

Understanding of feedback mechanisms of the introduction of new technology in rice farming from ecohydrological and social perspectives in heterogeneous farm households in Korea

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The agricultural institutes in Korea promote a new rice farming technology, so-called "wet-hill-direct-seeding". This technology would reduce the production costs as well as labor and prevent ear of rice from collapsing, resulting in better initial growth and rooting. However, the new method may result in uncertain consequences in term of ecohydrology and biogeochemical cycling. It also requires the application of herbicides, which may not be suitable for organic-farming. The younger generation of farmers are prone to adopt this new technology whereas the older prefer the conventional approach. The objective of this study is 1) to develop a model framework for the assessment of the feedback mechanisms of the introduction of new technology from ecohydrological and social perspectives and 2) to simulate the potential economic and environmental impacts of this technology over time in a community with heterogeneous farm-households. In this presentation, the framework of multi agent systems simulator is introduced, which include social systems defining specific behavioral processes of farm households, agricultural systems characterizing different management and ecohydrological conditions, and the interactions between two systems. In the context of climate-smart agriculture, various factors are considered such as decision-making, diffusion of technology, and environmental modules such as carbon-calculator, biotic and thermodynamic indicators. The expected outcome from this study is to better understand how new technology, market dynamics, environmental change and policy intervention affect a heterogeneous population of a local farm-households and the resources they command.

Keywords: climate smart agriculture, ecohydrological and social effects, multi agent systems modeling, rice farming , new technology