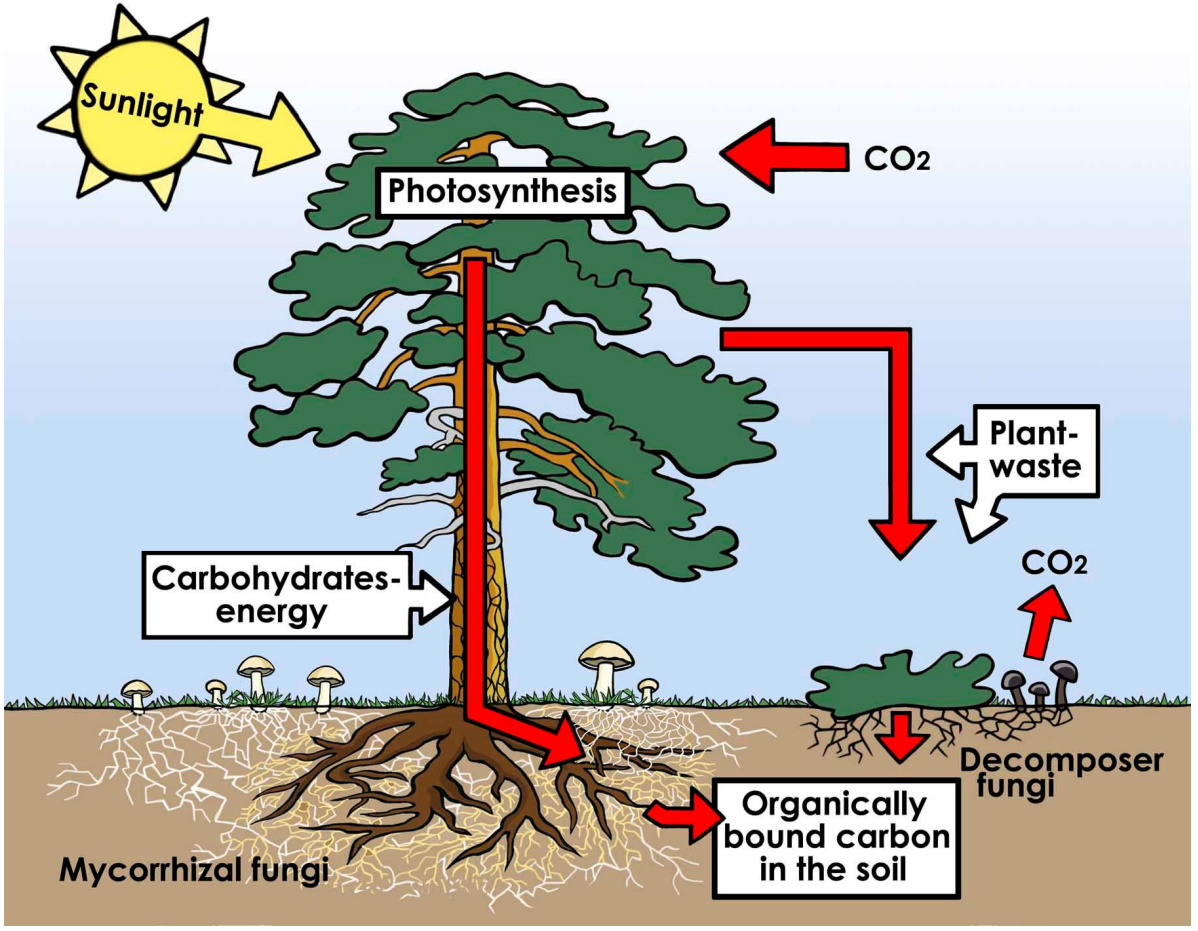
Introduction to Natural Systems

Understanding carbon is a big part of the solution to climate change

Carbon and plants



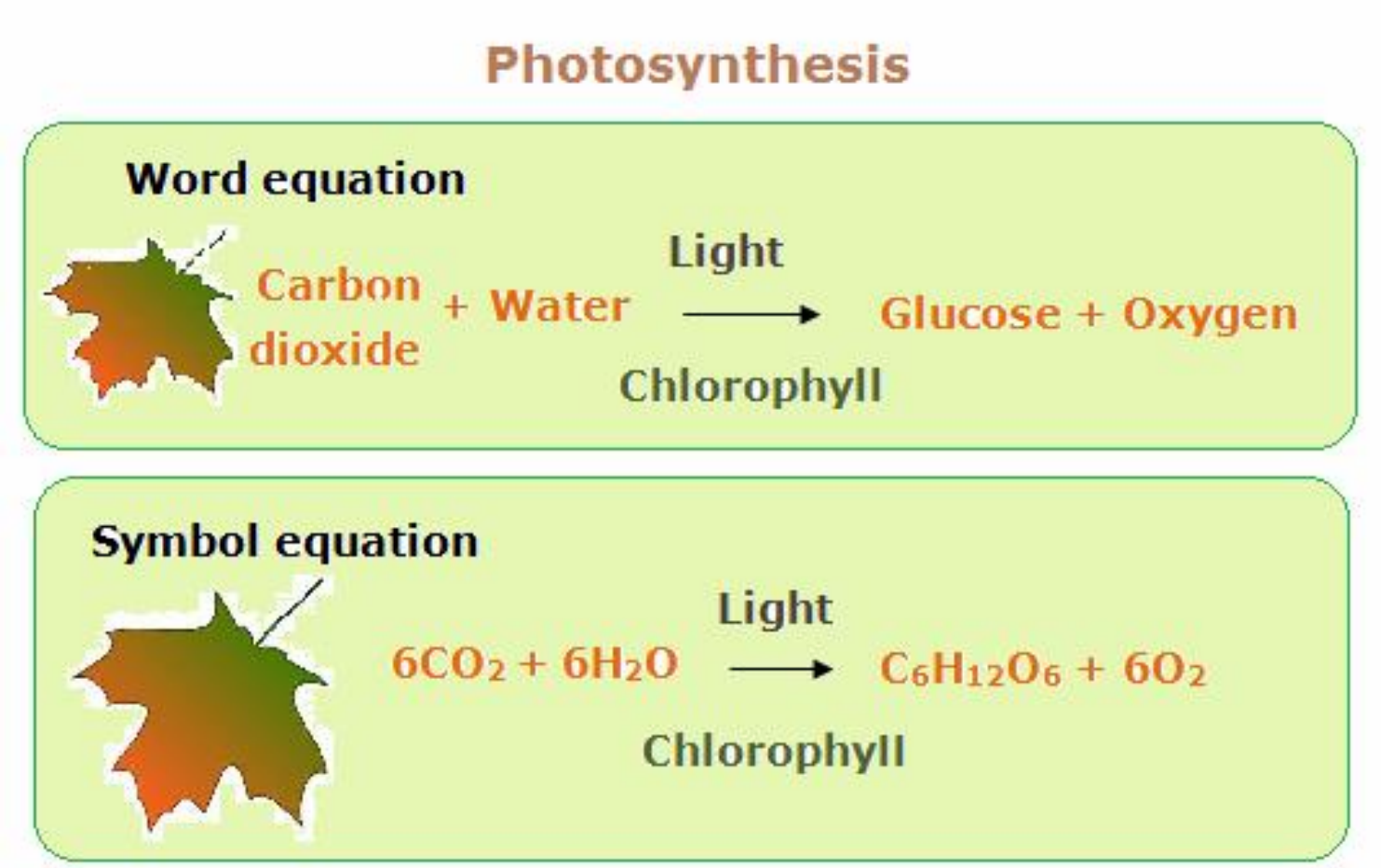
Photosynthesis

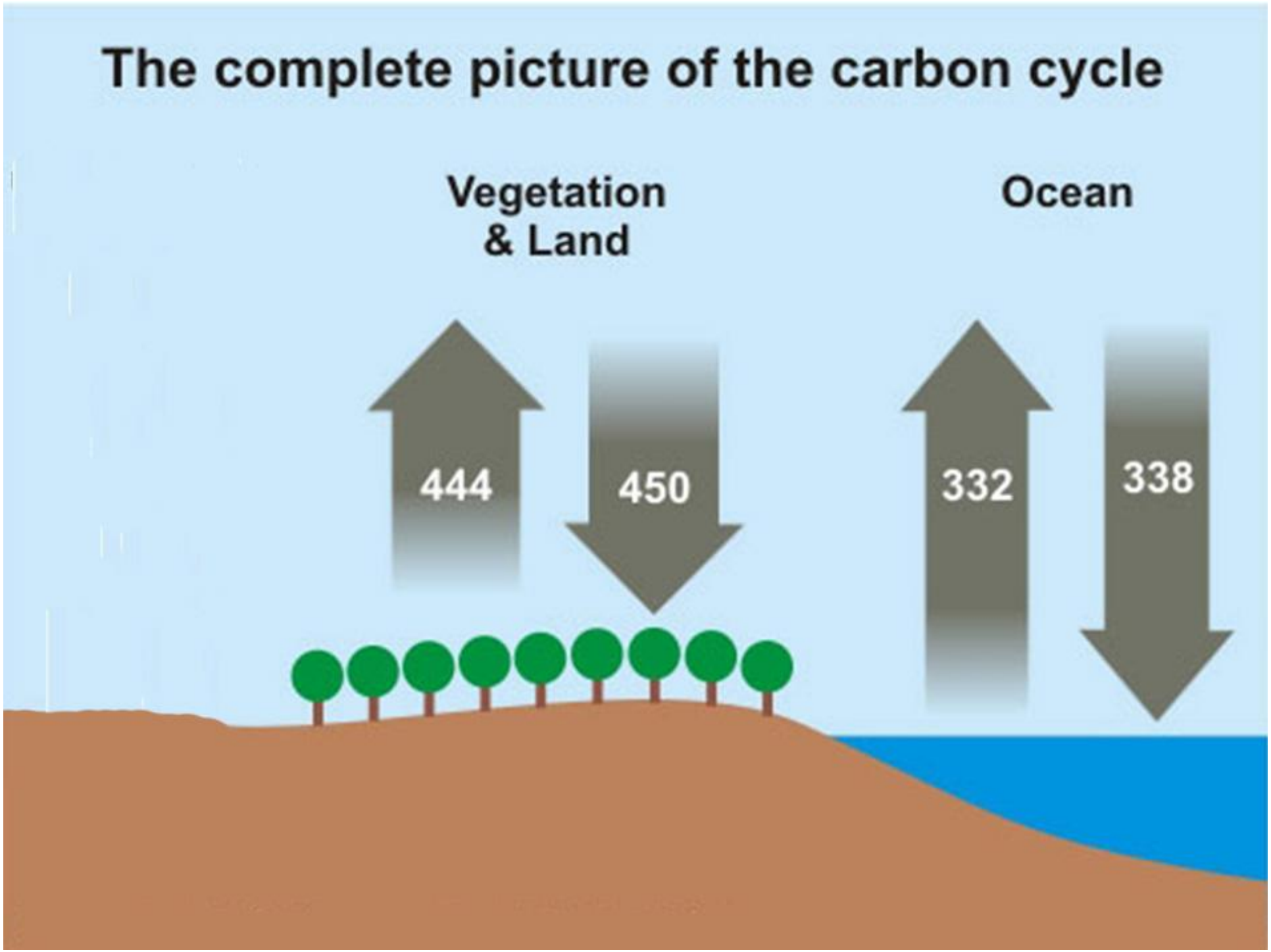
- Water + Carbon dioxide + energy from sun = sugars and carbohydrates

Plants also draw nutrients for structure and health from the soil by exchange sugars with soil microbes

