

Farming for Ecosystem Resilience in a Changing Climate

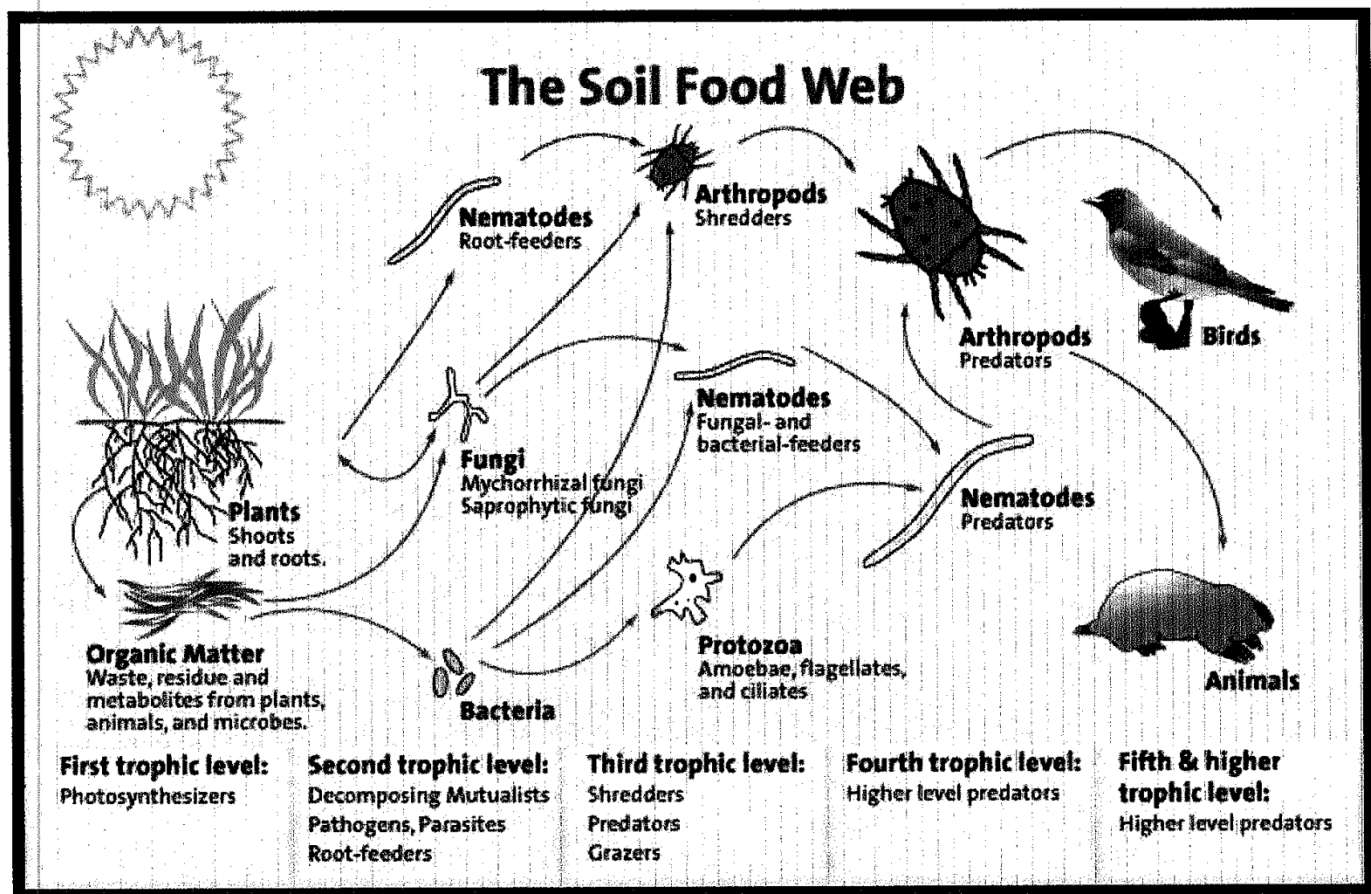
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ECONOMY

Οικος ↔ HOME

Νέμωμαι ↔ MANAGE





**Metabolic Activity of Microbes in the top 15cm. of one acre
of rich soil exceeds the metabolic activity of 50,000 humans**

**Over 75,000 species of bacteria and over 4000 species of fungi can be
found in 1 TSP of healthy soil.**

**Less than 5% of the estimated 1.5 million species
of fungi have been described**

**300 species of protozoa live in the thin film of water that line the pore
space in soil. If the water film that lines the pore space in 2 TBSP. of soil were
spread out flat, it would cover 2400 square meters. 10 billion protozoa live in
the top 15 cm. of a square meter of meadow.**

Australian Fruits and Vegetables

Food Item	Nutrient	1948	1991	% down
Potatoes	Calcium	27mg.	3mg.	89%
Broccoli	Magnesium	160 mg	29mg.	82%
Carrots	Vitamin A	25,000IU	91IU	99.6%
Apples	Vitamin C	25 mg.	5 mg.	80%

Gaining Carbon



Losing Carbon



With intensive tillage, there is no better way to blow carbon dioxide out of the soil and into the air.



