Reconciling urban food metabolic pattern with its environment – a "mission impossible"?

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Abstract

Existing trends of changes in both world population and global diet, are associated with a growing environmental impact, meaning that food consumption is a major concern for environmental sustainability. In relation to this point, in 2022, Greater Geneva committed to a sustainable transition, setting several legitimate, albeit very ambitious objectives for 2050: (i) preserving and regenerating local biodiversity, (ii) reducing environmental pressures generated by society (locally and abroad), (iii) ensuring good health, equity and inclusion of all its inhabitants, and (iv) contributing to the improvement of world population's well-being.

In this paper we check the plausibility of this integrated set of pledges by adopting an integrative analysis capable of addressing all these concerns simultaneously. For this purpose, we adopt the MuSIASEM accounting approach (Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism) to run "what if" scenarios for the Greater Geneva region and Geneva Canton. In particular, we use an approach called "quantitative storytelling" to check the plausibility of two targets – (1) food self-sufficiency; and (2) preserve biodiversity by protecting 30% of territory – while analyzing the trade-offs over the different targets. In relation to the first exercise of quantitative storytelling, results show that when adopting the current Swiss diet, Greater Geneva would require much more agricultural land and agricultural workers than those currently available to achieve total food security (i.e. not depending on imports). Assuming a shift to a more plant-oriented diet, environmental and social pressures of food production would be markedly reduced, but still food sufficiency would remain problematic. In relation to the set aside of land for ecological infrastructure, when considering Greater Geneva region as a reference political boundary, we identify the factors that will make this solution problematic.

This study shows the potential of MuSIASEM approach in characterizing a regional food metabolic pattern, especially considering that the same type of metabolic analysis can be extended to other domains and other urban areas to assess the sustainability of energy or water metabolisms.

Keywords: Metabolism, Sustainability, Nexus, Food, Water, Biodiversity

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