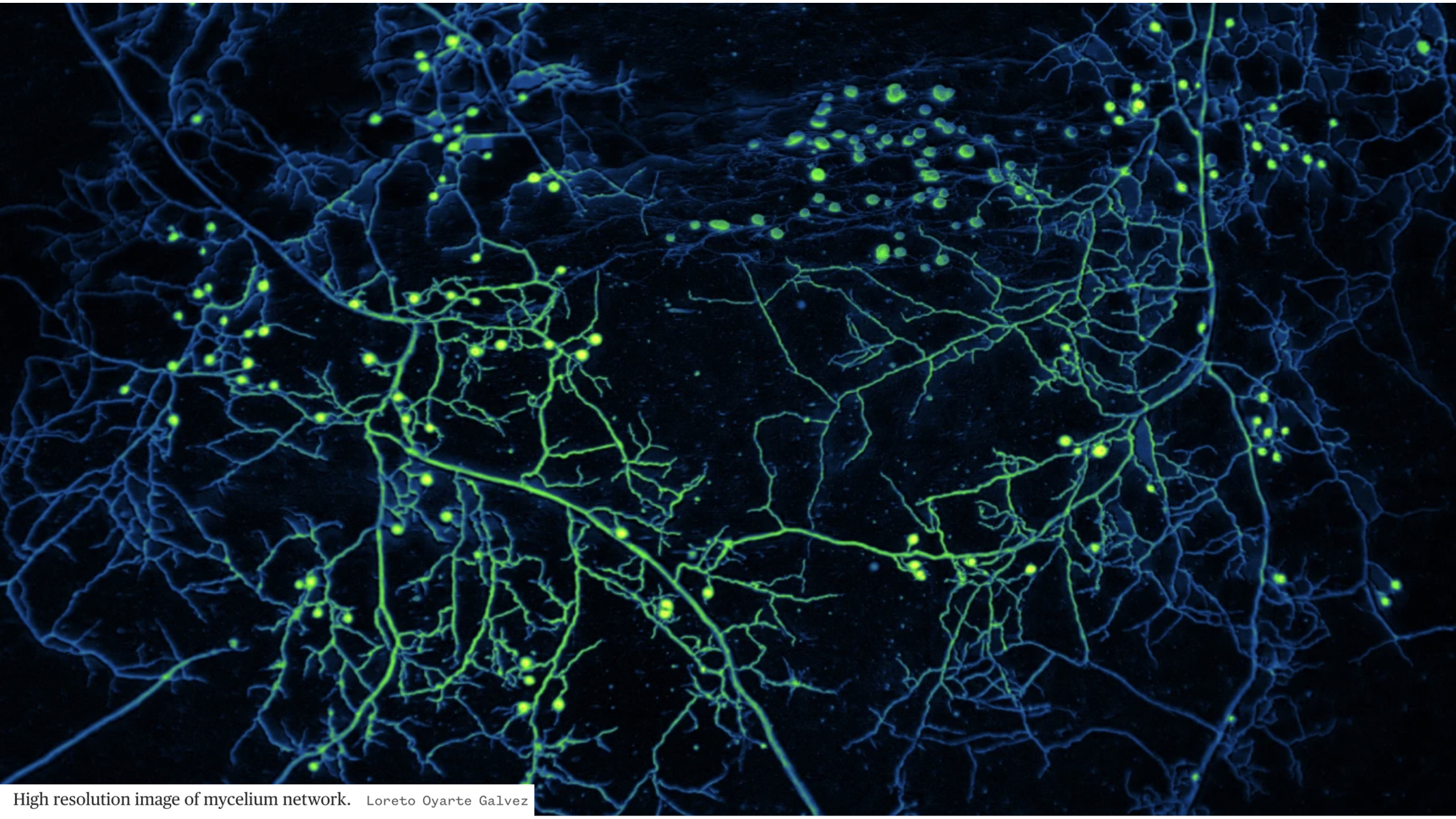
Earth as a System

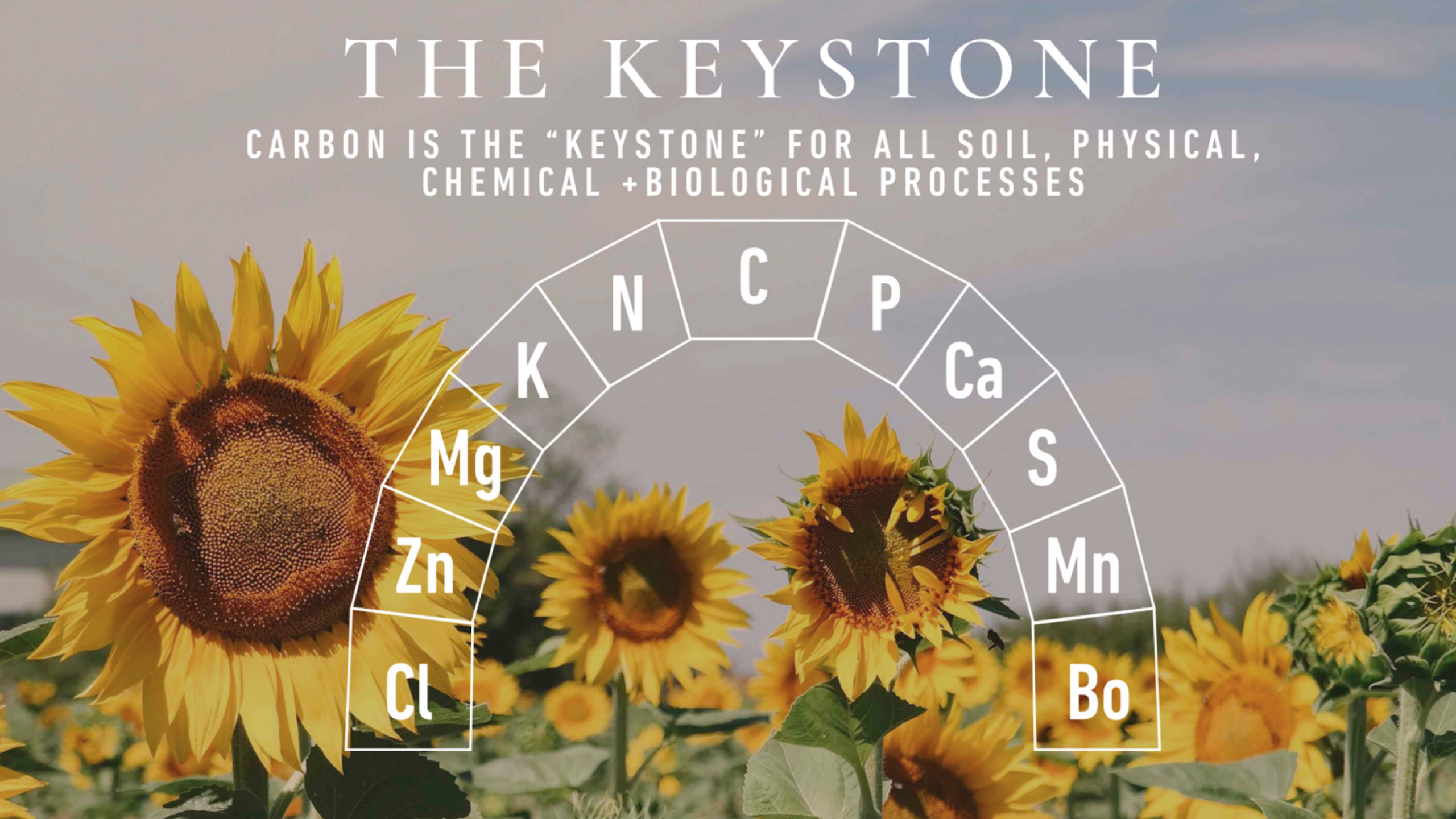
More Than The Sum of Its Parts

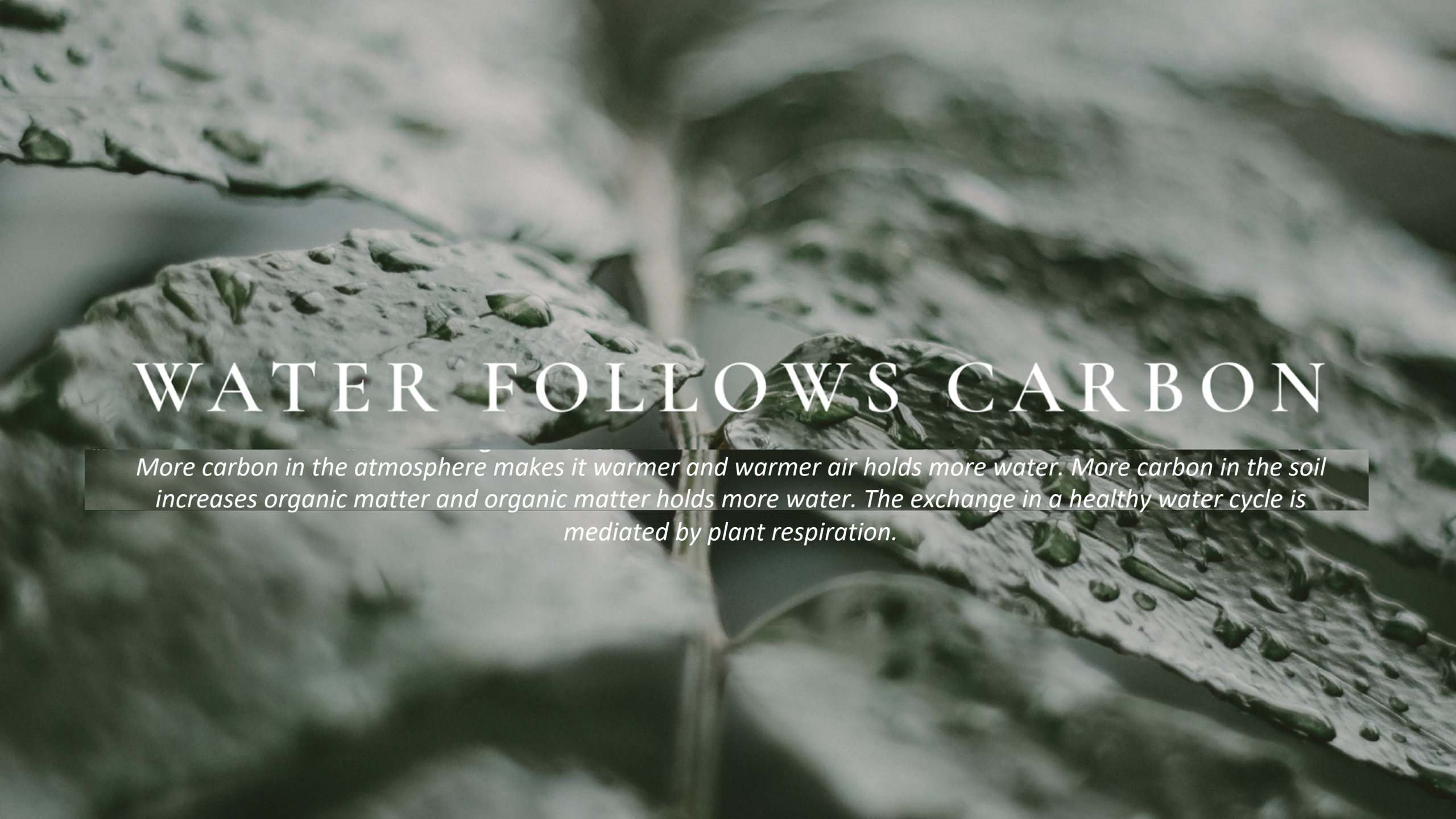


