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“Resilience of agricultural systems against crises”

Soils and Resilience, Much More Than a Slow Variable

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Abstract

In resilience science soil properties are classified as a 'slow variable' or a factor that changes slowly in response to long-term processes. These slow variables in part determine the resilience of an ecosystem. The slow variable concept in resilience is much too limited a lens to understand the role of soil in resilience of agricultural systems and livelihoods. Panarchy theory enriches this simple concept by using the metaphor of the adaptive cycle, that better explains why apparently stable systems may become unstable quite rapidly and how drivers from other domains (social, economic, institutional) may critically affect ecological processes. In this paper we explore the role of soils in resilience by taking a view through the holistic lens of ecosystem services. A whole range of services depends on soil function - water cycles - carbon cycles - nutrient cycles. These ecosystem services, in cases where human and ecological systems are closely coupled, such as small scale farming communities in developing countries, directly impact the resilience of the population. It is possible to understand resilience and the role of soil function and soil health better by breaking down the elements that can be considered contributing to resilience - response diversity, adaptive capacity and ecological buffering capacity.

Keywords: Resilience science, soil science