

**SOIL ECOLOGY:**  
**DETERMINING SOIL BIOLOGICAL ACTIVITY**  
**AS A FUNCTION OF LAND MANAGEMENT**

***MENTOR:*** ALAN FRANZLUEBBERS



Soil is a vast reservoir for a wide diversity of organisms. Plant roots explore this diversity daily. Various other animals consume smaller creatures either intentionally or unintentionally by foraging on plant roots, insects, and microorganisms.

Soil ecology is the study of how soil organisms interact with other organisms and their environment – their influence on and response to numerous soil processes and properties form the basis for delivering essential ecosystem services.

Organic matter is a keystone component of soil, upon which many other processes and properties are intricately linked. Soil organic matter is an assorted mixture of organic compounds, having been processed over varying lengths of time by soil microorganisms. It may be living (e.g. plant roots, insects, fungi, protozoa, or bacteria) or it may be dead, dying, or partially decayed. The most abundant constituent of soil organic matter is carbon (50-58%), hence the congruence between soil organic carbon and soil organic matter. Availability of soil organic carbon to microorganisms is a way we can understand the health of soils, by defining soil's ability to function and decompose organic matter inputs and cycle nutrients.

Our goal is to (1) determine soil biological activity by measuring the quantity of carbon dioxide emitted, (2) relate soil biological activity to other important soil structural and nutrient cycling processes, and (3) characterize soil health from different land management schemes using a complement of soil chemical, physical, and biological measures. Research involves both field work to collect appropriate samples and laboratory procedures to quantify responses.