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Pinpointing areas of increased surface erosion following land cover changes using RUSLE modelling and sediment fingerprinting: a case study of the Lake Manyara catchment, Tanzania.

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Lack of long-term scientific land cover and sediment flux data impedes the development of sustainable land management plans to tackle the increasing land degradation and soil erosion problems in East-Africa. Using Landsat imagery this study managed to reconstruct almost three decades of land cover change (1988-2016) in the Lake Manyara catchment, Tanzania. The main observed trend was the conversion of natural or semi-natural land cover towards agricultural cover with ‘permanent savanna’, ‘bushland’ and ‘seasonal grassland’ as the biggest declining cover types. Subsequently, the effect of these land cover changes on the surface water erosion risk was modelled using the RUSLE approach. The results highlighted that a lot of the land conversion happens in high risk areas, seriously increasing the surface erosion risk in these areas. Complementary to the risk change mapping, information about the actual sediment movement was gained by tracing the transported riverine- and deposited lake sediment. By unmixing the fingerprints of the lake mixture and riverine sources, the proportional sediment contributions of the different subcatchments in Lake Manyara were obtained. The sediment contribution from different subcatchments closely matched with those subcatchments where the model predicted big increases in surface erosion risk. This study thus highlights the potential for combining risk change mapping and sediment fingerprinting, which is particularly useful for pinpointing exact areas of increased erosion and that way assist management authorities to target these areas for on-site action.