

Farmers of the Sugar River Watershed

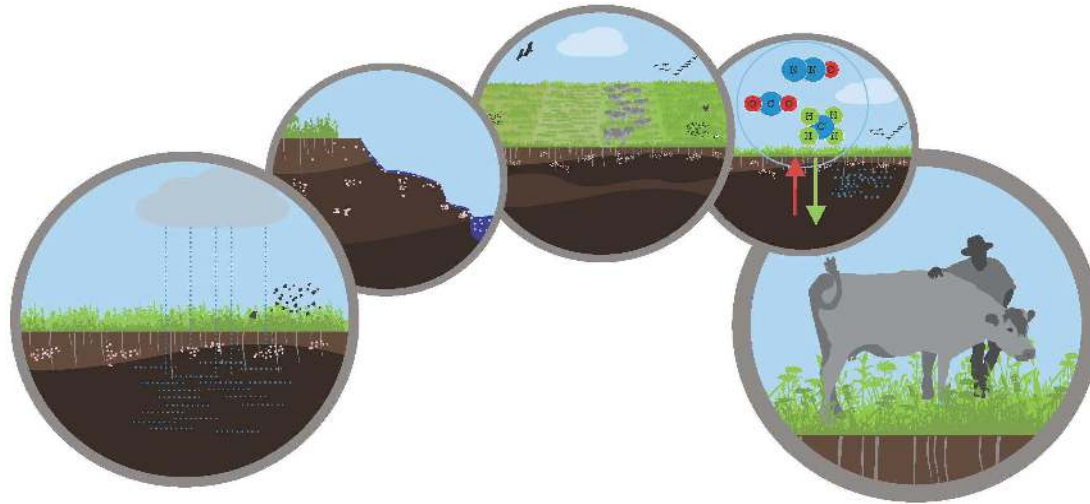
Isn't healthy soil your most valuable crop?

Steven I. Apfelbaum
steve@aeinstitute.org
