The Use of Digital Landscape Models for Large-Area Reconnaissance Wetland Resource Inventories: Model Development and Case Studies on the Greater Yellowstone Area

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Performing wetland inventory over large areas has been problematic for resource managers. Specialized, ground-based inventories often have high cost and tend to focus on easily-accessible parts of the study area. Approaches using satellite imagery avoid some of these problems, but high sampling rates drive costs up and technology limits accuracy and precision. I propose a method of delineating wetlands using an approach that can complement the above systems. This method is partially based on my past experience developing GIS-based resource monitoring methods in the People's Republic of China, and experience in the generally-forested Greater Yellowstone Area in the United States.

Existing soil and ecological inventories contain a wealth of information on the landscape, including present conditions as well as indicators of potential sites. These inventories have been ground-truthed and are usually at rather large scales. However, their methodology varies widely with age. Terminology, map unit size, interpretive systems, and management emphasis all affect their design and execution. Attribute data is in different formats. Maps may be in different projections with poor or no edge-matching to other surveys. My proposal is to integrate them using geographical techniques in GIS, importing and converting attributes to standardized form, using professional consulting to standardize terminology and spatial data, and developing query-based systems to extract information appropriate to the accuracy of the component inventories.

My case study includes the Greater Yellowstone Area (14 million acres.) I developed a "landscape model" using existing digital data, then used that model for two projects: to predict soil properties for ecological studies, and to evaluate vulnerability of watersheds in the area. In this report I show the results of those uses as well as a trial run of wetland prediction based on landscape properties. Though the results are not site-specific, they are of sufficient detail to focus further efforts on areas having the landscape properties appropriate for site investigation. This approach's advantages are consistency over the geographical area, repeatability, self-documentation, and data-independence once the initial landscape model is developed. My approach is repeatable and property-based, using commonly-available corporate software and hardware, making it transportable and compatible with future data additions. I can use the model to predict conditions favoring wetlands on a landscape scale, to help focus expensive ground-based inventories or satellite studies toward areas having high potential for wetland occurence.

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