Soil erosion and sedimentation is an increasing problem in South Africa with detrimental effects on rivers and impoundments. In order to address these sediment-related problems, we need to understand the dynamics of these processes. At Geography, Rhodes University, we have recently established a new Environmental Tracing Laboratory. We make use of mineral magnetic characterisation and gamma-ray spectrometry to fingerprint and trace sediments. We have applied it to a wide range of scenarios and locations in South Africa, some with success and others not. Various scales were covered including gully-fan complexes, small catchments of farm reservoirs, alluvial fans and wetlands and sediment movement down large river systems (Mzimkhulu, Mokolo, Orange). In the process of developing tracing methods, we have learnt various lessons regarding sampling design, site selection, sampling and sample processing. In this paper, we will give an overview of how we have applied the various methods and the lessons we have learnt from it.