High resolution image of mycelium network. Loreto Oyarte Galvez

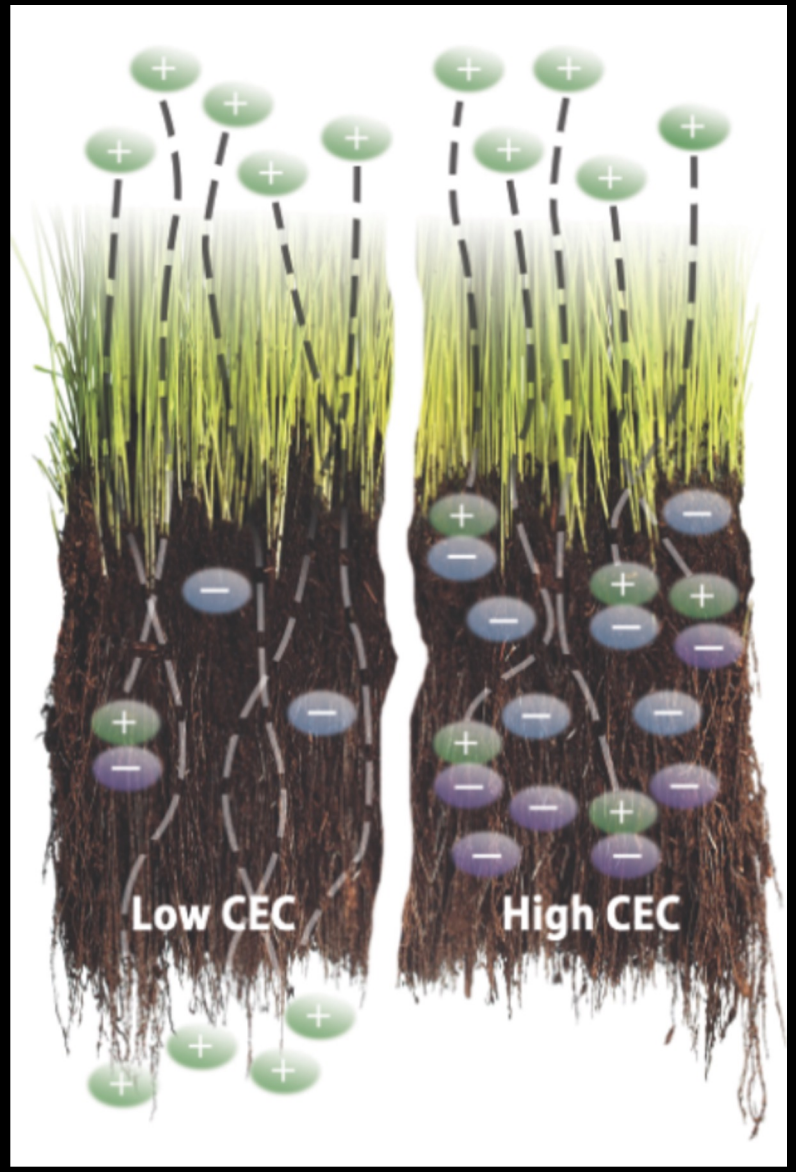
THE KEYSTONE

CARBON IS THE "KEYSTONE" FOR ALL SOIL, PHYSICAL, CHEMICAL +BIOLOGICAL PROCESSES





More carbon in the atmosphere makes it warmer and warmer air holds more water. More carbon in the soil increases organic matter and organic matter holds more water. The exchange in a healthy water cycle is mediated by plant respiration.

