Quantifying the relative contribution of hillslope and channel erosion in water reservoir catchments of subtropical South East Queensland, Australia

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Soil erosion in a water reservoir catchment raises a number of issues for reservoir managers including the potential for a reduction in the water storage capacity of the reservoir through sediment deposition and a decline in water quality as a result of increased turbidity and/or the transport of pollutants absorbed to the sediment. In South East Queensland (SEQ) many of the water reservoirs are located in agricultural catchments. Hence erosion can also lead to issues including loss of valuable topsoil and associated nutrients (hillslope erosion) and loss of valuable farming land (channel erosion). Managing erosion of soils and sediments is therefore an important issue for water authorities and land managers in the region.

Successful management of soil erosion is dependent on understanding the sources and causes of the erosion. Erosion processes within a catchment can be influenced by factors such as climate, geology, landuse, and land management (Rose 2004). Sediments may originate from the erosion of hillslopes, and from gully and stream bank erosion (channel erosion). At the local level, it is common for either hillslope or channel erosion to clearly be the dominant erosion process. The management of these two erosion types differs. Channel erosion is best managed by preventing stock access to streams, protecting vegetation cover in areas prone to channel erosion, revegetating bare banks, and reducing sub-surface seepage in areas with erodible sub-soils (Rutherfurd *et al.* 2000). Hillslope erosion is best managed by promoting groundcover, maintaining soil structure, and promoting deposition of eroded sediment before it reaches the stream (Marshall *et al.* 1996). It is therefore important to be aware of the dominant source of erosion before attempting local or catchment-wide management to control it.

Sediment tracing techniques are useful methods to determine erosion sources within the landscape. The fallout radionuclide tracing method can be used to assess the relative contribution of hillslope and channel erosion to stream sediments by measuring differences in activity concentrations and ratios between Caesium-137 (^{137}Cs), which is anthropogenic, and naturally-occurring and excess fallout Lead-210 (^{210}Pbex) (Motha *et al.* 2002; Olley *et al.* 2001; Wallbrink and Murray 1993). Whilst the characteristics of the spatial source of erosion can be determined by measuring major and trace elements using X-ray fluorescence (XRF) (Olley *et al.* 2001). The objective of this study is to examine the erosion processes generating sediment in three water reservoir catchments of South East Queensland with different landuses and geologies. Traditionally, the characterisation of sediment delivered to waterways during rainfall events has been conducted on channel lag deposits collected after the event. This study is unique in that suspended sediment samples were collected from streams during the event and therefore changes in the source of sediment throughout the event can be identified. These samples, collected from seven event monitoring stations in three water storage catchments, together with samples of potential source materials are currently being analysed for fallout radionuclides (^{137}Cs and ^{210}Pb) and major trace elements (by X-ray fluorescence (XRF)). The results of this study and their implication for the management of erosion in these catchments will be presented and discussed.

References

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