

# TERRECO: Evaluating Ecosystem Services in Production Versus Water Yield and Water Quality in Mountainous Landscapes

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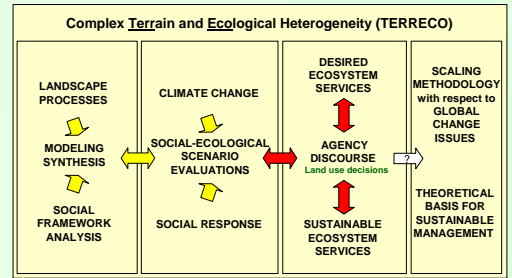


## Problem Statement:

Sustainable acquisition of ecosystem services, their economic gains, and management of supporting natural resources for human well-being under the influence of global change are concerns that must be analyzed in the context of complex social-ecological system (SES) response (Carpenter et al. 2012). In particular, regional scale analysis is critical in order to focus on real acquired data, meaningful social-ecological measures, and specific trade-offs and compromises that depend on local ecosystem and land use characteristics within a specific cultural context.

## Overall Goals:

TERRECO analyzes the multi-dimensional **ecosystem responses to natural and human disturbances in Soyang Lake Watershed**, the largest reservoir system in South Korea. We evaluate at system level the processes controlling gains in services from agriculture, forestry and from the reservoir itself. Via simulation modeling, the **trade-offs** due to climate and land use change in **1) production of ecosystem services and 2) environmental and economic efficiencies of land use** are examined. We are developing a **discourse with management agencies** to consider environmental policies and their potential impacts on ecosystem services.



Information flows and bridging within TERRECO

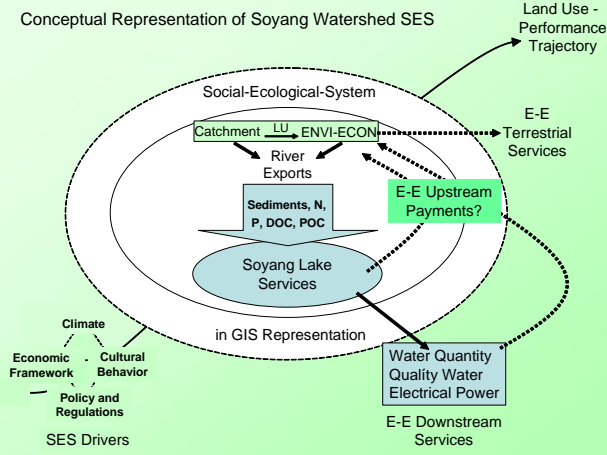
## Overall Project Linkages and Research Organization:

The Soyang Watershed land use (LU) is recorded in a geographical information system (GIS). The SES changes over time, due to climate, economics, environmental policy and cultural preferences, resulting in a trajectory in performance.

Field studies support our understanding of agricultural and forest production and resulting economic gains (E-E Terrestrial Services). E-E indicates the environmental-economic analyses applied in relating natural processes to the social system.

The relationship of land use to exports to the river system, and ultimately to Soyang Lake is investigated. Economic analyses of the services obtained from Soyang Lake, both locally and via the provision of services to metropolitan areas, is undertaken, considering the costs of environmental impacts.

Components are integrated in simulation models that allow scenario evaluations of possible future land use in terms of regional environmental and economic efficiencies.

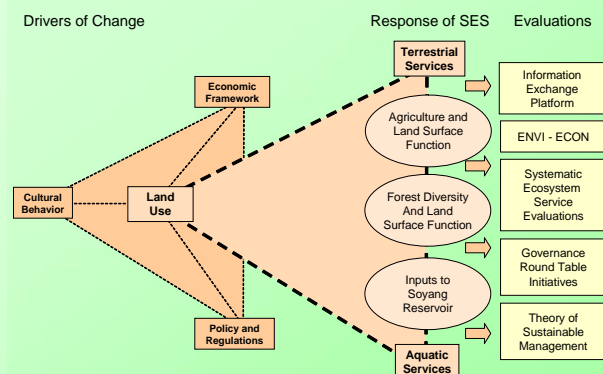


## Cohort 2 Project Groups, Planned Activities and Cross Cutting Issues:

**Drivers of Change:** Studies at UBT focus on factors influencing land use decisions by farmers, the current political background influencing water policy and adaptation of agriculture to climate change, and the modeling of land use change via different methodologies.

**Response of SES:** Efforts are made to understand agricultural and forest land use with respect to land surface exchange; water, carbon, and nutrient balances; variations in production; and transport of materials. A further focus is on the transport of materials in the river system into Soyang Lake, and description of the impacts that occur with respect to water quality in the reservoir. The studies are linked in each case with economic evaluations.

**Evaluations:** Based on the doctoral projects, an innovative long-term information exchange platform is being constructed, new approaches to ecosystem service evaluations are being designed, economic and environmental efficiency approaches are developed for communication with managers, initiatives are underway to establish discourse with those involved in governance, and a long-term view of the importance of our studies for theory related to resource management is being undertaken.



Ordering of the cohort 2 projects and activities within TERRECO as presented in following poster groups.