Determination of Indicators of Ecological Change

SERDP Strategic Environmental Research and Development Program
Improving Mission Readiness Through Environmental Research

ERDP's SEMP Ecosystem Management Project

Background:

The concept of ecosystem integrity, or "health", in the context of the military installation, encompasses not only the sustainability of the "natural" biota in the system, but also the sustainability of human activities at the installation, primarily the military mission. Thus, changes in ecological condition are of great concern to both resource managers and military trainers. A suite of variables is needed to measure changes in ecological condition. Two types of indicators that may be useful are (1) variables that inform managers about ecosystem status and (2) variables that signal impending change in ecosystem functions..

Objective:

The goal of our research is to develop suitable indicators of ecosystem integrity and impending ecological change resulting from both natural variation and anthropogenic activities. We will identify physical, chemical and biological properties and processes that reflect ecological condition and change in intensively and lightly used ecosystems on the Ft. Benning military installation.

Approach:

The University of Florida – Purdue University research team is employing a multidisciplinary and multi-scale approach, which will result in robust techniques for ecosystem monitoring and evaluation. We are evaluating a suite of parameters related to properties and processes in the soil, understory vegetation, and surface hydrology as potentially sensitive indicators of ecosystem integrity and ecological response to natural and anthropogenic factors. In general, the soil hydrologic and biogeochemical parameters to be examined relate to changes in soil physical and chemical characteristics, and the response of soil microbial population and plant communities.

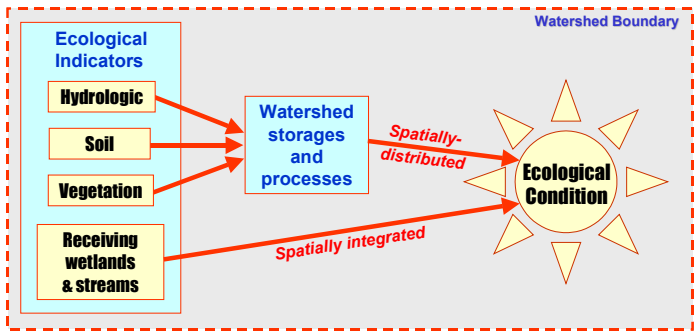
Preliminary Results:

Relationships among ecological indicators and land condition are being evaluated following soil and vegetation sampling at 300 sites over a broad area encompassing a range of military and non-military land use and anthropogenic disturbance (low-intensity sampling). From this analysis, a short list of promising indicators were selected for further evaluation. Concurrently, a watershed scale evaluation of hydrologic and biogeochemical response to intensive military land use has been ongoing in paired watersheds in the Bonham Creek area.

Results obtained thus far have revealed a strong relationship between land disturbance and plant-available water (soil moisture) and nutrients. During the next year hydrologic, soil and vegetative indicators will be evaluated in localized areas of relatively homogeneous environmental conditions (high-intensity sampling) to determine short-range spatial and temporal variability in indicator response. Additional watershed-scale monitoring in four representative basins will be used to link hydrologic cycling with vegetation patterns and soil biogeochemical characteristics.

Benefits:

Results of the study will enhance the ability to avoid, minimize, mitigate or remove major environmental constraints on DoD's ability to conduct the military mission. Early indications of change, and understanding of the likely causes, will improve installation managers' ability to manage activities that are shown to be damaging, and prevent long-term, negative effects.



For more information, visit the SEMP website
http://www.denix.osd.mil/SEMP

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