DEVELOPMENT OF ELTP LAYER FOR THE HOOSIER NATIONAL FOREST, SOUTHERN INDIANA

Andriy V. Zhalnin, George R. Parker, and Patrick Merchant[†]

One of the critical components of decision making in natural resource management is ecological information. The US Forest Service adopted a national ecological classification hierarchy in 1993 with ELT (ecological land type) and ELTP (ecological land type phase) forming the lower levels of the hierarchy (ECOMAP 1993). This study examines the potential of computer mapping ELTPs for the Hoosier National Forest (HNF) located in southern Indiana.

Van Kley developed an ecological classification for the forest in 1993 that includes six ELTs and sixteen ELTPs in total for both subsections (Van Kley et al. 1995). The most important factors affecting classification at ELTP level were A-horizon depth and vegetation composition. An ELT layer based on physiographical conditions was mapped with GIS tools (Shao 1998).

An extensive ELTP sampling was performed in 2001 and 2002 within the four units of HNF that are situated within the Brown County Hills (BCH) and Crawford Upland (CUP) subsections according to the eastern United States classification (Keys, Jr., McNab, & Carpenter 1995). We used a 10 m resolution USGS DEM and a soil survey map as a source data layers. GIS layers were calculated with ArcView or ArcInfo tools. Each sample point received elevation, slope, aspect, curvature and soil type values from respective GIS layers.

We performed statistical analysis only for those ELTPs that occupy sites similar in physiography and differ only in vegetation and soils in classification description. Kruskal-Wallis test of landform variable means indicated a statistically significant variation ($P<0.05$) among all ELTPs in elevation, aspect, slope and profile curvature both for BCH and CUP subsections. A pairwise Mann-Whitney test showed a significant difference ($P<0.05$) in general and plane curvature between ELTPs 10 and 11 (BCH), and ELTPs 21 and 23 (CUP). Elevation difference was significant between ELTPs 20 and 21 (BCH), and ELTPs 50 and 51 (BCH, CUP). Chi –Square test of soil types derived from soil survey map units revealed significant difference ($P<0.05$) in soil type constancy between ELTPs 50 and 51 (BCH, CUP); 10 and 12 (CUP); 20 and 21 (BCH, CUP); 20 and 23 (CUP); 21 and 22 (CUP); 60 and 61 (CUP).

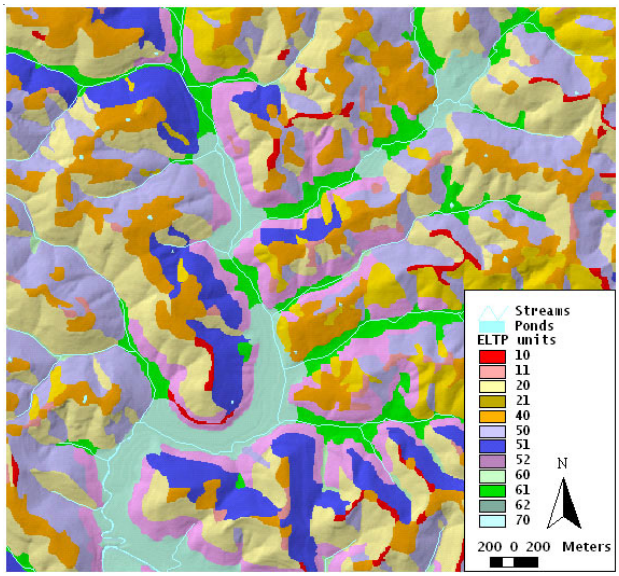

Figure 1.—An example of ELTP map, Lost River Unit, HNF.

We generated ELTP subunit map based on physiography characteristics defined in classification and used our survey points as well as information from statistical testing to map ELTPs characterized only by differences in vegetation and soils in original classification. Resulted map provides the basis for development of Land Type Associations using “bottom-up” approach.

This research was funded by the USDA Forest Service.

[†]Ph.D. Candidate (AZ), Professor (GRP), Department of Forestry and Natural Resources, Purdue University, West Lafayette, IN 47907; e-mail: azhalnin@purdue.edu, (PM) Soil Scientist, Hoosier National Forest, Bedford, IN 47421; e-mail: pmerchant@fs.fed.us