Geophysical Research Abstracts, Vol. 7, 08029, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08029

Modelling the impact of land use change and farm dam construction on the sediment delivery to river channels at the regional scale. A case study of the Murrumbidgee catchment, Australia.

G. Verstraeten (1), I.P. Prosser (2)

(1) Physical and Regional Geography Research Group, K.U.Leuven, Belgium (gert.verstraeten@geo.kuleuven.ac.be) (2) CSIRO Land and Water, Canberra, Australia

Landscapes in southeastern Australia have changed dramatically since the onset of European colonisation in the 19th century. Due to widespread forest clearance for cultivation and grazing, erosion and sediment yields have increased by a factor of more than 150. In the 20th century, erosion and sediment yield were reduced again due to an increasing vegetative cover. Furthermore, during the last decennia, hundreds of thousands small farm dams have been constructed. These dams trap a lot of sediment, thereby further reducing sediment delivery. Changes in sediment delivery since European colonisation are documented in sediment archives. In this study, these changing rates in hill-slope erosion and sediment delivery were modelled using a spatially distributed erosion and sediment delivery model (WATEM/SEDEM). This model was calibrated for Australian ecosystems using sediment yield data derived from sedimentation rates in farm dams. Sediment transport coefficients for three different land use categories were calibrated. The calibrated model was applied to the Murrumbidgee river basin (30.000 km^2) under different land use scenarios. First, the erosion and sediment yield under pre-European land use was modelled. Secondly, actual land use patterns were used in the model. Finally, actual land use including the impact of farm dams was simulated. Changes in land use were simulated by changing the vegetation factor in the erosion equation and the sediment transport capacity coefficient. The impact of farm dams was simulated by calculating their sediment trap efficiency using Brown's equation. The results show that WATEM/SEDEM is capable of predicting the intensity of the geomorphic response to changes in land use through time.