



## Tolerable soil erosion in Europe

Frank Verheijen (0,1), Bob Jones (1), Jane Rickson (1), and Celina Smith (1)

(0) European Commission - Joint Research Centre, Institute for Environment and Sustainability (IES), Ispra, Italy.  
(frankverheijen@gmail.com, +39-0332-785535), (1) National Soil Resources Institute, Natural Resources Department,  
Cranfield University, UK

Soil loss by erosion has been identified as an important threat to soils in Europe\* and is recognised as a contributing process to soil degradation and associated deterioration, or loss, of soil functioning. From a policy perspective, it is imperative to establish well-defined baseline values to evaluate soil erosion monitoring data against. For this purpose, accurate baseline values – i.e. tolerable soil loss - need to be differentiated at appropriate scales for monitoring and, ideally, should take soil functions and even changing environmental conditions into account.

The concept of tolerable soil erosion has been interpreted in the scientific literature in two ways: i) maintaining the dynamic equilibrium of soil quantity, and ii) maintaining biomass production, at a location. The first interpretation ignores soil quality by focusing only on soil quantity. The second approach ignores many soil functions by focusing only on the biomass (particularly crop) production function of soil. Considering recognised soil functions, tolerable soil erosion may be defined as ‘any mean annual cumulative (all erosion types combined) soil erosion rate at which a deterioration or loss of one or more soil functions does not occur’. Assumptions and problems of this definition will be discussed.

Soil functions can generally be judged not to deteriorate as long as soil erosion does not exceed soil formation. At present, this assumption remains largely untested, but applying the precautionary principle appears to be a reasonable starting point. Considering soil formation rates by both weathering and dust deposition, it is estimated that for the majority of soil forming factors in most European situations, soil formation rates probably range from ca. 0.3 – 1.4 t ha<sup>-1</sup> yr<sup>-1</sup>. Although the current agreement on these values seems relatively strong, how the variation within the range is spatially distributed across Europe and how this may be affected by climate, land use and land management change in the future remains largely unexplored.

\* [http://ec.europa.eu/environment/soil/pdf/com\\_2006\\_0231\\_en.pdf](http://ec.europa.eu/environment/soil/pdf/com_2006_0231_en.pdf)