



**Murrumbateman Landcare**

# **Soil Health and Holistic Farming**

**Tony Hill**

**Holistic Management Educator  
EOV Master Verifier**

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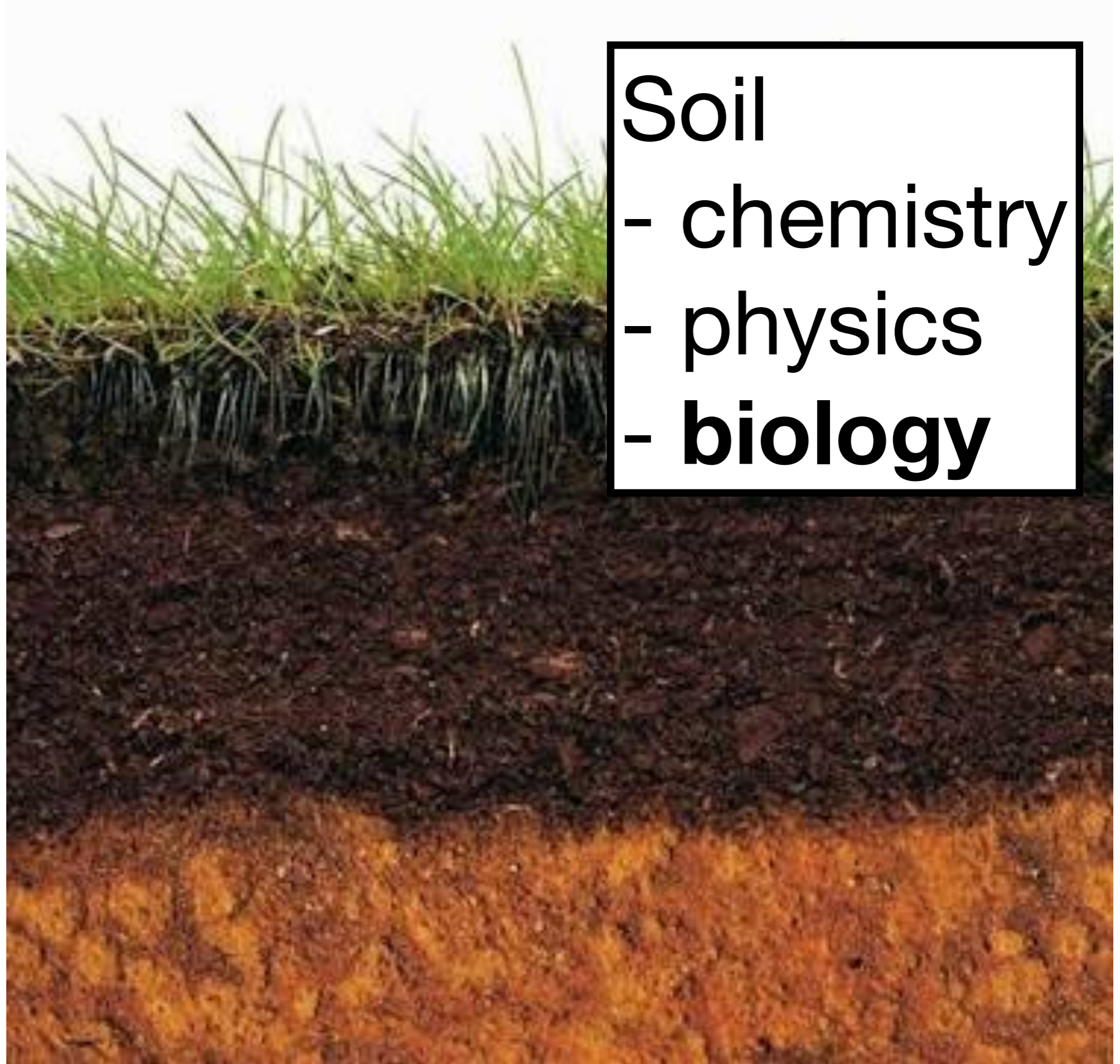