$$H_20 + CO_2 + \text{Energy} \blacktriangleright \text{Sugar} + H_20 + O_2$$

Photosynthesis



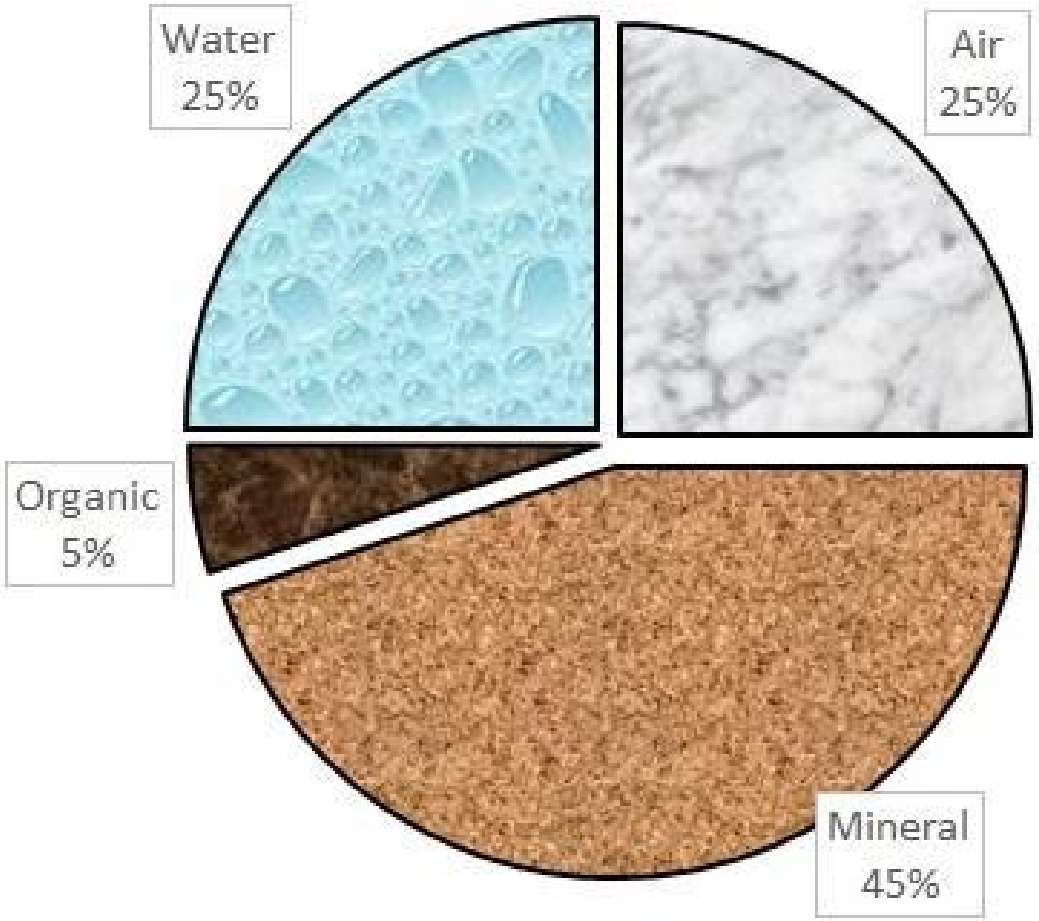

The complete picture of the carbon cycle
Vegetation & Land
Ocean
444
450
332
338

Millions of years of carbon

What is Soil

- Naturally occurring, loose material at the surface of the Earth
- Supports plant and animal life
- Composed of: solid, liquid and gas

