

Land Use Change and Agricultural Intensification: Key Research Questions and Innovative Modeling Approaches

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Paper Summary

- Review of land-use modeling approaches to evaluate sustainable agricultural intensification
 - > Theory and methods literature review
 - > Example applications
 - Water quality, biodiversity, carbon sequestration
 - > Integration of economic and biophysical models
 - > Research questions and study areas
- Agricultural intensification
 - > Defined by a low fallow ratio and intensive use of inputs
 - Externalities: erosion, fertility, biodiversity, runoff
- Sustainable agricultural intensification
 - > A production system that allows yield increases without generating adverse environmental impacts

Comments

- Excellent introduction to static land use change econometric methods and applications
- Econometrics
 - > Static land use decisions
 - > Reduced-form dynamic land use (Hennessey 2006; Hendricks et al *in progress*)
 - > Structural dynamic discrete choice (Rust 1987; Su and Judd 2012)
- Direct linkage with biophysical Models
 - > Linear Programming (Adams and McCarl)
 - > Calibrated models (Howitt et al 2012)
 - > Microeconometrics (Antle , Valdivia, Stoorvogel)
 - > Stochastic Dynamic Programming (Doole 2009)

Discussion Points

- ◉ Sustainable agricultural intensification potentially has a third margin of adjustment
 - > Intensive, extensive, and dynamic margin
- ◉ Availability of disaggregate primal production data
 - > SEBAL/METRIC, USDA NASS CDL's, other remote sensing, field surveys in GIS
 - Crop rotations, aggregation bias, dynamic supply response
 - > Microeconometrics
 - Dynamic Discrete Choice
 - Tradeoff Analysis Project
- ◉ Insights from hydro-economic and other calibrated models
 - > SWAP, CALVIN, CAPRI, WEAP
 - > Integration with disaggregate production data
 - Yolo Bypass (Garnache et al in progress)
 - CA Switchgrass (Merel et al 2011)