



Food Self-Sufficiency across scales: How local can we go?

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“Think global, act local” is a phrase often used in sustainability debates. Here, we explore the potential of regions to go for local supply in context of sustainable food consumption considering both the present state and the plausible future scenarios.

We analyze data on the gridded crop calories production, the gridded livestock calories production, the gridded feed calories use and the gridded food calories consumption in 5' resolution. We derived these gridded data from various sources: Global Agro-ecological Zone (GAEZ v3.0), Gridded Livestock of the World (GLW), FAOSTAT, and Global Rural-Urban Mapping Project (GRUMP). For scenarios analysis, we considered changes in population, dietary patterns and possibility of obtaining the maximum potential yield. We investigate the food self-sufficiency multiple spatial scales. We start from the 5' resolution (i.e. around 10 km x 10 km in the equator) and look at 8 levels of aggregation ranging from the plausible lowest administrative level to the continental level.

Results for the different spatial scales show that about 1.9 billion people live in the area of 5' resolution where enough calories can be produced to sustain their food consumption and the feed used. On the country level, about 4.4 billion population can be sustained without international food trade. For about 1 billion population from Asia and Africa, there is a need for cross-continental food trade. However, if we were able to achieve the maximum potential crop yield, about 2.6 billion population can be sustained within their living area of 5' resolution. Furthermore, Africa and Asia could be food self-sufficient by achieving their maximum potential crop yield and only round 630 million populations would be dependent on the international food trade. However, the food self-sufficiency status might differ under consideration of the future change in population, dietary patterns and climatic conditions.

We provide an initial approach for investigating the regional and the local potential to address food security across multiple spatial scales. We identify the areas where one can depend more on local/regional products as a transition path towards sustainable consumption and production.