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Global Change and Soil Degradation
Changement global et dégradation des sols

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Soil degradation ranges from soil loss via erosion, through chemical depletion, to water logging from irrigation systems or solute accumulation. These are all serious, if site-specific issues, but given that a large proportion of the world's land suitable for production has been already degraded by water and/or wind erosion, GCTE has placed initial emphasis on this topic in its Task "Soil Degradation Under Global Change". Accelerated rates of soil loss are usually caused by changes in land use, notably by converting natural vegetation to cropping systems, increasing grazing pressure on marginal land and intensifying production in arable land. The impact of such changes on the severity, frequency and extent of erosion will be confounded by changes in rainfall amount and intensity, and by changes in wind.

Increasing reliance is being put upon modelling studies for estimating the consequences of varied scenarios of changed land management and climate on erosion. The overall objectives of the GCTE Task are therefore (i) to refine and adapt current soil erosion models for use in global change studies in a variety of conditions; and (ii) to design and undertake experiments to provide improved mechanistic understanding of the relationships between global change and soil erosion, to aid model development. Since erosion processes have a certain threshold set of conditions, experimental emphasis is being put on the determination of such thresholds, on reversibility of processes, and on soil resilience. Infrequent climatic events, such as heavy storms, typhoons, etc. can trigger severe erosion that would be unpredictable from short-term records. Long-term erosion monitoring is therefore essential to observe possible transient and non-equilibrium interactive responses to climatic and land-use changes. The linking of erosion processes across temporal and spatial scales is another major area of research, and the comparison of modelling approaches at plot and catchment scales has been a major area of study.

Many national and international research programmes address the influence of land-use change on soil erosion. Often, however, studies are conducted as independent efforts, and a clear need for an international co-ordinating role has been apparent. GCTE helps achieve this through the activities of the GCTE Soil Erosion Network; and through this, links are being established with the Land Quality Indicators Program and other international organisations and research groups.

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