

## The Power Of Life

Ray Archuleta  
Seymour, Missouri



Biology is the study of life. Life is a powerful force. Ranchers and Farmers interface regularly with soil life. Yet, most landowners lack the understanding of its power and intelligent design. Shockingly, soil is one of the most diverse and mis-understood ecosystems on the planet. Soil is the foundation resource. For soil life to function correctly, it must be given time to regenerate itself daily. Most plant and animal life are designed to handle acute stress but not chronic stress. Acute stress can be a short drought period, a proper grazing event, light tillage event, a wise pesticide application, a harvest event, and a short fallow period. Chronic stress is continuous prolonged habitual stress. For example, continuous over grazing, chronic tillage, long fallow periods, and chronic application of chemicals that inhibit soil function.

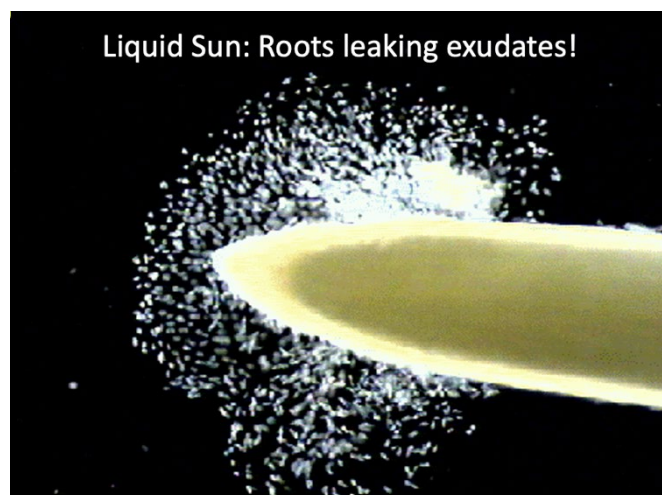
It is important to understand that the soil ecosystems and plant are one. The plant and soil are a collective one. Soil biology without plant biology is just geology. These amazing plants feed the soil microbes and microbes provide sequestered nutrients to the plant-this is designed symbiosis. Without these interconnected processes, earth would not function. Ancient people use to call the plant, “the mouth of the soil”. Why? Without plants live cannot be sustained in the soil. Plants do the following:

- 1) The plant covers and protects the soil surface from heat, rain, wind, and other forces with residue/leaf surface area.
- 2) The Plant is habitat for insects and other living creatures.
- 3) The plant converts light energy into chemical energy (photosynthesis) which feeds soil organisms, insects, animals, humans, and other creatures.
- 4) Plants regulate the soil temperature and reduces rain impact to protect soil organisms.
- 5) Plants help regulate the climate. Over 40 percent of terrestrial rain comes from plants evapotranspiring moisture into the atmosphere to form rain clouds. This is called the small water cycle.
- 6) Plants draw carbon from the atmosphere into the soil and give oxygen to all other organisms.
- 7) Plants in sync with soil organisms form aggregates that determine water infiltration for completion of the water cycle. Plants are also part of the nutrient cycle.



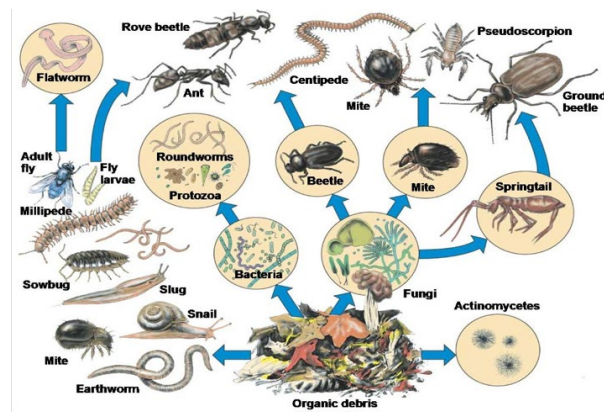
### ***Farms and Ranches Must Run on New Sunlight-Not Ancient Sunlight!***

Plants are energy transformers and biological primers. Plants convert light energy into chemical energy (liquid sun). Plant roots leak hundreds of photosynthetic carbon-based molecules that feed a complex array of soil organisms. Astonishingly, a majority of cropping and grazing systems are not capturing this live and energy giving processes. Instead, our agriculture systems are heavily depended on ancient sunlight. What is Ancient Sunlight? Ancient sunlight is old dead plant material and organisms converted into oil. This old liquid sun energizes our whole society. This petroleum-based energy energizes: our equipment, pesticides, and fertility. Therefore, farmers and ranchers are struggling financially. Agriculture is heavily addicted on this energy source. This picture below shows new liquid sunlight (photosynthesis) should be our main source of energy.



