Climate Change, Soil Health, and Ecosystem Goods and Services

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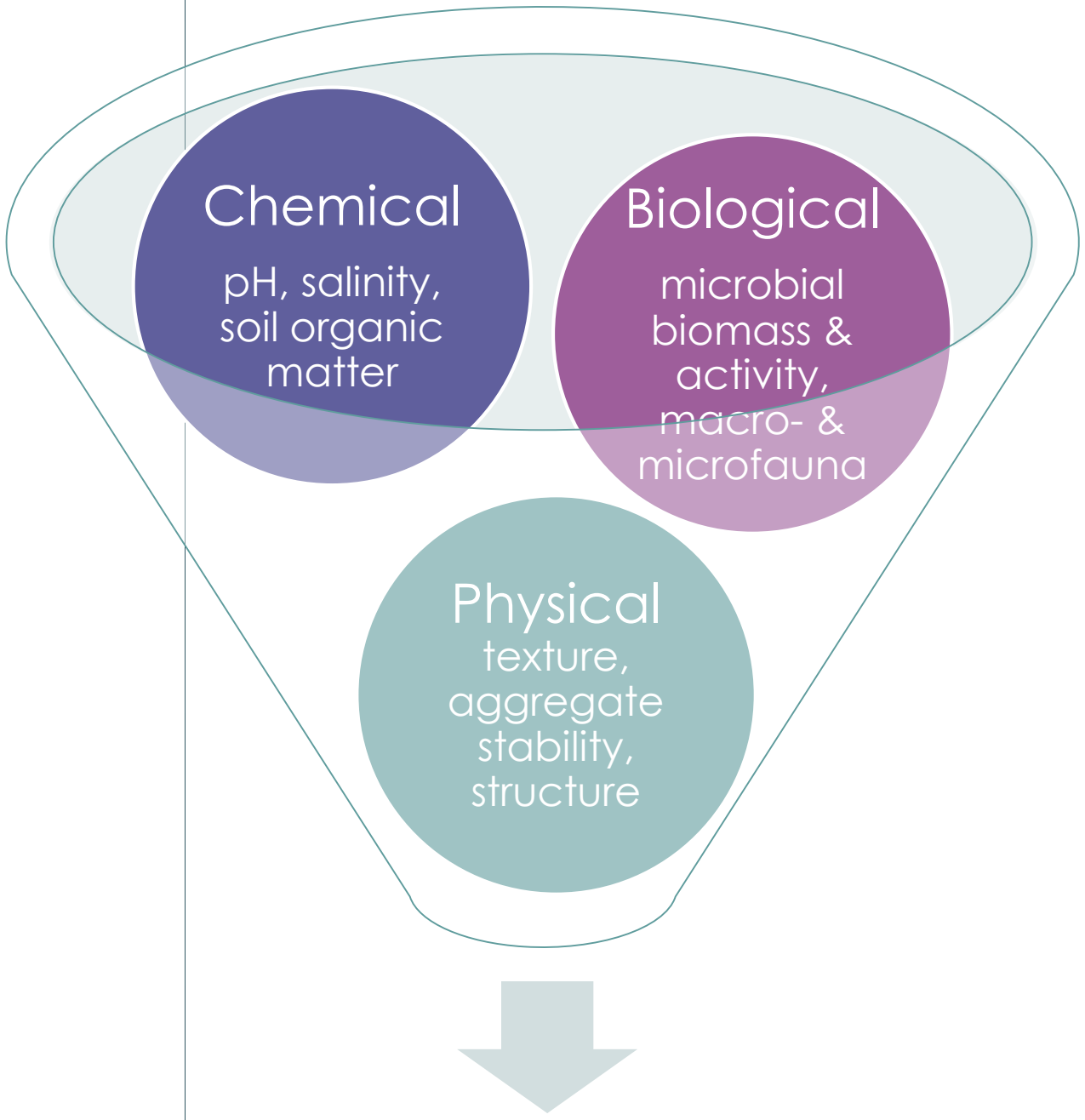
Soil Health

