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A first-order assessment of climate change effects on rainfall erosivity and soil erosion in New South Wales, Australia

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Rainfall has shown considerable secular variation and statistically significant change on the time scale of decades in New South Wales (NSW), Australia. The climate change predictions seem to suggest an increased rainfall intensity for the region. To assess the likely impact of climate change on rainfall erosivity for 13 sites in NSW, a daily rainfall erosivity model was used to compare rainfall erosivity values using historical rainfall data and adjusted rainfall data representing future climate scenarios. To use the rainfall erosivity model, 6-min rainfall intensity data from the 13 sites were used to calibrate the model. The historical rainfall data were available for the period of 112 years (1895 - 2006) for the 13 sites. Adjusted rainfall data for 112 years were provided based on output from Global Climate Models, namely CSIRO-MK3.0 (CSIRO, Australia), MIROC-M (Centre for Climate Research, Japan); MIUB (Meteorological Institute of the University of Bonn, Germany); MRI (Meteorological Research Institute, Japan). The rainfall erosivity model was run for each of the 13 sites, and mean annual, seasonal rainfall erosivity values were contrasted for the present and future climate scenarios. In addition, rainfall erosivity values were compared for average recurrence intervals of 2, 10, and 100 years so that changes to rainfall erosivity during extreme erosive events can be assessed. The results show rainfall erosivity would increase by about 4.6% on average, and the increase occurs mostly in summer (December-January-February). Output from all 4 models suggests that rainfall erosivity would decrease in winter months. Spatially, the change to rainfall erosivity is quite variable, with greater increase mostly occurring along the coast with a temperate climate. As mean annual soil loss is linearly proportional to rainfall erosion, impact on soil loss of a similar magnitude is therefore implied for the 13 sites in NSW.