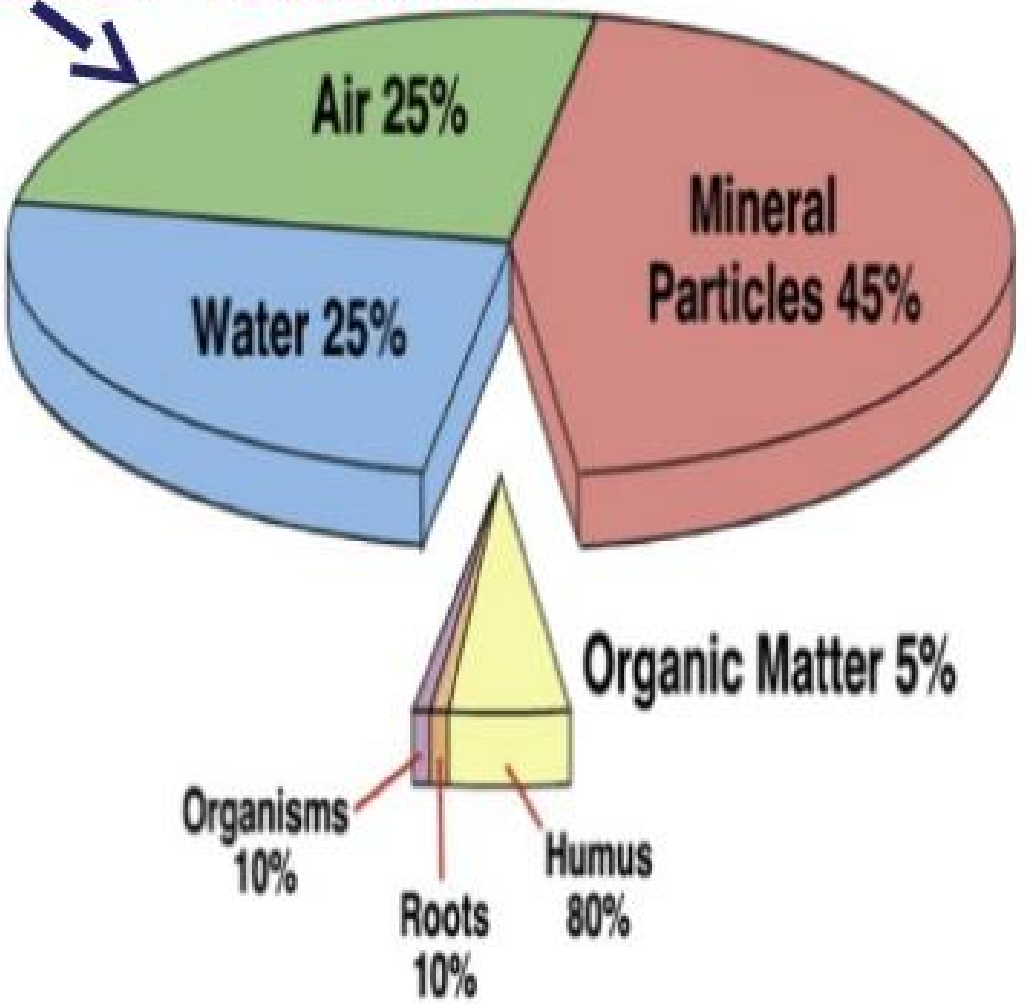
Soil make up



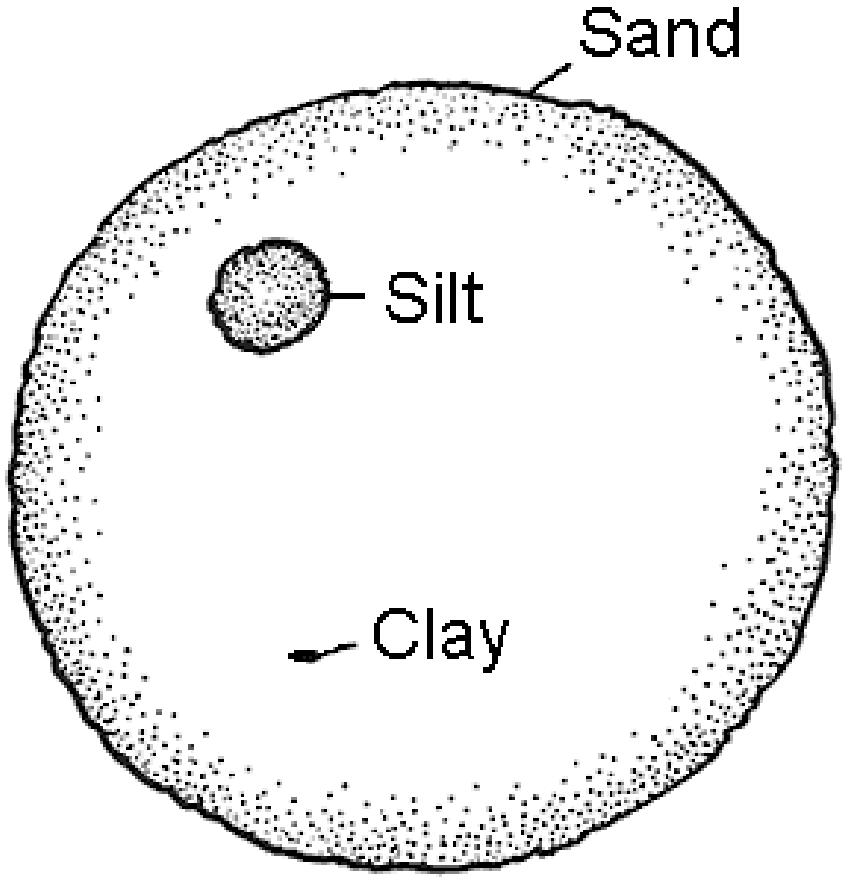
Ideal

What Is Soil Made Of?

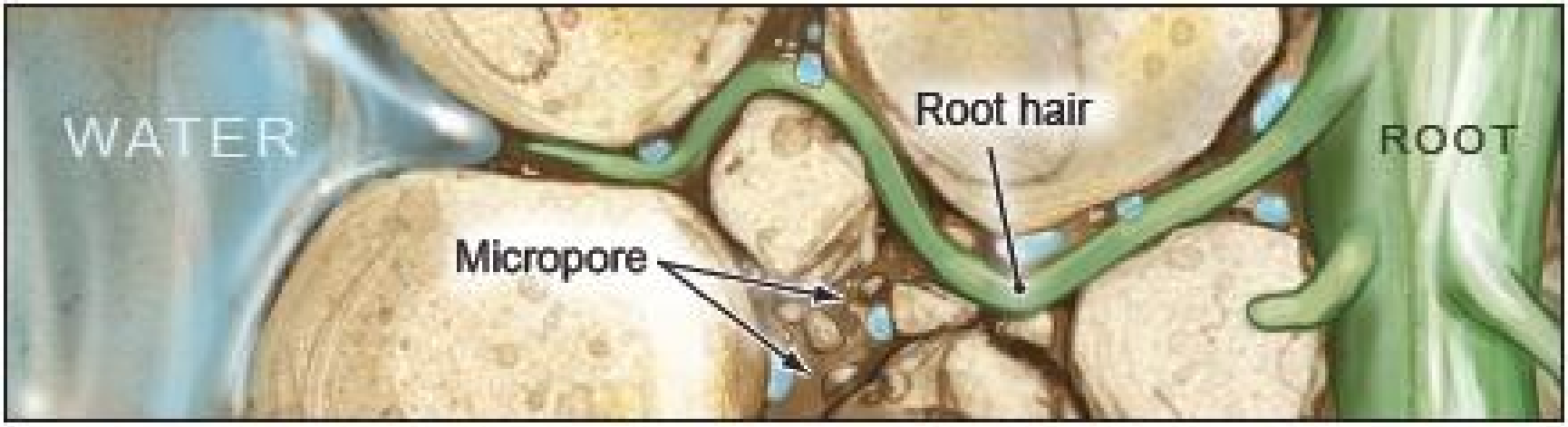
Start Here (Copy on chart)



