Digital Soil Mapping in the NZ context: Hawke's Bay, North Island, New Zealand

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Digital Soil Mapping (DSM) techniques have become an essential part of the NZ pedologist's toolkit. Methods for incorporating DSM applications guided by prior knowledge have been refined. This paper focuses on mapping approaches in the Hawke's Bay region.
The Hawke's Bay region is a tectonically active forearc region. The region contains greywacke mountains, volcanic plateaus, hills and downlands of erosion prone sedimentary rock and limestone, river terraces, fans, floodplains, limestone cuestas, uplifted marine benches and melange landforms. Strong gradients in rainfall (800 - 3,000 mm/yr), tephra (0 - >1 m) and loess (0 - 1 m) thickness, and incidence of erosion/deposition by fluvial and mass movement processes has led to identification of 24 land systems. Strong gradients and contrasts in soil forming environments make DSM techniques effective, even with a 15 m Digital Elevation Model (DEM) in downlands and short hill country. Much of the Hawke's Bay Region has greater than 20° slopes and is underlain by erosion prone materials. This has led to complex patterns of hydrology, erosion/sedimentation and eluviation/illuviation in a 4-dimensional setting with respect to space and time. Where deep loess was present in combination with duripans, pedodiversity was low and predictability of soil patterns was high. DSM was not effective for the alluvial terraces of the Ruataniwha Plains in the absence of information about presence/absence of pans, stones and allophanic soil materials under the soil surface – a role for citizen science. In the accretionary wedge, tectonic disruption of the rock mass and subsequent mass movement was complete and anticipated pedodiversity was absent.
Pedologist-defined sampling was employed to develop prior knowledge of land systems based on observed recurring patterns of soils, followed by a DSM process. The pedologist developed purpose-built covariate layers, including 1:25,000 scale maps of parent materials and terraces of different ages.