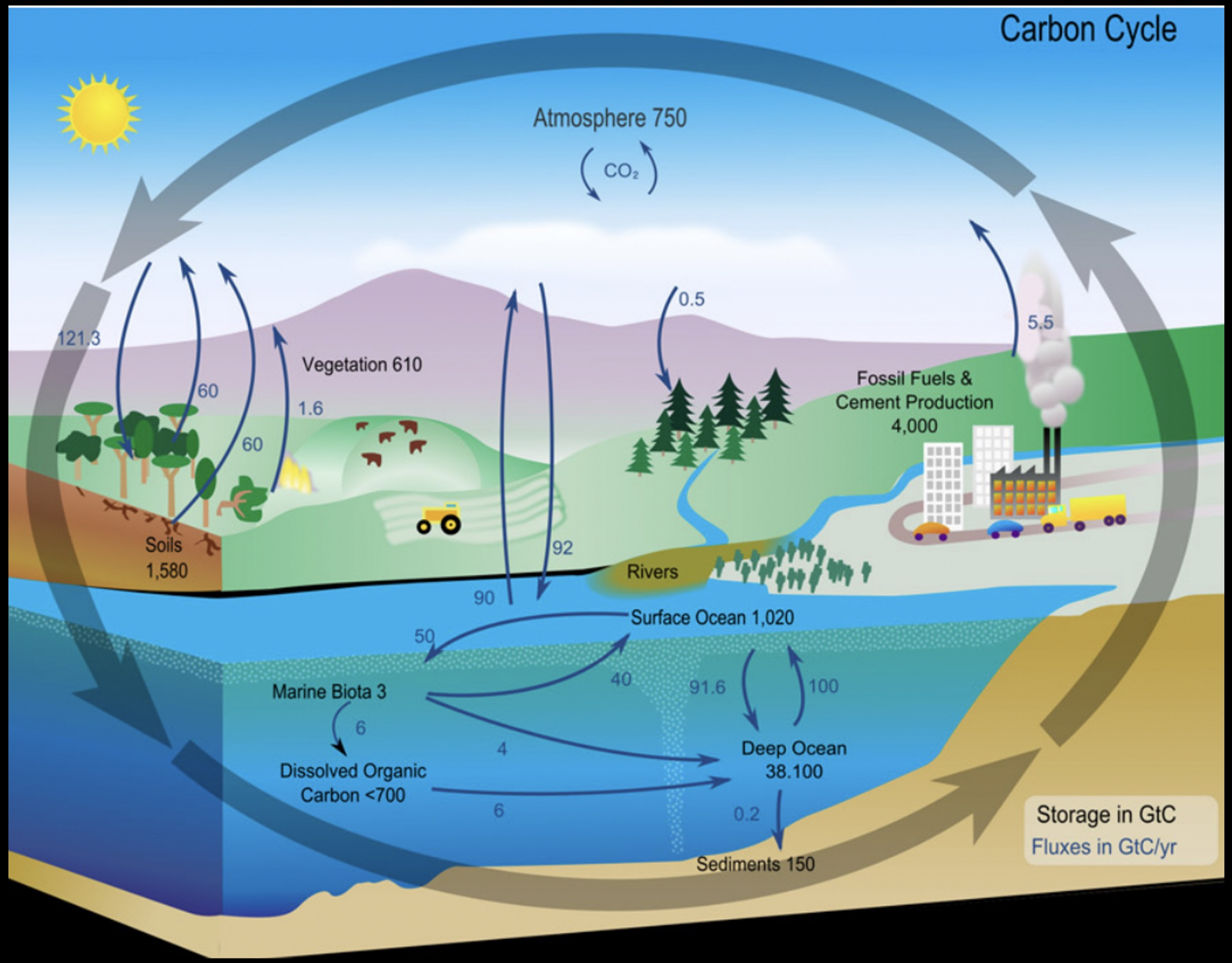


Carbon +Water helps to stabilize nutrient cycles

When there is more carbon in the soil organic matter increases, this increases water holding capacity and retention, these then in turn increase the Cation Exchange Capacity which stabilizes nutrients.

CEC is the soil's ability to maintain and release nutrients to the plant.

