The local agrifood systems in face of changes in urban rural relationship: the foodscape of Rome

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Abstract: The lack of productive urban land, the food insecurity, the uncontrolled urban growth, the lack of stable local food markets, the land use conflicts in the urban areas and a general lack of knowledge about the food production, fuel the debate about city and food in time of changes (Morgan & Sonnino, 2010). In the evolution of the urban rural relationship we can consider agricultural production not as the antithesis of the city, but of an integrated urban activity that contribute to the resilience of cities (Barthel & Isendhal, 2013). Besides scholars and institution seem move towards a new paradigm for a territorial agri-food system planning to improve the local management of food systems that are both local and global (FAO, 2011, Sonnino, 2013).

The paper explores the changes in rural urban linkages of Rome's province, focusing on its the development of the metropolitan area in the framework of a food sustainable planning and in landscape resilience. In this frame the case of Rome is interesting due to several reasons. First, Rome is the largest city in Italy, in terms of surface area and population, and was the largest agricultural municipality in Europe until 1992, when the municipality of Fiumicino separated itself from Rome. The special features of the case of Rome also concern the extent and size of the settlement developments characterizing the area: two thirds of the urbanized surface areas have been built up in the last fifty years, occupying mostly agricultural land (Bianchi & Zanchini 2011, Cavallo et al., 2013). The local food network behind agriculture in the city, within a number of integrated social agrarian cooperative, who represented an alternative food production system and landmark for many initiatives carried out by the civil society, associations, cooperatives, volunteer and school sectors. We focus on assessing the role that local flows of agri-food system can play in the frame of metropolitan food demand and consuming, try to explore how much land in Rome could be productively used for agriculture and how much could realistically be grown. These issues are important steps toward increasing knowledge and establishing a baseline for evaluating the potential role of Roman local food shed, even in terms of its impact on agroecosystems and landscape. Starting from the relationship between food and city, we are mapping rural urban linkages and changes in Rome's foodscape (Morgan & Sonnino, 2010), identifying a number of representative conditions - typologies - in the area of whole province of Rome. We can identify a set of recurring elements, whether criticality rather than opportunities, that holds together the relationships between urban space and the role played by agricultural activities in rural and periurban contexts.

Keywords: Rural urban relationship, urban food planning, Rome

Introduction

The evolution of the shapes of settlement development has brought about transformations that have contributed to redefining relationships between the large urban – physical and social – sizes and the agricultural-environmental systems that they are located in. This process has taken place within a framework of changes in the production systems that have seen the changeover from an industrial economy to one of services and information, with heavy consequences on the city's social configuration and spatial geography (Donadieu, 2003, Indovina 2009, Insolera 2011, Lanzani & Pasqui 2011). The complexity of the forms and functions that define the relationships between urban space and the role played by agricultural activities (Indovina 2005, Barthel & Isendhal, 2013), even in terms of urban food governance and the so-called new food equation (Morgan & Sonnino, 2010, Sonnino, 2013).

The paper proceeds as follows. Section 2 examines the case of Rome's province and the key topics that define the area. In section 3, we investigated the changing in urban rural linkages by examining the land use transformation, agricultural and population census data. Finally, some conclusive remarks are provided.

The evolution of the urban rural relationship in Rome province between resilience and pressures

In Italy the territorial model of urban sprawl that has become a familiar scene, in particular in the last twenty years, where functional conditions are prevalent urban social relations but with forms of land use that are far from urban models, characterized by low density and urban sprawl (Indovina, 2009).

Two thirds of the urbanized surface areas in Rome's area have been built up in the last fifty years, occupying mostly agricultural land (Insolera, 2011). Its distinctive nature can be found in the role that the Roman countryside plays on a historical and cultural level – for example timed to iconography and Gran Tour literature (Palazzo 2005), and also in its value in terms of biodiversity (Blasi et al, 2008).

The area that we considered is about 5.363 km^2 which stretches just beyond the administrative borders of Rome' province and 121 municipalities. The transformation of the land in the Roman area has taken place over an extremely long period of time, which has led to the substitution of the original forest ecosystem with a new agro ecosystem which is especially heterogeneous in the types of natural vegetation (Blasi et al. 2008), in which the agriculture, pasture, the dense network of water courses and the residual woodland are the landscape's key elements.

