# Integrative Perspectives for Ecosystem Service Evaluations

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## Problem Statement:

Cultural landscapes are shaped by differing patterns in land cover and, thus, deliver ecosystem services of varying types. The evaluation of ecosystem services in Soyang watershed to support decision-making requires the collaborative study during cohort 3 of the linked research illustrated here.

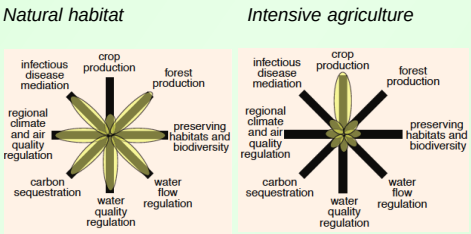


Fig 1: Ecosystem services delivered from different land cover types (from Foley et al. 2005)

**Climate scenarios**
- Current baseline
- 2050 A1B Ensemble
- 2100 A1B Ensemble

**Ecosystems**
Processes in water, soil, atmosphere & biodiversity *with process models (SWAT, HydroGeosphere, LandClim, PIXGRO)*

**Land use and land cover**
- Past and current baseline
- *with remote sensing*
- Future scenarios *trend-based, agent-based, discourse-based*

**Decision making of land users**
- Land cover class
- Crop choice
- Field management
- *with surveys, Bayesian models*

**Markets**
- Crop price changes
- Renewable energies

**Policies**
- Rice subsidies
- Spatial planning
- Water pricing

Market response

Policy response

**Supply of Ecosystem Services ES**
Trade-offs and synergies *with Bayesian models*

**Demand for ES**
Preferences of consumers *with surveys*

**ES conflicts/ efficiencies**
- Economic externalities and efficiencies *with stated preference methods and Envi-Econ tool*
- Spatial interactions *with regression analysis*

Regional Social-Ecological System of Soyang

## Project Linkages and Research Organization

## Expected results:

### 1) Land cover scenarios

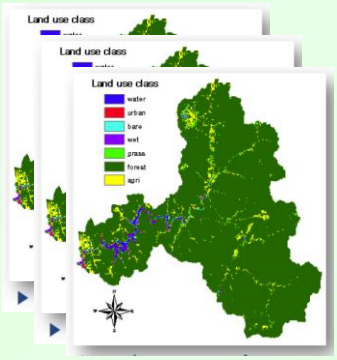


Fig 2: Land cover of Soyang watershed

### 2) Ecosystem services trade-offs and synergies


Fig 3: Negative (red) and postive (blue) correlations between pairs of ecosystem services (from Raudsepp-Hearne et al. 2010)

### 3) Optimization of land use


Fig 4: Optimization of land use to reduce conflicts and inefficiencies

## Cross-cutting Issues:

1. How sophisticated must models be?
2. Linkage between ecological and socio-economic models?
3. Which policy, climate and market scenarios?
4. Optimization of ecosystem services?

## References:

Foley et al. (2005): Global consequences of land use. *Science* 309: 570-4

Raudsepp-Hearne, C., Peterson, G., & Bennett, E. (2010). Ecosystem service bundles for analyzing tradeoffs in diverse landscapes. *Proceedings of the National Academy of Sciences*, *107*(11), 5242–5247.