Soil  
- chemistry  
- physics  
- **biology**

A

B

C ↓




# Soil Chemistry

## Key Plant Nutrients

**N** - nitrogen

**P** - phosphorus

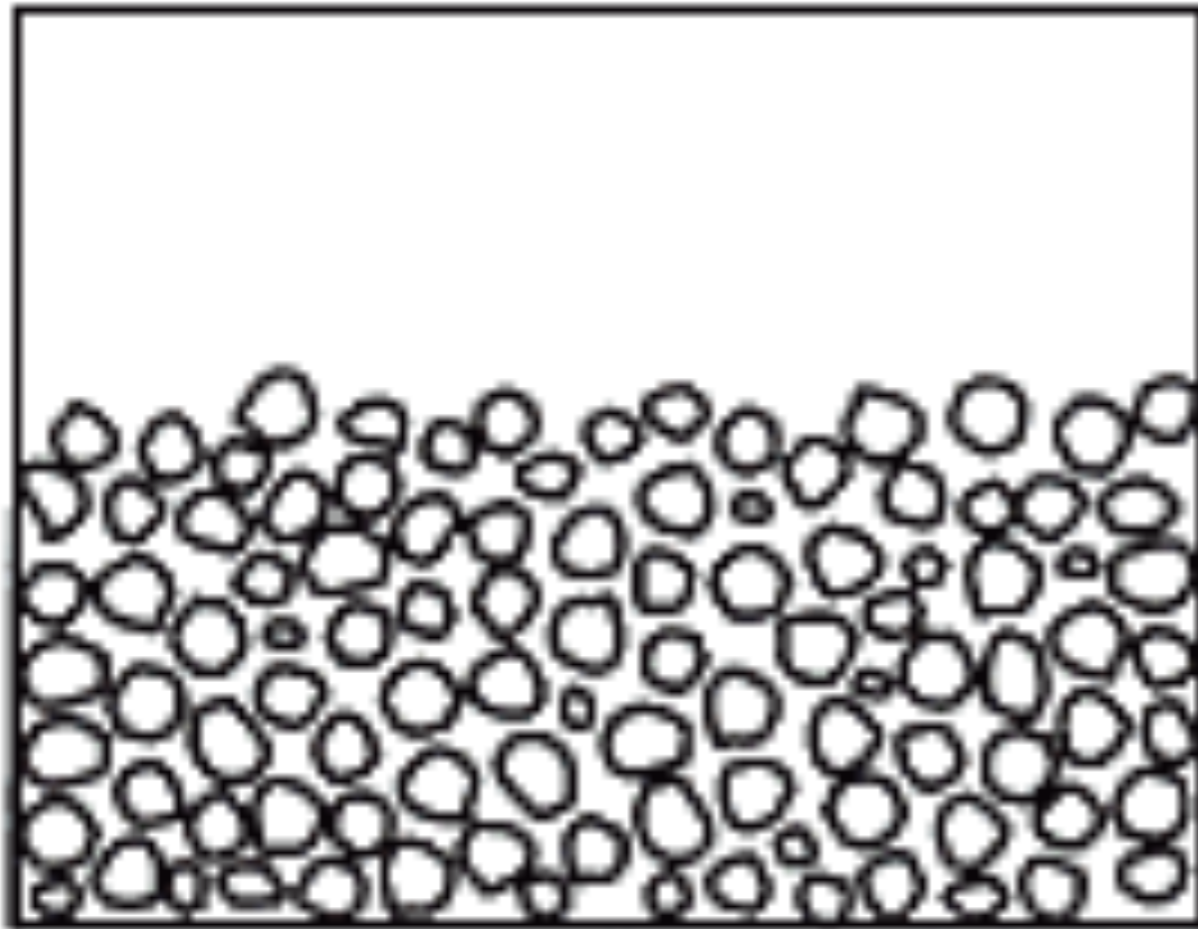
**K** - potassium

	Haney Extraction	Calcium (mg/kg)
		Magnesium (mg/kg)
		Potassium (mg/kg)
		Sodium (mg/kg)
		Sulfur (mg/kg)
		Zinc (mg/kg)
		Manganese (mg/kg)
		Iron (mg/kg)
		Copper (mg/kg)
		Aluminum (mg/kg)