Soil particle size



Soil relationships

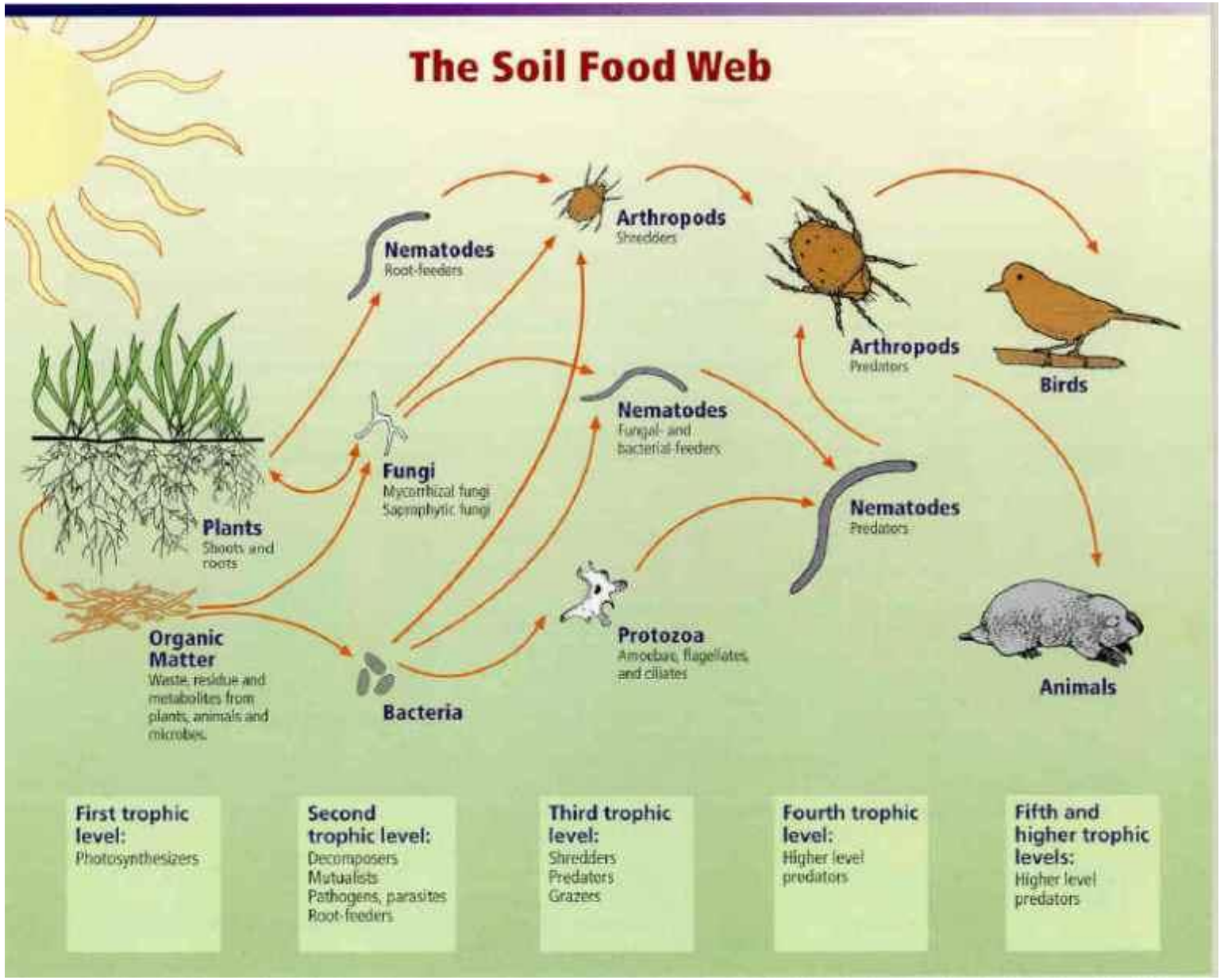


Soil has several horizons

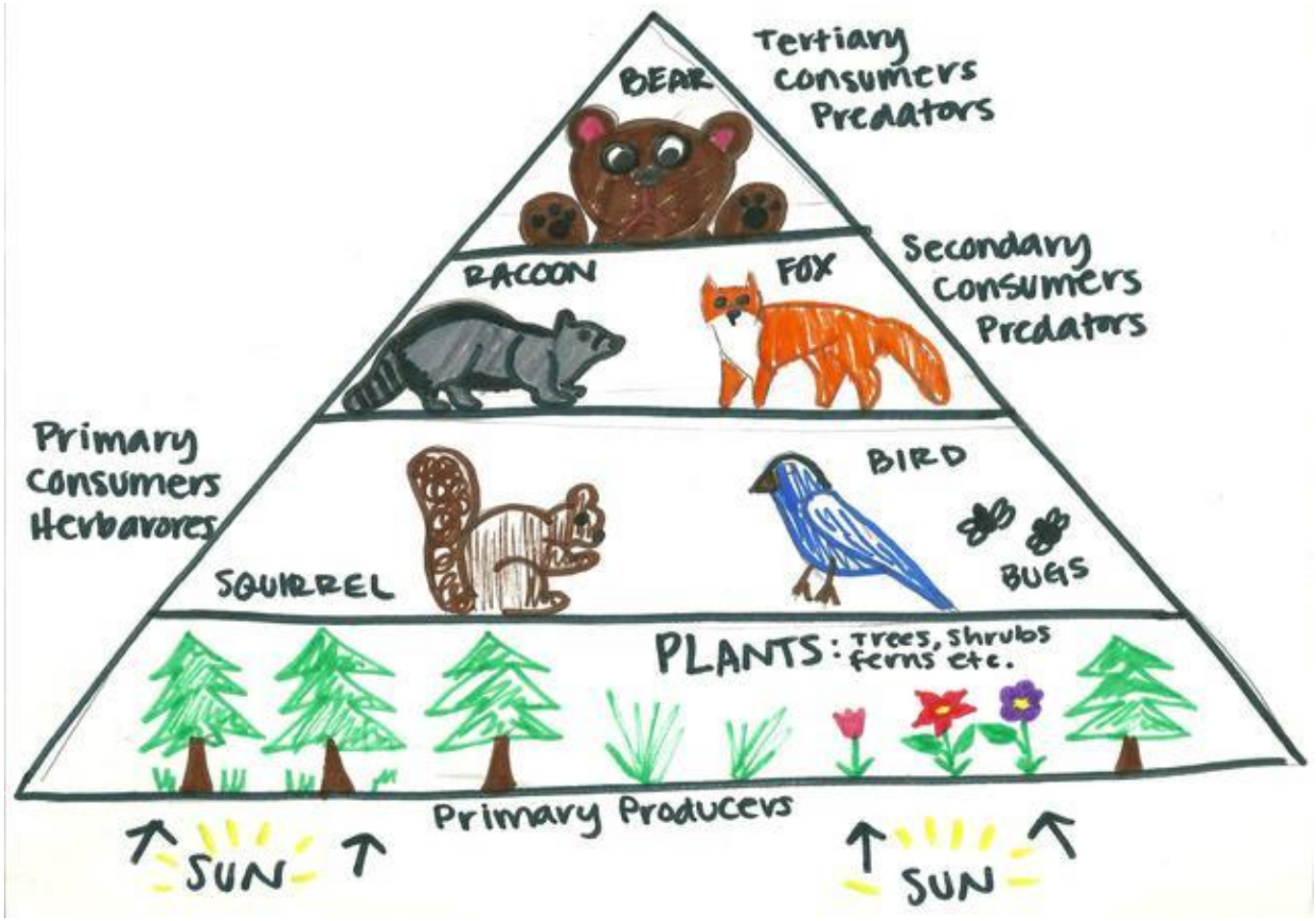
Root Fungi - Mycorrizae

Air in soil, compaction slows growth

