

Conservation Ranking of Watersheds versus Land Type Associations Using Remotely Sensed Land Cover Data

I. Problem Definition

The spatial extent of different land use and land cover categories (e.g. cropland, forest, grassland, etc.) is perhaps the best single indicator of overall land health and environmental quality. For example, the extent of cropland within a drainage basin is closely linked with non-point source pollution problems such as sediment loading, pesticide loading, and nutrient loading; the extent and patch size of forest is linked with an area's potential to support forest biota such as neotropical migratory birds. Land type often determines land cover at a local, intermediate, and regional scale. For example, river floodplains of 10s to 100s of square kilometers in north and central Missouri are often used almost exclusively for row crop production, whereas adjacent hills are used as pasture or wood lots. Non-point source pollution from these land types is vastly different. Watersheds, especially at larger scales, often cross major land types such as broad floodplains and rolling hills. Therefore, ranking watersheds by use of mean values for any variable sensitive to land type (e.g. land cover) may be misleading or entirely spurious. For example, ranking watersheds for overall environmental quality (wildlife habitat, potential for non-point pollution, etc.) by comparing mean values for hectares of row crop production would be valid only if land type were held constant for all watersheds. None-the-less, land cover and other variables sensitive to land type are often summarized by watershed and used to define regional conservation priorities.

II. Goals

Our goal is to test the validity of ranking watersheds for conservation via attaching variables that are sensitive to land type differences. We will rank both land type associations (uniform landforms of 10s to 100s of square kilometers) and watersheds within the same region using the same variables derived from land cover statistics. Will similar areas be highlighted as important conservation concerns? If not, which approach should be used to define priority conservation areas?

The validity of ranking watersheds and the examination of differences between land type association and watershed ranking is critical to the overall thrust of the MoWIAP project. We will test alternative approaches to identifying conservation priorities within a single region. Models designed to identify priorities for conservation are only as valid as the basic approach used. How valid is any model for ranking watershed, regardless of the model's flexibility? This project is set to analyze the validity of watershed ranking. If ranking of land type associations results in different priority areas versus watershed ranking within the same region using identical criteria, is there a hybrid approach that might better identify true priority areas?

III. Study Approach

For watersheds and land type associations of the Dissected Till and Loess Plains of north central Missouri (essentially the area north of the Missouri River from just east of Kansas City east to Glasgow) we will: (1) define and refine maps of ecological land type associations, (2) refine the Missouri land use/land cover classification as far as possible using Thematic Mapper satellite data, (3) attach land use/land cover variables to land type associations and to watersheds using GIS, and (4) define regional conservation priorities by land type association and watershed by using land cover variables as an index to overall land health. Appropriate land cover variables and models (e.g. total cropland, patch size of forest land, total cropland within 150 meters of streams, total grassland,



sums or combinations of these variables) will be defined in concert with EPA and Missouri DNR personnel, plus other interested MoRAP partners. Thus, a flexible decision support tool will emerge from the defining and testing of different models.