

# The Importance of Interdisciplinary approaches to Urban Agriculture and Transitions in Food Systems: Research on Lisbon Metropolitan Area

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## Abstract

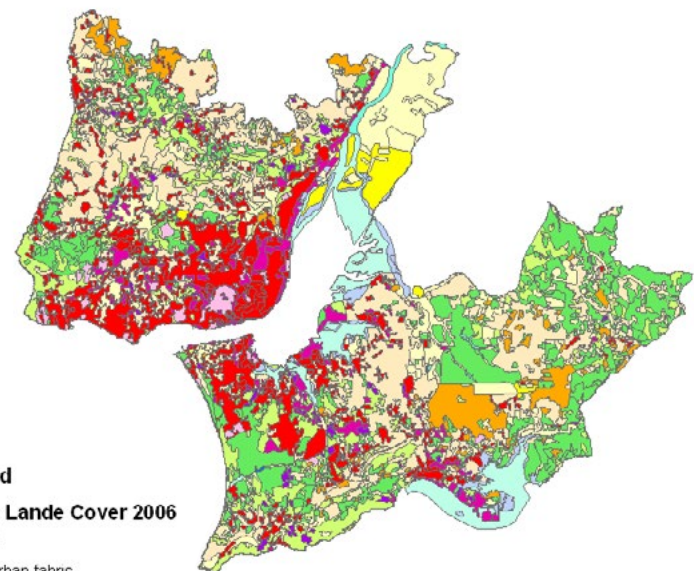
**Metropolitan areas are strategic territories in the research on 'urban agriculture, food and food systems'. Land use categories and farm related activities constitute major indicators in this research. One of the main characteristics of periurban areas is the complementary nature of the relations between urban and rural systems. The paper presents and discusses the main findings of two research projects conducted in Lisbon Metropolitan Area, in relation with urban agriculture and food and the transition of the food sociotechnical system. This presentation and further discussion highlights the adequacy of interdisciplinary approaches regarding 'Connections and missing links within urban agriculture, food and food systems'.**

## Keywords

*Urban food, interdisciplinarity, sustainability, Lisbon Metropolitan Area*

## Introduction

Lisbon Metropolitan Area (LMA) integrates the capital city of Portugal (Lisbon) and corresponds to an association of 18 municipalities (Alcochete, Almada, Amadora, Barreiro, Cascais, Lisboa, Loures, Mafra, Moita, Montijo, Odivelas, Oeiras, Palmela, Sesimbra, Setúbal, Seixal, Sintra, and Vila Franca de Xira). LMA has 2,8 million inhabitants (26% of the total national), and suffered a demographic decrease of its center during the last years related with a displacement of population to boarder municipalities and a consequent daily movement for working reasons (Ferreiro et al, 2016: 113). According to Corine Land Cover 2006, agriculture corresponds to the main land use of LMA, as it was already in the beginning of twentieth century (figure 1).



## Legend

### Corine Land Cover 2006

#### Level 2

Urban fabric	Scrub and/or herbaceous vegetation associations
Industrial, commercial and transport units	Open spaces with little or no vegetation
Mine, dump and construction sites	Inland wetlands
Artificial, non-agricultural vegetated areas	Maritime wetlands
Arable land	Inland waters
Permanent crops	Marine waters
Pastures	
Heterogeneous agricultural areas	
Forests	

Figure 1: Land Uses in Lisbon Metropolitan Area (2006)

Grounded on knowledge provided from land uses analysis, conducted within LMA, two research projects Periurban1 and MEMO2 (both financed by Fundação para a Ciência e a Tecnologia), have attempted to contribute, each of them in an interdisciplinary manner, to identify common links of interest among different disciplines in order to design a possible methodological approach towards a sustainable urban future for LMA. This paper, by taking profit of such knowledge, aims to bridge the gap among interdisciplinary studies, and discuss how the integration of the results of those two projects can effectively transcend their barriers and produce new knowledge. To do that, a brief analysis of each of the above-identified projects is provided, while identifying their main aims and methodological approaches, as well as the interdisciplinary contributes; secondly, it reflects on how an interdisciplinary exercise, focused on a transition towards a sustainable food sociotechnical system can contribute to new knowledge. Finally, some initial conclusions are here attempted for further discussion and development.

## 2. Interdisciplinarity in the approach to Agriculture and Food in Lisbon Metropolitan Area: lessons from two research projects

Periurban project was carried out by a multidisciplinary research team from two universities: Lisbon University (Instituto Superior de Agronomia and Instituto Superior Técnico)

1. Periurban areas facing the challenges of sustainability: scenario development for Lisbon Metropolitan Area. (PT/AUR/AQI/117305/20102012-2015).
2. MEMO-Evolution of the Lisbon Metropolitan Area Metabolism. Lessons towards a Sustainable Urban Future PTDC/EMS-ENE/2197/2012

and ISCTE - IUL. The 19 researchers were from 13 scientific areas (e.g. architecture, economics, sociology, spatial urban planning, ecology).