The Carbon Cycle

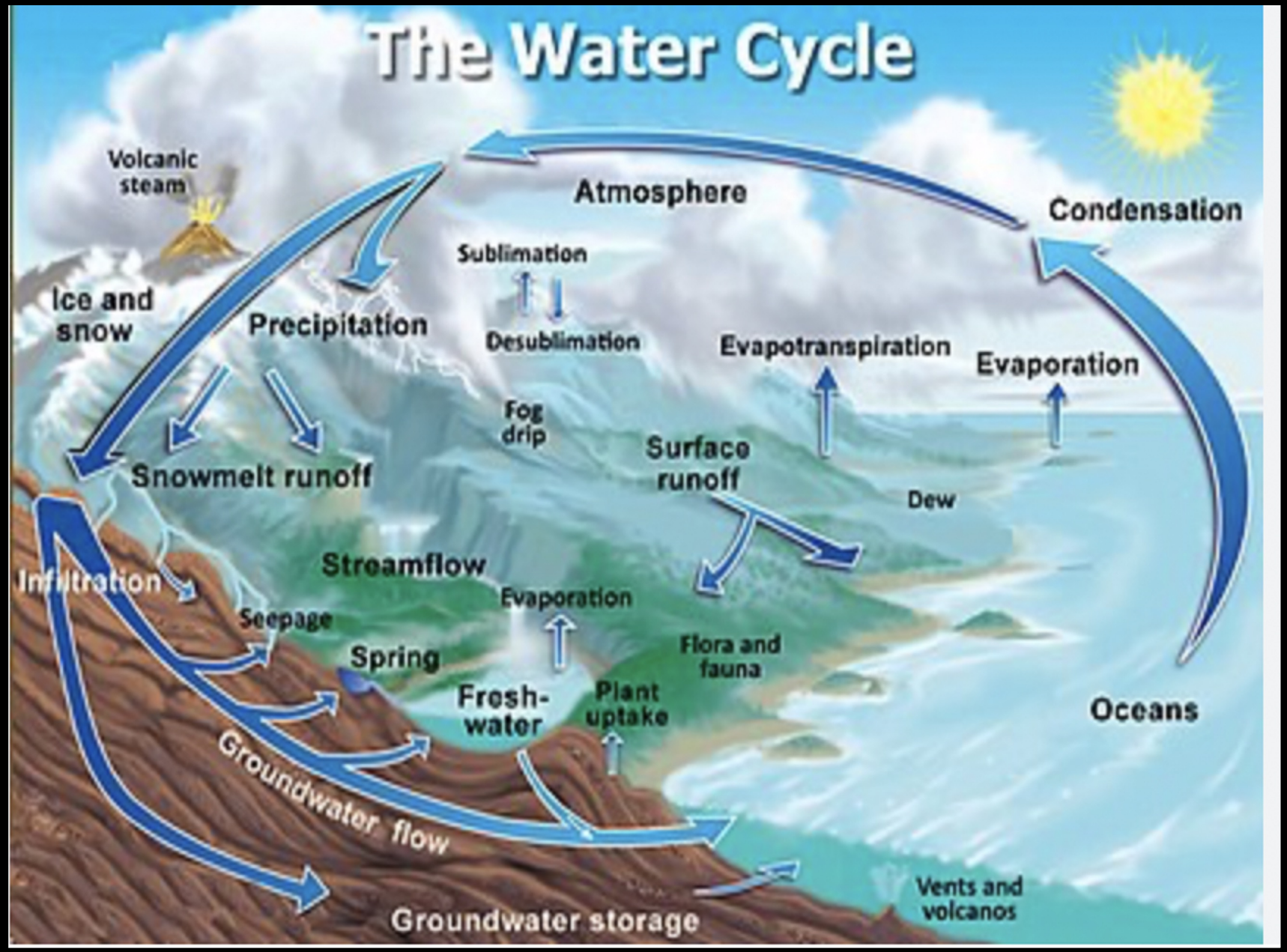



9,795 GT C

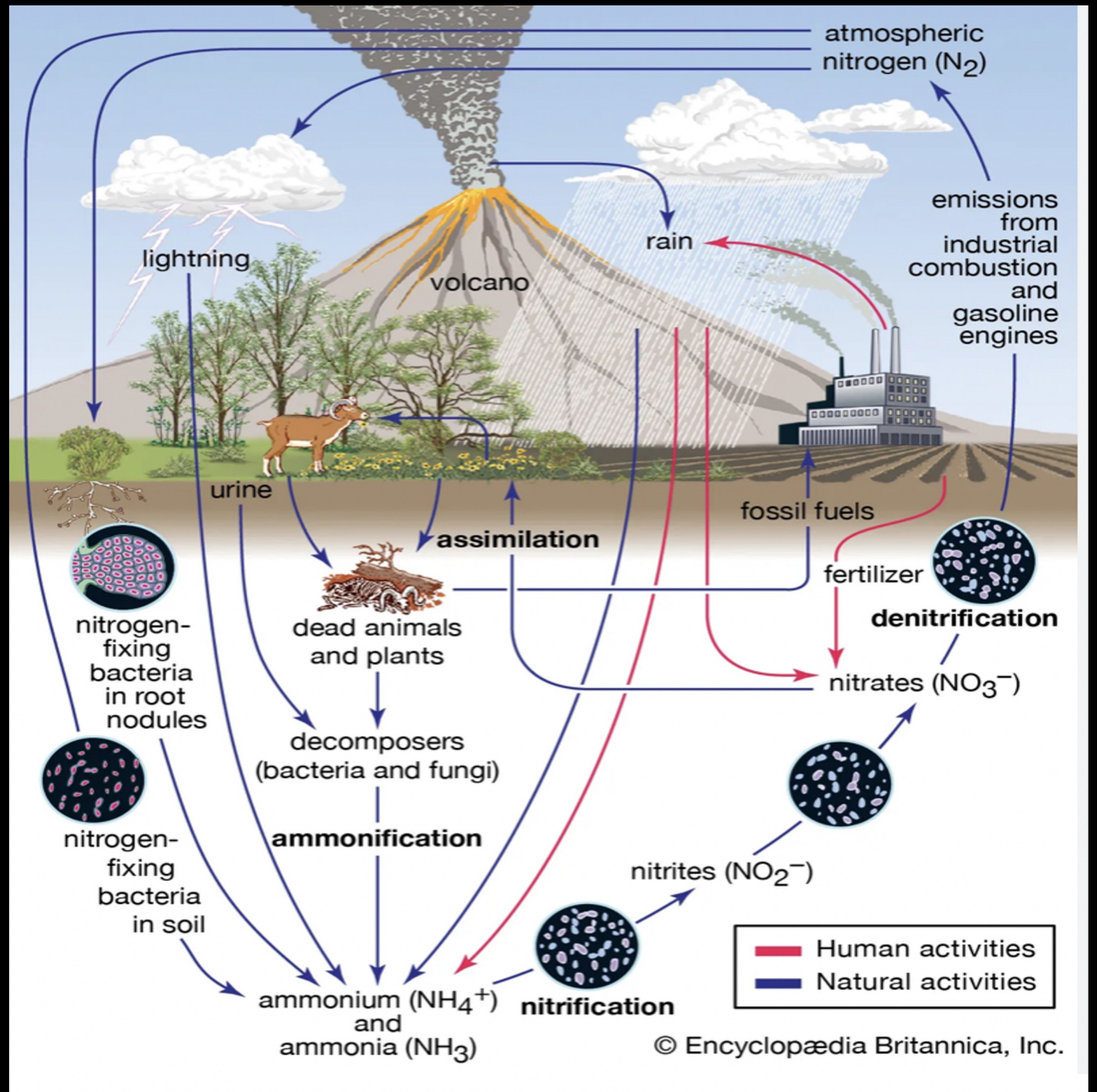

2,546.7 GT C
2,938.5 GT C


= 44%
LEFT IN ATMOSPHERE

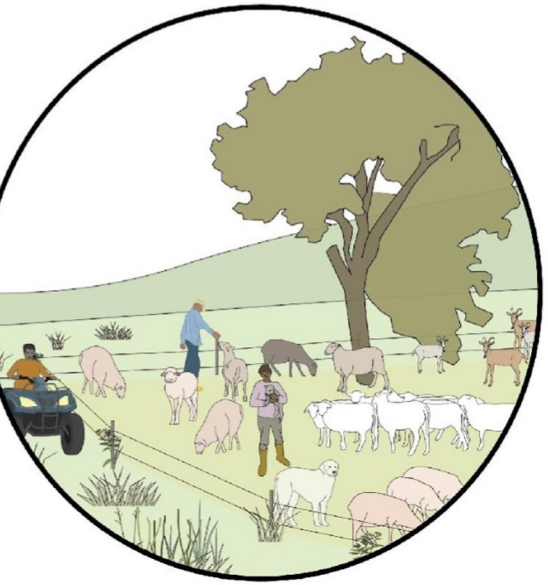
The Water Cycle



The Nitrogen Cycle



The largest way we manage these cycles is through how we tend the land and recycle organic materials!




