



Scale and processes dominating soil erosion and sediment transport: case studies from Indonesia and Australia

A.I.J.M. van Dijk (1) and L.A. Bruijnzeel (2)

(1) CSIRO Land and Water, Canberra ACT, Australia (albert.vandijk@csiro.au), (2) Faculty of Earth and Life Sciences, Free University, Amsterdam, Netherlands (sampurno.bruijnzeel@fslw.vu.nl)

Soil erosion and sediment transport at different scales of space and time are dominated by a variable set of landscape properties and processes. Research results from West Java (Indonesia) and southeast Australia are presented, taking a natural resources management perspective. The dominant role of vegetation and soil health, rainfall infiltration, and connectivity between hillslope and stream are elaborated on.

In humid volcanic upland West Java, vegetative cover and associated infiltration capacity are the dominant control on surface runoff and sediment generation, with additional variation attributed to slope and soil surface structure. Use of process models to replicate and upscale field measurements highlighted that a predictive theory to link vegetative cover and infiltration capacity is lacking, and that full knowledge of the covariance between terrain attributes that promote sediment generation is needed for process based modelling. At the hillslope to catchment scale, slope gradient and a less erodible substrate became additional constraints on sediment yield. A conceptual framework relating processes, scale and sediment delivery ratio was developed.

In water-limited southeast Australia, measures to reduce erosion and sediment production generally aim to intercept surface runoff, allowing runoff to infiltrate and sediment to settle on vegetated buffer strips or roadsides or in leaky dams. It is illustrated how remote sensing can help to assess the sources of sediment and hydrological connectivity at different scales and to identify opportunities for mitigation.