Soil is alive



Trophic pyramid



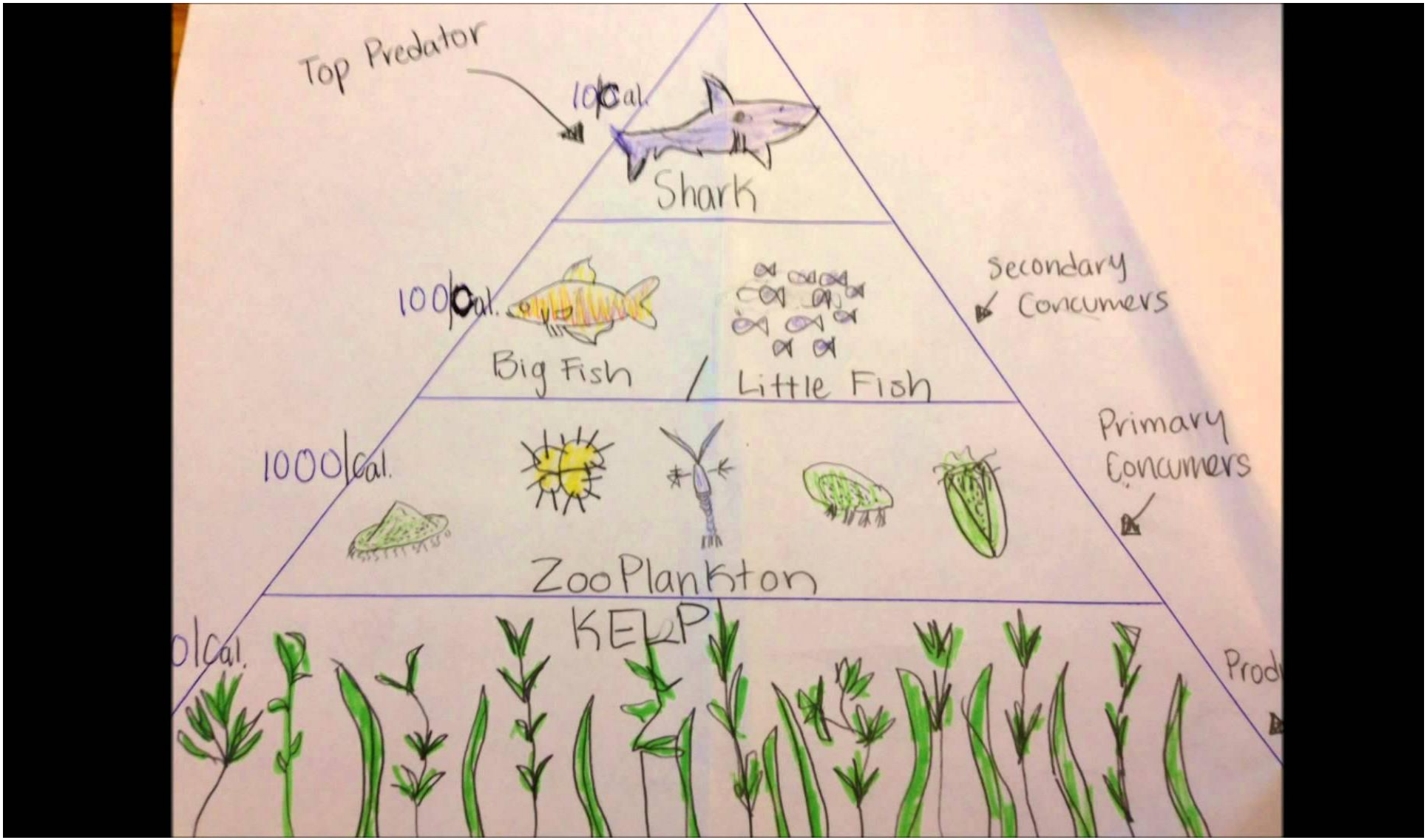
Grassland

Ecological Pyramids

Pyramid of Numbers:

Shows the relative number of individual organisms at each trophic level.