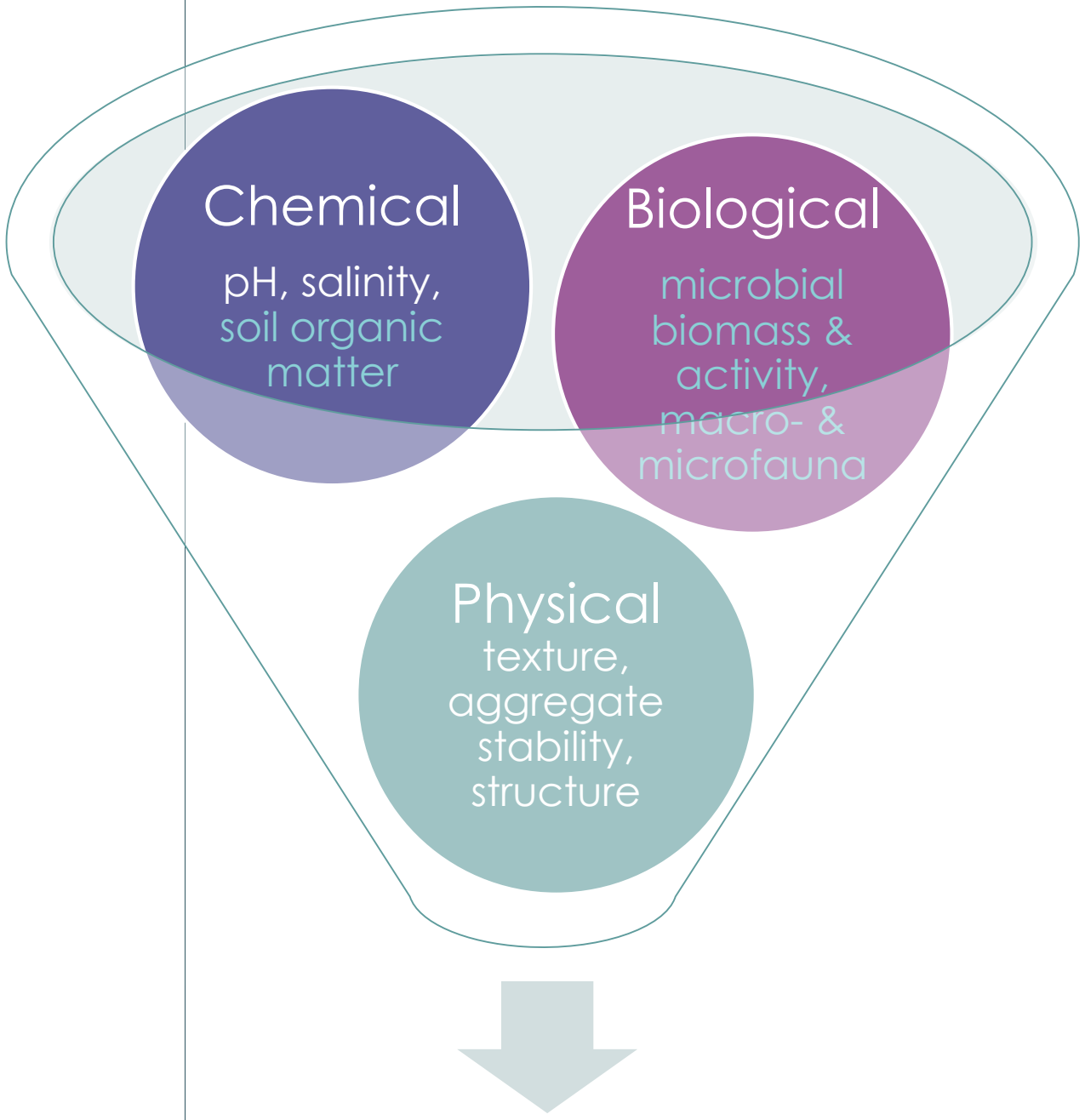
Soil health is the capacity of a soil to contribute to ecosystem function and sustain producers and consumers.

Healthy soils provide a variety of ecosystem goods and services

Components of Soil Health



Components of Soil Health



Soil Organic Matter

Soil organic matter (SOM) is correlated with soil fertility: generally speaking, the higher the SOM, the "healthier" and more fertile the soil.

*In this presentation, I will also mention soil organic carbon (SOC), which is an indicator of soil organic matter.

