Geophysical Research Abstracts
Vol. 14, EGU2012-14049, 2012
EGU General Assembly 2012

Food transitions in last 50 years and related environmental implications

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Food production is an important driver for global change processes such as land use change and green-house-gas emissions. We analyzed a global, long term data set on food consumption per country to identify typical patterns of diets for the last 50 years. From changes in these patterns, we derived food transitions on a global scale. Subsequently we assessed the environmental consequences from green-house-gas (GHG) emission and anthropogenic inputs.

More specifically, we applied Self Organizing Maps (SOM) to identify the dietary patterns based on supply of 12 food groups from FAOSTAT dataset for a period 1961-2007. Using the data on energy output/input ratio for crop production and agricultural emission, we estimated fossil energy and GHG emission associated with the diets.

We found 16 typical consumption patterns consisting of high, moderate, low and lowest calorie supply with varied food compositions. The high calorie diets are associated with a higher supply of cereals, animal-products, vegetable-oils and sugar-sweeteners featuring a total supply greater than 2800 kcal/cap/day. During the last 50 years, we observed food transitions from lower calories diets to higher calories diets. On the one hand, food transition towards affluent diet, sometime with shortcuts, occurred in developing countries. On the other hand, developed countries increased consumption of fruits and vegetables. Some of the developing countries are also stagnated in the low consumption level during the last 50 years. The high calorie diets also embed higher fossil energy (1800-3500 kcal/cap/day) and are associated with higher GHG emissions (3.7-6.1 kg CO_2 eq/cap/day). However, their non-CO_2 GHG emission intensities per kilo calorie of food are relatively low.

Changes in dietary patterns are a part of the global change processes. Identification of past transitions is way to predict possible future transitions. This in turn supports policy processes and negotiations in the fields of climate change, water management and development goals.