The relationship between the city and the agricultural system within it has continued to develop and was characterized by a substantial equilibrium until the 1950s, when a phase of urban expansion began which was unprecedented for both its size and speed. The social and economic weight of the Agro Romano has progressively decreased, not only due to the decline in agricultural profitability compared to the other economic activities connected with urban development, but also due to the particular set-up of the land property which originates from the large agricultural estates system, owned by aristocratic families and the Church, with a bearing towards seed cultivation and livestock rearing. From the early twentieth century up until the Second World War, there was an increase in the value of land, further to urban development and land reclamation in the Agro Romano area, and on the other hand the land owned by the aristocratic families was divided for new capital farms. In the 1950s, the fear of expropriation, linked to the land reform processes, and fiscal pressure brought about the apportionment of many pieces of land (for construction purposes) by the large-scale owners and a consequent further division and apportionment, which only a few large areas of land were saved from, which were then bought by local associations and national institutions. The same period saw the start of illegal construction developments, which continued for a large part of the 1970s, in spite of the attempt to correct such action through the

planning tools over the years. Urban expansion continued at a rate of more than a thousand hectares a year until (Insolera, 2011) the end of the 1980s, producing the effects of directing landowners towards those economic activities which are linked to building development. Wide areas of agricultural land thus became transformation land, the so-called "waiting" agriculture linked to land revenue, to be preserved while awaiting variations to urban laws which permitted the possibility of construction (Palazzo, 2005, Insolera 2011), with the consequent increase in the price of land that discouraged agricultural businesses even further.

According to recent studies (Blasi et al., 2008, Salvati et al., 2012, Cavallo & Marino, 2013) urban sprawl increased over the last decades not only in low ecological quality fringe areas (e.g. arable lands, degraded pastures, abandoned fields), but also in high environmental quality ones (e.g. pastures, vineyards, olive groves). While compact urban growth in the Mediterranean region involved primarily, up to the 1980s, low-intensity agricultural areas, abandoned fields, and low-quality dry pastures at the urban fringe (Insolera, 2011), sprawl has invaded in recent years larger areas located progressively further away from the Rome. Changing land use in Rome and Fiumicino areas in the last twenty five years regarded: an increase of +194% mix woods, + 47% urban, a decline of - 48% mix farming, -94% pasture, -78%mediterranean maquis (Cavallo & Marino, 2013).

The urban and landscape planning instruments, as well as those of rural policies, over the years have not expressed a territorial set-up strategy linked to the environmental, agricultural and landscape factors of the Rome area (Palazzo, 2005, Magnaghi 2011). The same planning tools plans did not, however, stop large parts of the Agro Roman being transformed into built-up areas of housing, where the value of the land lay in the ability to provide the minimum size for being able to build. There was therefore a role reversal in the ratio between residency and agricultural land, with the first no longer being at the service of the last, but the last taking on the function of capital asset for residency. A market-oriented agriculture is therefore set up, specifically in the traditional food chain of the area: sheep breeding, dairy farming, extensive grazing, vineyards, olive.

According to the data of the last census, in the province of Rome there are 21.631 farms occupying a total area of 249.124 hectares (TAA) and an agricultural utilized area (UAA) at 175.977.87 hectares[275]. The previous census had recorded 51.410 farms on an area of 287,544.82 hectares, with a UAA of 193,092.35. In the case of the City of Rome in the last decade there was an increase of 40% of farms, amounting in 2010 to 2.656 units, 763 more than a decade ago, on 43.271 hectares, 6.236 more than in 2000, a share +17%. Therefore, the role played by the local food network is remarkable, particularly in case of farmers' market, Solidarity Purchased Groups and those linked to box schemes experiences have seen significant success (Marino and Cicatiello, 2012, Fonte, 2103). The increasing importance of Alternative and Local Food Networks is showed in the data: the 60% of Rome municipalities farms sell directly (Istat, 2011) it was registered an increase of + 57% Farmers' market at municipality level and of + 64% in Rome's province (2010/13) (Marino et al., 2013). The local food network behind agriculture in the city, within a number of integrated social agrarian cooperative, who represented an alternative food production system and landmark for many initiatives carried out by the civil society, associations, cooperatives, volunteer and school sectors, community supported agriculture (CSA) initiatives.

