

UNDERSTANDING THE EFFECT OF DIFFERENT LAND USE PRACTICES ON CARBON STOCKS CHANGES USING A SIMULATION MODEL

L.H.P.GUNARATNE

Department of Agricultural Economics, Faculty of Agriculture, University of Peradeniya

During past few years, the realm of scientific debate on global climate change has moved to recognition of controlling greenhouse gas emissions and to implementation of international conventions. The main focus is on carbon stocks changes where land use pattern plays a major role. The land use changes and farmer adoption of tree-based technologies such as agroforestry or fruit crop cultivation are heavily influenced by variety of socio-economic as well as biophysical factors. In order to actively involve in the global process of managing carbon stocks, the need to understand and predict carbon stock changes is of paramount importance. However, direct measurement of both carbon stocks or peoples actions and understanding the carbon dynamics become more and more complex.

Process based simulation models possess a high scope in testing hypotheses, analyzing tradeoff among different options and predicting the future, compared to conventional approaches. Therefore, an attempt was made to develop a simulation model to obtain different scenarios of carbon stocks at different sites under a variety of land management practices. The farmer's perception on tree-based innovations and their socio-economic factors and resource constraints were also included into the model. The model was developed using a flow-chart based simulation software "STELLA" (version 6.0). The necessary parameter values to develop the model were obtained from literature.

The developed model is capable of simulating the carbon stocks under a wide range of changes in different land use patterns such as forest conversions to shifting cultivations or to other crop-fallow systems. It evaluates the tradeoffs among different land use practices based on number of possible outcomes. Moreover, different scenarios on the farmer perceptions and the factors affecting the adoption of tree-based systems were also evaluated.

The model was tested using a field data set and found that it could be used to understand the farmer's action and their consequences on carbon stocks changes.