Climate change impacts on agriculture & agricultural economies: The example of Senegal

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In Senegal, 60% of active population works in agricultural sector but it contributes less than 10% of GDP due to low level of fertilizer use, old agricultural equipment, poor seeds and climate conditions (Jalloh et al., 2013, chap.11) that affect productivity.

West Africa will cover almost 7% of world’s population in 2050 (Jalloh et al., 2013, chap.1) ==> higher demand for food challenged by climate perturbation that alters production conditions. In this study, we assess the future impact of climate change on farmers’ production practices and their net returns (NR).

Study region: Peanut Basin

Future temperatures are expected to increase and non smooth changes in rainfall patterns are predicted (McSweeney et al., 2010, Jalloh et al., 2013) while studies pointed out agriculture vulnerability to climate changes (Roudier, 2012)

Data

Farming practices: mixed crop-livestock systems

Peanut Basin

Crops activities: Cereals (Millet/sorghum, Maize, Rainfed rice), legumes (Peanut, Cowpea) and horticultural crops (tomato, onion)

Livestock activities: Small ruminants (ovine, goats), poultry, small amount of bovine

Study focuses on small to medium size farms with less than 7ha

Future yield scenarios (Jalloh et al., 2013)

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<td>Maize, Sorghum</td>
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<td>Rainfed rice</td>
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Methodology: complementary models, TOA-MD model & PMP approach

TOA-MD (Trade-Off Analysis model for multidimensional impact assessment) of Antle and Valdivia (2011): population level impact

- Ex-ante impact of climate change on economic variables in a heterogeneous population of farms by considering two systems representing farmers in two different situations
  - S1: observed situation (2010)
  - S2: unobserved situation (2050) with changing climate, social and economic conditions

PMP (farm production modeling approach of Howitt (1995)): farm level impact

- Representative profit maximizing farm with exogenous yields
  - farm-level adaptation behavior is endogenously determined: yield scenarios are imposed to predict land allocation under climate change
  - Results are inputted into TOA along with yield changes to set system two

Results

References


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