



Hydrograph separation

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In order to quantify various runoff components during floods in the semi-arid Makanya catchment in the South Pare Mountains of Tanzania, natural tracers were used. Two flood events were investigated during the rainy season of Oct- Dec 2005 and analysed for electrical conductivity, dissolved silica, chloride and sulphate. The first event (9-11-05) showed two peaks, each originating from one subcatchment (Vudee and Ndolwa), and each with distinct water quality signatures. Hydrograph separations indicated that the two peaks in the hydrograph originated from a delay in response between the two catchments, hence the variation in the water quality at the downstream point of measurement. The hydrograph separation indicated that for this event over 80% of the discharge could be attributed to groundwater, while the remainder (20%) was due to surface runoff. The dominance of groundwater was also indicated by the lack of suspended sediments in the samples (no erosion through surface runoff formation). A second flood event was sampled on 28-11-05. During this event the contribution from Ndolwa was much higher than from Vudee, which was clear from variations in both sulphate and silicate concentrations. Furthermore, the two hydrographs sampled indicated a delay in the time-to-peak of around 5 hours between the concentration front and the discharge. Our study indicates that hydrograph separation using natural tracers has potential in identifying runoff generating processes and identifying the hydrogeological and hydro-chemical processes. The importance of groundwater for flood formation in this semi-arid catchment was clearly demonstrated.