### ***The Power of Liquid Sunlight (Photosynthesis)***

Liquid Sun feeds the array of soil life which a collective whole. This soil web of life is interconnected in function. These organisms' function to create soil structure, water cycling, nutrient cycling, and other various ecosystem functions. Without these organism's life on earth would not function. According to Dr. Jonathan Lungren, "seventy percent of all insects continue their life cycle on the first inch of the soil. These organisms are impacted with over-grazing and over-haying. It is important to understand that nature is self-healing, self-organizing, and self-regulating. These processes are diminished when soil habitat is chronically over-grazed, over-tilled, and long periods of bare soil.



### **Healthy Soils have Design and Pattern:**

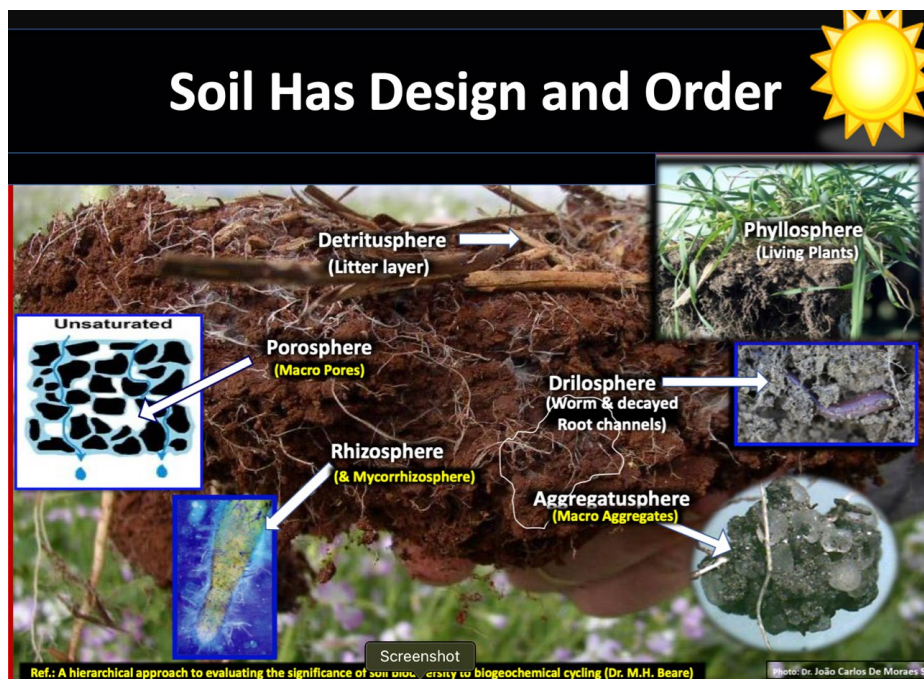
All healthy soils have design and order. This image below shows all the spheres of a healthy soil. All healthy soils have these spheres always present.

- 1) **Phyllosphere**- this sphere is the leaf surface where certain specialized bacteria that live and enhance plant metabolism. Also, this leaf surface is an area where photosynthesis occurs. This live giving sphere transfers light energy from photosynthesis (chemical energy)- that is leaked through the Rhizosphere.
2. **The Rhizosphere** is a critically impactful sphere. This sphere changes the geological matrix (Sand, Silt and Clay) into a living dynamic ecosystem. Without the root in the soil; water cycling and nutrient cycling would not exist.
- 3) **The Aggregatusphere**: fuses the geology (sand-silt-clay) into chocolate cake texture which creates pore space. Biological glues are created by fungi, bacteria, roots, and other biological life. This sphere allows water infiltration and gas exchange.
- 4) **The porosphere** provides habitat that allows microscopic soil organism to swim and life.
- 5) **Drilosphere**: Is the sphere of boring or tunneling insects: dung beetles, termites, and especially earth worms. These organisms modify the soil profile with bacterial and fungal rich tunnels which are laced with bacteria and nutrients. These passages enhance gas exchange and water filtration.
- 6) **Detritosphere (skin)**: This final sphere is the skin of the soil. This sphere protects and regulates temperature, moisture, rain impact, and weeds. This precious carbon-based skin feeds the soil and is habitat to myriad of fungus, bacteria, and insects. This living skin prevents soil crusting. Soil crusting causes poor gas exchange of CO<sub>2</sub> and Oxygen. Crusting also causes poor water infiltration. This living skin also feeds the plant with CO<sub>2</sub> gas via the stomata which is behind the leaf. This process enhances photosynthesis. This skin creates aggregates and organic matter on the surface. All these spheres must be present at all the time. If one sphere is diminished the others are impacted.

