

## Analyzing the Consequences of Environmental Spatial Patterns on Environmental Resources: the Use Landscape Metrics Generated from Remote Sensing Data

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A number of existing and new remote sensing data provide images of areas ranging from small communities to continents. These images provide views on a wide range of physical features in the landscape, including vegetation, road infrastructure, urban areas, geology, soils, and water courses. Despite increases in the spatial and attribute resolution of images over the last few years, we have fallen behind on our ability to move these images beyond pretty pictures to robust environmental assessments. This paper presents a series of methods developed by the US Environmental Protection Agency to analyze spatial patterns in the environment and the consequences of such patterns on the conditions of ecological resources, including forests, water, and biota (biological diversity). The methods apply fundamental principles from the fields of landscape ecology and ecological hierarchy theory, and take advantage of new remote sensing databases and advances in geographic information system (GIS) technology. We demonstrate the applications of these approaches relative to three scales: (1) an assessment of forest fragmentation at the global scale, (2) an assessment of water resources at a regional scale, and (3) an assessment of habitat resources (biological diversity) at a watershed or catchment scale. **Key Words:** Landscape Ecology, Remote Sensing, Ecological Assessment, Geographic Information Systems.