Economic Valuation of Forest Ecosystem Services and Trade-Off Analysis in Soyang Watershed, South Korea

Cosmas Kombat Lambini, Trung Thanh Nguyen, and Thomas Koellner

cosmas.lambini@uni-bayreuth.de

University of Bayreuth

BayCEER

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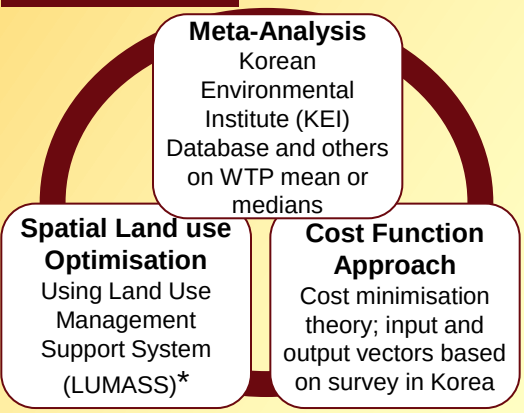
Objectives

- Meta-analysis of Willingness To Pay (WTP) measures for water quality and recreation in Soyang Watershed
- Estimate cost of provision of biodiversity and carbon sequestration in Soyang Watershed
- Analyse land use optimisation and trade-offs between incomes from forest farms, water quality and land allocation for carbon stock using Land Use Management Support System (LUMASS) Framework

Introduction

Forests produce a multitude of ecosystem services that are of benefit to society. The knowledge and tools for identification and design of sustainable forest ecosystem services are evolving. Economic methods for assessing ecosystem services are limited due to incompleteness or inconsistency of data. Moreover, integrating ecological parameters with economic ones remains challenging. Our research seeks to address some of these problems and to contribute to new and improved methods on forest ecosystem services economic valuation from the demand and supply sides. It takes into account the joint provision of these services, spatial dimensions and their trade-off-analysis.

Method

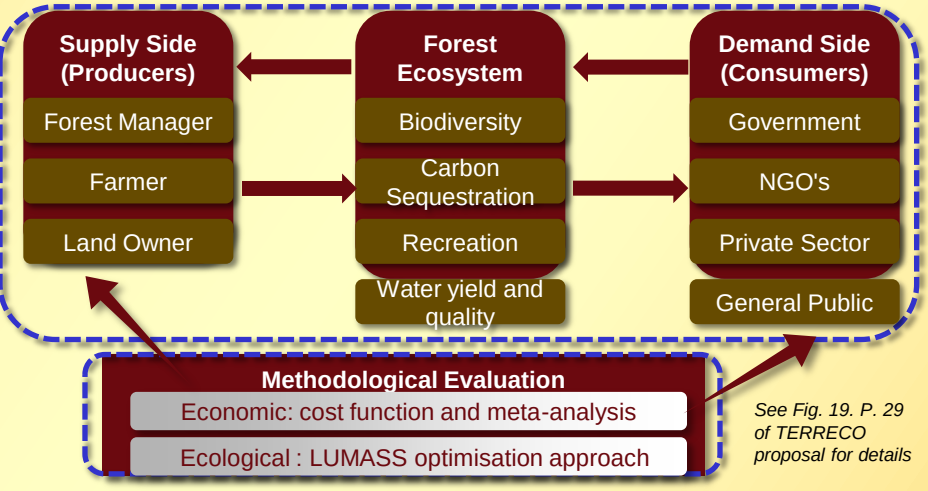


The methods to be applied to this research seek to combine economic theories for valuation studies and optimised landscape for the trade-off analysis of forest ecosystem services. These combinations help to do a comprehensive assessment of the watershed. Meta-analysis model will be applied to evaluate monetory values based on WTP estimates from the demand side. Cost function approach will be considered in the estimation of supply of biodiversity and carbon sequestration. The cost method will be based on a field survey. LUMASS framework for trade-off and land-use change analysis will be applied in the catchment area. This framework is implemented in Arc Map Environment.

Case studies

The Soyang Watershed case is pictured below and serve as workings labs for empirical field data collection, provide data for our models and test labs for the application of valuation methods and trade-off analysis.

Conceptual Framework



See Fig. 19. P. 29 of TERRECO proposal for details

There are several factors that influence the supply and demand of forest ecosystem services. Our study will take into account the supply and demand of forest ecosystem services in the watershed. From the framework we demonstrate relationships between producers and consumers of selected forest ecosystem services in the study area. Our study seeks to analyse these relationships. We review the feedback effects of forest ecosystem services and the multifunctionality of these services. Our conceptual framework considers economic and ecological methodological evaluations for the valuation and trade-off analysis. These methods are linked to the demand and supply sides of the case studies.

Expected Results

Our research assesses the cost components and the drivers for forest ecosystem services provision from the supply side. From the demand side, we evaluate the Willingness to Pay (WTP) for ecosystem services and apply transfer values for policy designs. Finally, the study will attempt a trade-off analysis of these services for policy design and sustainability assessment in both cases.

* Ausseil A-GE, Herzig A, Dymond J.R. (2012). Optimising Land Use For Multiple Ecosystem Services Objectives: A Case Study In The Waitaki Catchment, New Zealand. International Congress on Environmental Modelling and Software (IEMSS2012), Leipzig, Germany, July 2012