**For each % increase in soil humus
water holding capacity per acre
is increased by 18,000 gallons.**

Christine Jones PhD

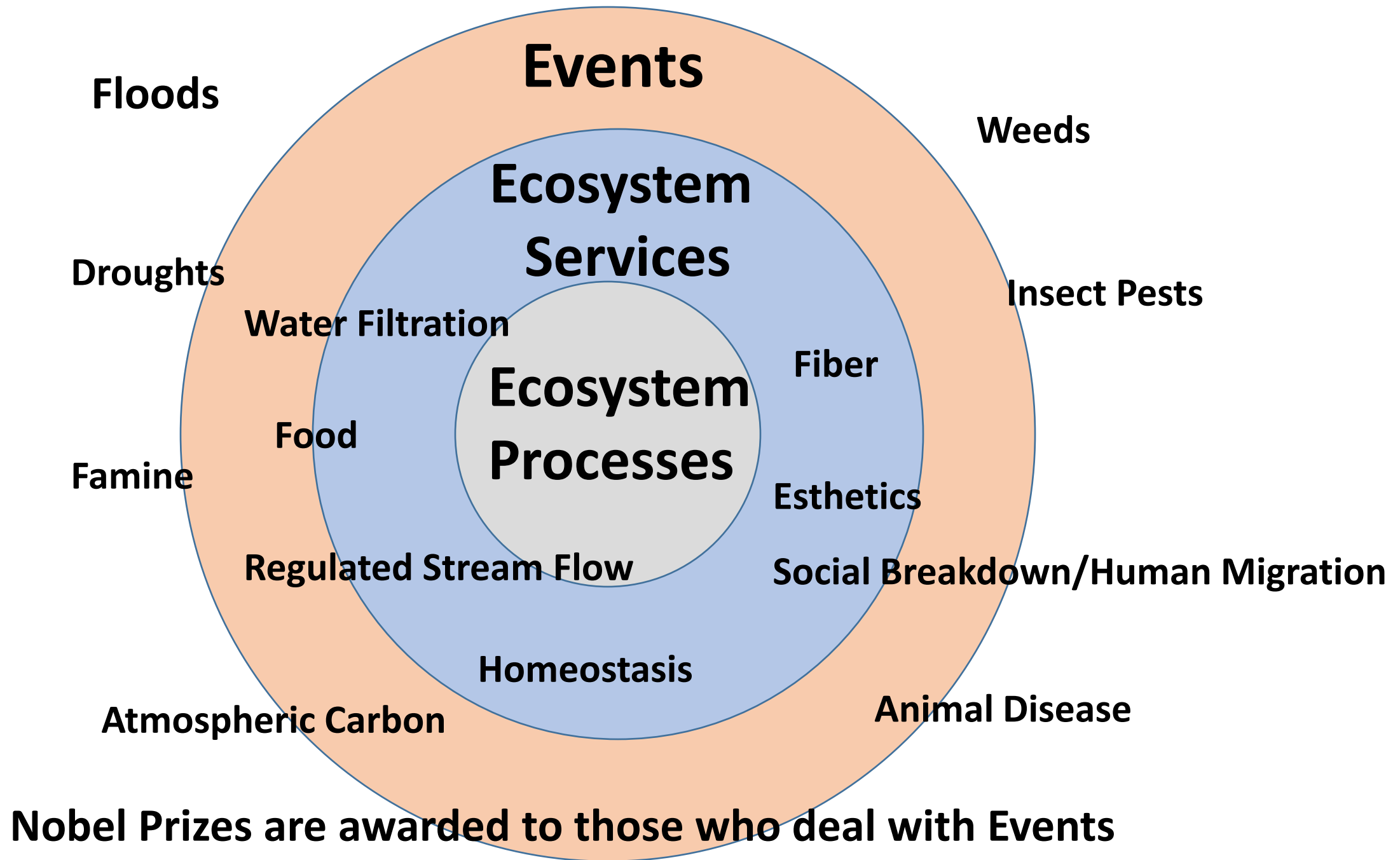




Brown Ranch after 13 inches of rainfall in 24 hr period







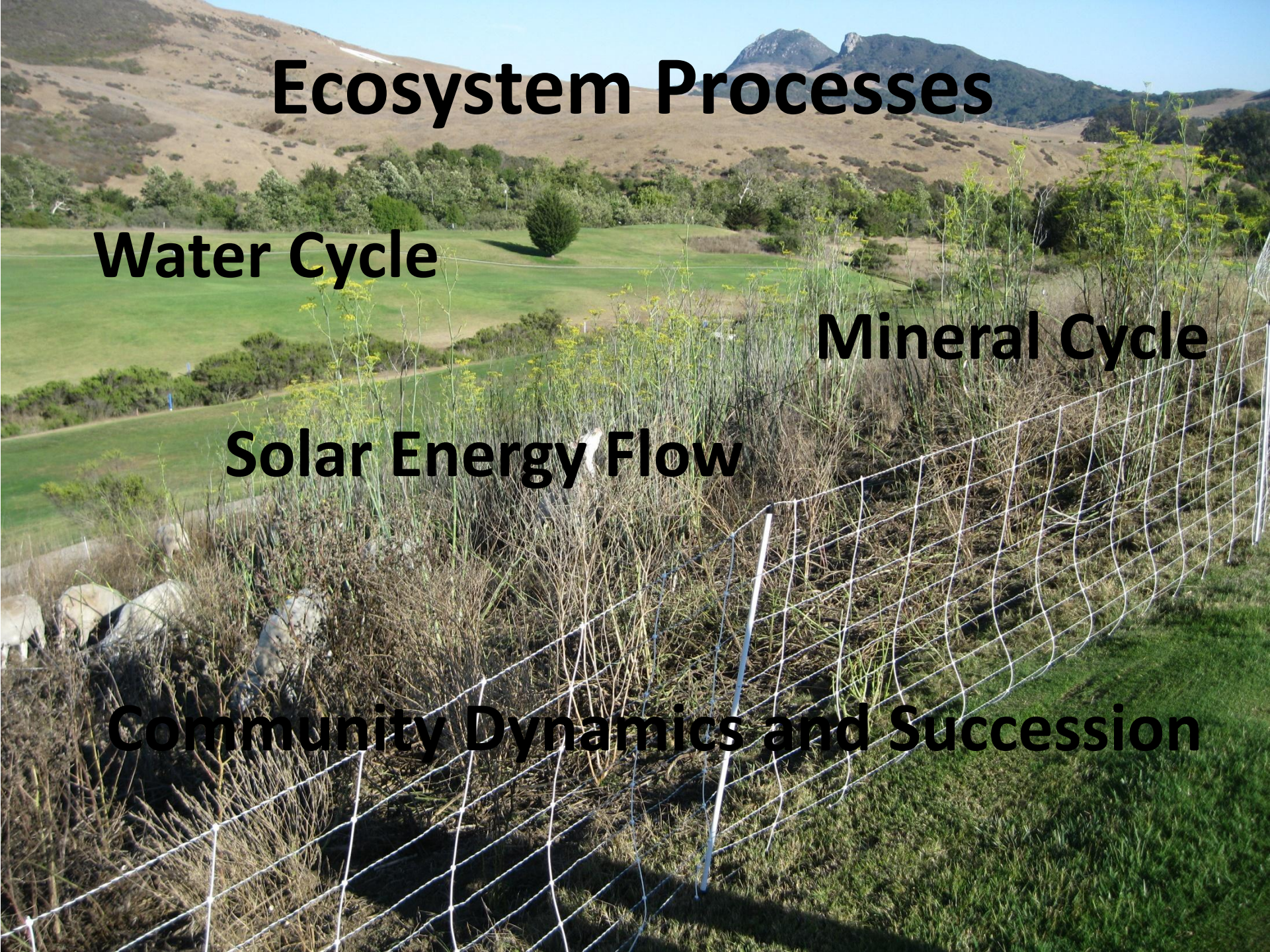
Ecosystem Processes

Water Cycle

Mineral Cycle

Solar Energy Flow

Community Dynamics and Succession



Sunshine Spill



Hunter Gatherer

20 Kcal of Food for each Kcal expended

Slash and Burn Agriculture

10 Kcal of Food for each Kcal expended

Neocaloric era (modern ag)

1 Kcal of food for each 10 Kcal expended

Soil lacking fertility

fertilizer

put more on

Too many insects

insecticides

put more on

Too many pests

pesticides

put more on

Lacking soil moisture

irrigation

put more on

Too many weeds

herbicides

put more on

**“I have hitherto described this earth and generally
the whole visible world
as if it were merely a machine in which there was
nothing at all to consider
except the shapes and motions of its parts”**

**Rene Descartes
Principles of Philosophy, IV
1644**

Systems

Hard

- Made of parts
- Emergent properties predictable
- Unforeseen consequences not unusual
- Non self-replicating
- Non self-organizing
- Problems solved by convergent thinking
- Can be complicated

Soft or Natural

- Made of relationships
- Emergent properties sometimes unexpected
- Continue to function with parts missing – although differently
- Self-replicating
- Self-organizing
- Problems solved by divergent thinking
- Are complex

“The reality is that the division of knowledge into feudal fiefdoms of expertise has made general understanding and coordinated action not simply impossible but despised and distrusted”

John Ralston Saul

**What does this
mean for farmers
facing climate
change?**

It Depends upon Economy
And Ecosystem Processes



Questions?