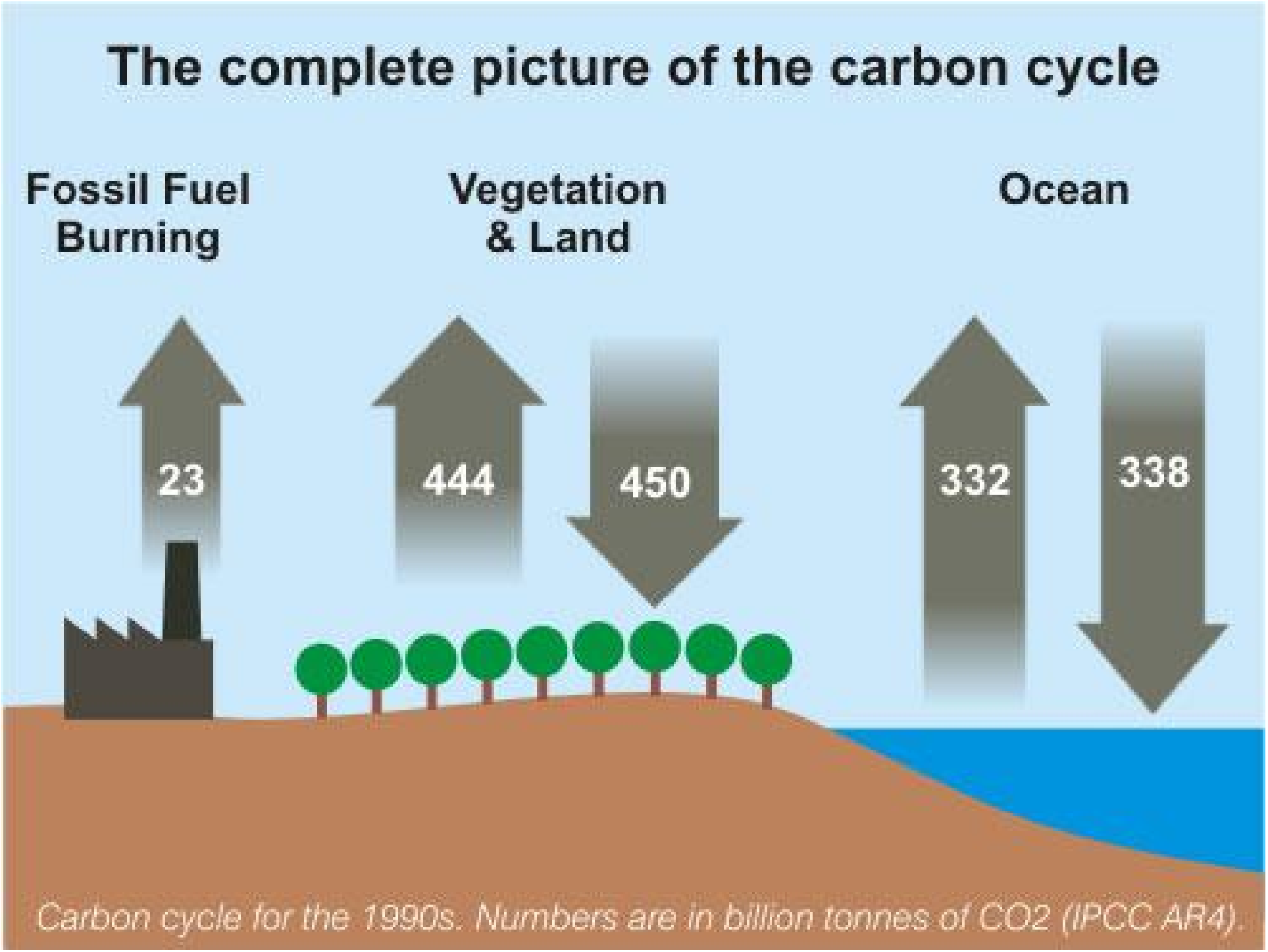
Aquatic

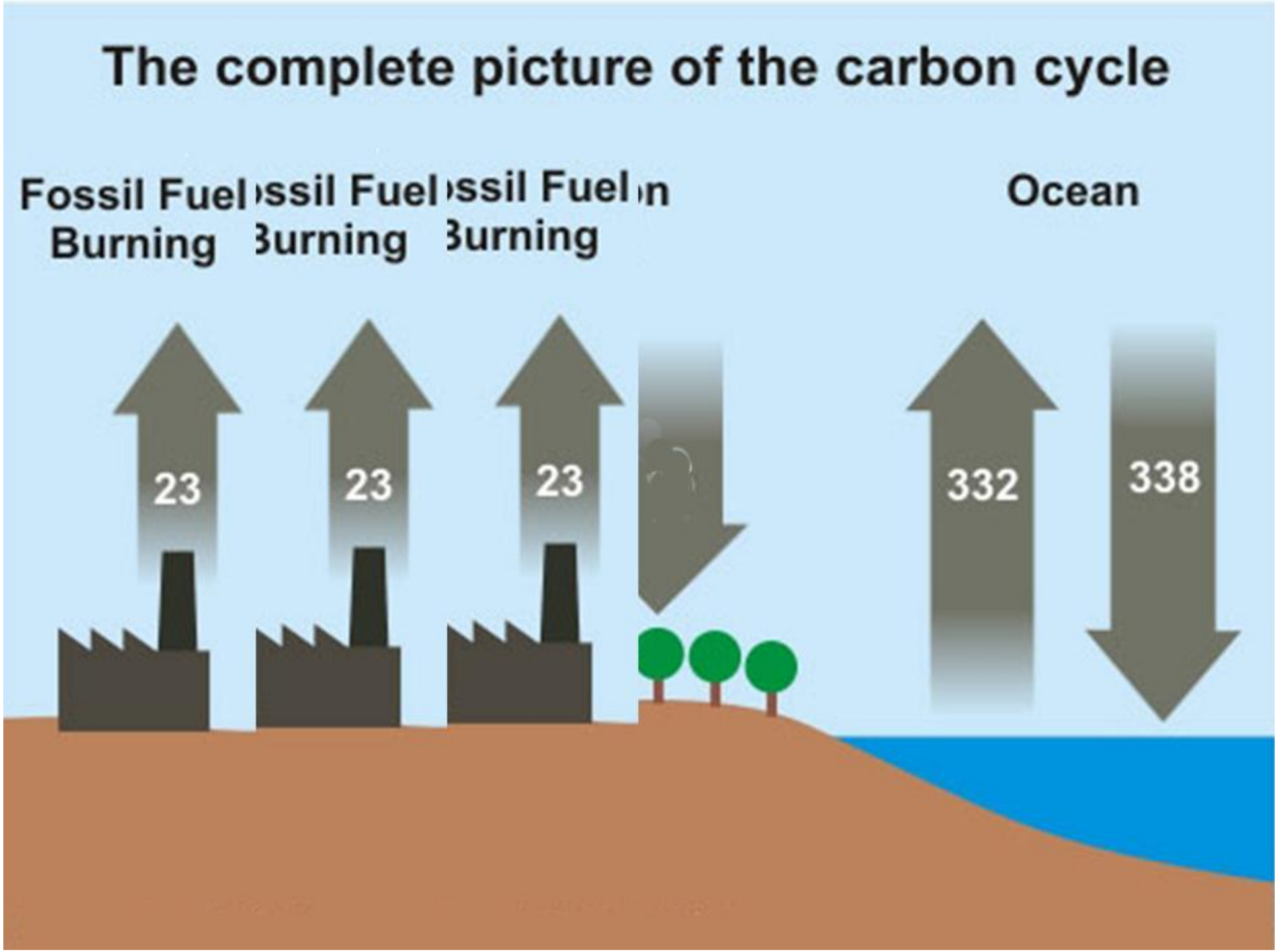

Top Predator
10 Cal.
Shark
100 Cal.
Big Fish
Little Fish
Secondary Concumers
1000 Cal.
Primary Concumers
ZooPlankton
KELP
Prod

End

Farming

- Modern farming is a product of the oil age
- Farming was completely different even as recently as 60 years ago
- In majority world, eg Uganda most farmers are still working by hand or with animals and organically