### ***Why do we need the spheres?***

Without this soil spheres-the four ecosystem processes will be diminished in efficiency. Our ranches and farms run on these processes: The four processes are the following:

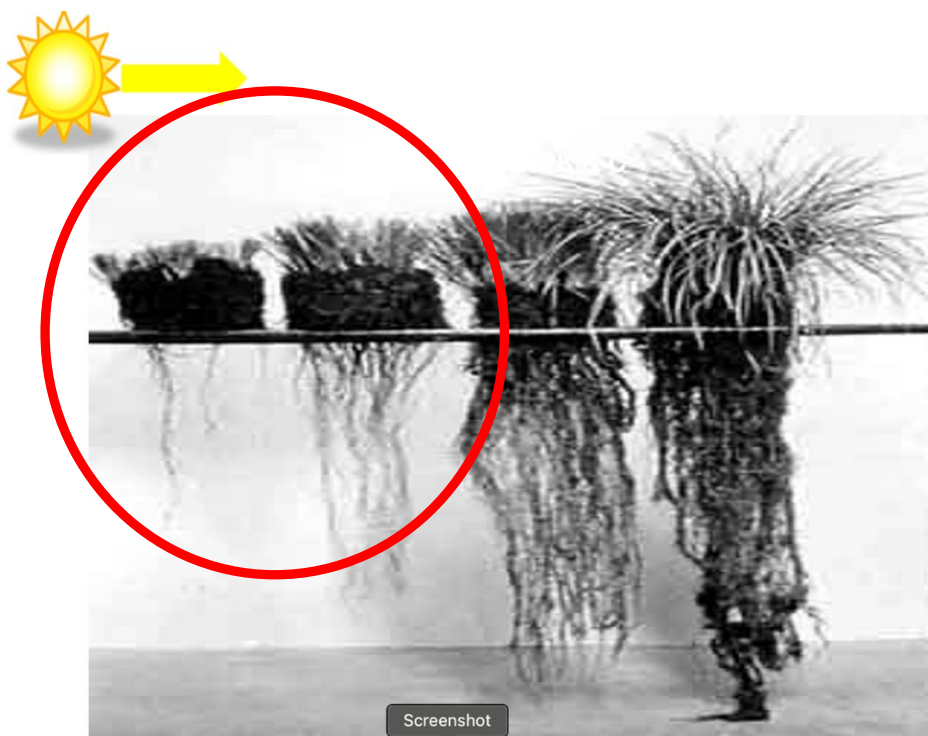
- 1) Photosynthesis: plants capture and convert light energy into chemical energy (liquid) sun.
- 2) The Water cycle is completed when rainwater infiltrates into the soil-not runoff into the rivers and lakes. The plant canopy and the detritusphere reduces the rain drop energy and the aggregatusphere increases water infiltration
- 3) The nutrient cycle is driven by living microscopic soil organisms which swim in pools of water located in the porosphere and the detritusphere. The detritusphere is habitat for larger soil organisms and insects. This collective soil web-above and below the soil -plus the plant is the nutrient cycle.
- 4) Finally, the last ecosystem process is the community of diversity life. The diversity of life is the software of life. Our computers and phones are worthless plastic and metals without software. Without intelligent design and software, you have no functionality. These patterns are similar in soils and natural ecosystems. Without the diversity of micro-organisms, insects, plants, fungi, and other diverse life- the earth is just frozen geology in empty space. The more diversity of life we have on our farms and ranches the more self-healing, self-regulating, self-organizing process that continue regenerative process which will reduce are ancient sunlight dependency.