What happens in this territorial context? Is increased the roles played by agricultural activities in urban area more than in rural context? Which scenario is emerging? This study integrates a clas-

[275] Agricultural area (UAA) describes the area used for farming, it includes the land categories: arable land, permanent grassland, permanent crops and other agricultural land such as kitchen gardens. The term does not include unused agricultural land, woodland and land occupied by buildings, farmyards, tracks, ponds, which are considered in Total Agricultural Area (TAA).

sification of rural urban relationships, land cover maps and census data (2001, 2011), in order to identify the trajectories of urban rural linkages in Rome areas.

Understanding urban rural linkages in face of changes: a proposal

The OECD (2007) approach classifies regions as predominantly urban, intermediate or predominantly rural based on the percentage of population living in local rural units. The typology identified by Eurostat (2010) builds on a simple two-step approach to identify population in urban areas: the population density threshold (300 inhabitants per km) applied to grid cells of 1 km, and a minimum size threshold (5.000 inhabitants) applied to grouped grid cells above the density threshold. We apply the classification build by the Italian Ministry for Territorial Development (DPS, 2013) based on some accessibility indicators measuring the degree of remoteness of essential services: educational services, health and rail transport. The mapping is mainly influenced by two factors: the criteria by which to select areas for supply of services and the choice of the threshold distance for measuring the degree of remoteness of many areas, and a minimum size threshold (35.000 inhabitants) for urban areas. Based on this approach we identify different typologies (urban, periurban and rural), and specific index in order to identify the role played by urban rural linkages in drive the flows of people, urban settlement and agrifood products or, in other words, the agricultural foot print of territories. The results of this classification are represented in figure 1.

The territorial typologies identified is compared on the overlay of land cover (CLL, 2006), the map shows that agricultural areas are distributed in a homogeneous way regardless of classification, in a way this confirm the role of Rome as agricultural metropolis. The periurban typology is developed in two directions, north-east and south-east, according the main directions of urban fabric shapes (the third is represented by the settlement along the costal area). In figure 2 we represent agricultural land use classes. Comparing the figures 1 and 2, we observe the role played by the complex patterns (particularly relevant form the ecological point of view), olive (NE) and by vineyard around the volcanic area of Castelli Romani, areas of transition between town and country. The urban and periurban agriculture is, in fact, strongly linked to the presence of green infrastructure, as showed in figure 2, the network of protected areas works as a green belt, around the metropolitan area, they area able to ensure the functionality of the ecological network at the provincial level.

If we consider the uses of the land and the agricultural landscape's shape, we note how the rural area occupies the central area, with a heavily irregular urban fabric in which the agricultural and semi-natural areas enter the spaces that have been left free from urban development, while in the north east, close to the city, seed-grown agriculture is predominant. The agroforestry mosaic of the Rome province is complex in SE direction. Those areas with high agronomic and ecological complexity coincide with those most directly affected by urban pressure. However, largely of them are protected areas, as show figure 2. Cities are particularly vulnerable to a number of risks due to causes of a different nature including population growth (FAO, 2011), as shows table 1. Cities that have a higher stock of natural capital are more resilient and less vulnerable to extreme natural events. Agricultural activities, in fact, play a key role for the definition of a model of management of natural capital and resilience in urban areas (Barthel and Idendhal, 2013). Beyond food production the agro-ecosystems play the role of a network of natural and manmade systems, reducing the territorial fragmentation: they, if properly designed, can work as a widespread reticular pattern of green a blue infrastructure" between the fields (e.g. ditches, hedges, fringes) and buffer zones around sensitive.

Figure 1: The territorial typologies and land cover (CLL, 2006), scale 1:100.000.