Brodhead, WI

“Carbon rich soil is healthy soil, beneficial for the entire ecosystem”

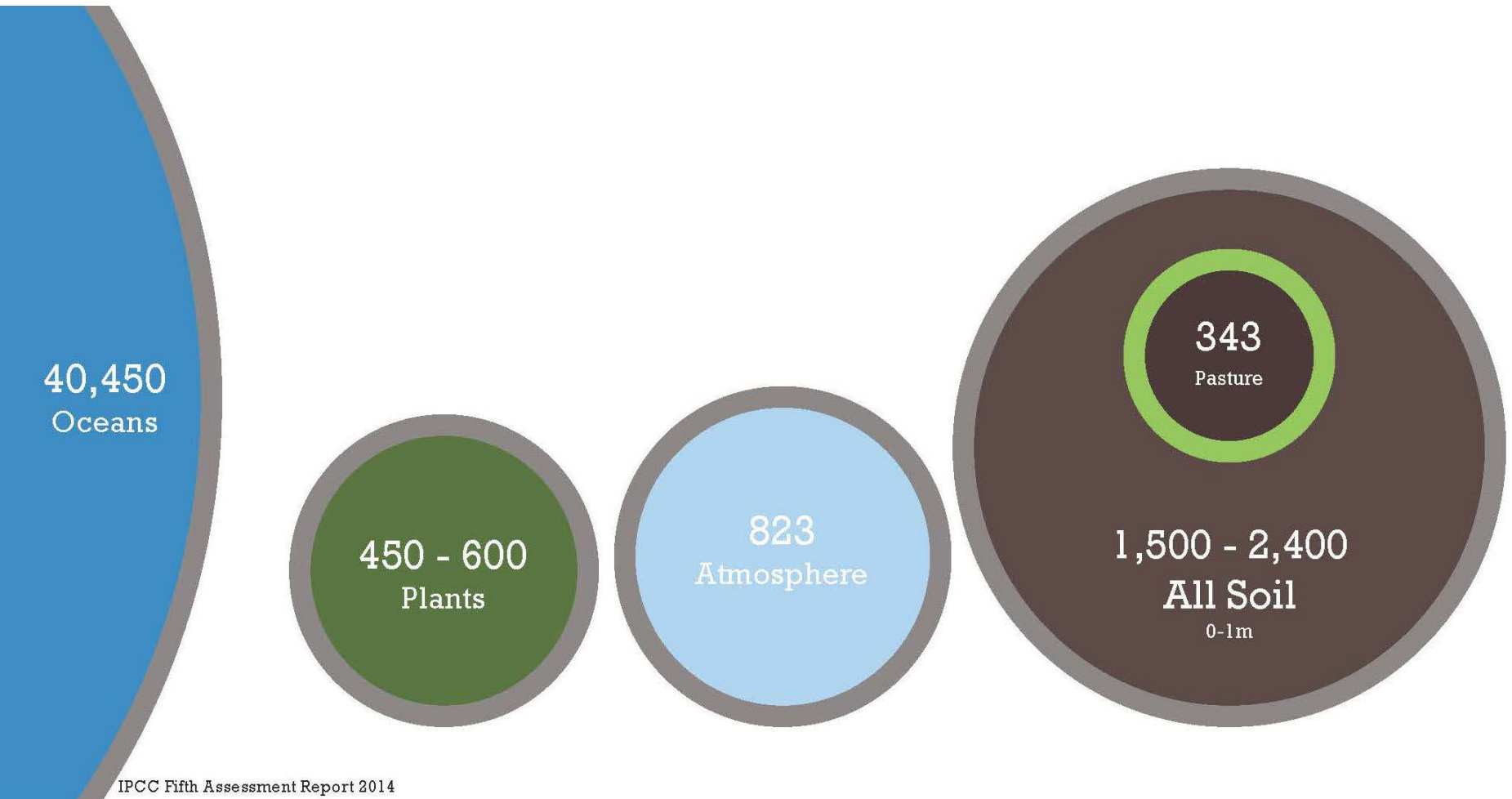
Healthy soil is created in ecosystems by plants:

