

Catchment Elements in the Granites and Basalts of Southern KNP

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The conceptual framework

- In water-controlled ecosystems, the temporal and spatial distribution of water constrains a wide range of ecological processes
- Water partitioning largely results from interactions and feedbacks between vegetation, soil and topography
- Which also generate and sustain distinct patches of soil and vegetation at multiple scales
- Arranged in patterns that reflect the spatial configuration of drainage networks

Why another classification?

- Links hillslopes to drainage network
- Groups areas dominated by similar hydrological processes (e.g. rainfall partitioning and water storage capacity)
 - Patches controlled by the same dominant processes are likely to respond in similar ways to disturbance, management initiatives and environmental change
- Allows experimental designs and sampling strategies for research and monitoring to be designed in a spatially explicit way within the topographic, soil, vegetation and water distribution contexts that drive the system at multiple scales

The Landscape Hierarchy

Morphometric units are large-scale patterns of landscape dissection

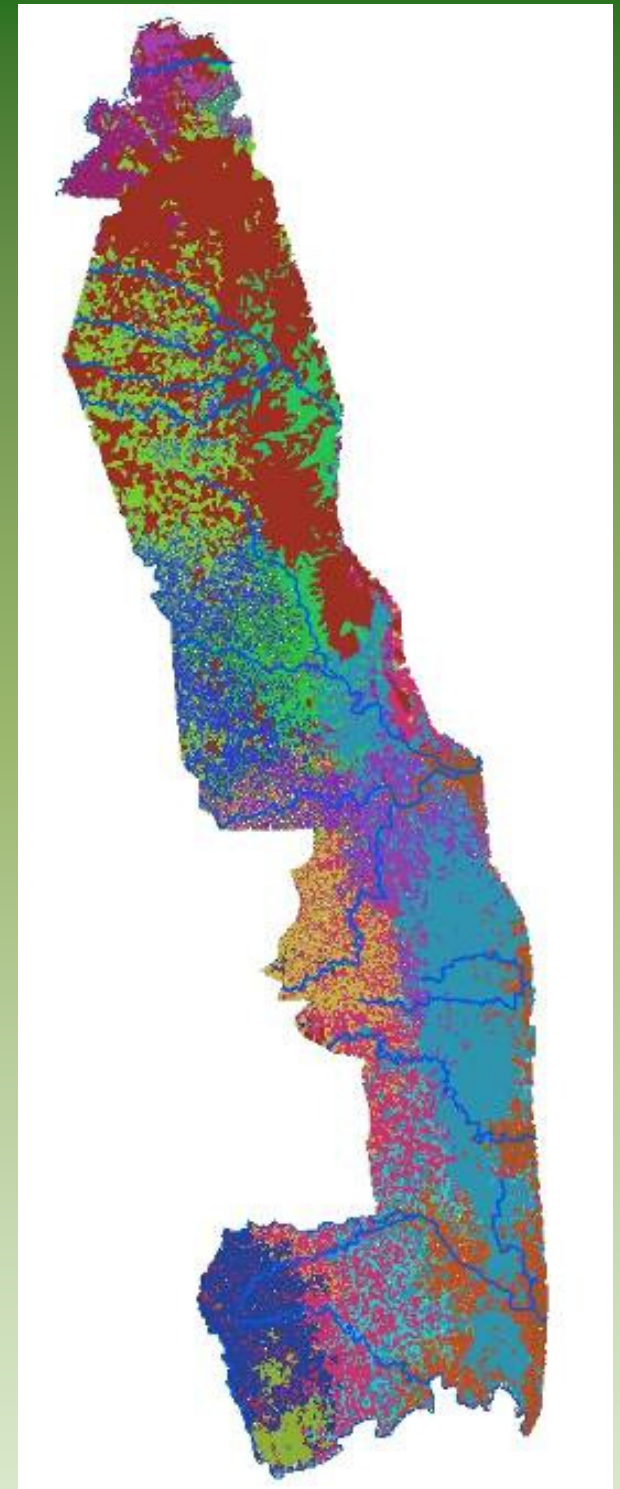
Catchments within each morphometric unit tend to display characteristic mosaics of lower-level elements that control the movement of water across and through the landscape.

