

University of Bayreuth



The Search for Appropriate Crop Land Cover Descriptions in Evaluations of Agricultural Production under Global Change

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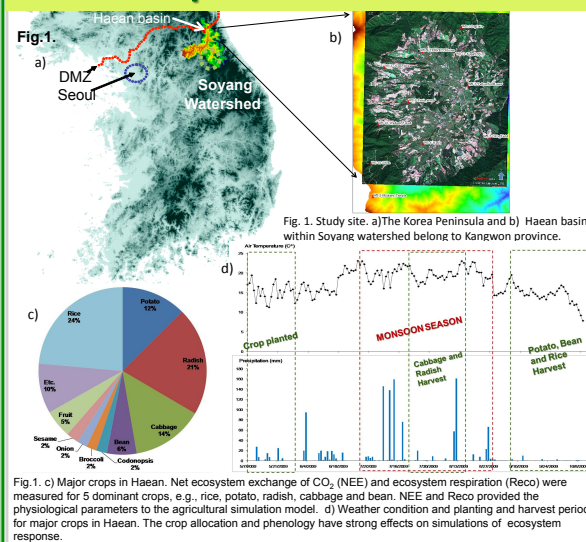
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Introduction

Approaches at landscape and regional scale for evaluating the ecosystem services gained from agricultural production, as well as considerations for how agricultural adaptation can be carried out under global change, require that information on production processes and economic gains or losses be merged. In principle, detailed information on response of many agricultural species to climate and management is needed, along with understanding of the related market economy. However, practical considerations limit the complexity level at which we can couple descriptions of land cover, simulations of agricultural yields, and economic modeling. This research describes choices made in establishing crop land cover maps for the Haeon Catchment (60 km²) and the larger Soyang Lake watershed (2800 km²) in South Korea, considering their usefulness in examining global change influences on crop yields and estimation of farm incomes. Compromises carried out in reducing the crop representation from an actual number of 51 agricultural uses to serve both perspectives are described. Methods to achieve compatibility between process-based growth simulations and economic evaluations are discussed. The importance of long-term observations focusing on current crop rotations and sequential change at landscape scale in order to support policy measures and decision-making is emphasized.

Site Description



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Research Project

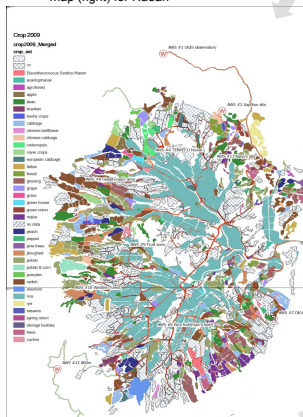
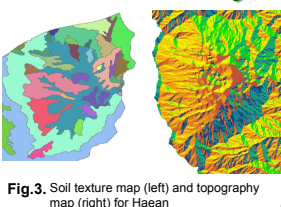


Fig. 4. Current land use map in Haeon (2009). We surveyed more than 50 categories for land use.

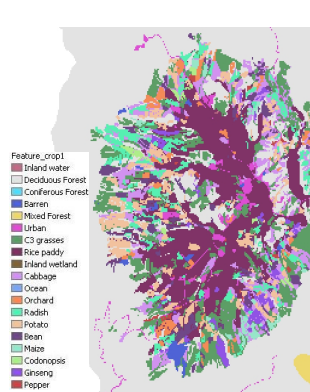


Fig. 5. A simplification of current land use map (fig. 4)

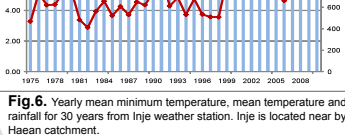
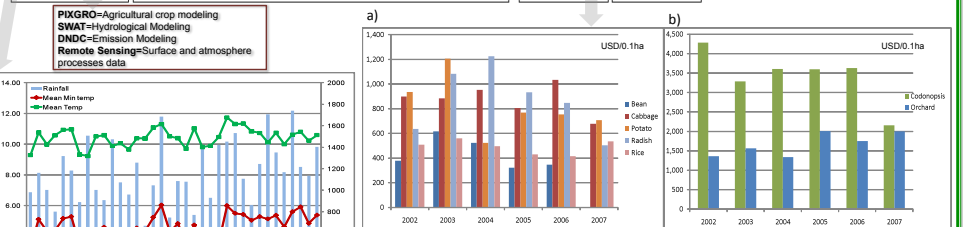
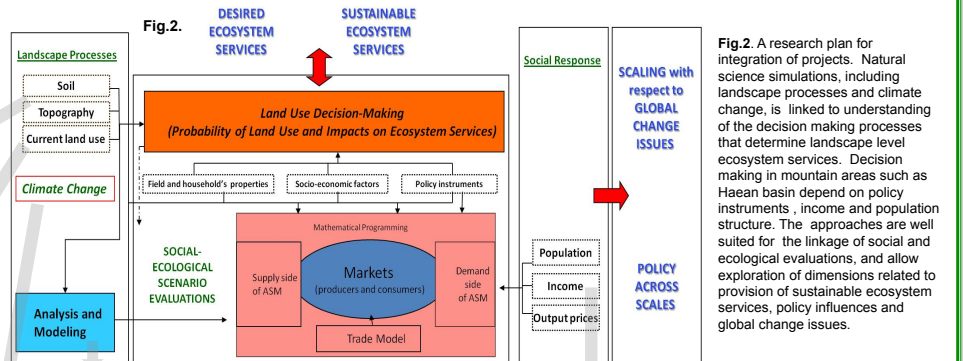


Fig. 6. Yearly mean minimum temperature, mean temperature and rainfall for 30 years from Inje weather station. Inje is located near by Haeon catchment.

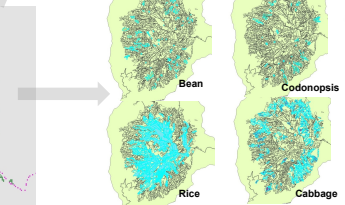


Fig. 8. Detecting NDVI from MODIS image. The information of pixel for identifying crop location obtained by coordinates from field survey using GPS. The coordinates derived the remote sensing XY pixel number from LANDSAT image. The MODIS image showed NDVI value according to XY pixel number (table).

Discussions and Conclusion

The approaches in this study are oriented to combining field surveys, modeling and remote sensing for crop land cover description. Land cover is critical for understanding ecosystem services. Land use change will depend on climate change, and culturally on local land use decision-making. In this case, income is one of the important decision-making factors. Our intent is to better relate these variable to each other. We hope to use NDVI patterns from MODIS 250 m for the major crops to identify key land use change, such as increase in orchards, Codonopsis and ginseng. Thus, we identified several points of land cover change from the NDVI values in the last decade. However, MODIS pixel size is bigger than geographical data for regional simulation model and field survey. The scaling up is still ongoing work. In terms of field survey, we represent the detail land cover map using GPS in 2009, it provided the area for each crop. We have obtained the data of income for agricultural crops during 2002-2007 from RDA that income data summarized for Kangwon province. For the more reasonable results, social response studies systematically examine the local social-economic response, for example, population structures, political frameworks, outcome and income situations. This project is still in progress. One of the most important expected result is integration of ecosystem-economic scenarios formulated with respect to global change issues.