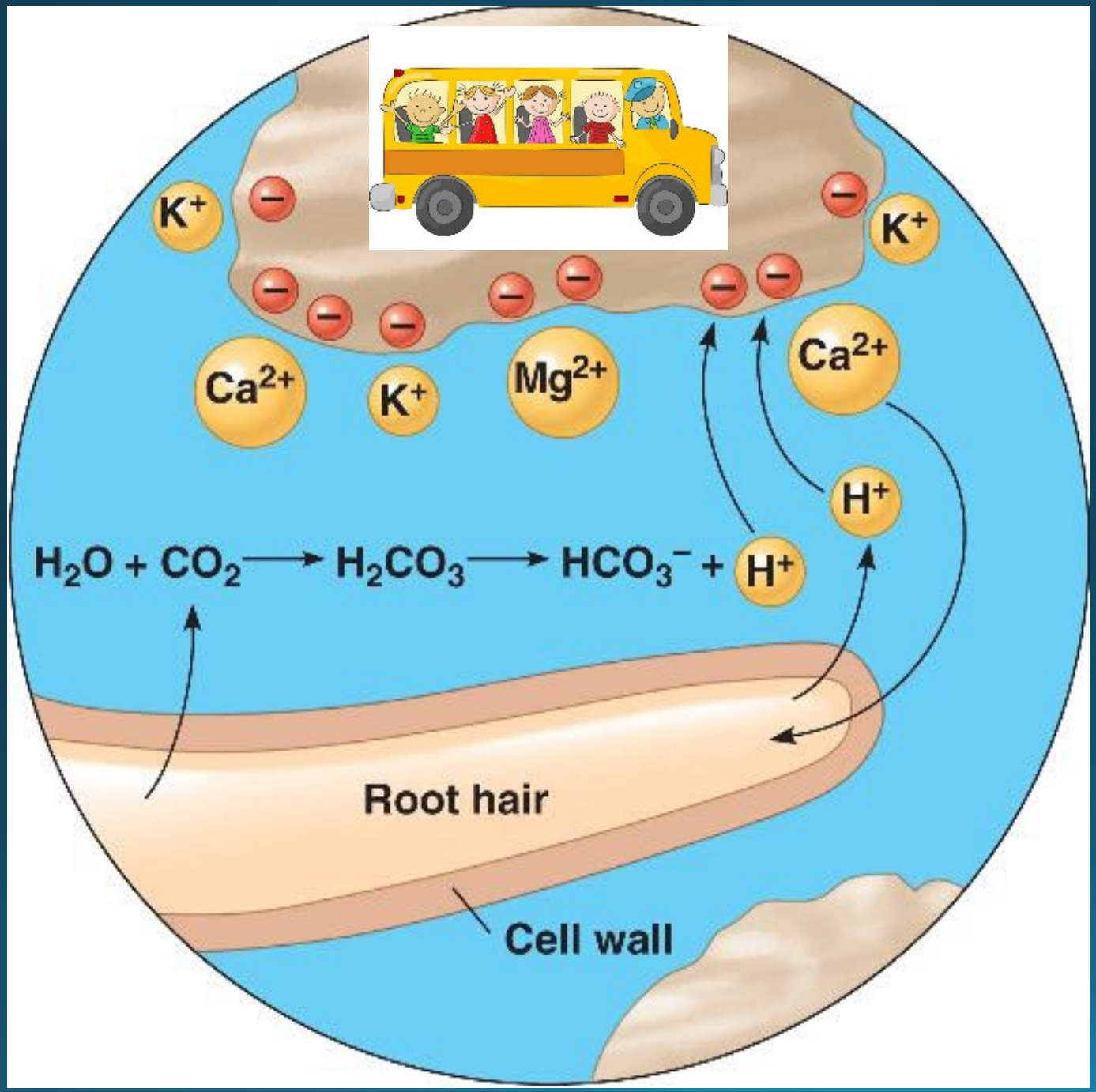

What is the ideal way to get the ***healthiest*** *possible soil?*

Build organic matter!

How do I build
Organic Matter?