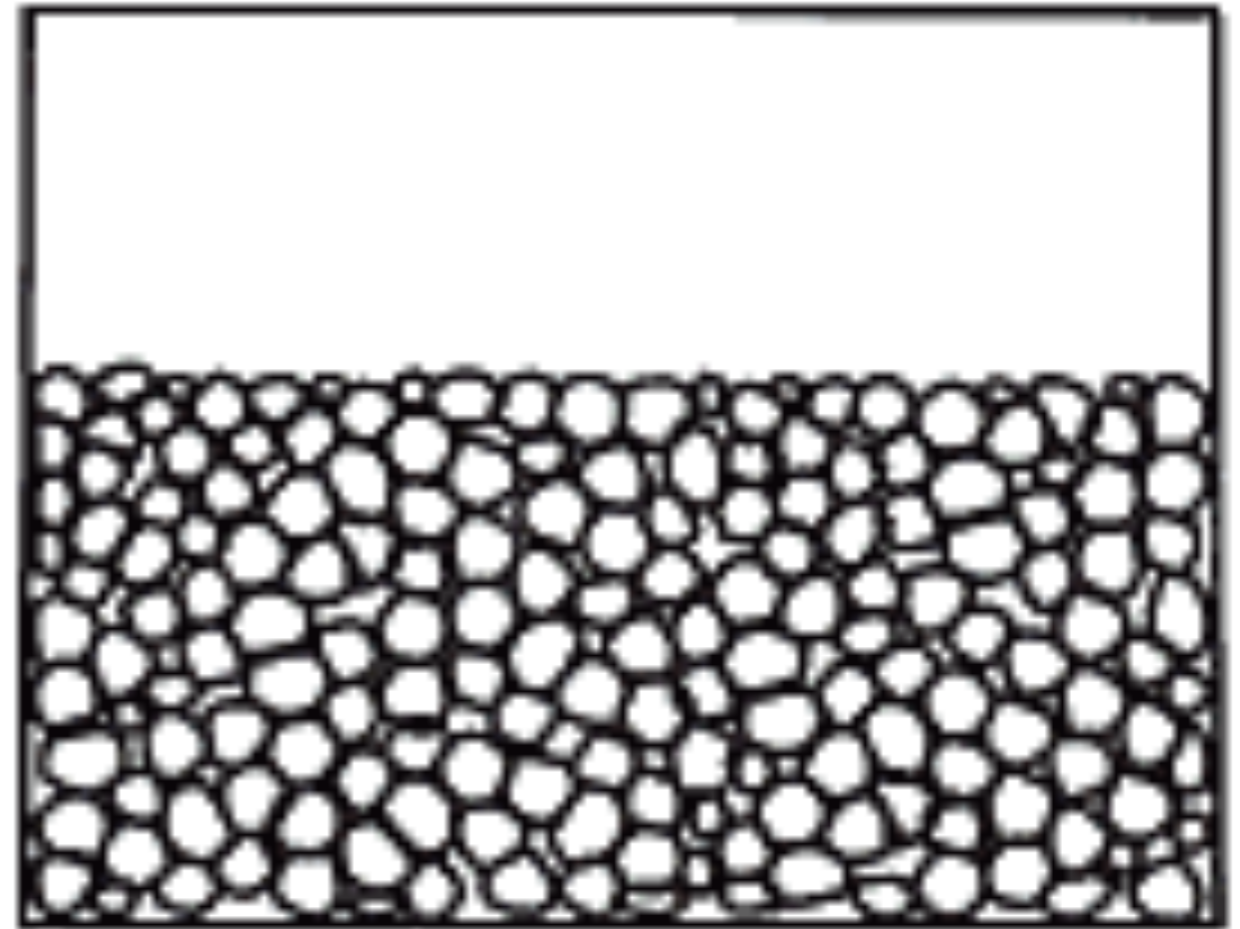


# Soil Physics

## Soil Density