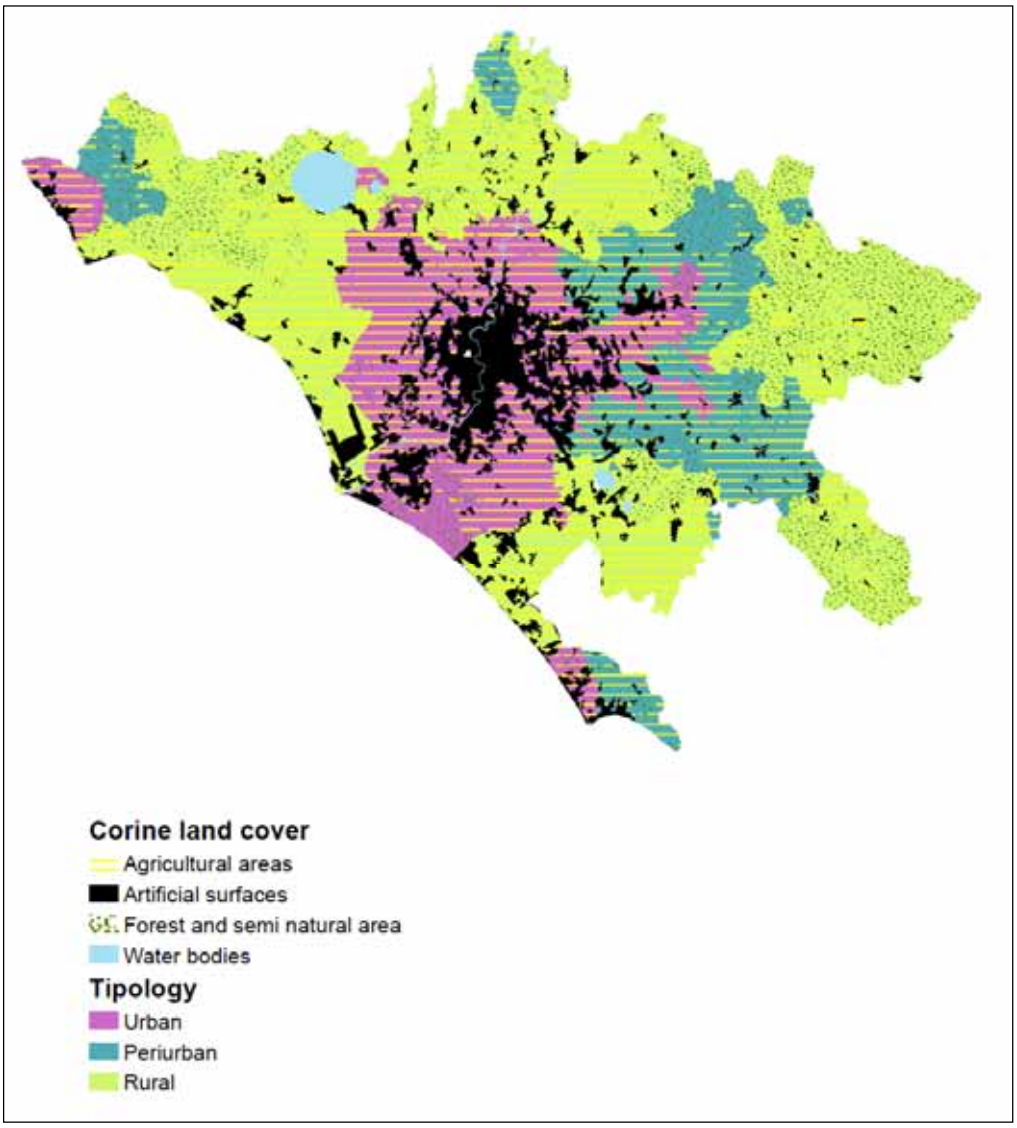