Soil Organic Matter and SOC

The amount of SOM, and therefore SOC, in the soil is affected primarily by:

Temperature

Soil moisture

Topography

Soil texture

Plant community structure

Biomass production

Soil pH

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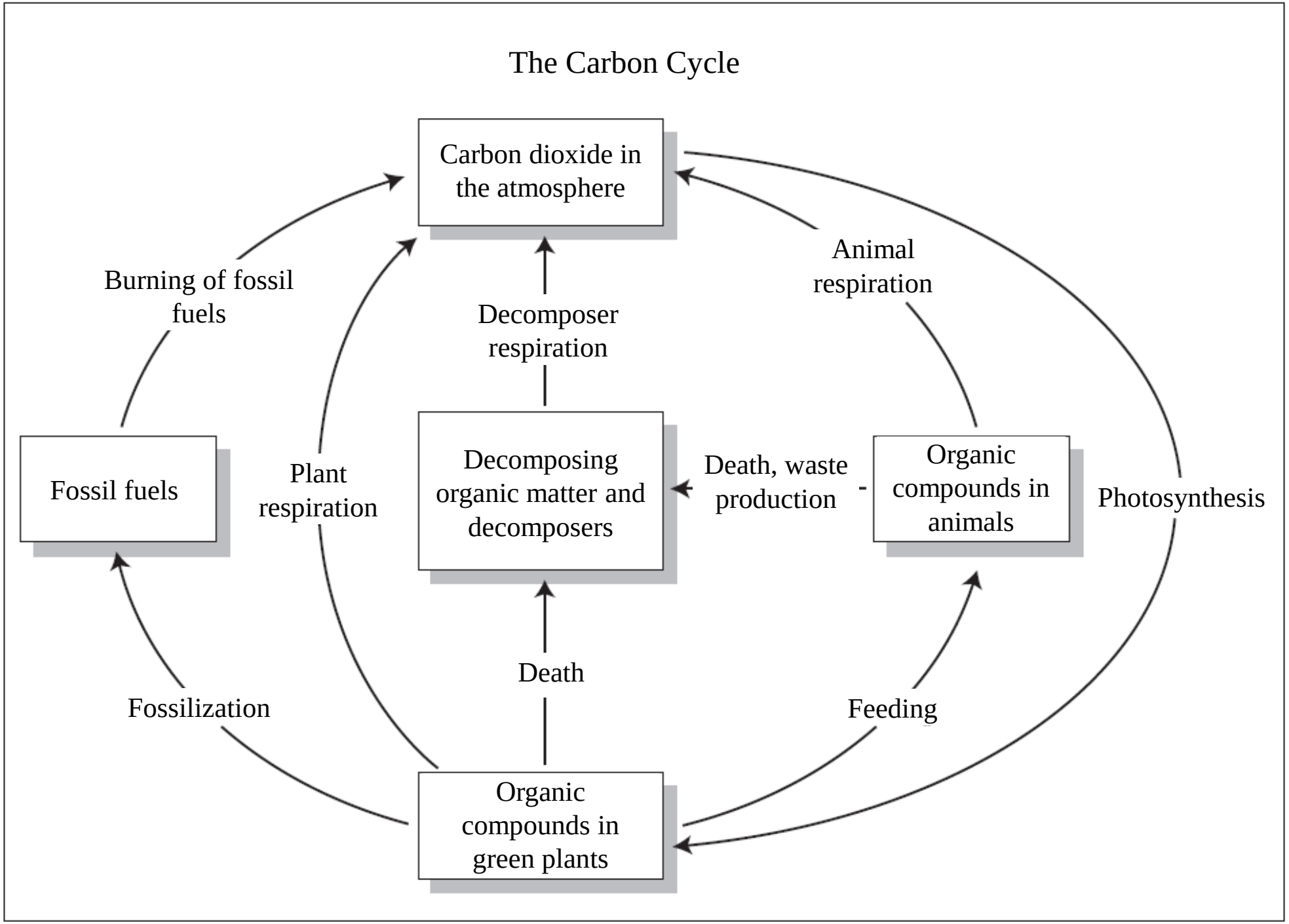
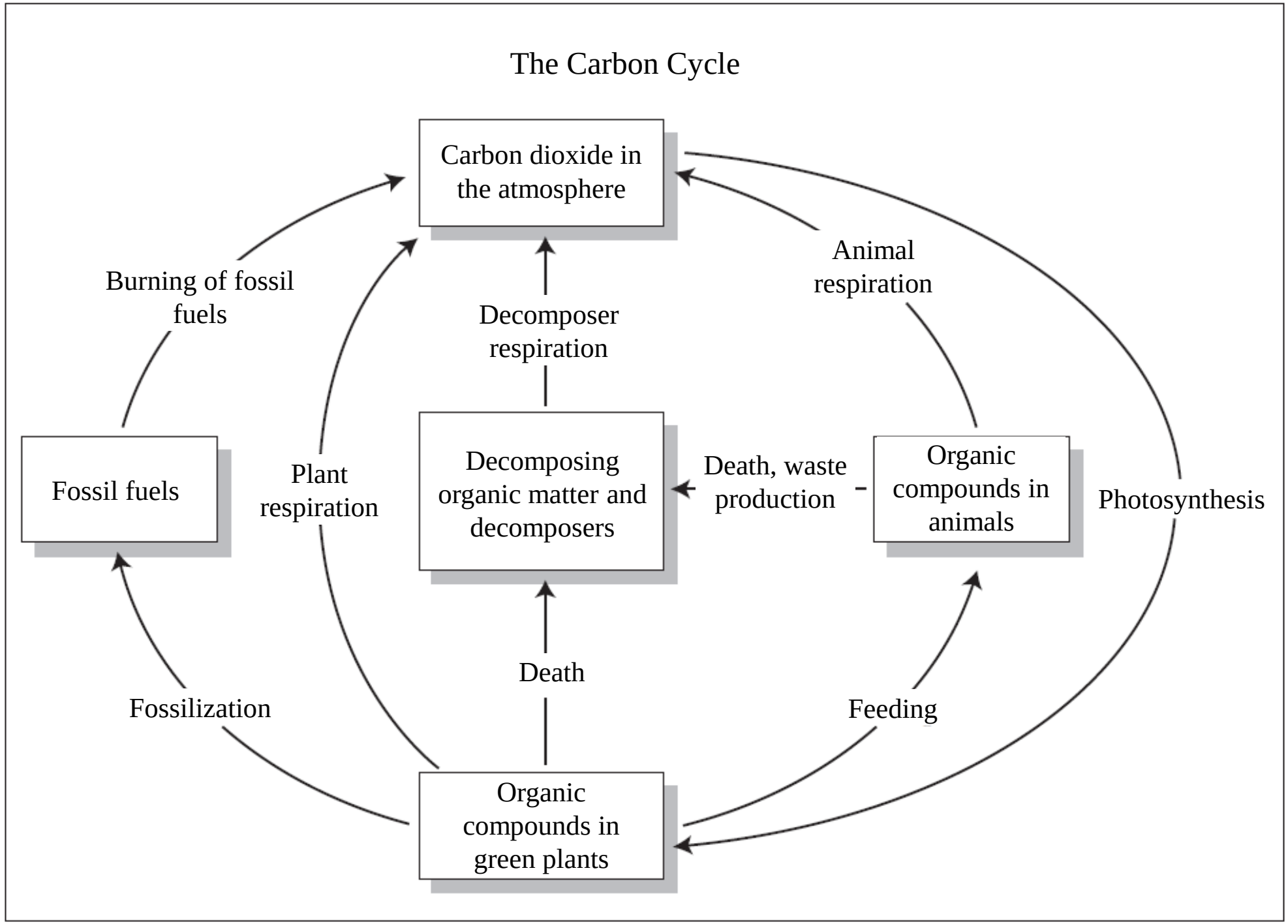
Climate Change and Soil Health