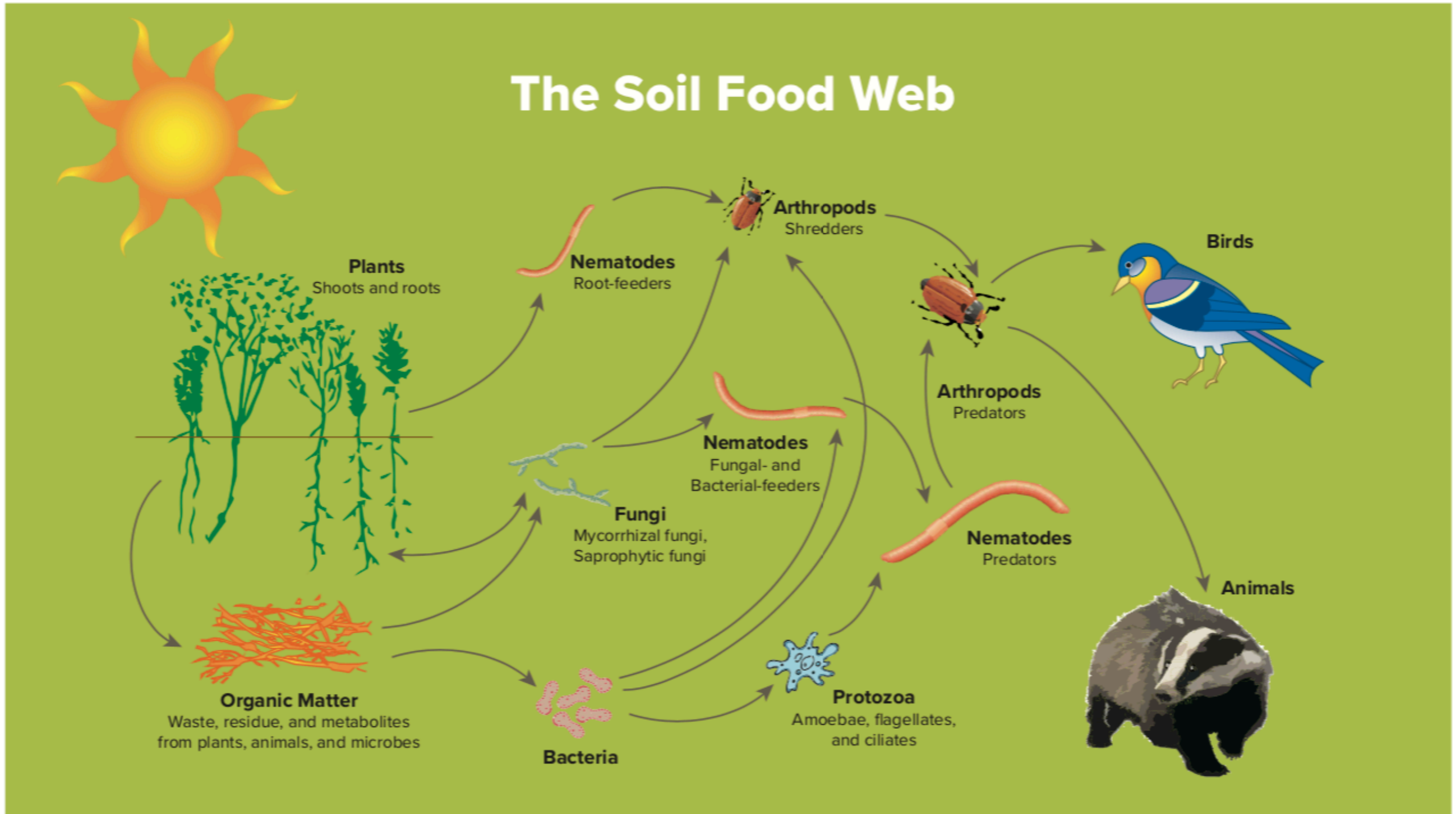


**Loose Soil**  
(poor load support)

