Influencing Adoption of Sustainable Land Use Options in the Upland Through Bioeconomic Modelling

An EEPSEA supported research project titled "The Economic Analysis of Smallholder Tree-based Farming System Alternatives for *Imperata* Grassland in the Philippines" was implemented using a bioeconomic modelling approach.

Objectives

- Aims to provide farmers and policy makers science-based information on improving the productivity, profitability and sustainability of upland grasslands.
- It examines which land use systems would provide the most economic and environmental benefits to farmers of upland grassland areas, particularly the environmental and economics benefits that tree-based systems can bring.
- It also investigates the main reasons why farmers are reluctant to change from their current unsustainable cropping regimes.

The study modelled six land use systems:

- Imperata-dominated grasslands that have not undergone any burning or cultivation
- Farmers' current main practice of annual maize cropping
- Timber trees with Imperata for animal grazing
- Timber trees planted in hedgerows with annual maize cropping at the alley areas
- A social forestry model where larger area is planted with timber in hedgerows, with annual maize cropping at the alley areas
- Timber plantation

Tree-based Systems Provide Greater Environmental and Economic Benefits to Farmers

Modelling and economic analysis showed that tree-based land use systems could provide greater environmental and economic benefits to smallholder-farmers and society than current farming practices. The timber plantation system obtained the highest net present value (NPV) of PHP241,170/ha (USD4,544/ha). The lowest NPV of PHP271/ha (USD5/ha) was realized by the *Imperata*-grassland system. Timber plantations and other tree-based systems gave the best environmental benefits. These included higher carbon sequestration values and a higher level of soil nutrients relative to maize cropping. Reduced soil erosion was a major benefit of all tree-based systems. In fact incorporating timber trees would help reduce soil erosion even in the most eroded farmlands.

The study found that it would make economic and environmental sense for farmers to convert a large percentage of their farms over to tree planting. However, many farmers are reluctant to make the move because of the economic risks involved. A risk analysis of the various land use systems showed that while timber-based systems earned the highest NPV, they were also the most risky options.

Landcare Project Uses Bioeconomic Modelling to Evaluate Land Use Options

The SEARCA-ACIAR Philippines-Australia Landcare Project used the bioeconomic modelling techniques developed from EEPSEA supported project.in setting parameters for monitoring and evaluation of land use systems recommended for farmers adoption. It has also adopted the modelling approach in designing and screening promising farming systems prior to field experimentation. Landcare facilitators from three project sites (Ned, Cotabato; Claveria, Misamis Oriental; Lantapan, Bukidnon) attended a two -day training workshop on bioeconomic modelling using the "Soil Changes Under Agriculture, Agroforestry and Forestry" (SCUAF) and Excel-based Economic Model platform.

The use of bioeconomic modelling helps the landcare project evaluates its farm level impacts that influence adoption of sustainable land use options in the marginal grassland areas in Mindandao. Research methods and outcomes from EEPSEA research assisted the landcare project in enhancing farmer adoption of simple conservation practices in the Philippine uplands through .

Impacts in Salcedo Watershed Management

The Salcedo Watershed Management Project, which was implemented by the Environmental Legal Assistance Center (ELAC), has adapted the research methods and outcomes from my EEPSEA supported research project. Research results from the project served as basis in conducting a participatory financial and economic analysis of land use options for Salcedo Watershed. These were also used in the training on Benefit Cost Analysis for Salcedo Local Government Units, ELAC researchers, and the counterparts of the project from Eastern Samar Agricultural College (Salcedo Campus). Eventually, they themselves used their learnings and assisted in the analysis of land use options and allocation decision through stakeholder consultation, development and planning workshop for the different barangays within the Salcedo watershed.

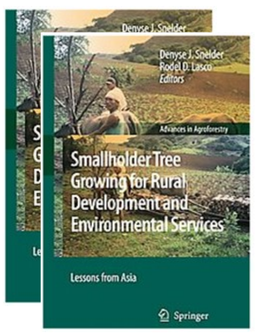
Research Outcomes Provided Inputs to RUPES Project in Mindanao

The carbon sequestration benefits from tree-based systems that were estimated from EEPSEA project provided the initial inputs during the earlier phase of the RUPES Project in Mindanao. The project inputs was formally presented and discussed in a workshop on "Developing Mechanisms for Rewarding the Upland Poor in Asia for Environmental Services that they Provide (RUPES) Program", which was held on Septermber 18-19. 2002.

Career Impacts

This project has given me the opportunity to present papers in local and international conferences, and published the following papers that significantly contributed to my academic career growth and development:

• Predo, C.D. and H.A. Francisco. 2008. Improving Productivity, Profitability and Sustainability of Degraded Grasslands Through Tree-Based Land Use Systems in the Philippines. *In*: Snelder, D.J. and R.D. Lasco (eds.) Smallholder Tree Growing for Rural Development and Environmental Services: Lessons from Asia, Advances in Agroforestry Series, Vol.5 . 510p. Springer



•Predo, C.D. and H.A. Francisco. 2006. Understanding Tree-Growing Decisions of Smallholder Farmers in Claveria, Northern Mindnao, The Philippines. Philippine Journal of Crop Science (PJCS), 31(3):3-20

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