“AGRICULTURE IS THE BUSINESS OF MOVING CARBON BETWEEN CARBON POOLS TO PRODUCE FOOD, FUEL, FIBER, AND FLORA”
–JOHN WICK

A quick aside on nutrients…

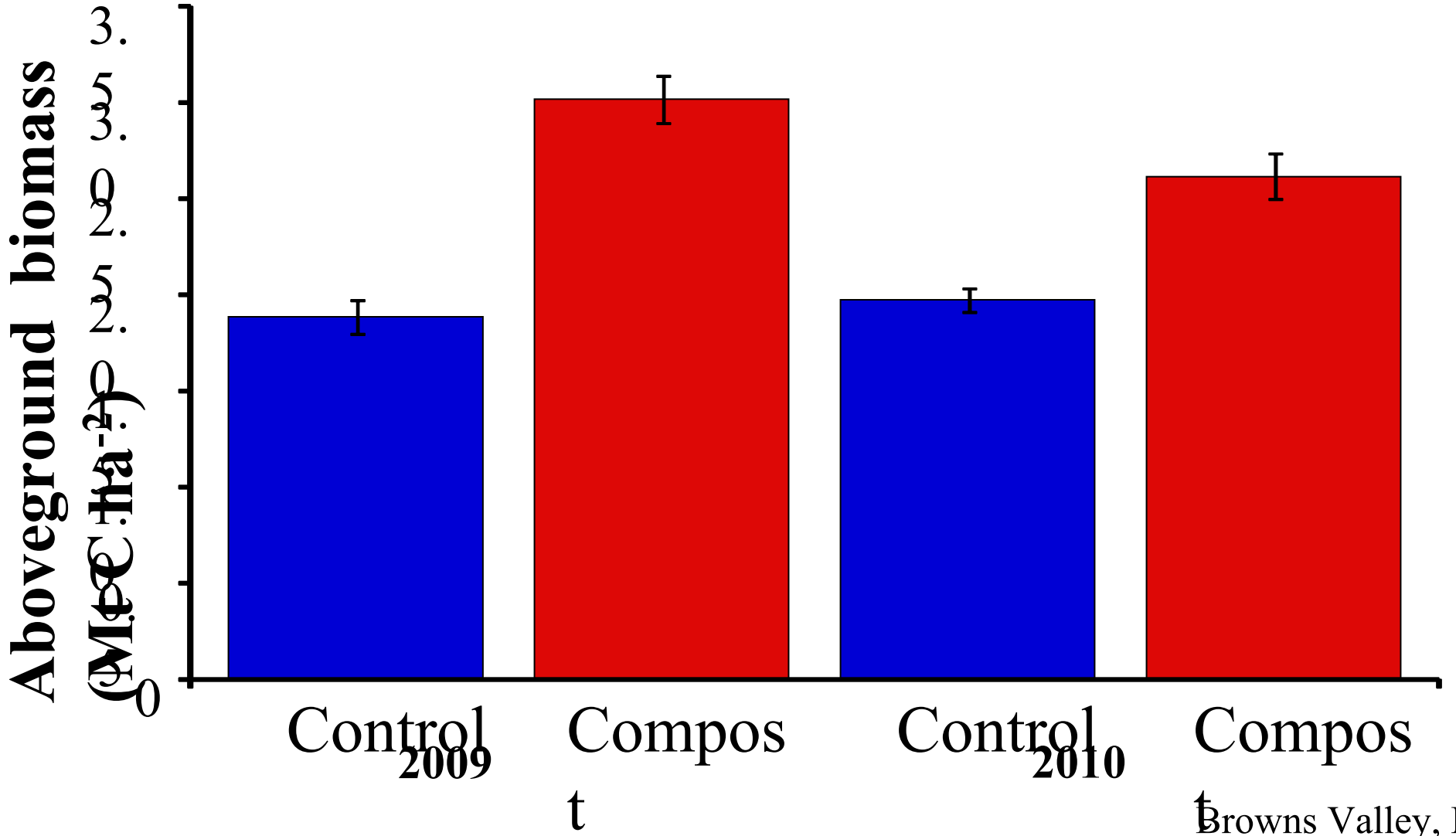
Agriculture uses over 25,000 kilotons of “P” phosphorus and 107.7 megatons of “N” nitrogen per year.