- Drawing down CO₂ rebuilding soil organic matter, resulting in;
- Improved water infiltration;
- Increased biodiversity of fungi, microbes, plants, insects, wildlife;
- Reduced soil erosion; and,
- **Improved livestock and farmer/rancher well-being.**



Global Carbon Stocks

~**Farmers and Ranchers Manage** ~11 billion acres of cropped and pastured land on earth.



Healthy Soil Can Save \$ and Generate New Revenues



Livestock
\$\$

Crops
\$\$

New Revenues From Improved Soil Health

Washington State Study of Low Disturbance Cropping---

No-till with 2-5% soil disruption, 80-90% crop residue retention.

**Soil
Carbon
Storage**
\$\$\$



WI opportunities for farmers to become involved in at least three new markets:

How--Reduced tillage, cover crops, crop residue mgmt, STRIPS, perennial cropping, etc.

**Soil
Carbon
Storage**
\$\$\$



**Nutrient
Storage** \$\$\$



**Soil Water
Storage** \$\$\$



Adaptive Multi-Paddock (AMP) Grazing Study on 50,000 acres. Ranchers received \$1.6 million in carbon payments.

AMP Grazing is:

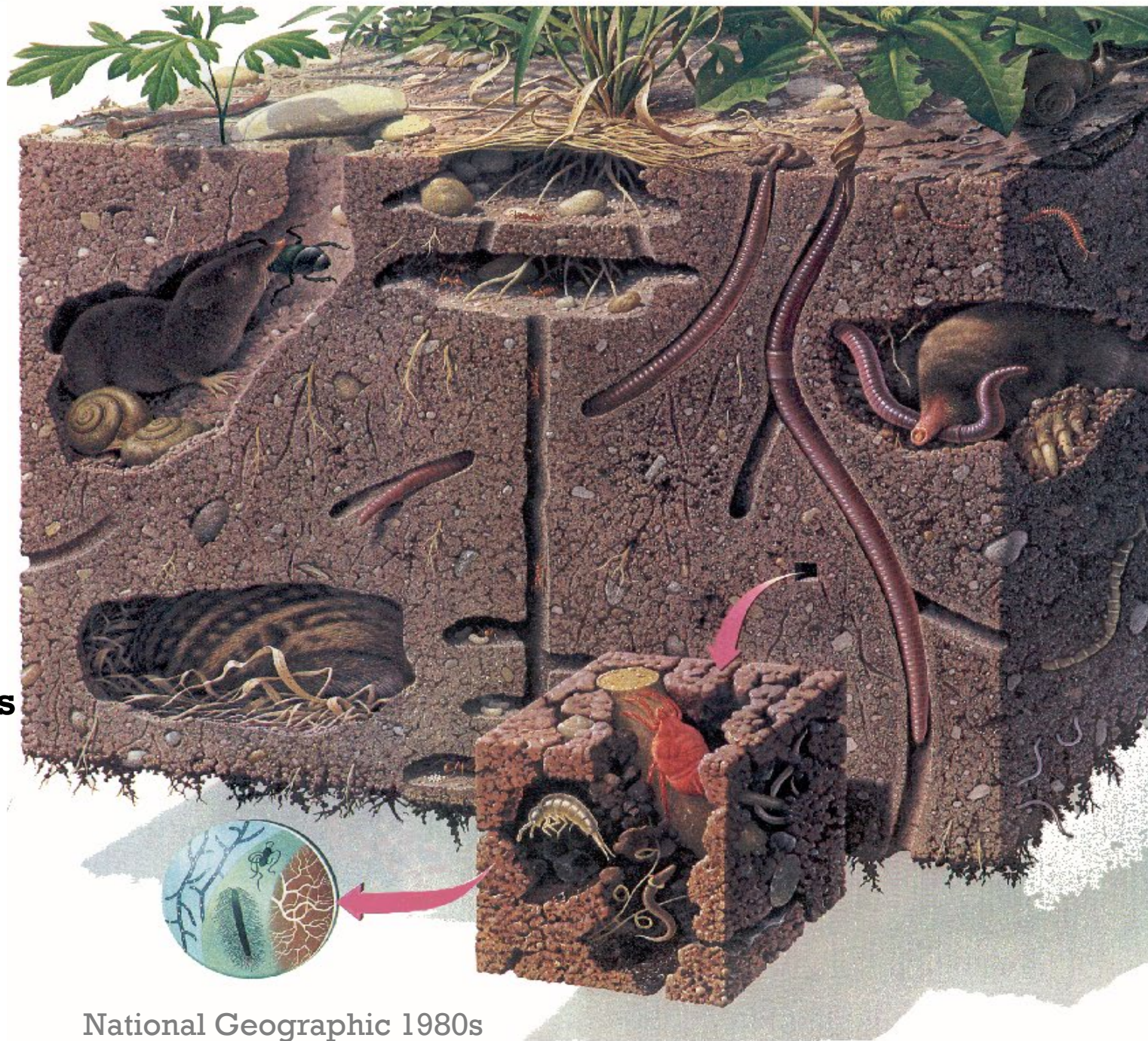
- High Animal Mass
- Very fast graze
- Long rest/recovery



