

'Out with the Old?' Why Coarse Spatial Datasets are Still Useful for Catchment-Scale Investigations of Sediment (Dis)Connectivity

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Review

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3 1 **'Out with the Old?' Why Coarse Spatial Datasets are Still Useful for Catchment-**
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5 2 **Scale Investigations of Sediment (Dis)Connectivity**
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20 9 **Abstract**
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24 11 The increasing popularity of remote sensing techniques has created numerous
25 12 options for researchers seeking spatial datasets, especially digital elevation models
26 13 (DEMs), for geomorphic investigations. This yields an important question regarding
27 14 what is the most appropriate DEM resolution to use when answering questions of
28 15 geomorphic significance. The highest possible resolution is not always the best
29 16 choice for a particular research aim, and DEM resolution should be tailored to fit both
30 17 the scale of investigation and the simplicity/complexity of modelling processes
31 18 applied to the dataset. We find that DEM resolution has a significant effect on a
32 19 simple model of bed load sediment connectivity in the Lockyer Valley, Queensland.
33 20 We apply a simple bed load transport threshold to catchment DEMs at three different
34 21 resolutions – 1 m, 5 m, and 25 m. We find that using a 1 m resolution DEM
35 22 generates numerous disconnections along tributary channel networks that
36 23 underestimates the sediment contributing area, effective catchment area (ECA), of 7
37 24 tributary basins of Lockyer Creek. Utilizing a coarser (lower-resolution) DEM helps
38 25 eliminate erroneous disconnections, but can reduce the detail of stream network
39 26 definition. We find that the 25 m resolution DEM provides the best measure of ECA
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3 27 for comparing sediment connectivity between tributary catchments. The utility of
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5 28 simple models and coarse-resolution datasets is important for undertaking large,
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7 29 catchment-scale geomorphic investigations. As catchment-scale investigations are
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9 30 becoming increasingly entwined with river management and rehabilitation efforts,
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11 31 scientists need not embrace an 'out with the old' philosophy. Simple models and
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13 32 coarse-resolution datasets can help better integrate geomorphic research with
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15 33 management strategies and provide inexpensive and quick 1st-order insights into
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17 34 catchment-scale processes that can help focus future management efforts.
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23 36 **KEYWORDS:** effective catchment area, DEM resolution, sediment budget
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