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# A Longitudinal Study of Hydrological Changes using Rainfall Simulators resulting from Destocking in the semi-arid Tropics of Australia

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After construction of the Fairbairn Dam, (1972, Lake Maraboon), on the Nogoa River, a tributary of the Fitzroy River, Central Queensland, Australia, strong environmental arguments were raised and reports written making claims that erosion in the contributing catchment would fill 20% of the dead storage area of the impoundment in 40 years. Aerial photography was used to map the areal severity of soil erosion and extrapolate delivery of sediment to the lake. Subsequently, the government moved to facilitate research into land use and grazing property management. Small catchments at the 10ha scale were instrumented to measure runoff and soil erosion because these were the landscape units suffering the greatest visible degradation and where rehabilitation could be implemented.
Throughout the study rainfall simulations of increasing sophistication were carried out (1982, 1987, 1999-2000) to explore derivation of modelling parameters that could be used to predict the impact of soil and vegetation changes at the small catchment scale under longer term climate variability and un-grazed conditions. Consequently, rainfall simulations were carried out over a range of regenerated and rehabilitated vegetative conditions on various geomorphological landscape units where soils had also undergone some metamorphosis.
This paper investigates the effects through time of "resting" and minimal intervention on some hydrological variables on a previously degraded landscape. Can rainfall simulations elucidate changes in initial losses of rainfall to runoff, changes in spatially averaged maximum infiltration and the retardance effects of increasing size of plants and subsequent increasing depression storage? Can soil biological changes through increased incorporation of organic residues from the cycles of grass growth and decay, seedling repopulation, cyrtptogam colonisation and re-colonisation of areas by ants, spiders, soil roaches and millipedes be measured under simulation plots in a way that is meaningful at the catchment scale.
Analysis of the results is part completed but indicate that the results from different simulating machines may not be reconcilable. However, the dramatic hydrologic changes that have occurred since 1996 at the catchment level are not so clear cut under a $25m^2$ rainfall simulator in all cases. Complete analysis of the data is planned for the conference.