**90% of Soil
function is
mediated by
microbes**

**Microbes
depend on
plants**

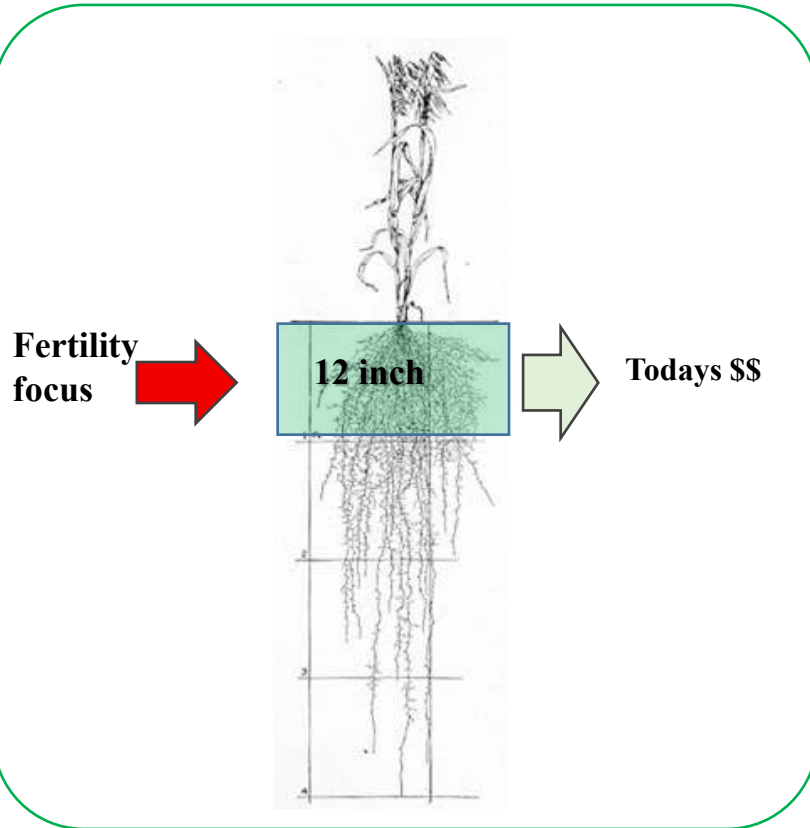
**So how we
manage plants
is critical**



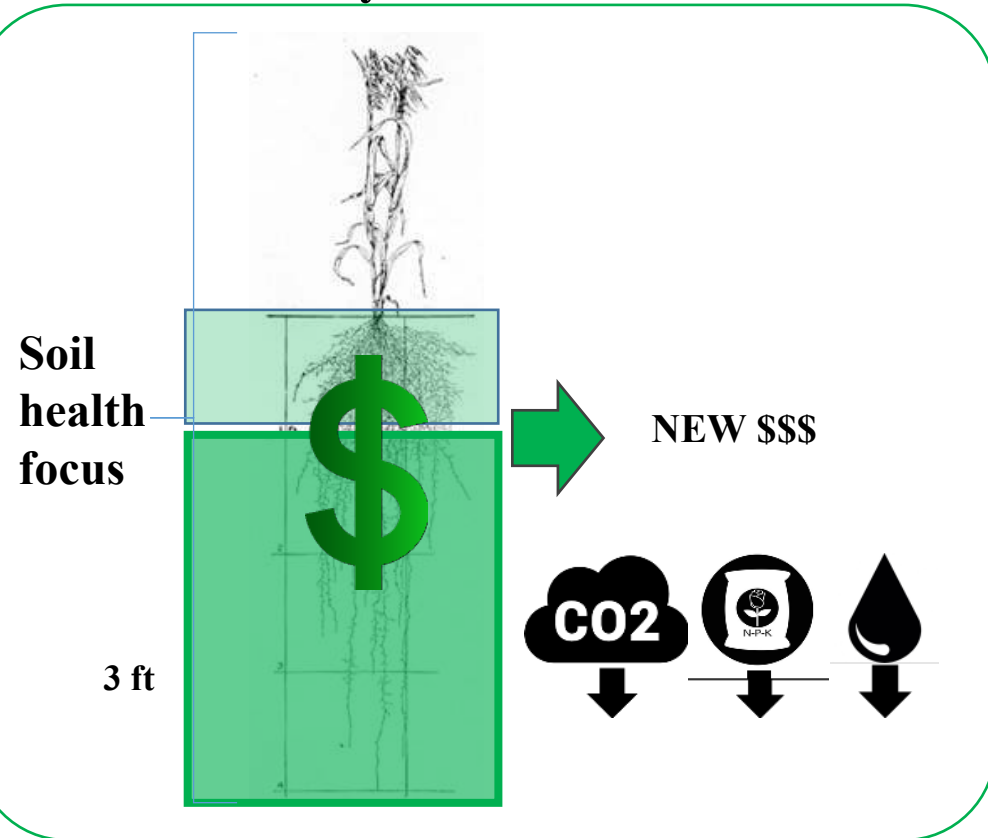
National Geographic 1980s

Heathy soil stores more carbon, nutrients, water, and provides for all life!