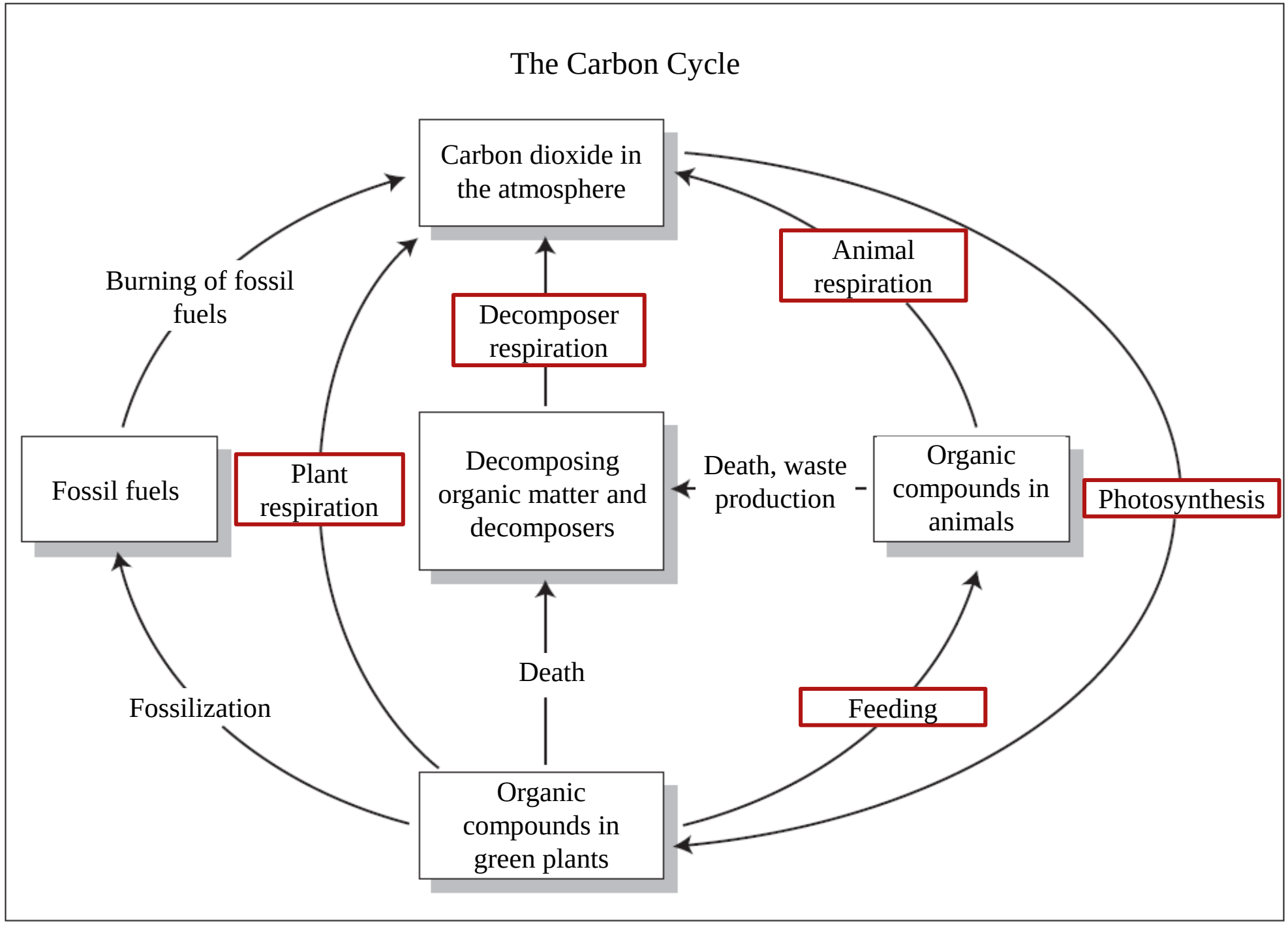
Given the direct and indirect effects of climate on soil, what do shifts in climate mean for long-term soil health and associated ecosystem services?