80% of these are lost in application

The Marin Carbon Project

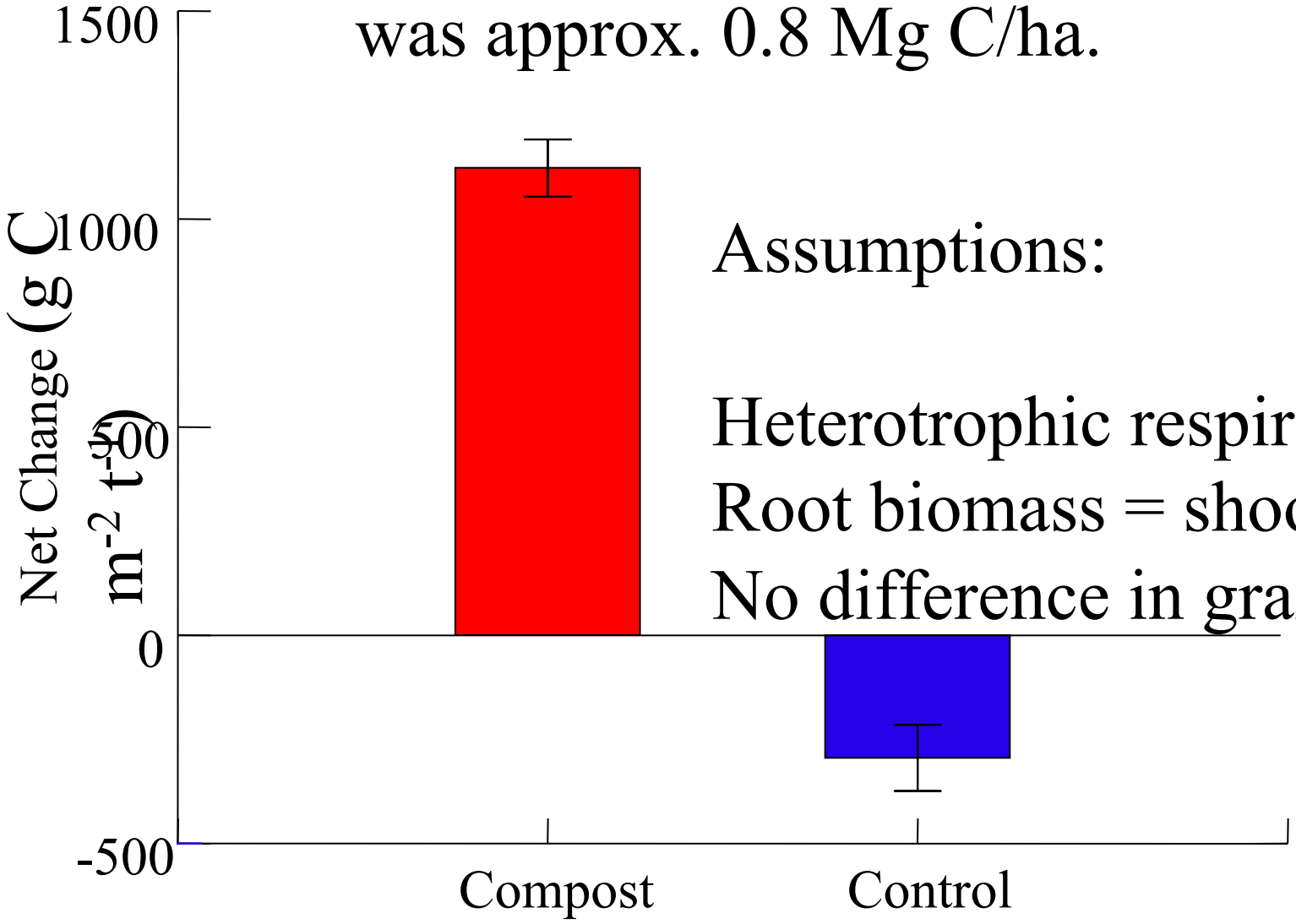
Can we increase durable soil carbon with a topical application of a compost?

Compost significantly increased plant and forage production



Browns Valley, Ryals and Silver in

Organic amendments increased total system carbon by over 10 Mg C/ha in year 1; net gain, beyond compost additions was approx. 0.8 Mg C/ha.



Assumptions:

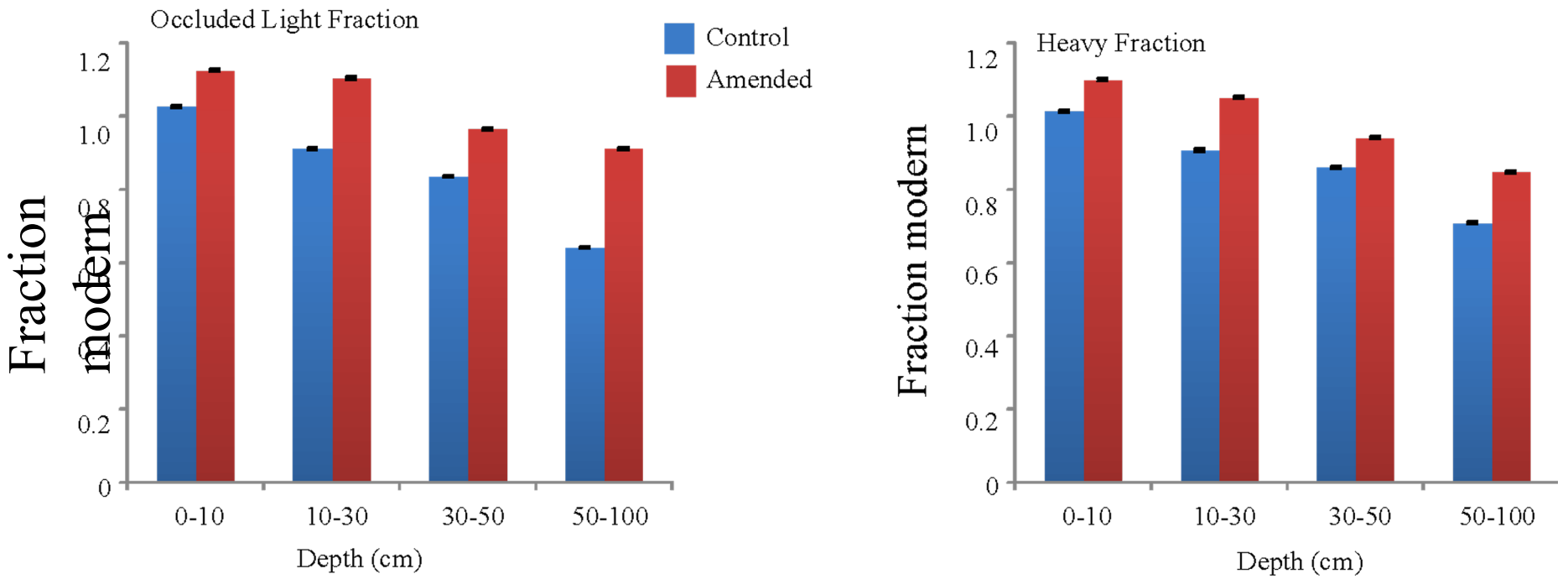
Heterotrophic respiration = 50% of total