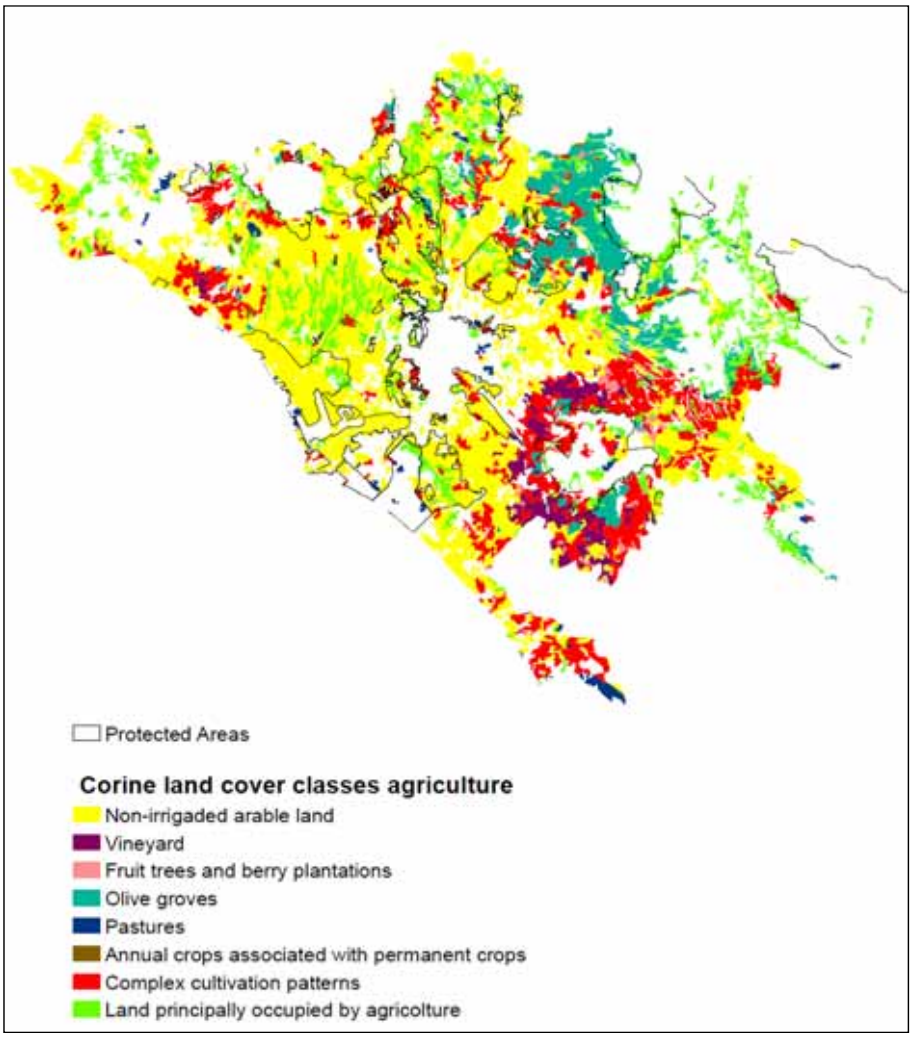