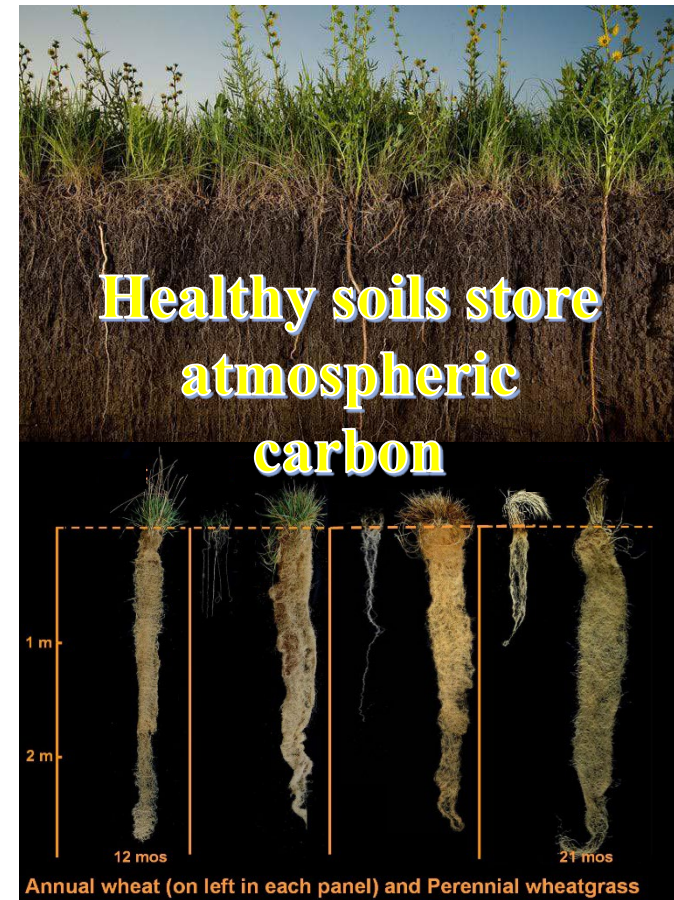
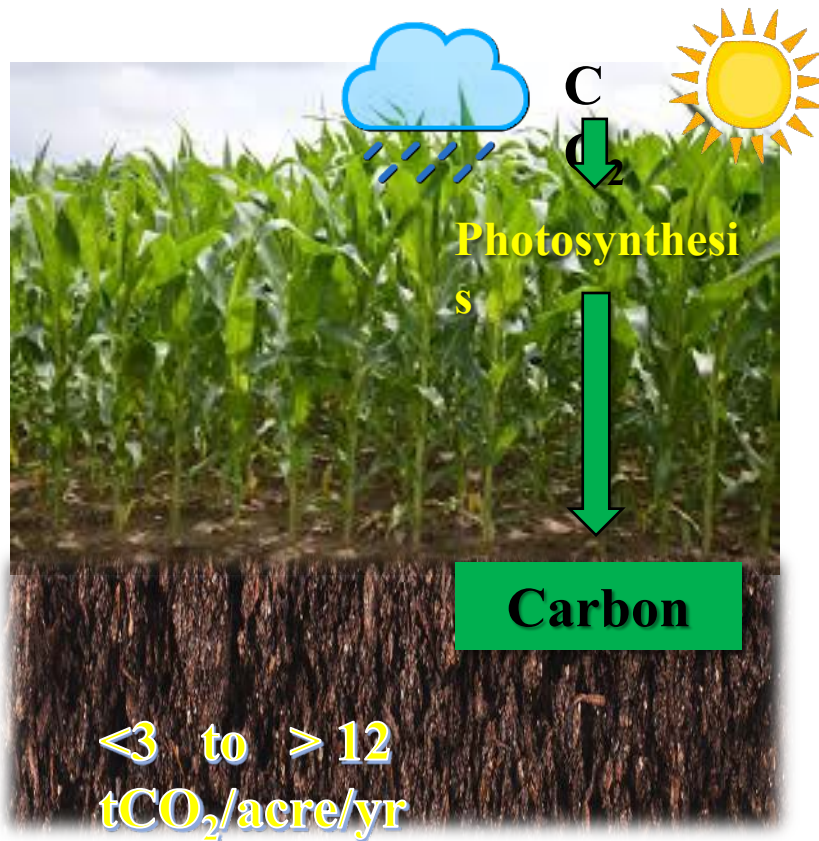
Crop Focus