Root biomass = shoot biomass

No difference in grazed biomass

Nicasio, Ryals and Silver in

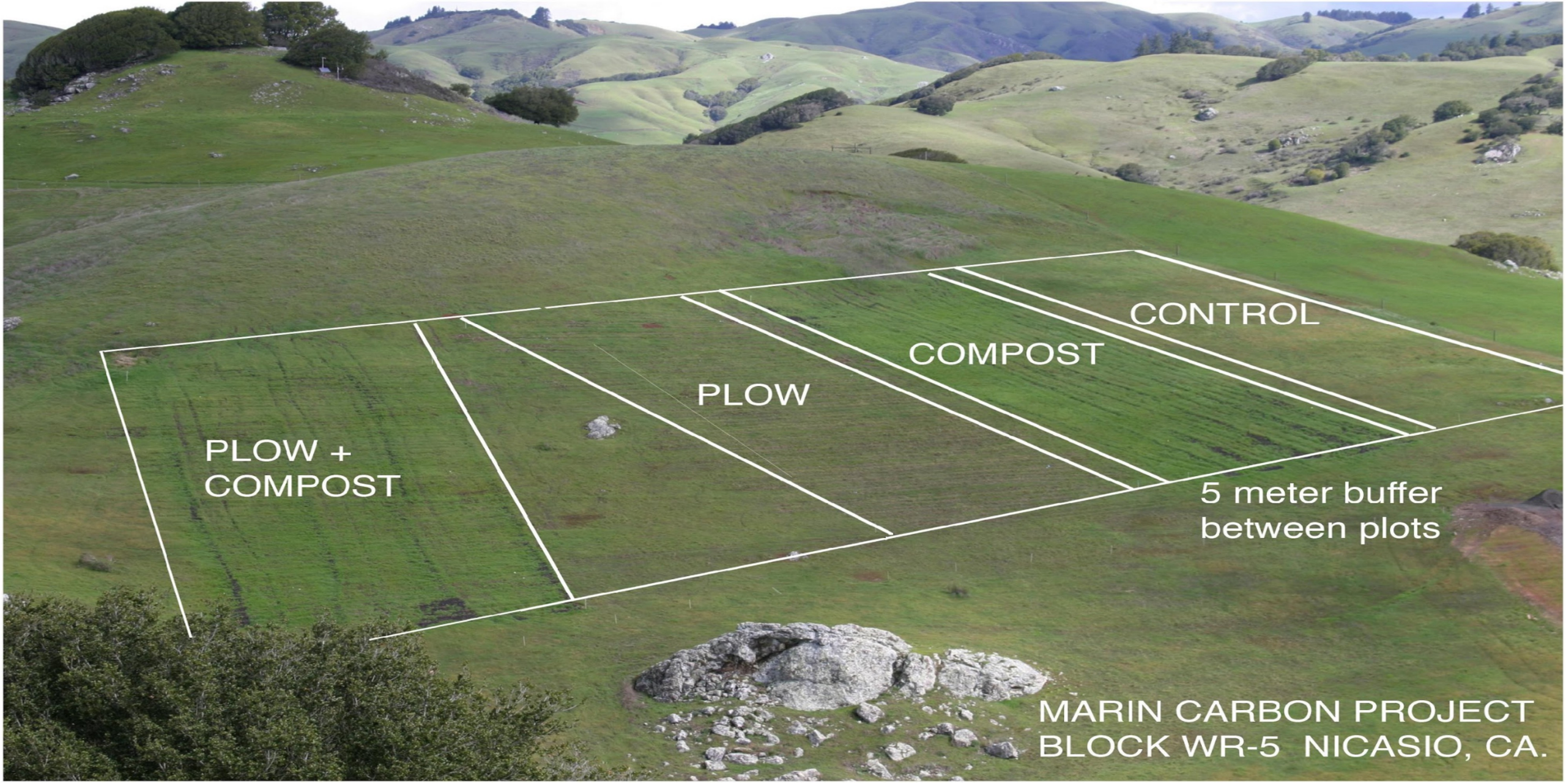
Soil C from amendments can be stored in soil C pools with long turnover times



OLF: decades to centuries
HF: centuries to millennia

Analysis of ^{14}C in soil carbon fractions

Silver


CONTROL
COMPOST
PLOW
PLOW +
COMPOST
5 meter buffer
between plots
MARIN CARBON PROJECT
BLOCK WR-5 NICASIO, CA.

Can Dirt Save the Earth?

Agriculture could pull carbon out of the air and into the soil — but it would mean a whole new way of thinking about how to tend the land.

By MOISES VELASQUEZ-MANOFF APRIL 18, 2018

Can Compost be the Centerpiece of a New, Place Based, Human Centered, Climate Beneficial Economies?

What would need to be done to make that potential real?