Combining tracers and landscape modelling to predict sources of sediments and phosphorus to waterways

Ck. Bundella **C. J. Wilson**
P. J. Wallbrink **C. Martin**

The Liverpool plains in the Namoi River basin, NSW, is one of the most productive agricultural regions in Australia. However sedimentation in the streams and rivers running through it has resulted in severe environmental degradation. Eutrophication is also a major associated issue, algal blooms persistently occur. The occurrence of these blooms is associated with excess available Phosphorus. This phosphorus is derived as either particle bound from erosion of diffuse sources or as runoff of fertiliser p from cultivated and pastureland areas. The three major erosion sources of particle bound P are: i) sheet erosion of the 40% land surface under cultivation, ii) subsoil erosion from the significant number of channels and gullies that drain the region and iii) surface erosion from the pastureland and forested parts of the catchment. Fertilisers based on Nitrogen, P and K are used extensively in the catchment. The Bundella Ck catchment within the Namoi system, contains each of these landuses. As such it is an ideal location to determine the influence of these different diffuse sources to fluxes of sediments and p in this landscape. In this paper we use fallout tracers to quantify the proportionate contributions of sediments and diffuse P from these different sources. We also use measurements of REE and strontium isotopes to ascertain the contribution of fertilizer derived P compared to that from diffuse native P. We also create a topographic model to independently predict the contributions of sediment and P from these different sources. The strength of the model is its ability to charac-

terize not only fluxes of material from surface erosion, but also that from subsoil channel and gully erosion processes. We compare the results of sediment and P fluxes from the tracers and the topographic model and investigate the potential for applying the model to other parts of the landscape in which tracer data is not available.