Canadian Organic Growers
Cultivons Biologique Canada

REHYDRATING THE LAND

Shifting the Focus: From Rainfall to Retention and Soil Health

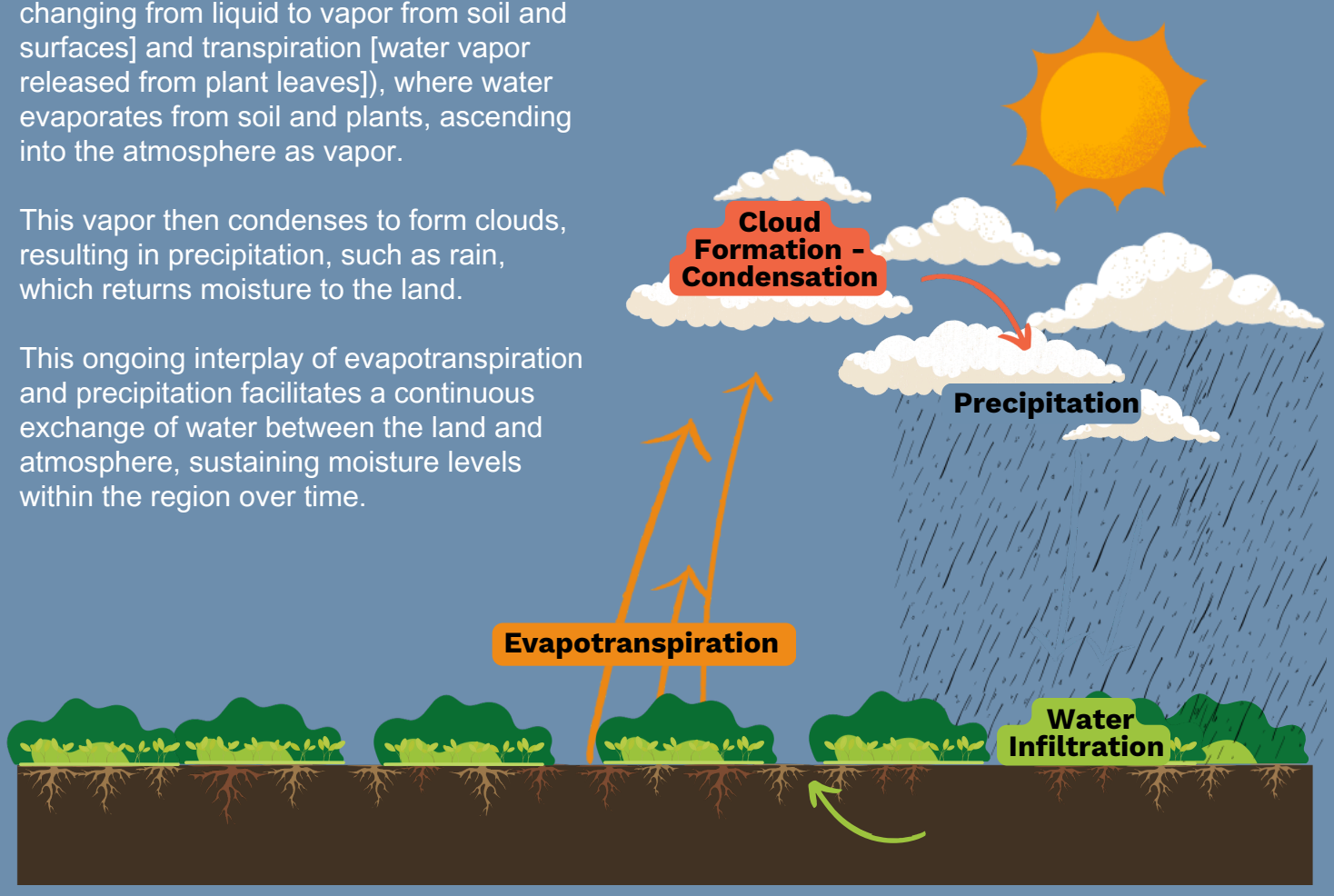
Small Water Cycle

The small water cycle, also known as the short/local water cycle, demonstrates how moisture circulates locally across land.