Healthy Soil Focus



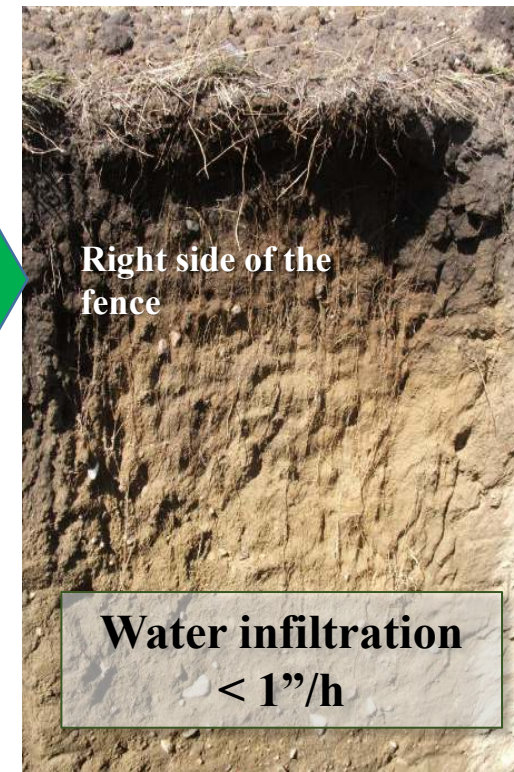
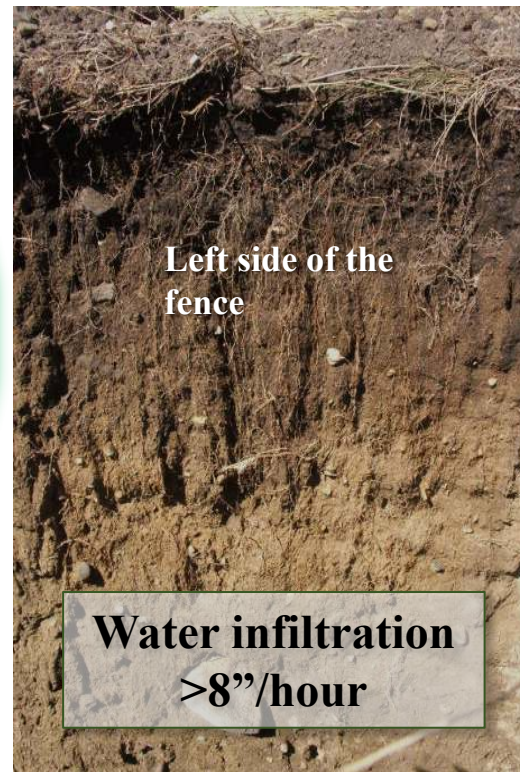
Deeper roots contribute to increased soil carbon



Healthy soils infiltrate and store more water!

AMP Grazing

Continuous Grazing



Water storage in soils is very valuable!



Cities are beginning to pay farmers to store water!

Farming/Grazing for Soil Health

Benefits Soil Carbon (and so much more)!

AMP Grazing improves:

Water Cycle

Mineral Cycle

Productivity



Can generate 2-5 carbon credits/ac/yr.

Farming and Grazing for Soil Health Also Benefits other life!



Such as grassland birds.

