The evolution of concepts for soil erosion modelling

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From the earliest models for soil erosion, based on power laws relating sediment discharge or yield to slope length and gradient, the development of the Universal Soil Loss Equation was a natural step, although one that has long continued to hinder the development of better perceptual models for erosion processes. Key stumbling blocks have been:
1. The failure to go through runoff generation as a key intermediary
2. The failure to separate hydrological and strength parameters of the soil
3. The failure to treat sediment transport along a slope as a routing problem
4. The failure to analyse the nature of the dependence on vegetation

Key advances have been in these directions (among others)
1. Improved understanding of the hydrological processes (e.g. infiltration and runoff, sediment entrainment) leading to KINEROS, LISEM,WEPP, PESERA
2. Recognition of selective sediment transport (e.g. transport- or supply-limited removal, grain travel distances) leading e.g. to MAHLERAN
3. Development of models adapted to particular time/space scales

Some major remaining problems
1. Failure to integrate geomorphological and agronomic approaches
2. Tillage erosion – Is erosion loss of sediment or lowering of centre of mass?
3. Dynamic change during an event, as rills etc form.