Climate Change and Soil Organic Carbon



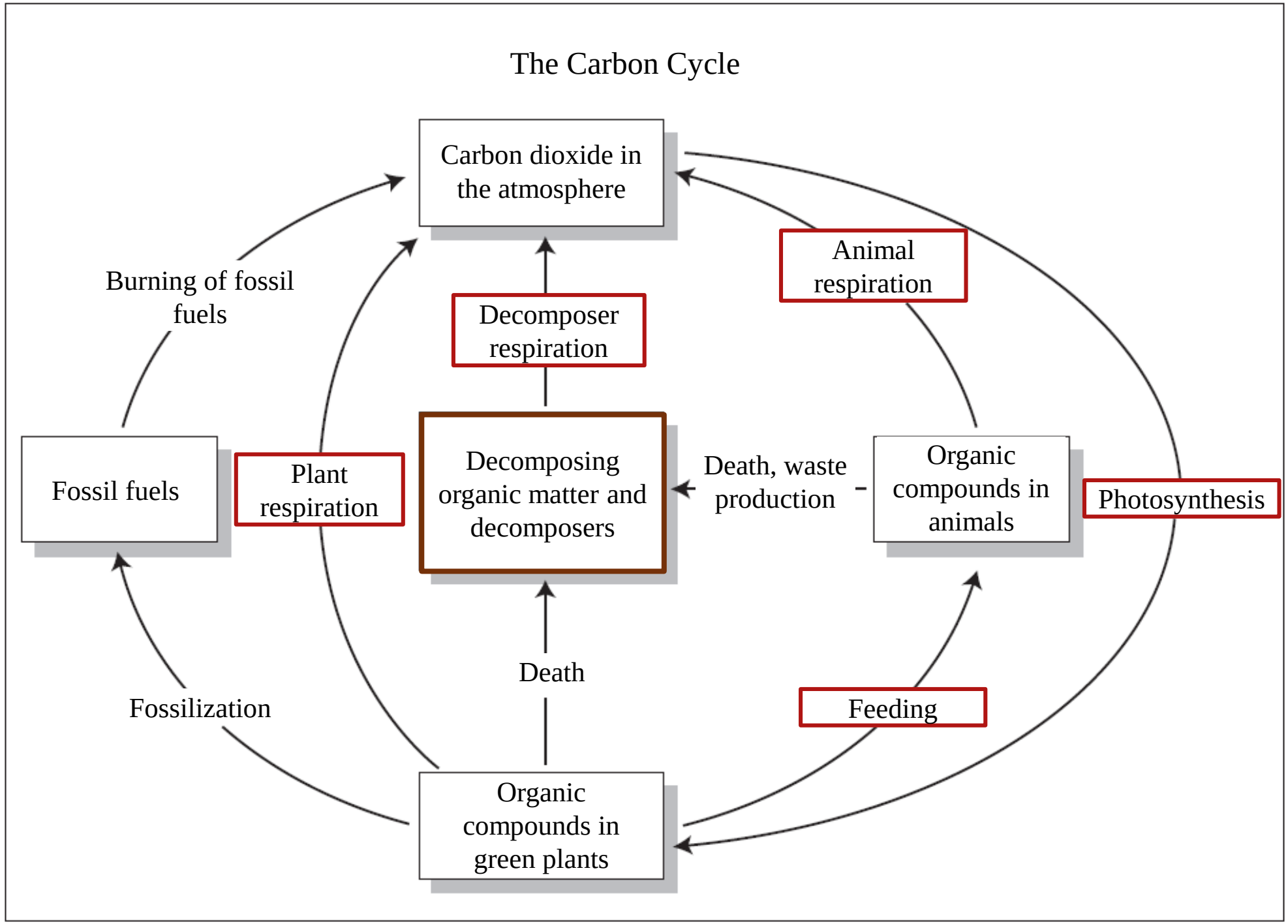
The rate of carbon cycling is partially dependent upon environmental conditions



Generally:

Higher temperature and precipitation →

Higher production & higher rate of decomposition



Generally:

Higher temperature and precipitation →

Higher production & higher rate of decomposition →

Larger amount of carbon stored in the soil

Soil Organic Matter

Soil organic matter (SOM) is correlated with soil fertility: **generally speaking, the higher the SOM, the more fertile the soil…**

…And more fertile soil tends to be healthier and more capable of providing ecosystem services.