Table 1: Main population index (Istat, 2000, 2011).

Territorial typologies	Population 2000 (inhab.)	Population 2011 (inhab.)	Variation (inhab.)	Variation (%)
Rural	655.712	774.106	118.394	18,1
Periurban	348.847	435.392	86.545	24,8
Urban	2.695.865	2.787.967	92.102	3,4
Total	3.700.424	3.997.465	297.041	8,0
Territorial typologies	Density 2000 (inhab./kmq)	Density 2011 (inhab./kmq)	Density variation (inhab./kmq)	Variation (%)
Rural	19.176	21.363	2.187	11,4
Periurban	13.907	16.792	2.885	20,7
Urban	4.689	5.241	552	11,8
Total	37.772	43.397	5.625	14,9

Figure 2: Agricultural land use and protected areas boundaries, scale 1:100.000.



By analyzing census data, summarized in table 2, we observe the decline of UAA in rural and periurban areas, while it increased in urban context. On the other side, about farms, the trend observed at national level (Cavallo et al, 2012), the farms are reduced (more then halved) in periurban and rural areas, but the decline is lower in urban context. In table 3 we consider the farms density of the Rome's province area.

Table 2: Changes in agricultural surfaces and farms.

Territorial typologies	**UAA 2000 (hectars)**	**UAA 2010 (hectars)**	**Variation (hectars)**	**Variation (%)**
Rural	115.357	97.775	-17.583	-15,2
Periurban	33.959	29.020	-4.939	-14,5
Urban	43.776	49.183	5.407	12,4
Total	**193.092**	**175.978**	**-17.114**	**-8,9**
Territorial typologies	**Farms 2000 (unit)**	**Farms 2010 (unit)**	**Variation (unit)**	**Variation (%)**
Rural	34.405	12.479	-21.926	-63,7
Periurban	12.642	5.584	-7.058	-55,8
Urban	4.363	3.568	-795	-18,2
Total	**51.410**	**21.631**	**-29.779**	**-57,9**

Table 3. The density of farms in Rome' province.

Territorial typologies	Farms 2000/Total area (unit/hectars)	Farms 2010/Total area (unit/hectars)	Variation	Variation (%)
Rural	1.242	382	-860	-69,2
Periurban	473	210	-263	-55,6
Urban	46	19	-28	-60,0
Total	**1.762**	**611**	-1.150	-65,3

Exploring the role played by agriculture in rural urban linkages of Rome's we have to focus on its relationship with the development of the area in the framework of a food sustainable planning (Morgan and Sonnino, 2013). At the same time ensure the productive urban landscape as a part of the urban phenomenon require an assessments of its roles, which are not limited to the provision of food. We characterize the agro-urban landscapes by the ensemble of relations and interactions that are established between cities and (intra and peri-urban) agriculture, recognizing from the outset that they are multidimensional (i.e. geographic, territorial, economic, social, cultural, political, ecological), within the resilience approach (Holling, 1973). In speaking of agro-urban landscapes, the goal is to understand the relationships between cities and agriculture in all their dimensions, in a symmetrical way between the agricultural and the urban, to look beyond the rural-urban divide. The involved issues are particularly intense surrounding the Mediterranean since the principal agricultural lands (Donadieu, 2006, Indovina, 2009, salvati et al., 2012), indispensable to the life of the inhabitants and the preservation of natural resources, are located on coastal plains where urban pressure is similarly concentrated. The challenge therefore is to integrate agriculture with urban development in the practices of regional organizations and in local public policies (i.e. agri-food planning policies) over the long term.

