SERDP
Strategic Environmental Research and Development Program

Developing a Spatially Distributed Terrestrial Biogeochemical Cycle Modeling System to Support the Management of Fort Benning and its Surrounding Areas

Conservation
CS-1462

Background:

Biogeochemical cycles describe the movement of nutrients, matter, and elements between the earth's systems and influence a variety of biological, geological, and chemical processes. Well-designed models predicting fluctuations in the biogeochemical cycles of carbon (C) and nitrogen (N) can provide valuable information on the impacts of land management and uses, climate change and variability, and other ecosystem processes dependent on those cycles. Current models are limited by the scale to which they can accurately predict changes in these cycles. Relating them to land use and management on a regional scale and taking into account on-installation land practices is a challenge.

Objective:

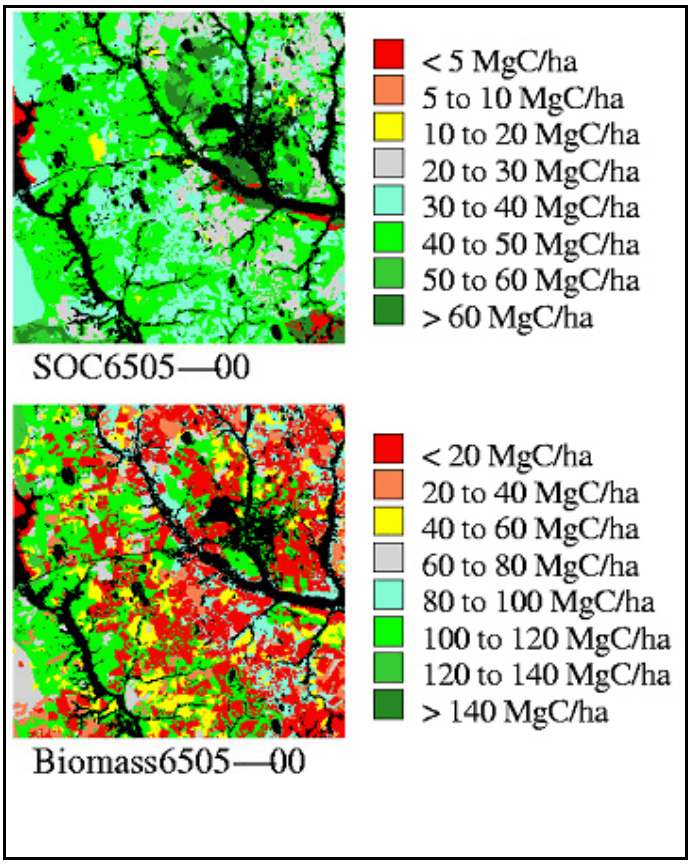
The objective of this project is to develop an advanced, spatially distributed, terrestrial biogeochemical cycle modeling system for Fort Benning, Georgia, and its surrounding ecosystems. This system will contribute to an overall understanding of ecosystem dynamics and enable development of nutrient availability thresholds.

Process/Technology Description:

This research will be conducted in two phases. In the first phase, a conceptual modeling system consisting of a plot-scale and a regional-scale model of both C and N cycles will be developed. The system will address the impacts of natural processes and land management practices on C and N cycle dynamics for ecosystems on and around Fort Benning. The conceptual modeling system will modify and expand upon existing biogeochemical models in order to leverage existing biogeochemical research at Fort Benning. In the second phase, the conceptual modeling system will be implemented numerically, using model parameters and driving variables derived from existing Fort Benning research activities. Due to the spatially explicit simulations of soil C and N movements on the landscape, the modeling system will be capable of operating at a range of spatial scales in terrestrial, riparian, and aquatic contexts.

Expected Benefits:

This modeling system will provide installation managers with valuable information describing the biogeochemical responses of Fort Benning's ecosystems. Installation managers then can apply that information toward improving their land use and management activities, including restoration of longleaf pine forests, prescribed fire regimes, and rehabilitation of lands and waterways for sustained military use. Furthermore, this modeling system will be developed in such a way that it can be readily adapted to simulate C and N cycles in other geographical regions. (Anticipated Project Completion - 2008)



Spatially explicit modeling of carbon stocks in soils (SOC) and vegetation (biomass) in 2000 in a 10-km by 10-km block (ID: 6505) in the vicinity of Fort Benning, Georgia. Impacts of soil erosion and deposition were not included.

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