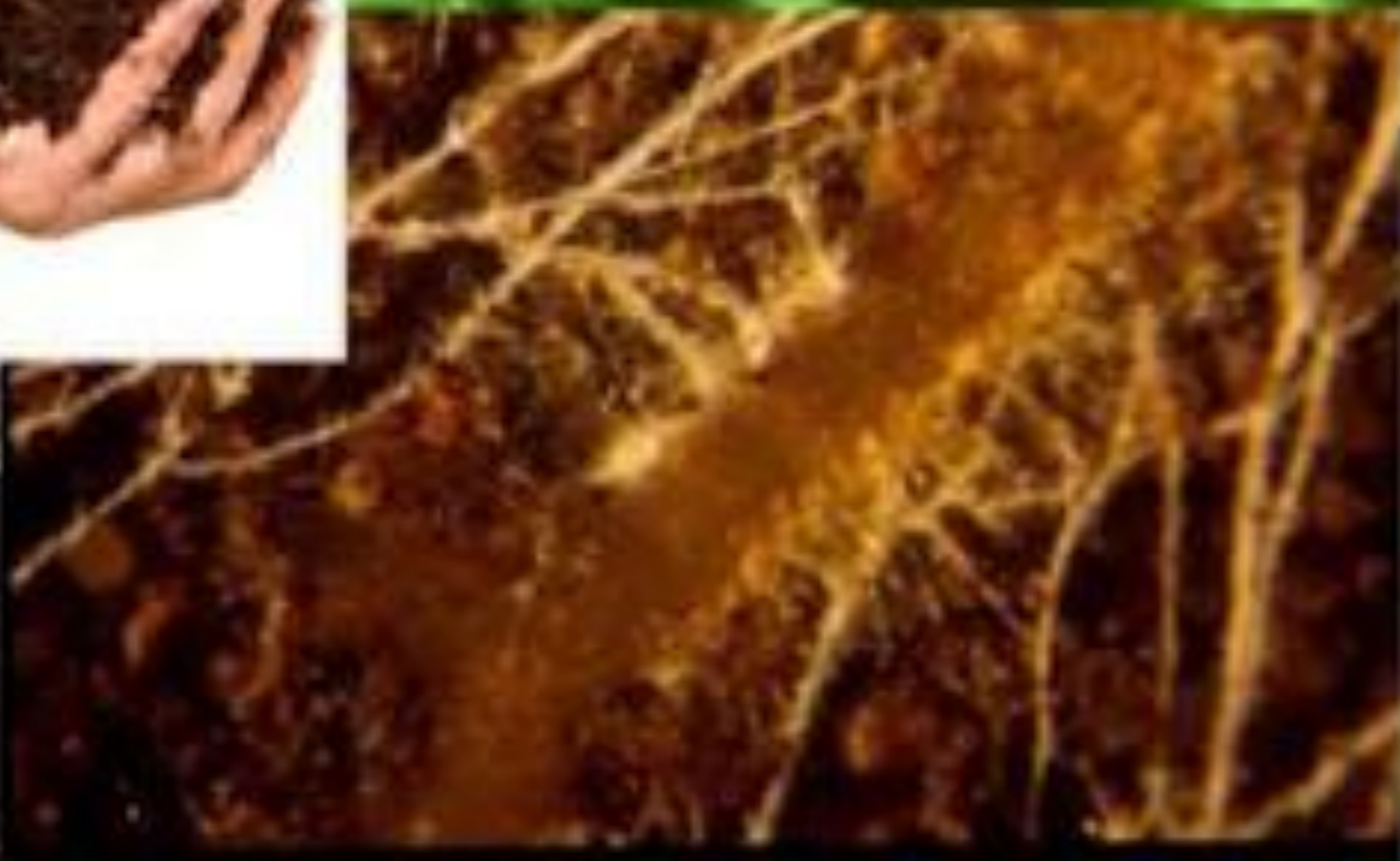
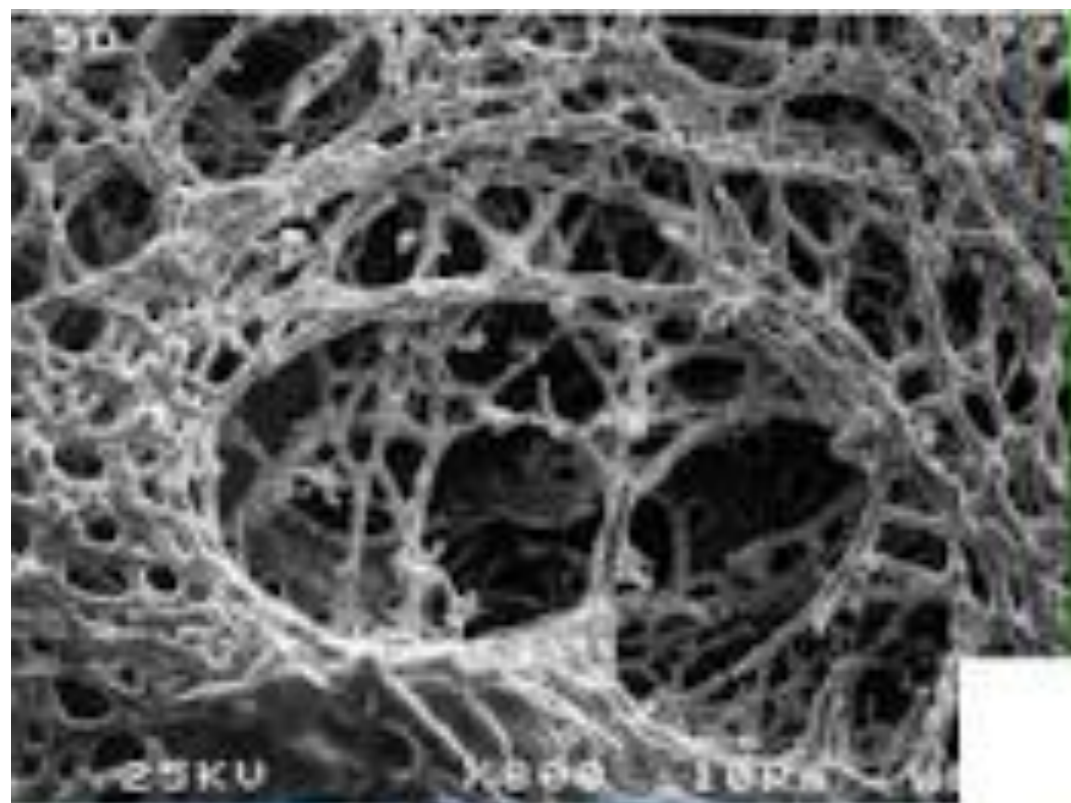


