A preliminary analysis of the supply and demand of net primary production in the semi-arid Sahel

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Supply and Demand of Net Primary Production in the Semiarid Sahel

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Introduction

• NPP represents the rate of formation of new plant biomass and is an important component in the global carbon cycle.
• Fluctuations in the supply and demand of NPP drives ecosystem processes and directly impacts human livelihood in terms of providing food, feed, fuel and fiber.
• Semiarid regions in Africa are particularly vulnerable to fluctuations in the supply of, and demand for, NPP due to recurring food crises.

Research Questions

1. What is the present condition of per capita NPP availability in the Sahel?
2. What drives the trend of per capita NPP in the Sahel?
3. Are trends in annual food production visible in annual cropland NPP?

Methodology

Cropland NPP was extracted from MODIS1 and GLO-PEM4 using the recent MARS-JRC2 cropland mask. Then, per capita NPP was derived using de-cadal population data (1980-2010) from UNEP/GRID3 and divided by GLO-PEM (1981-2000) and MODIS NPP (2000-2010) data. Primary crop production data was downloaded from FAOSTAT5.

References


Early Results

• There is moderate correlation between MODIS cropland NPP and primary crop production for the eight Sahelian countries (Figures 3 and 5).
• Per capita trends in MODIS cropland NPP and primary crop production seem to be coupled to the extent that both datasets were able to detect the 2002 Sahelian food crisis (Figures 2, 5, and 6).
• Change in per capita NPP between 1980 and 2000 has not been constant across the region (Figure 4) and is speculated to be a function of land use and climate.