What we learned with LDC cropping and AMP Grazing

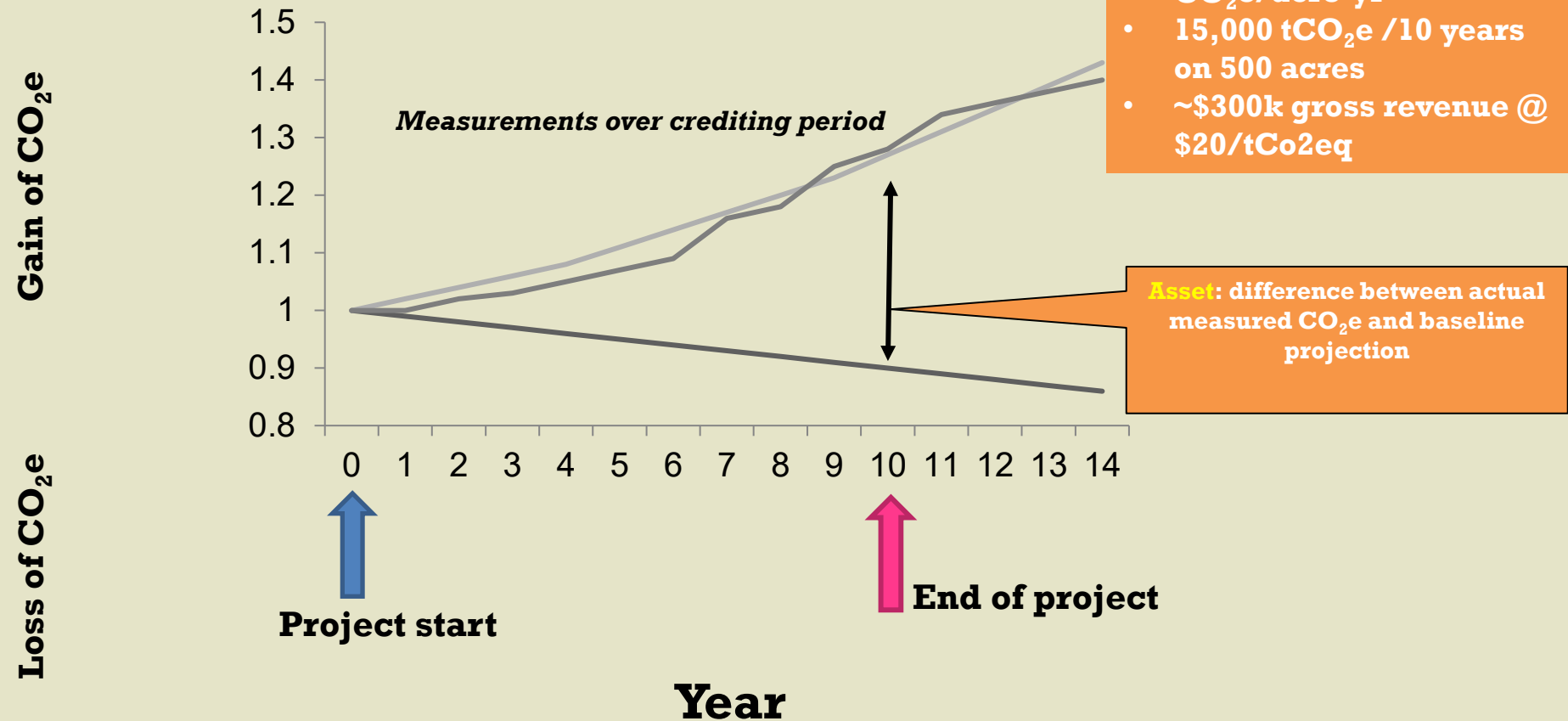
- More **Soil Carbon**,
- More **Water Infiltration**,
- More **soil Nitrogen and Cations w/out fertilizers**,
- More **forage and higher nutrition**,
- More **Birds**,
- More **soil microbes**,
- More **Soil fungi**, beneficial insects (e.g. pollinators)
- **Less GHG's!!!**

Less Cost & More \$\$\$.

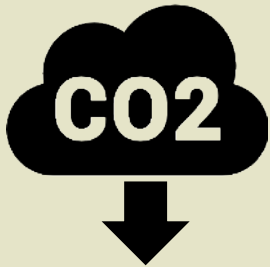
Can Farmers/Ranchers Benefit?