Catchment elements are patches of relatively homogenous soil and vegetation, associated with a particular slope position - a three-dimensional catena

Morphometric Units

Patterns of landscape dissection

- Mapped by clustering key topographic variables associated with the catchments draining into each stream segment
 - stream length
 - catchment area
 - mean gradient
 - elevation
- Results reflect
 - geological and rainfall patterns
 - incision by the major rivers



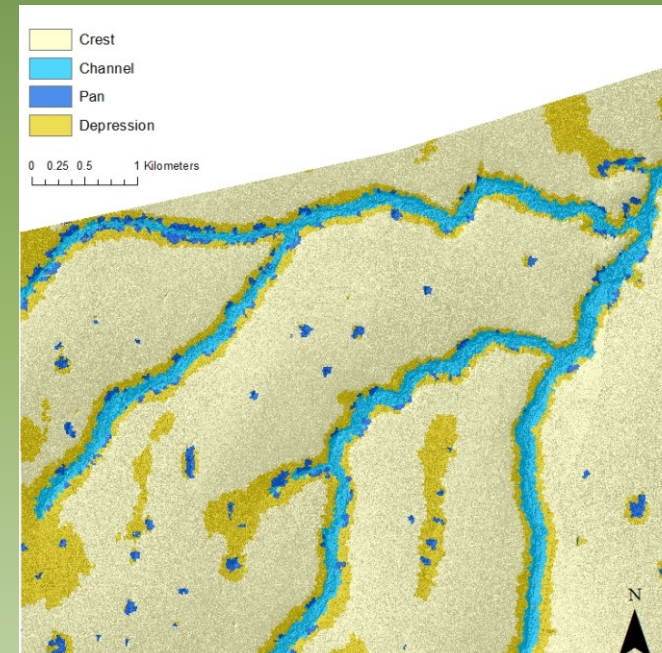
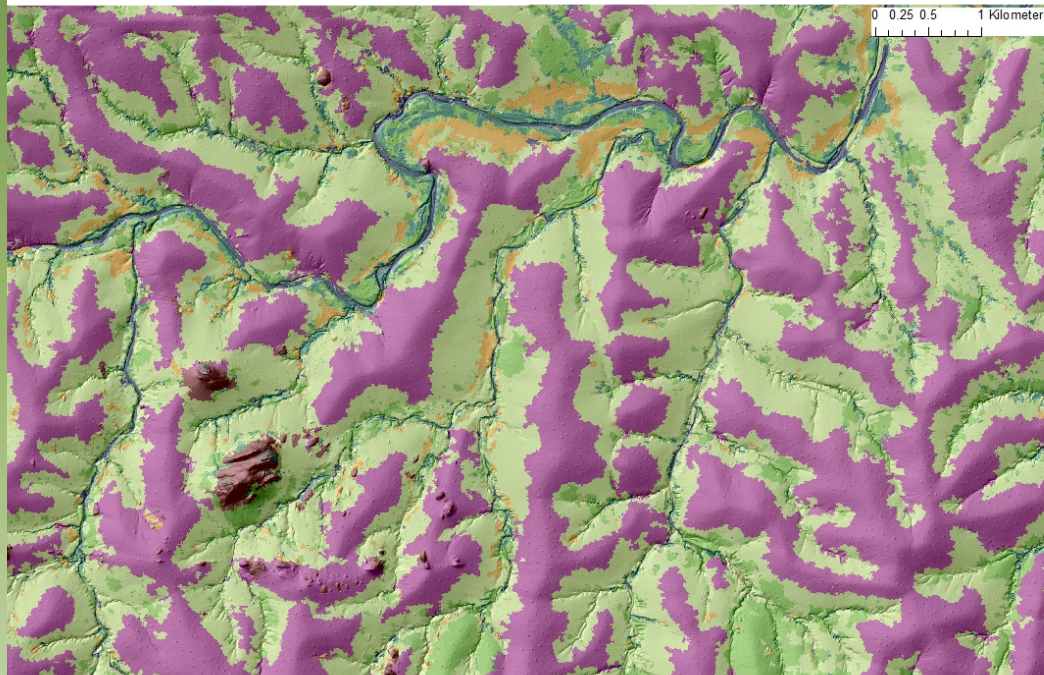
Patterns of landscape dissection...