The complete picture of the carbon cycle
Fossil Fuel Burning
Vegetation & Land
Ocean
23
444
450
332
338
Carbon cycle for the 1990s. Numbers are in billion tonnes of CO2 (IPCC AR4).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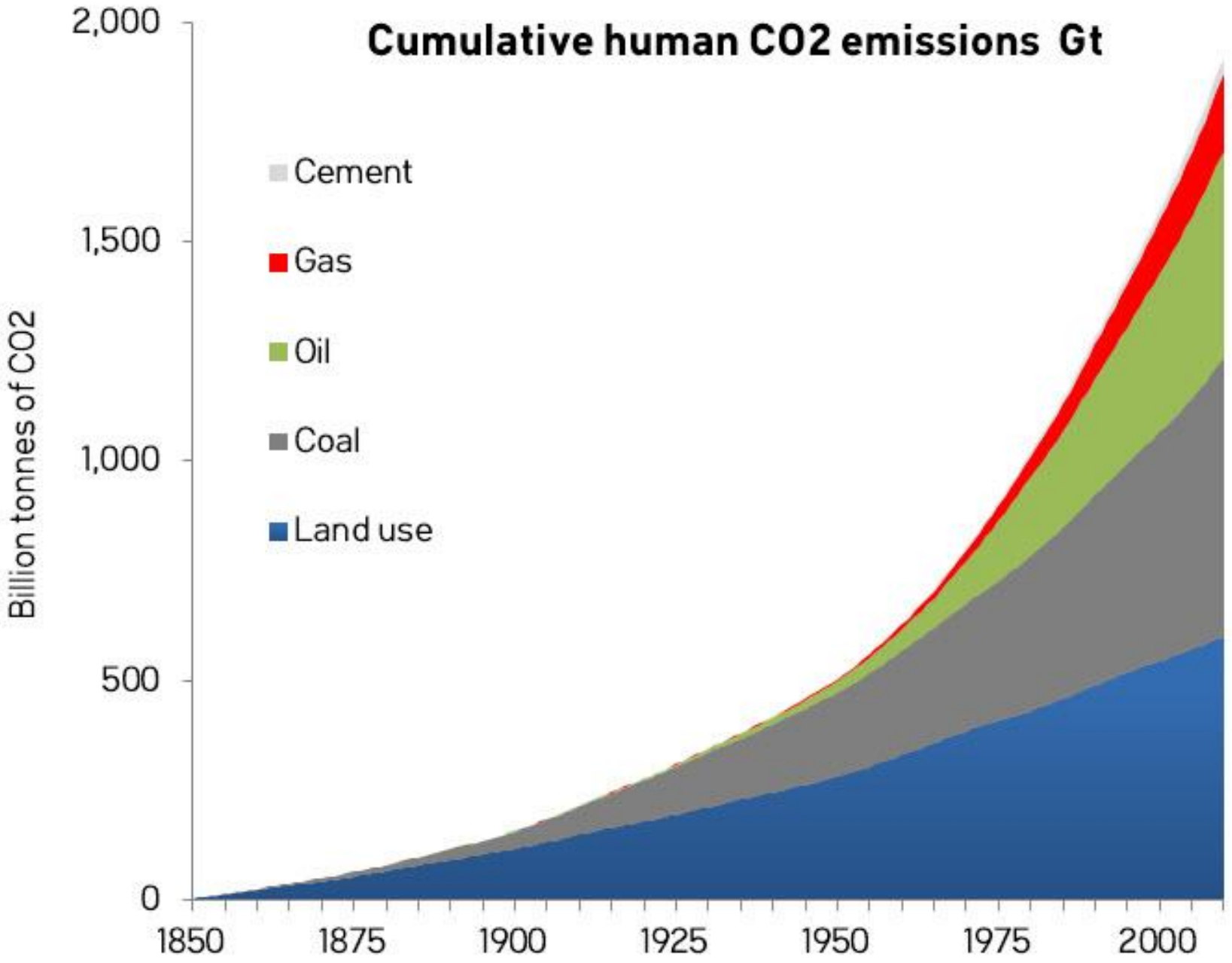

Cumulative human CO2 emissions Gt
Billion tonnes of CO2
2,000
1,500
1,000
500
0
Cement
Gas
Oil
Coal
Land use
1850
1875
1900
1925
1950
1975
2000

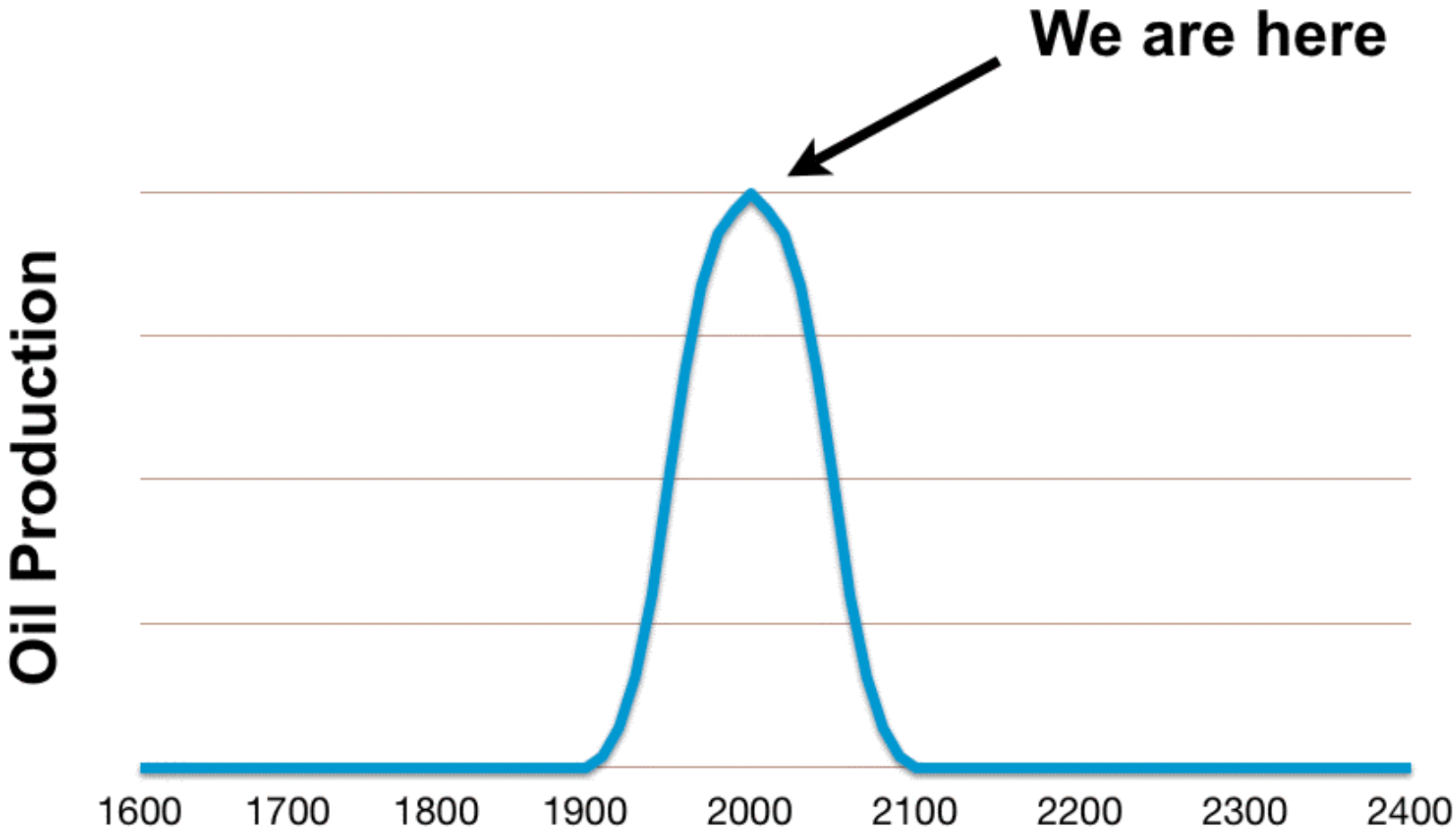
Farmers will be the next rockstars

- Next generation farmers will face 2 challenges – it will take creative talent, original thinking and daring!

Next generation farmers will face 2 challenges

- – they will have to go organic as quickly as possible
- They will have to learn how to manage the landscape in a way that stores carbon
- Farming is on the front line of fixing climate change!

Oil age – what comes next?



