



Types of Physical Soil Degradation and Implications for Their Prevention and Monitoring

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Abstract

Physical soil degradation is a deterioration of the soil's structure diminishing its functions and ecosystem services. It is mainly initiated

and manifested by physical forces and processes, such as energy impacts of water, wind and mechanical pressure on soils, and it is accelerated by various kinds of anthropogenic

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pressure. This is a threat to meeting visions of the Sustainable Development Goals of the United Nations. We review the current state of some types of physical soil degradation, such as erosion by water, wind and tillage, soil compaction and soil sealing/land take. Despite some knowledge in research of degradation processes, gaps in knowledge and need for action exist at several levels. There is a need to understand the event-wise, stochastic character of erosion and compaction processes and the complex interaction of mechanical disturbances of soil structure with soil hydrological and biochemical processes. The implications of these processes for soil health and ecosystem functioning must be better quantified, yielding indicators, baseline values and thresholds. Progress is needed to develop simulation models of soil erosion and compaction towards complex modular models that can figure and forecast ecosystem processes. There is a demand to construct manageable decision support systems, which can help to plan and conduct zero-soil degradation projects at a landscape level. Cross-comparisons of models and strengthening the databases in terms of field laboratories and long-term experiments are essential to prevent and monitor soil degradation at different scales.

Keywords

Soil degradation · Soil erosion · Soil compaction · Soil sealing · Soil health · Ecosystem modelling