The development of research on periurban areas in the context of sustainability challenges beyond classical urban approaches, on one hand, and the analysis of the Portuguese case, on the other hand, were the main goals and the reasons behind the design and development of the project. It was also acknowledged that the opportunities of periurban areas should result from the integration of multiple policies and sectoral views related with territorial planning. The search of an integrated approach explains the interdisciplinary nature of the project. In fact, and besides the combination of multiple scientific areas, Periurban has drawn on the knowledge and perceptions of LMA stakeholders during all the process and main milestones. Besides experts, stakeholders included metropolitan, regional and local public administration, namely technicians responsible for urban planning, other public entities (e.g., schools, health entities), entrepreneurs, and local development associations. These socioeconomic and political actors were involved and actively participated, through participatory methodologies, in the design of the outputs of the project, that is, periurban typologies, scenario development and definition of sustainability indicators.

By assuming that the opportunities and challenges of periurban territories are related with the integration of visions, policies and the consideration of the diversity of these metropolitan areas, Periurban project proposed typologies based on 24 indicators aggregated in 5 distinct dimensions (economic, social, environment, mobility and land cover).

The findings related with socioeconomic dimensions of periurban territorial typologies reveal that periurban territories are 'spaces in transition' and "strongly marked by social and territorial recomposition", "eminently fragmented, and composed of changing communities with distinct identities" (Ferreiro et al, p.117). The importance of agro-forestry sector in LMA (57%) corresponds to one important characteristic of these areas and explains the "coexistence of a rural-agriculture matrix" (Ferreiro et al 2016, p. 116). In fact, agriculture still represents the main land use in periurban areas (figure 1) and despite its decline in economic terms: "the process of industrialisation, the improvement of transport infrastructures and technology involved in storage of agricultural products, concur to this decline. However, agricultural activities in periurban areas reveal also a changing nature related, for instance, with pluriactivity, the increase of subsistence farming and the presence of agro-food industry (idem, ibidem). The current importance of agriculture in terms of land use and activity in LMA constitutes a central figure in the reflection about food security and sustainability of metropolitan territories.

An Interdisciplinary approach was also adopted by 'MEMO'. The project was established over the expertise of two teams from Lisbon University (IST) and Lisbon University

Institute (ISCTE-IUL). The scientific areas involved Environmental Engineering, Architecture and Urbanism. The main objective was to develop a comparative analysis of the Urban Metabolism of LMA, in two historical periods (1900 and 1950). Aware of the growing restrictions on the availability of natural resources and the implications of urban growth over the territory and the urban environment, the MEMO Project seeks to contribute to a better understanding of the relationship between Urban Morphology and the metabolic behaviour of the territory, in order to support the development of guidelines for land-use planning that aim to optimize the use of natural resources through two specific methodological approaches: a Material Flow Accounting of food products; a Visual Characterization of water and agriculture uses. This innovative combination of methodologies aimed to surpass a common difficulty to non-engineering disciplinary areas-to approach metabolic analysis of the urban environments. Therefore, the adopted methodology included five specific steps: i) accounting of food production and food consumption; ii) identification of potential supply areas; and iii) a visual characterization of agriculture uses and water elements through historical cartographic sources. While adopting conventional methods of material flow accounting, as employed within Industrial and environmental engineering mostly, this project added a new component: a detailed visual characterization of the elements related to agriculture (land use) and water use (equipment and infrastructures) in the territory under analysis and that were deemed to justify LMA Metabolism (Marat-Mendes et al, 2015, Marat-Mendes et al, 2016).