Fertilizers and pesticides

- Require constant energy inputs from coal, gas and oil
- Damage living systems
- Upset predator prey relationships

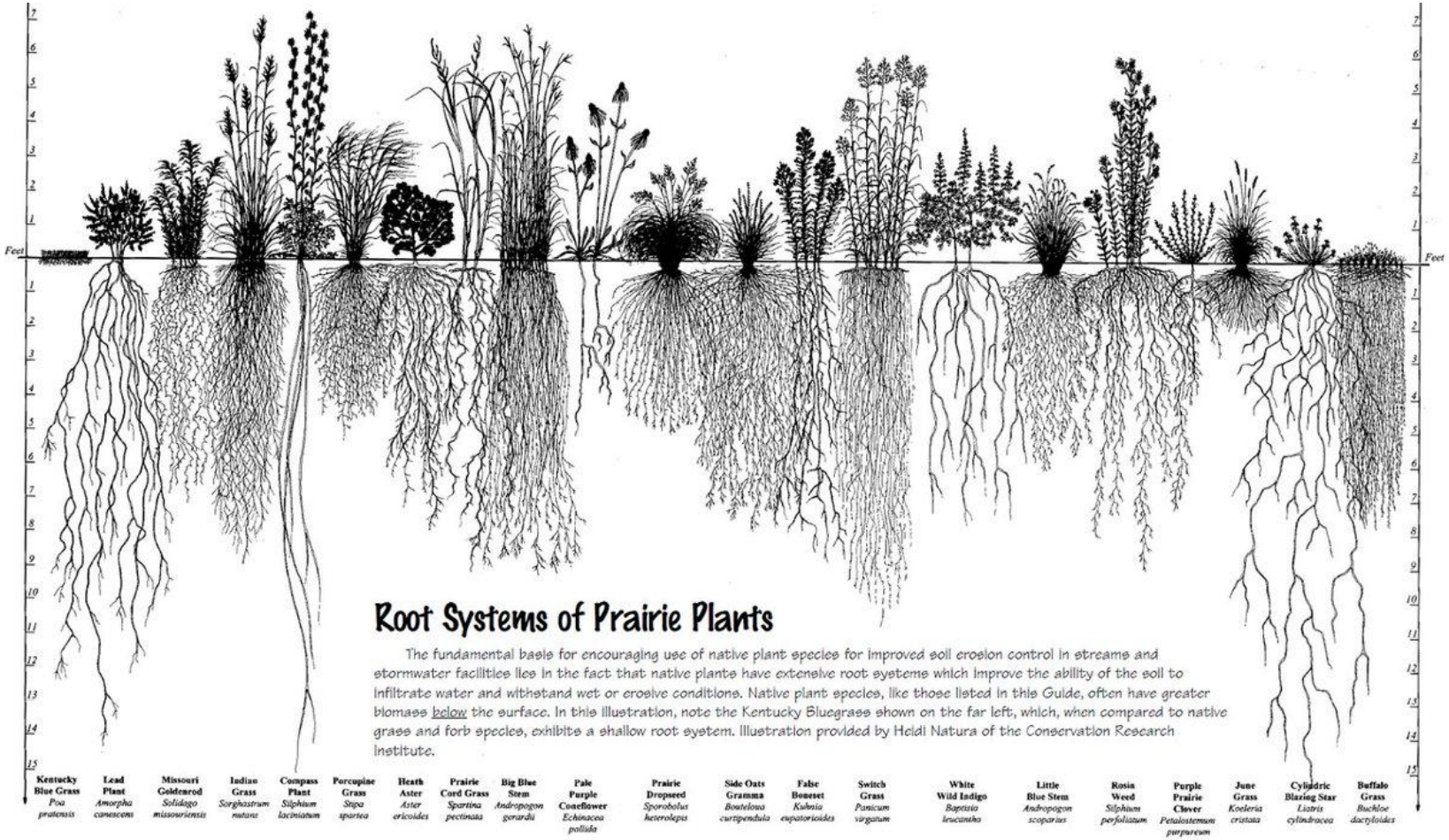
Combine air and natural gas over a catalyst under high pressure and intense heat

Farming without ploughing

- Move away from mono cultures
- Find organic alternatives for pest control and fertility
- Make food much more local again
- Put the trees back in the landscape

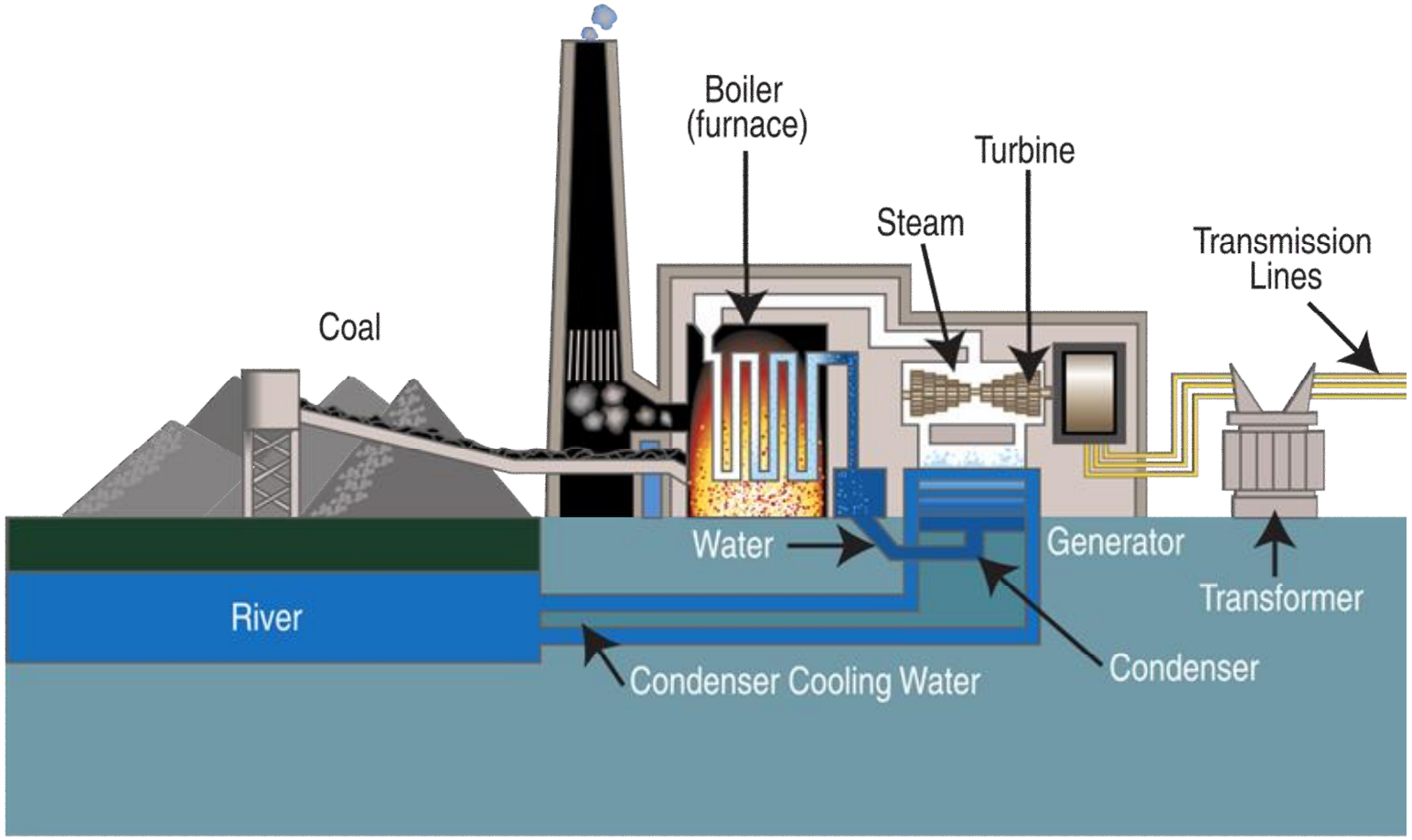
Crops of one plant have the same root depth

Different plants have different roots



End

Coal Power station

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