- Reflect the geological and climatic setting
 - Nature of substrate and weathering products (soils)
 - Amount and nature of water input (rainfall)
- Determine the character of hillslopes found in each setting
 - Area drained, slope length
 - Slope gradient – energy available to move water and particles
- Hillslope character in turn controls the types of elements found in each catchment

Granites

Basalts

CREST	MIDSLOPE	RIPARIAN AND CHANNEL
Woody crest	Grassy	Tall trees
Koppie	Woody	Unvegetated, possibly sodic
		Sandy river bed

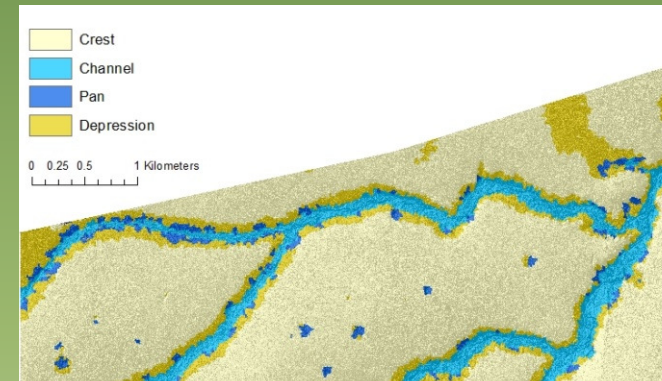
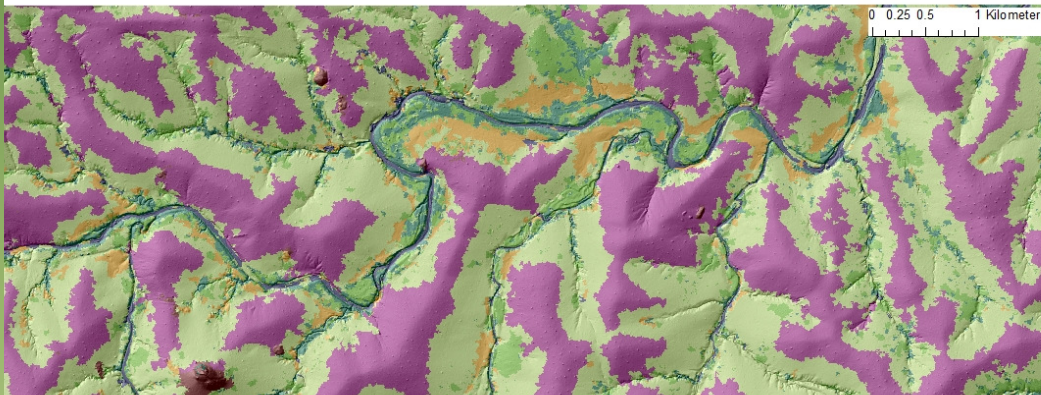


- Combination of topographic elements and vegetation patterns derived from CAO LiDAR and SPOT5 imagery

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- In both settings the landscape is organised by the drainage network.
- These maps are at the same scale – the higher stream density in granites mean that these landscapes are partitioned at a finer scale than basalts
- Different suite of catchment elements in each setting

Each catchment element has distinct structural and functional characteristics

	Hydrology	Vegetation	Soils
Crest				
Midslope				
Channel				
.....				

Scaffolding

- This framework provides scaffolding
- Building on Freek Venter's solid foundations
- Up to you to build the mansion....
- An ongoing process – synthesizing existing and new knowledge expands our understanding of each landscape element, improving contextual information for the next generation of research
- Kruger ideal place to build, providing an environment for the collaborative effort needed