Climate Change Impact on Agricultural Productivity and Environmental Affect by Simulation Model

**Suggested Topic**: GIS Decision Support and Models

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Abstract

This research adopted a physical simulation model called **SALUS** (**S**ystem **A**pproach to **L**and **U**se **S**ustainability) program, designed to model crop, soil, water and nutrient conditions under different management strategies for multiple years. This research firstly set up a spatial database of experimental site rice production area polygon identified from satellite images, and collected detail daily weather data from meteorology stations for the past 30 years, with soil profile information and management strategy and genetic coefficient. Secondly, Salus model simulation was applied to accurate reflect real observed yield information to compare with simulated result. The residual mean square of the comparison proved around 90 percent of confidence that the model can successful simulated yield output changes for each year. By model simulation running under different predicted weather regime condition due to climate change phenomenon, this research spatially compared the effect on rice crop productivity and the output of carbon emission, nitrate leaching, and irrigation demand at Red River Delta area in Northern Vietnam. The simulation runs results showed increased rice productivity in this field due to predicted temperature rise. But with a high cost of increasing the environmental affect such as higher carbon emission, higher nitrate leaching, higher water resources demand, and higher fertilizer demand …etc. to sustain the rice productivity. This paper examined these critical issues by integrating SALUS model and GIS function to demonstrate the possible output both economically and environmentally affect for better agricultural decision on experimental area.