Not all climates or changes are equal…








Climate Change, Soil Health, and Ecosystem Services

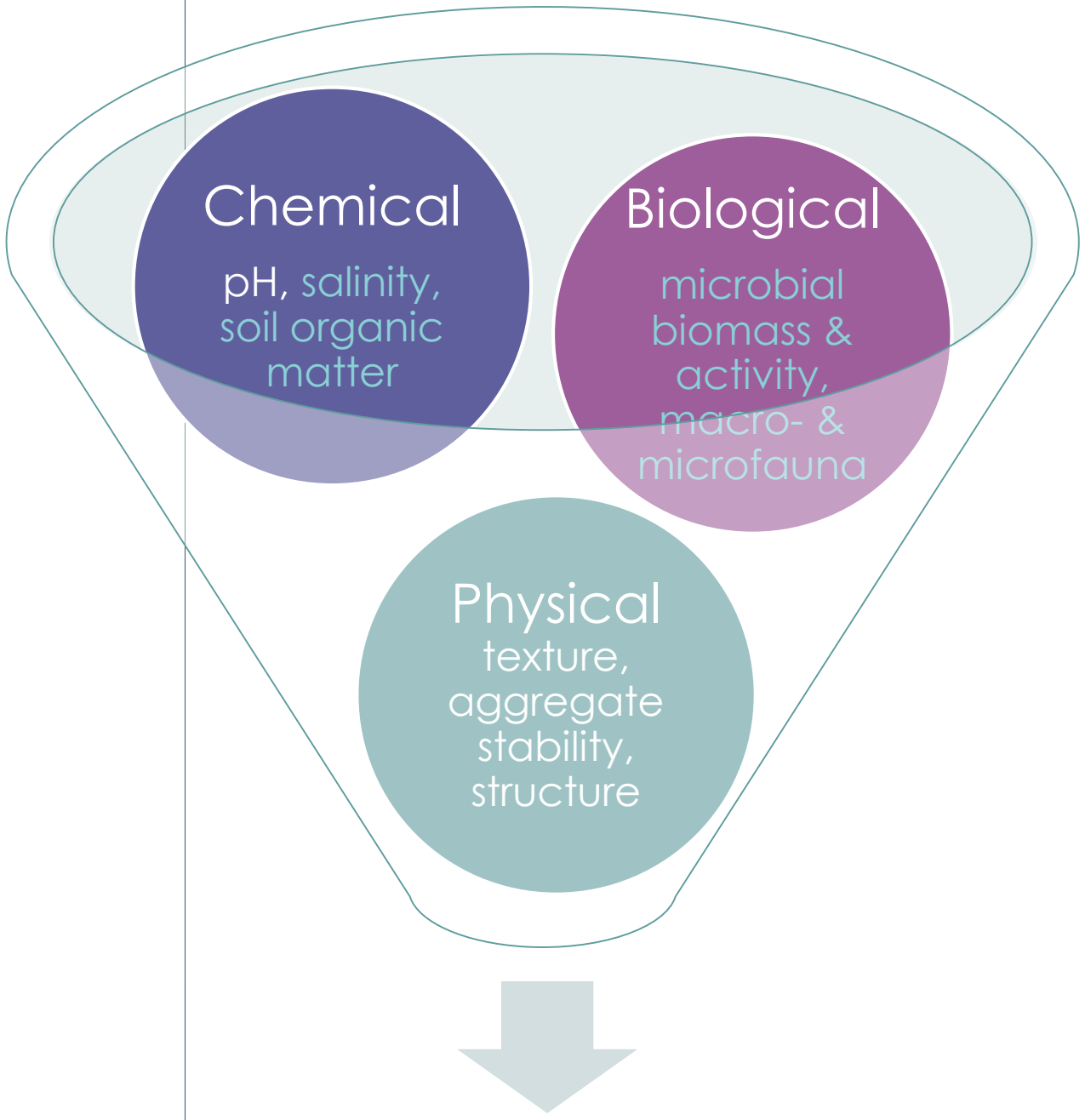
What does all of this mean for ecosystem services provided by healthy soils?