**Compacted Soil**  
(improved load support)

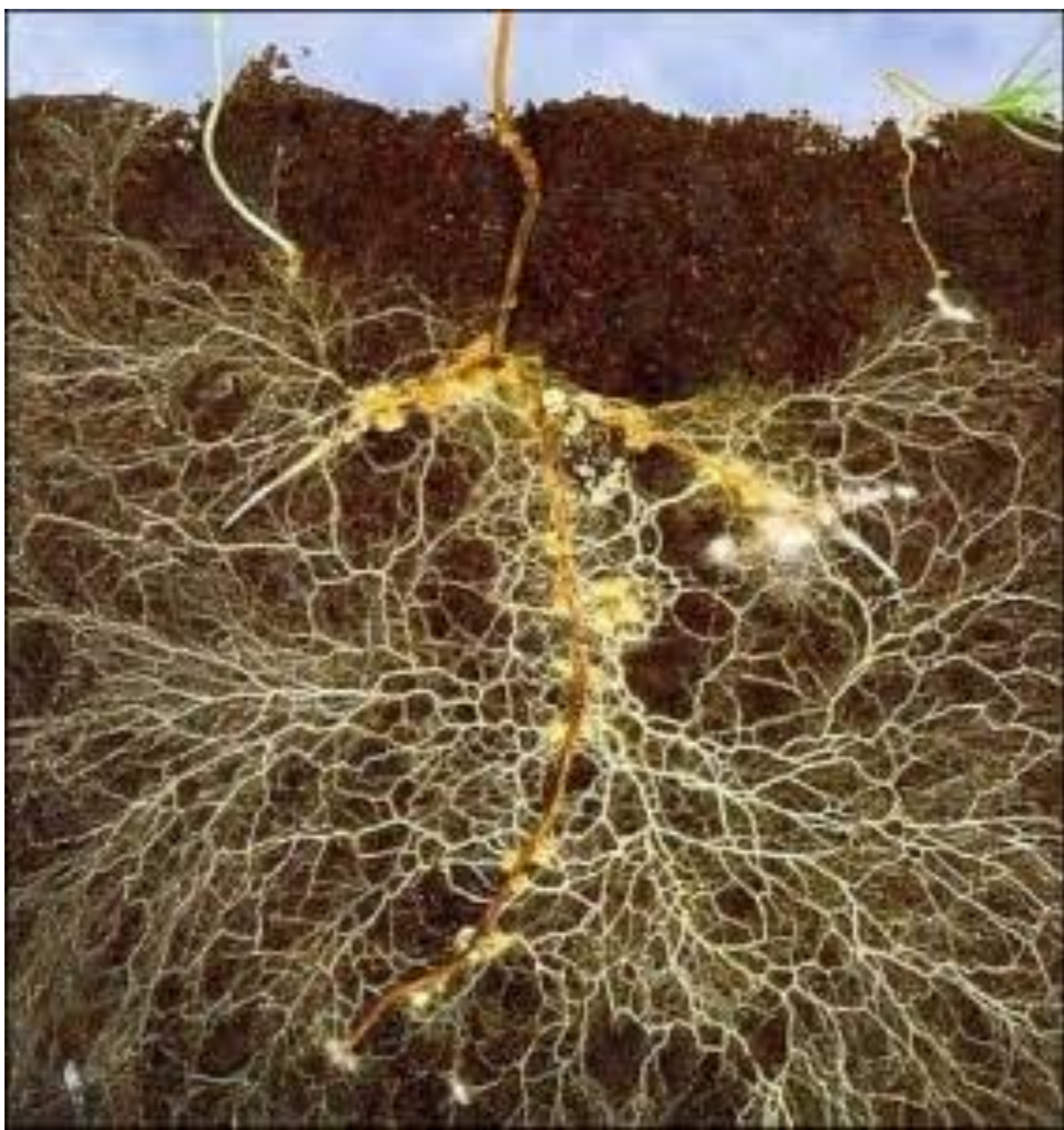
# Soil Biology















## Automated animal identification



Epoxide hydrolase and Parkinson's disease

Early Earth crust composition

Temporal regulation of plant nitrogen signaling

Census of global biomass

## RESEARCH ARTICLE

## The biomass distribution on Earth

 Yinon M. Bar-On, Rob Phillips, and  Ron Milo

PNAS June 19, 2018 115 (25) 6506-6511; first published May 21, 2018 <https://doi.org/10.1073/pnas.1711842115>

*a census of the  $\approx 550$  gigatons of carbon (Gt C) of biomass distributed among all of the kingdoms of life. We find that the kingdoms of life concentrate at different locations on the planet; plants ( $\approx 450$  Gt C, the dominant kingdom) are primarily terrestrial, whereas animals ( $\approx 2$  Gt C) are mainly marine, and bacteria ( $\approx 70$  Gt C) and archaea ( $\approx 7$  Gt C) are predominantly located in deep subsurface environments*

