Spatial uncertainty in remote sensing: The impact of scale and error on analysis in landscape ecology.

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The use of remotely sensed derived thematic data has become ubiquitous in landscape ecology. Remote sensing data has the potential to describe broad scale landscape pattern and relate it to landscape processes such as species persistence and distribution. However, these datasets are being used in ecological analyses without incorporating spatial uncertainty that is ever present in remote sensing data. Maps derived from remote sensing data will vary in the extent, patchiness and accuracy of their landcover classes. Differences in the classification are the result of the inter-relationships between a number of scale dependent factors such as pixel size, minimum mappable unit and categorical resolution as well as classification error. Furthermore, the effect of these factors on landcover classification is more pronounced in fragmented environments which are spatially complex, with habitat patches varying in size from median strips (~10m²) to large vegetation remnants contained within national parks (100km²).

This thesis investigated the interaction and the relative importance of scale dependent factors and classification error on the characterisation of landscape pattern and ecological analysis using real and synthetic landcover data. It demonstrated that the characterisation of landscape pattern is sensitive to spatial uncertainty. For example, ecologically important landscape elements such as small and linear vegetation patches will have lower classification accuracies and are less likely to be extracted than larger more compact features, highlighting the uneven spatial distributions of classification error within remote sensing landcover maps. It also showed that results of ecological analysis such as the calculation of landscape metrics, and ecological models will be affected by spatial uncertainty. Without this type of research, future analysis using remote sensing data will continue to produce results containing unquantifiable uncertainties leading to poor and/or ineffective management decisions.

Date: 4 June, Thursday
Time: 1:30 pm – 2:30 pm
Venue: Access Grid Room, 8.9.64-66