Climate Change, Soil Health, and Ecosystem Services

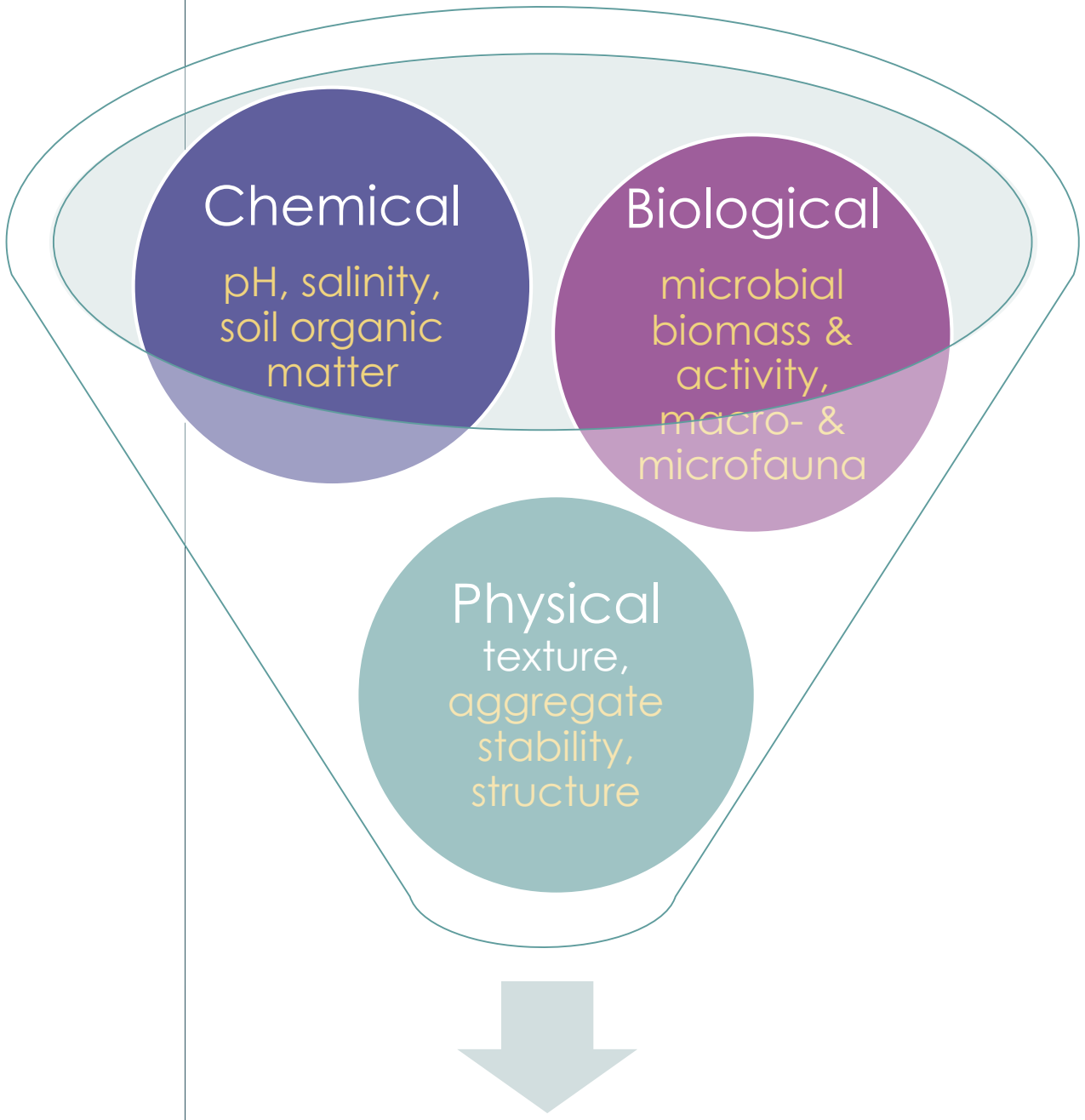
What does all of this mean for ecosystem services provided by healthy soils?

It depends on the soil, the ecosystem, the direction and type of change(s), **and people.**

Components of Soil Health



Components of Soil Health




APPROACHING DUST STORM IN MIDDLE WEST.
#525
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Conclusion

The extent to which climate change affects soil health and ecosystem services is contingent upon the type and magnitude of change, as well as other contributing factors

The potential for mitigating or enhancing any negative effects of climate change on soils is heavily dependent on soil management

The Takeaway

Adapting to and mitigating the effects of climate change on ecosystem services will require management directed at improving and preserving soil health.

Questions?

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Climate Hub Information:

https://www.climatehubs.oce.usda.gov