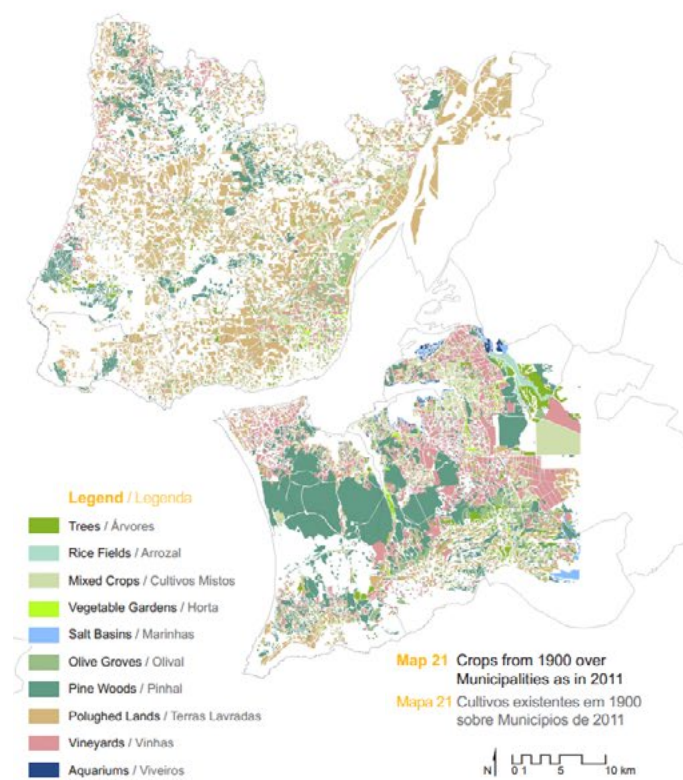


Figure 2: Crops from 1900 over Municipalities in 2011 in Lisbon Metropolitan Area

The main findings of MEMO Project have allowed accounting for the first time food consumption and goods produc-

tion in Lisbon, as well as the potential areas of production within Lisbon municipality (Niza et al, 2016). Vital sources for this assessment were the historical cartography produced for Lisbon region<sup>3</sup>, historical agricultural statistics<sup>4</sup> and reported dietary habits of Lisbon citizens<sup>5</sup>. Finally, this project confirmed the value of integrating both historical and scientific sources in order to approach urban metabolism, while adding specific temporal and spatial settings. Historical data can be used to add a temporal and visual dimension to scientific understanding, wherein merging knowledge provided by social sciences and natural and technological sciences. Scientific data can also play a role in reconstructing the urban environments to which the study of urban metabolism depends upon greater understanding.

### 3. Connections and missing links on urban agriculture, food and food systems

The debates on urban agriculture, urban food and food systems, and transitions in food sociotechnical system in the context of Metropolitan Areas, should integrate views and express the diversity of these subjects, that is, more complete and realistic approaches. The findings of Periurban and MEMO projects are important at this realm and, therefore, can contribute to the design of a methodological approach envisaging the discussion of connections and missing links of urban agriculture, food and food systems within a sustainable framework.

Food systems are the outcome of a modernization process from WW II onwards (Grin, 2012), driven by targets of productivity increase and efficiency and implying the intensive use of agro-chemicals, energy and water. This process came along with the rationalization of commercial circuits (with the generalization of packaging, labelling, and branding), the increasing supply of conserved, deep-frozen and convenience food, and the rise of concern with hygiene and safety. New outlets were created – most notably the supermarkets -, where a diversified array of products is offered, often sourced from distant locations (Grin, 2012). In fact, the liberalization of global markets enabled the access to a much larger food assortment. In order to become environmentally friendly, the food system has to change: in production – reducing and replacing chemicals, energy and water -, but also in transportation and packaging along the distribution and retail chains. The current resurgence of local production, seasonal consumption and short chains illustrates this phenomenon (Salavisa and Ferreiro, 2016), contributing to decrease the ecological impact of the system. Proximity production and supply will affect the territorial and functional organization of metropolitan areas, with new usages of land around the big cities and the transformation of commercialization circuits.

<sup>3</sup> CEM 1893–1932

<sup>4</sup> MNF-DGE 1890–1900

<sup>5</sup> MF-DGE 1915

The interdisciplinary approaches involved in these projects introduce useful insights envisaging the design and transition of food socio-technic systems by stressing the following aspects: i) the importance of land use devoted to agriculture and food production in LMA both in historical (MEMO) and current contexts (Periurban); ii) The acknowledgement of the diversity of land use and food production (Periurban and MEMO). Besides these insights, Periurban and MEMO can also contribute to the definition of a methodological approach to the research of the transition towards a sustainable sociotechnical system in food-related areas and activities. In fact, the adoption of a multiplicity of methods and techniques within those projects provided an opportunity to realize the importance of the combination of quantitative and qualitative methods as well as the visual and cartographic representation of land use and the inquiry to habits, sociodemographic dynamics and perceptions of urban population regarding territory and urban planning.

### 5. Conclusion

The paper presented and discussed main finding of two research projects on LMA envisaging the understanding of the transition of food sociotechnical system. It was proposed that interdisciplinary visions, both in theoretic and methodological terms, allow identification of connections and missing links of urban agriculture, food and food systems, because: i) they consider diverse dimensions of territories, establishing linkages between physical and socioeconomic dynamics of urban life (e.g., interface between urban planning and economic activities); ii) they reveal elements that are invisible to more conventional approaches (e.g., the diversity of types of rural territories and agriculture within metropolitan regions); they identify key actors of food systems in urban contexts. To sum up, interdisciplinarity, both in theoretical and methodological terms, provides a more holistic view on fundamental and complex aspects of metropolitan life related with agriculture, food and food systems.

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