<b>Global biomass</b>	<b>550 Gt C</b>	<b>100%</b>
<b>Plants</b>	<b>450 Gt C</b>	<b>82%</b>
<b>Animals</b>	<b>2 Gt C</b>	<b>0.4%</b>
<b>Bacteria</b>	<b>70 Gt C</b>	<b>13%</b>
<b>Archaea</b>	<b>7 Gt C</b>	<b>1%</b>



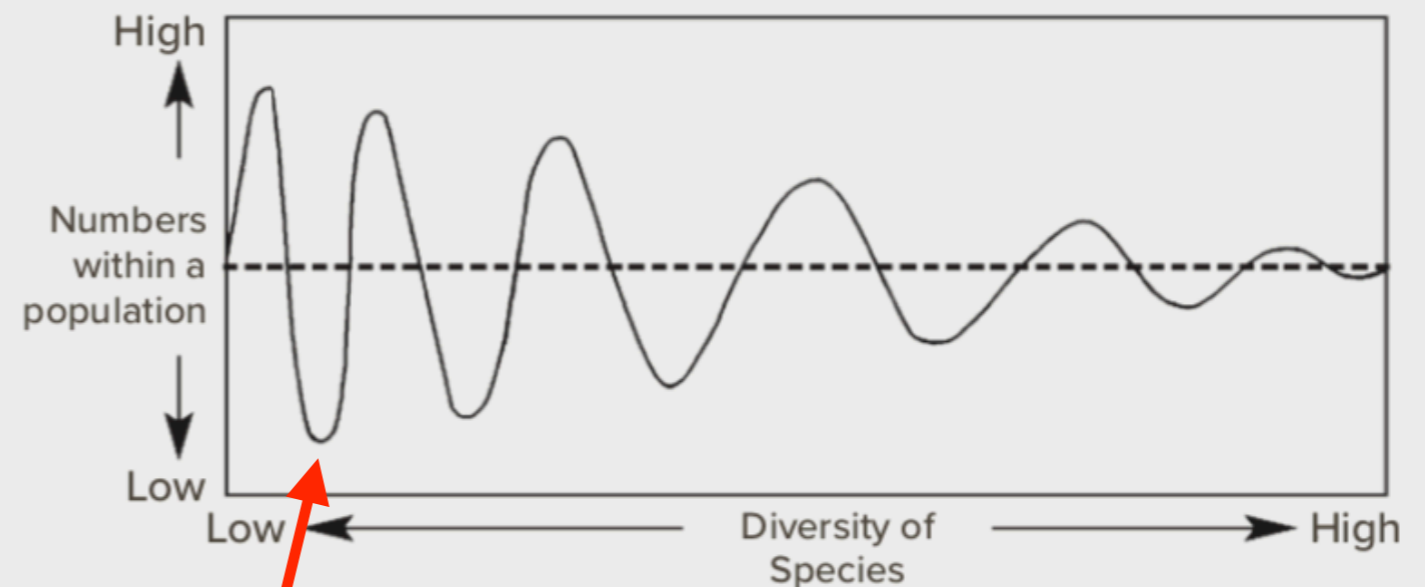
**But where do we fit in?**

**With our own management?**

# Linking floods/droughts to stable ecosystem conditions

## THE NEVER-ENDING PATTERNS IN THE DEVELOPMENT OF BIOLOGICAL COMMUNITIES

The more complex and diverse communities become, the more stable populations within tend to be.