It begins with evapotranspiration (the combined process of evaporation [water changing from liquid to vapor from soil and surfaces] and transpiration [water vapor released from plant leaves]), where water evaporates from soil and plants, ascending into the atmosphere as vapor.

This vapor then condenses to form clouds, resulting in precipitation, such as rain, which returns moisture to the land.

This ongoing interplay of evapotranspiration and precipitation facilitates a continuous exchange of water between the land and atmosphere, sustaining moisture levels within the region over time.



The Importance of the Small Water Cycle

The small water cycle, driven by the evapotranspiration process over land, is essential for local precipitation patterns and ecosystem stability. Human activities like intensive agriculture disrupt this cycle, leading to reduced soil absorbency, increased temperatures, and irregular rainfall.

When there is insufficient water in the soil, the sun's energy, which would normally facilitate evapotranspiration, instead raises the temperature of the air and land, contributing to altered precipitation patterns. To address these challenges, initiatives closely tied to efforts to rebuild soil health and restore natural water management systems are essential.

Figure 1. Good soil structure has adequate space (pores) between aggregates to alleviate compaction so that air, water and nutrients can reach plant roots.

Photo credit: Ag Solutions Australia

Rebuilding Soil Health to Restore Natural Water Management

The small water cycle is disrupted due to degraded soil health, where rainfall evaporates into the atmosphere instead of infiltrating the compacted, carbon-deficient soil. Healthy soils are rich in organic matter, have good structure, and are full of microbial life, allowing them to retain moisture and support plant growth.

For plants to grow and transpire water back into the atmosphere— where it can fall again as local rain—soils must be healthy and carbon-rich. When the small water cycle is disrupted due to degraded soil health, rainfall evaporates into the atmosphere because it can't infiltrate into the compacted, carbon-deficient soil.

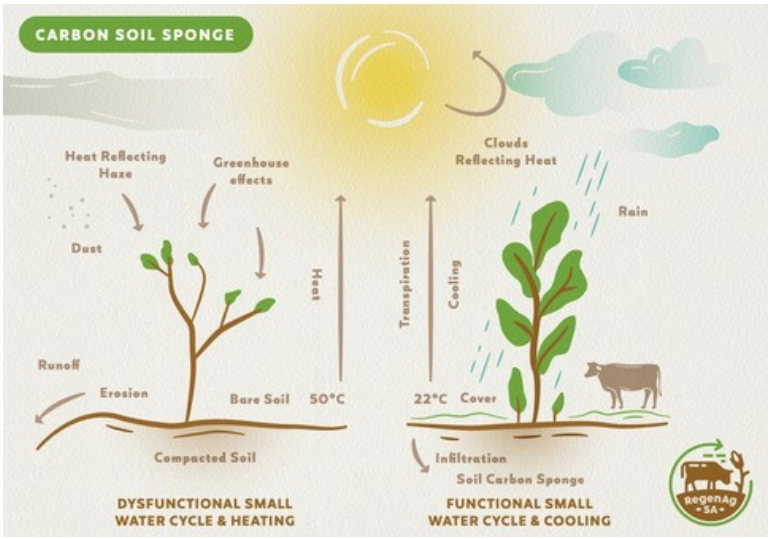


Photo credit: Regenerative Agriculture Association of Southern Africa

By improving water infiltration, we can enhance the small water cycle, retain more water in cool soil and generate greater local rainfall while simultaneously reducing fire intensity and creating essential cloud cover.

Restoring degraded soil will bring local temperature and rainfall benefits and positively impact the wider climate. By redesigning cropping and grazing practices to repair small water cycles, both farmers and the natural environment will benefit.

Effective Precipitation > Rainfall Volume

People often focus on rainfall volume, but the true concern is effective precipitation.

Without effective precipitation, rain struggles to nourish plants or replenish groundwater. Soil, like a sponge, should absorb water, but if it's as impenetrable as a brick wall (compacted), even heavy rainfall won't hydrate it.

So, it's not just about rain falling from the sky; it's about the soil's ability to infiltrate and make the most of every drop. And that all ties back to the importance of maintaining healthy soils.

Flour-Water and Bread-Water Demonstration: Visualization of the Impacts of Soil Structure and Soil Life on Effective Precipitation

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