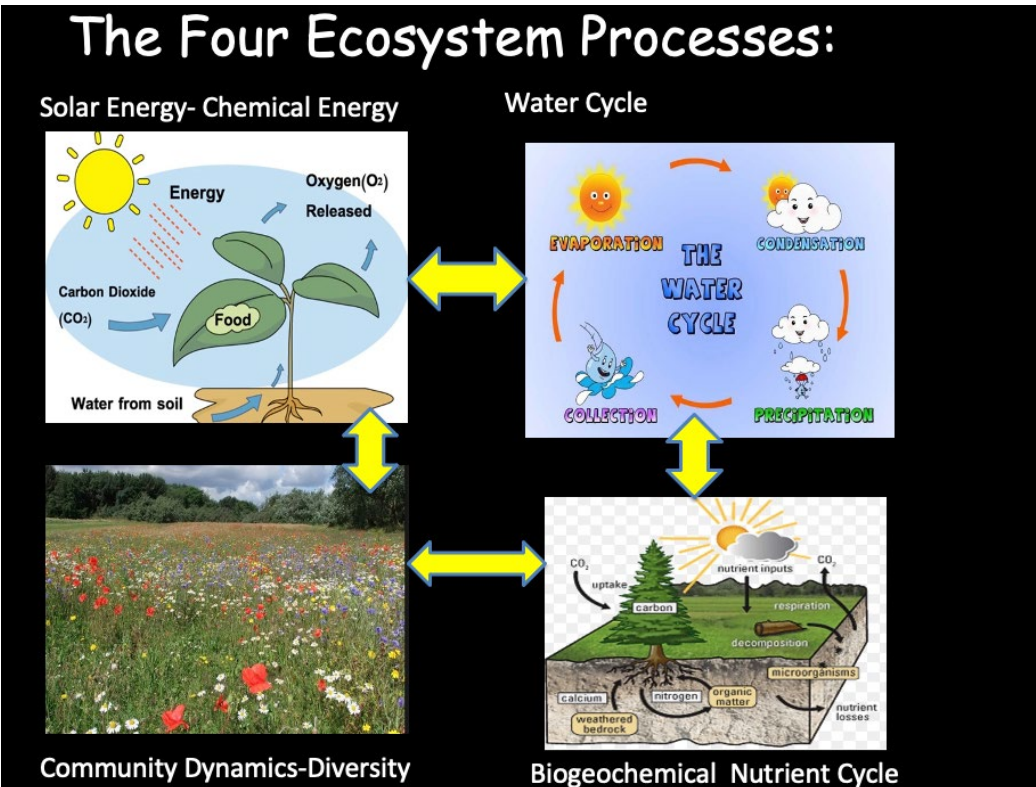


***Our management diminishes soil function:***

Sadly, this image below and the red circle soil depicts a common pattern throughout the earth. Over 80 to 95 percent of the pastures/grasslands are chronically stressed because of over-grazing and over-haying. Our poor cropping systems also disrupt ecosystem processes. Plus, 20 to 30 percent of our global soil surfaces are naked without plant vegetation. Naked soils are hungry for carbon (food), thirsty for water- unhealthy soils do not infiltrate. Soils without plant residue (skin) increase soil temperature which diminishes nutrient cycling. High temperatures in soils diminish microbial function. If nutrient and water cycling are diminished, then landowners must utilize more energy (Ancient sunlight) to provide external inputs for their cropping and grazing systems.

Finally, the mismanagement of our soils is leading to climate change. Without plants and soil there is not climate. When we overgraze and have poor cropping systems, we alter nature's ecosystem processes and its self-healing, self-organizing and self-regulating abilities. This what I call "death by tools". Chronic use of our tools (cattle, tillage, pesticides, and fertilizer) is diminishing our soil function-this impacts our health, climate, and your bank account. This happens because humans do not understand the power of life and its intelligent design.





### **About Ray Archuleta**

*Ray Archuleta is a Certified Professional Soil Scientist with the Soil Science Society of America and has over 30 years of experience as a Soil Conservationist, Water Quality Specialist, and Conservation Agronomist with the Natural Resources Conservation Service (NRCS). During his tenure with the NRCS Ray served in New Mexico, Missouri, Oregon, and North Carolina.*

*Ray received his AS degree in Livestock Science from Northern New Mexico College and a BS degree in Agricultural Biology plus 30 hours of graduate work in soil related courses from New Mexico State University. He served in the Peace Corps for two years in Guatemala as a Livestock Specialist.*

*After his retirement from the NRCS in 2017, Ray founded Understanding Ag, LLC, and Soil Health Academy, to teach Biomimicry strategies and Agroecology principles for improving soil function on a national scale. Ray also owns and operates a 150-acre farm near Seymour, Missouri that he operates along with his wife and family.*