Management principles for soil health

Disturb the soil less:

Reduce tillage to preserve organic matter

Feed the soil food web:

Add organic matter and keep living roots in the soil

Cover the soil more:

Grow vegetation and leave mulch on the surface

Diversify the system:

Add different kinds of plants to the system in open times or spaces

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Don’t dig or till (and maybe don’t walk on it) when it’s wet!

Reduce compaction

“If you want your soil to be healthy, you shouldn’t see it very often.”

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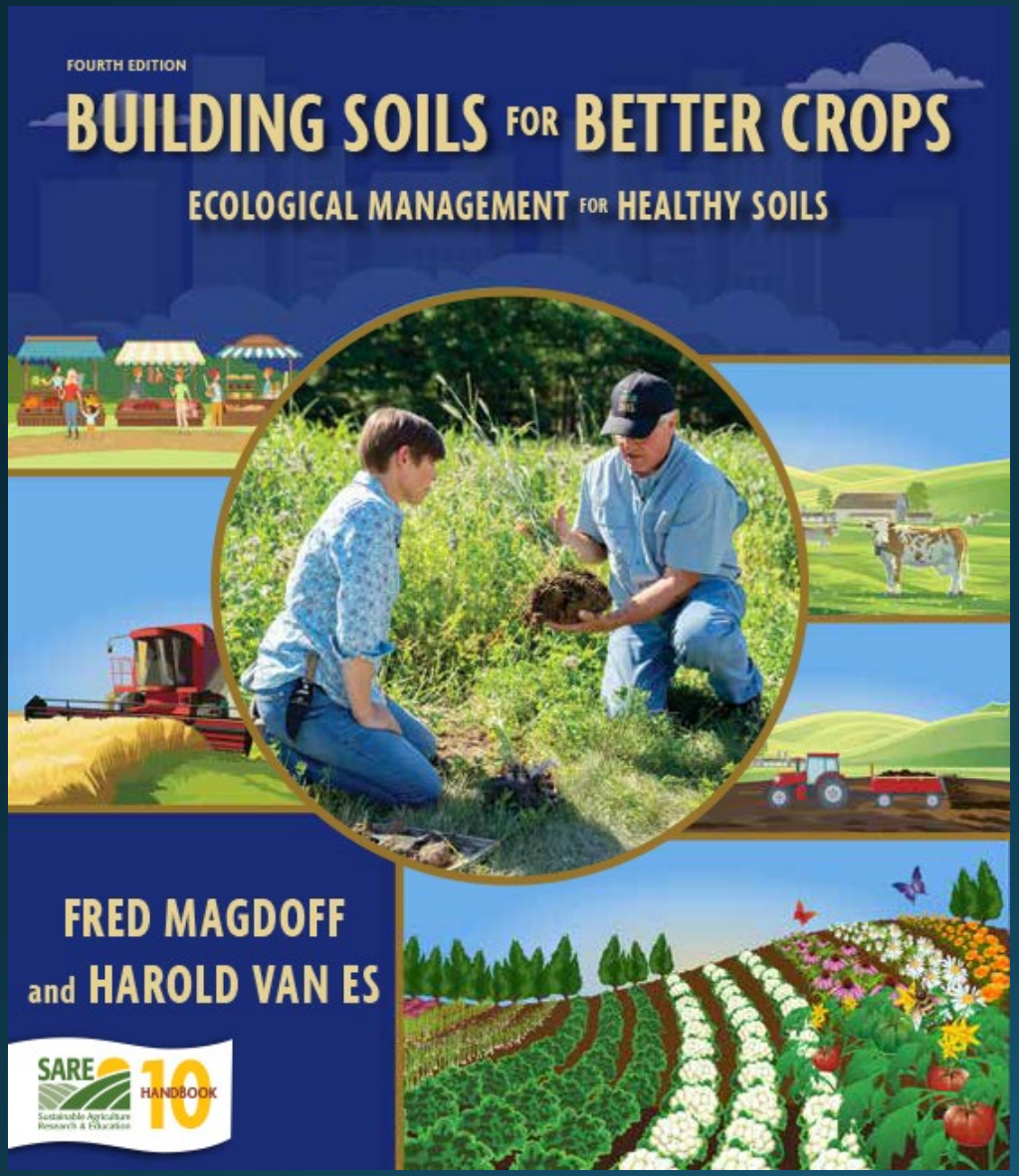
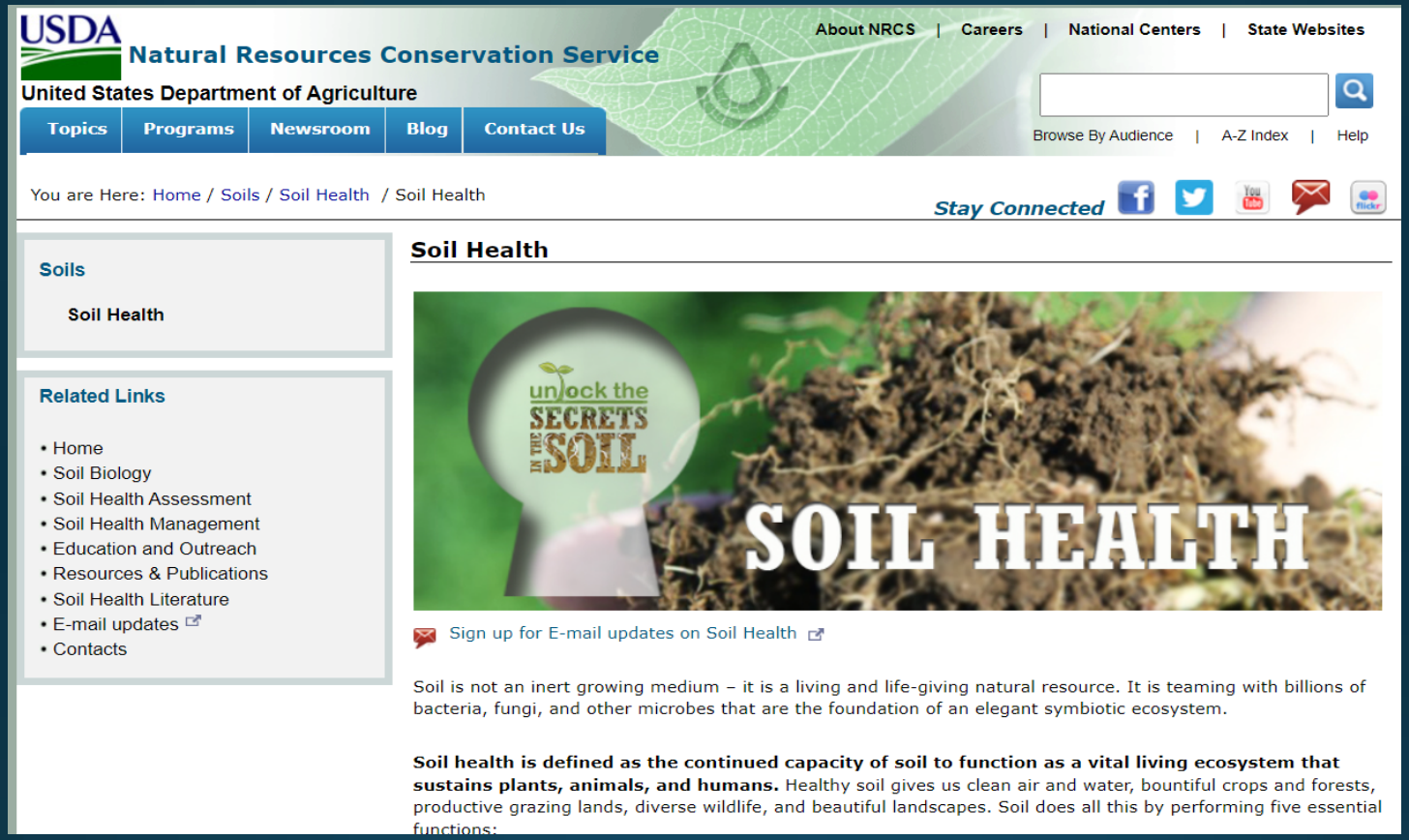


Resource:

https://www.sare.org/resources/building-soils-for-better-crops/

Free as pdf

$23 for print copy (not including tax and shipping)



Resource:

Soil Health | NRCS (usda.gov)

https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/soils/health/?cid=stelprdb1048783

Thank you!

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