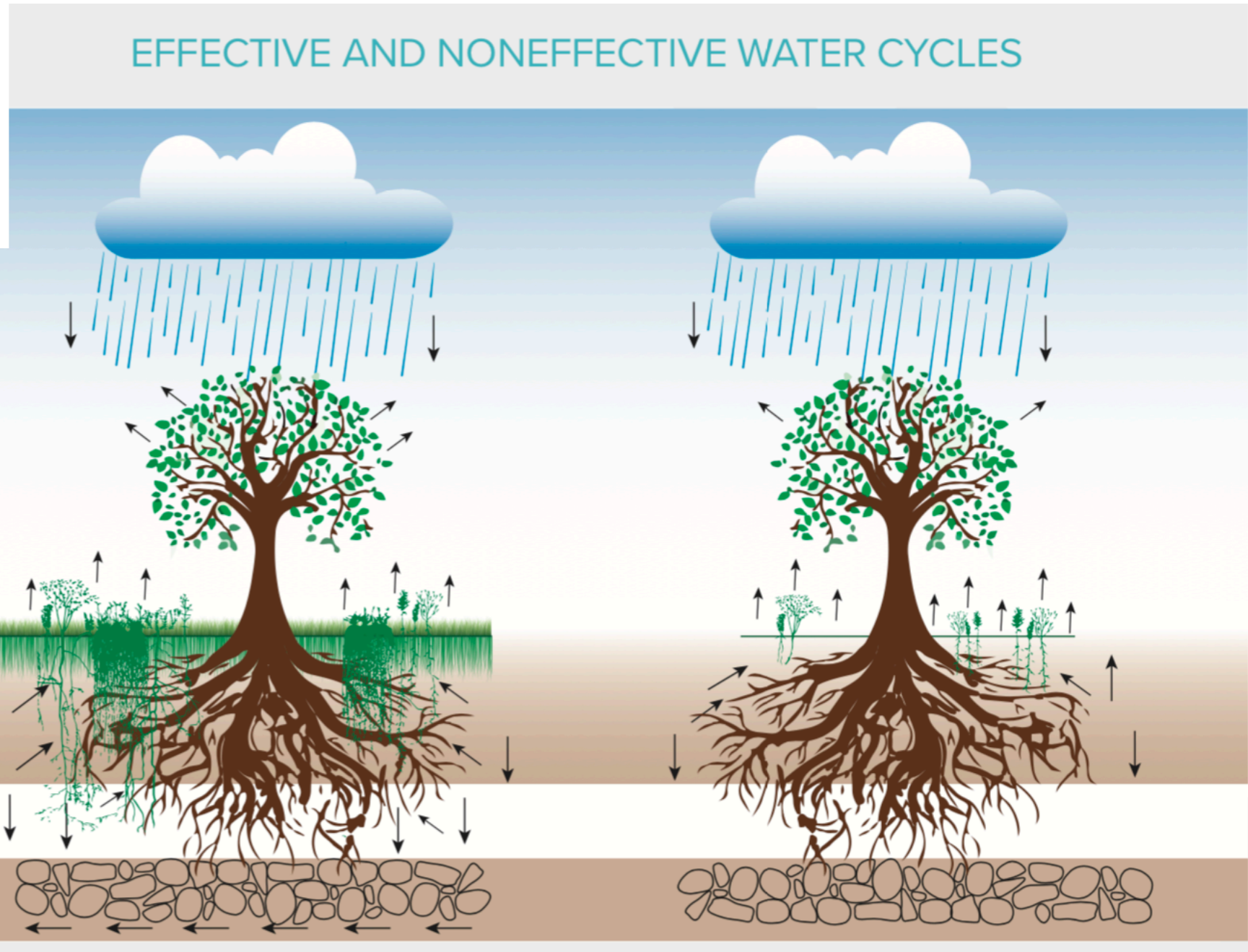


**More frequent  
floods  
droughts**





The Four Ecosystem Processes



**Bare soil is enemy  
number 1!**





*Bruce Ward Legacy Trust*

[holisticresults.com.au](http://holisticresults.com.au)





# Traditional Tools

Technology



Fire



Rest





# Additional Tools

Living Organisms



Grazing

Time, not  
animal numbers



Animal Impact

Mimics  
predator-prey



**Monitoring**  
*is critical!*



# Ecological Outcome Verification



## Ecological Health Index (EHI)

- annual monitoring of 15 indicators
- indexes of ecosystem health

## Ecological Outcome Verification (EOV)

- 5 year monitoring, EHI plus:
- detailed species biodiversity
- soil health

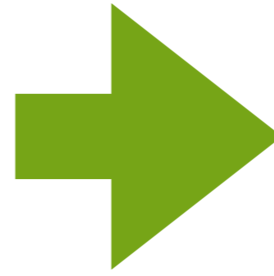


The Four Ecosystem Processes





Farmers & Producers



Market Partners & Consumers





# Holistic Management training courses



HOLISTIC MANAGEMENT FOUNDATION

NURTURING OUR PLANET

TOOLS TO MANAGE THE PROCESS

CREATING YOUR HOLISTIC CONTEXT

TESTING AND MONITORING YOUR DECISIONS

Tony Hill  
Savory Institute Accredited  
Holistic Management  
Field Professional & Educator  
[md@capitalconsulting.com.au](mailto:md@capitalconsulting.com.au)

ph: 0412 128 755

# Land to Market Australia membership



Australian Holistic Management  
Co-operative  
[tony@landtomarket.com.au](mailto:tony@landtomarket.com.au)

ph: 0412 128 755