

Anastomosing reach control on hydraulics and sediment distribution on the Sabie River, South Africa

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Abstract Rivers in the Kruger National Park, South Africa, have variable degrees of bedrock and alluvial influence. Pre-2000 aerial imagery for the Sabie River (catchment area 6320 km²) reveals downstream alternations from alluvial single thread or braided, to bedrock anastomosed or mixed anastomosed channel types, with pool-rapids also present locally. In 2000 and 2012, extreme floods resulted in significant alluvial erosion, widely exposing the underlying bedrock. Since the 2012 flood, aerial LiDAR surveys reveal the strong gradient control exerted by the bedrock and mixed anastomosed channel types, which influences hydraulic conditions and sediment dynamics. Two dimensional hydraulic modelling of moderate floods (<1500 m³ s⁻¹) reveals reduced velocities upstream of bedrock or mixed anastomosed channel types, which promotes deposition. During more extreme floods (>3500 m³ s⁻¹), the bedrock or mixed anastomosed channel types are drowned out, resulting in dramatically increased velocities along the entire river and widespread alluvial stripping regardless of initial channel type or location.

Key words semi-arid river; 2D modelling; anastomosing channels; flood impact; Sabie River, South Africa