Linking Local Scale Ecosystem Science to Regional Scale Management

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Ecosystem management with respect to sufficient water yield, a quality water supply, habitat and biodiversity conservation, and climate change effects requires substantial observational data at a range of scales. Complex interactions of local physical processes oftentimes vary over space and time, particularly in locations with extreme meteorological conditions. Modifications to local conditions (ie: agricultural land use changes, nutrient additions, landscape management, water usage) can further affect regional ecosystem services.

The international, inter-disciplinary TERRECO research group is intensively investigating a variety of local processes, parameters, and conditions to link complex physical, economic, and social interactions at the regional scale. Field-based meteorology, hydrology, soil physics, plant production, solute and sediment transport, economic, and social behavior data were measured in a South Korean catchment. The data are used to parameterize suite of models describing local to landscape level water, sediment, nutrient, and monetary relationships. We focus on using the agricultural and hydrological SWAT model to synthesize the experimental field data and local-scale models throughout the catchment. The approach of our study was to describe local scientific processes, link potential interrelationships between different processes, and predict environmentally efficient management efforts. The Haean catchment case study shows how research can be structured to provide cross-disciplinary scientific linkages describing complex ecosystems and landscapes that can be used for regional management evaluations and predictions.