New Revenue

Carbon and GHG balance, Tons of CO₂e



Soil health and improved storage capacity can generate \$\$\$



Carbon Storage value

Healthy soils capture and store atmospheric CO₂

Bought by Companies to offset greenhouse gas emissions

\$20 to more than \$100

\$/acre/yr



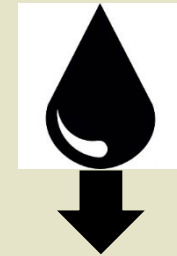
Nutrient Storage Value

Healthy soils and crops reduce nutrient runoff

Bought by water cleansing agencies, companies who pay for lower nutrient runoff

\$80 to more than \$400

\$/acre/yr



Water Storage Value

Healthy soils store water and prevent downstream floods

Water agencies are willing to pay you for flood prevention

\$15,000 to more than \$100,000

\$/acre/yr

Carbon rich soils holds nutrients, moisture, and supports higher crop yields

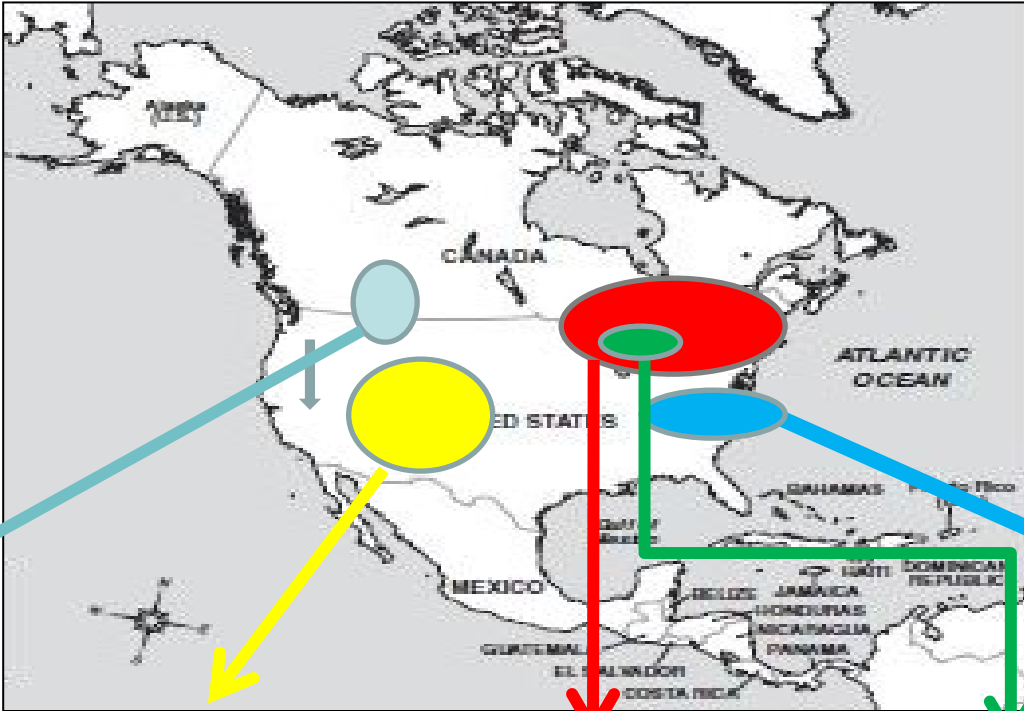
THANK YOU!

Steve Apfelbaum, Ecologist
steve@aeinstitute.org



Applied
Ecological
Institute

Soil Carbon Durability (Years)



Semi-arid: Palouse

Soil Depth	Average Carbon Age (yrs)
.1 m	30-60
1m	47,000
2m	120k-130k
3m	>200k

Retallack, 2013

Arid West, New Mexico

Soil Depth	Average Carbon Age (yrs)
.1 m	100-200
.2 m	30,000+
>.2-.5 m	3-5 million

Monger, C. NMSU

Wisconsin glacial till plain Uplands

Soil Depth (m)	Average Carbon Age (yrs)
.1	100-200
1-2	1500-12k
>2	>12k

Futuma, UM

Peat

Soil Depth (m)	Average Carbon Age (yrs)
.1	100-200
.1 to 1	1500-12k
>2	>80k

Unglaciatiated

Soil Depth (m)	Average Carbon age (yrs)
.1	100-300
.1 to 1	500-2k
1-2	>30k
>2	>200k

Estimated