

The Water Cycle: Understanding Nature's Essential Process

Defining the Ecological Processes

What Are the Four Ecological Processes?

The four ecological processes are crucial in understanding the systematic and holistic approach that regenerative organic agriculture takes. The ecological processes are not divisible; they always interact and are inseparable. When one of the processes is failing, they are all failing. That is why it is important to ensure the processes are fulfilled on your farm so that your crop yield and soil health are augmented.

The Water Cycle

Just like the nutrient cycle, the water cycle has no beginning nor end, and there is no starting or stopping point. The main objective for a farm is to capture as much water as possible and effectively utilise it to promote plant growth and soil health. So how does water cycle through the planet? Water cycles through evaporation, precipitation, infiltration, and transpiration, and these naturally occurring steps will be described in this document.

What Does a Non-Functioning Water Cycle Look Like?

Precipitation falls and meets scattered plants and exposed soil. If the precipitation cannot infiltrate the soil, it displaces it and leaves a trail of erosion, as well as pollutes downstream waterways. With less water able to soak into the soil, this makes the soil more susceptible to drought conditions. Compact soil also traps CO₂ and prevents oxygen uptake.

What Does a Functioning Water Cycle Look Like?

Solar energy is the main player in evaporation. Bodies of water like oceans, lakes and rivers are constantly exposed under the sun, and the solar heat turns these liquids into gases in the atmosphere. Soil also experiences evaporation when water escapes from pores in the ground. The moist air that is created through evaporation, plus water that travels through plants into the atmosphere (transpiration), rises to higher levels in the atmosphere. This air condenses in cooler temperatures, creating clouds that are saturated with water droplets. Once the cloud is sufficiently saturated and cooled, the clouds break and water droplets begin to fall in the form of precipitation. Snow and rain fall on the ground, and plants protect the soil by absorbing the impact of precipitation. Rain droplets gently seep into the ground. Any water that is not absorbed by the soil becomes surface runoff, which eventually leads to a freshwater body. Then, water in the soil feeds springs and creeks to keep water cycling through greater bodies. As the water enters the soil, it is consumed by plant roots and microbes for metabolism. The roots develop huge networks underground between fungi and their own root hairs to maximise surface area and optimise absorption.

When Plants Cover Soil:

- Soil temperature decreases
- Evaporation reduces
- Soil gains greater resilience to drought
- Soil aggregates better to permit more gas exchange
- Microbe networks below ground are protected

Conclusion

In a functional water cycle, water transformation and utilisation is maximised in a continuous flow for all life on the planet. This ecological process is crucial for creating a regenerative organic farming system and for restoring soil health.