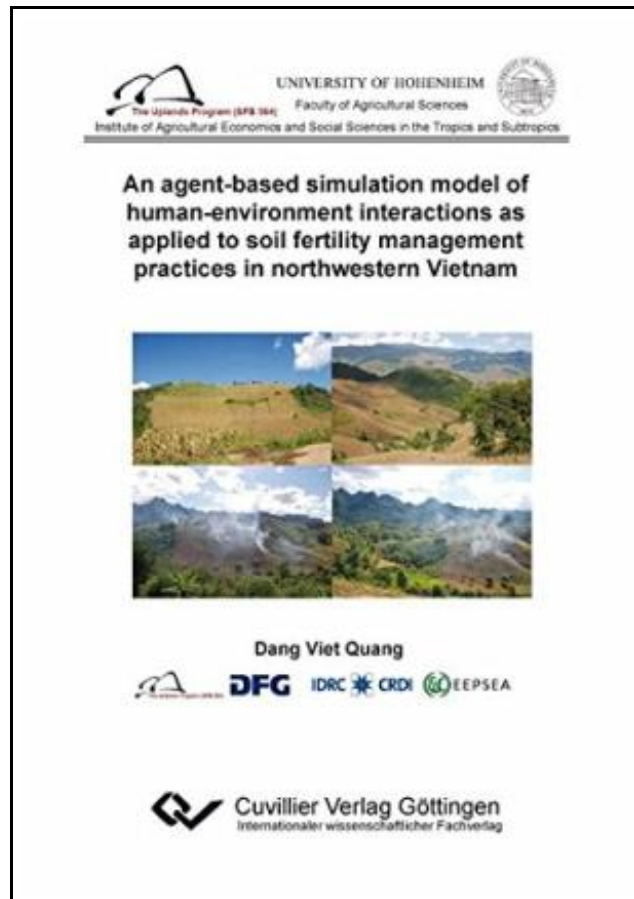


# An agent-based simulation model of human-environment interactions as applied to soil fertility management practices in northwestern Vietnam



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Cuvillier Verlag Jul 2012, 2012. Taschenbuch. Book Condition: Neu. 211x149x9 mm. Neuware - Intensification agriculture on sloping land in northwestern Vietnam has increased soil erosion and declined the soil fertility. In response to this decline in soil fertility, as well high output prices, highland farmers have increasingly turned to mineral fertilizers and high yielding varieties, and the rapid adoption of these has partly compensated for the underlying resource degradation process. However, these practices are not environmentally sustainable, and so long-term farm income levels could decline as a result. The objective of this studies is to explore the relationship between the decisions made within farm households and biophysical dynamics - such as soil erosion and soil fertility change, in order to assess how the introduction of soil conservation practices affects soil fertility and farm household incomes, to identify possible constraints on the adoption of soil conservation practices, quantify trade-offs between sustainability and the income of farm households, and to appraise the possible policy options available in order to promote the adoption of soil conservation practices. The studies applied an integrated model using a software package called `Mathematical Programming-based Multi-Agent Systems; (MP-MAS) in combination processes manipulated using the Tropical Soil Productivity Calculator (TSPC). The model was calibrated to cover a 22.58 km<sup>2</sup> catchment area in northwestern Vietnam that included 471 farm households, with each farm represented as an individual agent in the model. The results of the simulation showed that an increased use of mineral fertilizers improved crop yields and reduced soil nutrient losses. When soil conservation practices were included into the decision-making model, the area of land under these techniques remained low. The main constraints to the use of soil conservation practices identified included low crop yields and high labor requirements when compared to conventional practices, that is, those not using...



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