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► **To cite this version:**

Crystèle Léauthaud, Claude Napoleone, Delphine Leenhardt. Integrating water availability and accessibility constraints in localized food basin models. Agricultural uses of water and intensification of production systems: what impacts on land resources?, XIIIrd International seminar of the FONCIMED network, Oct 2022, Evora (Portugal), Portugal. hal-04488647

HAL Id: hal-04488647

<https://hal.inrae.fr/hal-04488647>

Submitted on 4 Mar 2024

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Integrating water availability and accessibility constraints in localized food basin models

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Key words: water resources, foodshed

Contextualization of the problem and main objectives of the communication

Territorial food projects are implemented in many cities and other local authorities in order to strengthen territorial agricultural resilience and food sovereignty, in particular through the relocation of production. It is therefore essential to assess local food supply capacities and to estimate whether these capacities are sustainable over time, in the context of climate change, and in particular in regions that are already in a water deficit situation, where the issue of water (access, availability and need) is a critical point that is likely to become major in the future.

Numerous models have been developed to calculate the territory needed to supply cities with the food required to satisfy their consumption habits (Schreiber et al., 2021). These "food basin" calculation models have been developed to estimate the capacity of cities to supply themselves locally, with analyses performed either at the scale of continents with explicit spatialization at smaller scales (Zumkehr and Campbell, 2015), or at the territorial scale (a city for example) (Zasada et al., 2019; Vicente Vicente et al. 2021). These studies analyze the impact of different variables (diet, type of agricultural production and especially the shift to organic farming, food waste, demographic characteristics, etc.) on the characteristics of the foodshed (radius, shape). The effect of water availability remains little studied. However, whether it be rainwater or irrigation water, its availability conditions both the spatial distribution of crops and the levels of food production. This is all the more important in Mediterranean or semi-arid contexts where the

resource is already scarce and subject to multiple uses. This availability is a function of several factors including water infrastructure, agricultural practices or available water quotas.

Our communication will have a programmatic orientation. It will seek to outline an approach or methodology for developing a relevant food basin model at a local scale (metropolis or region) integrating water-related constraints (access to water and water availability for farms, crop water requirements).

Methodology and sources used

We will start from a brief analysis of different existing food basin models to explore how the role of the water resource can be integrated. In particular, we will look at how to take into account its availability (rainfed and irrigated), its accessibility (infrastructure) and its use (types and modes of cultivation and irrigation management)

Conclusion

This project is original in the sense that it links two themes that are rarely addressed jointly: food systems and water management.

References

- Horst, M., & Gaolach, B., 2015. The potential of local food systems in North America: A review of foodshed analyses. *Renewable Agriculture and Food Systems*, 30(5), 399-407.
- Schreiber, K., Hickey, G. M., Metson, G. S., Robinson, B. E. and MacDonald, G. K., 2021. Quantifying the foodshed: a systematic review of urban food flow and local food self-sufficiency research, *Environmental Research Letters*, 16(2).
- Zumkehr, A. and Campbell, J. E., 2015. The potential for local croplands to meet US food demand, *Frontiers in Ecology and the Environment*, 13(5), pp. 244-248.
- Vicente-Vicente, J. L., Doernberg, A., Zasada, I., Ludlow, D., Staszek, D., Bushell, J., ... & Piorr, A., 2021. Exploring alternative pathways toward more sustainable regional food systems by foodshed assessment-city region examples from Vienna and Bristol. *Environmental Science & Policy*, 124, 401-412.
- Zasada, I., Schmutz, U., Wascher, D., Kneafsey, M., Corsi, S., Mazzocchi, C., ... & Piorr, A., 2019. Food beyond the city—Analysing foodsheds and self-sufficiency for different food system scenarios in European metropolitan regions. *City, Culture and Society*, 16, 25-35.