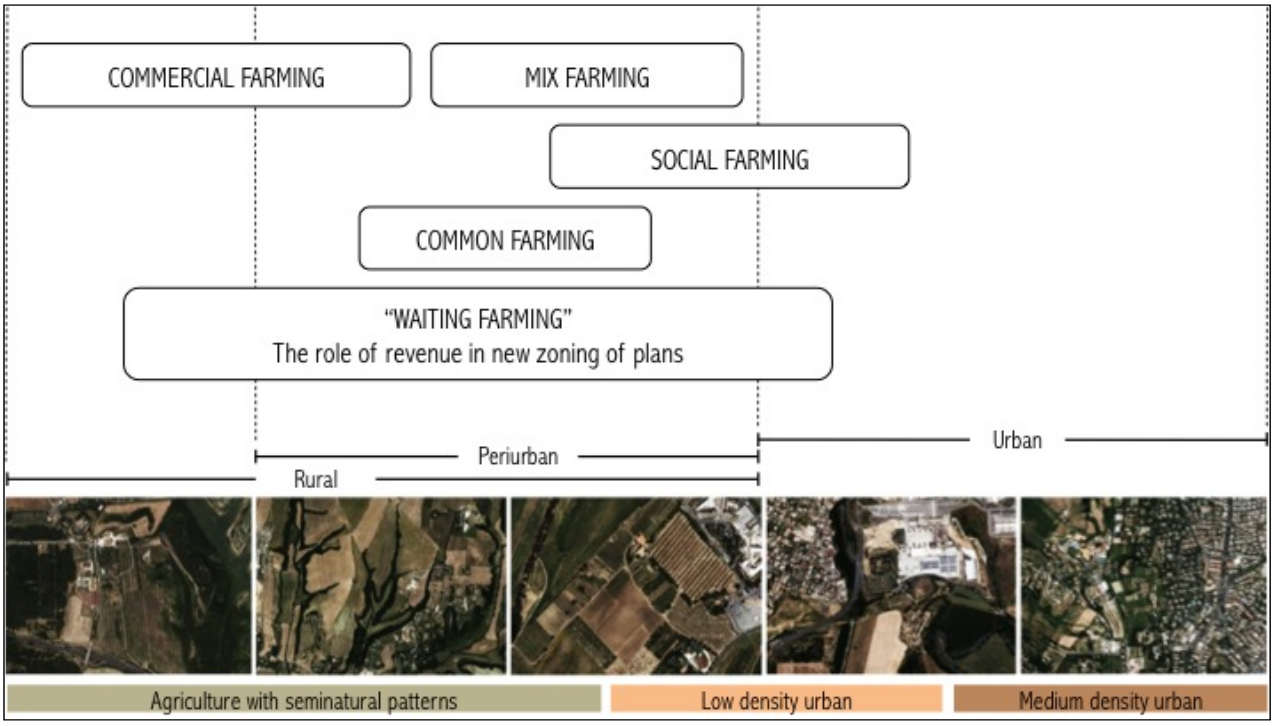
Starting from the relationship between food and city, or in other words by the foodscape Morgan and Sonnino, 2013), in table 3 we mapped the typologies of agriculture in Rome province's identifying a number of representative typologies. We summarize the stylized facts of the relationship between town and country, moreover we investigate the context of agricultural production in order to propose a taxonomy of the types of agriculture. The effort proposed here is a preliminary analysis of agriculture through a system of criteria for the classification of the distribution of the functional and relational features of agricultural activities in rural urban relationships. These interpretative categories attempt to reconstruct the causal relationships that translate agricultural production models (farms' data, legal forms, use of natural resources, localization), in specific forms in the spatial and functional urban dimension - physical and social -. On the theoretical level this analysis is embedded in the co-evolutionary paradigm and looks to the landscape as the result of interactions between the environmental system and the action of human who lives and uses the territory (Marino and Cavallo, 2009). This typization ultimately still seems a goal to achieve, this is the first step towards the construction of an interpretative and vocabulary typological then be systematize with the morphological data and those of land use. In figure 3, based on survey conducted (Cavallo et al., 2013) we summarized a description of four interpretative typologies of Rome foodscapes. In figure 4 these types are compared in a theoretical rural urban transect in urban fabric. In addition to the four types described above, we considered the role of agriculture practiced only as a sideline waiting for eventual conversion of agricultural land to other use, namely settlement.

Figure 3: Towards a collection of interpretative typologies of Rome foodscape.

FEATURES	COMMERCIAL FARMING Farms of small and medium dimension, with intensive rearing of husbandry dairy on the coastal strip and tree crops, mainly olive trees and vines, in the hill areas from the northeast to the southeast.	MIX FARMING The farmers of Roman countryside have managed their traditional agro-ecosystems for centuries characterized by extensive production systems associated with a multifunctional systems characterized by sheep, horticulture, arable, pasture, olive grove.	COMMON FARMING The farming systems linked with common farming is characterized by big farms and common land (mainly pastures and woods) managed by municipalities or other collective forms.	SOCIAL FARMING Farms that are involved in fostering rehabilitation, work integration and social inclusion.
Farms size	✓✓	✓✓	✓✓✓	✓
Main livelihoods	Horticulture, dairy, arable, greenhouses	Horticulture, dairy, arable, pasture, olive grove	Arable, dairy, pasture, woods	Horticulture
Market oriented	✓✓✓	✓✓	✓	✓✓
Employment	✓	✓✓	✓✓	✓✓
Innovation	✓	✓✓	✓	✓✓✓
Integration in agrifood system	✓✓✓	✓✓	✓✓	✓
Role in Local Food Networks	Pick you Own Box scheme	Food procurement	Pick you Own Solidarity Purchased Groups	Pick you Own Community Supported Agriculture
Policy support	✓✓✓	✓✓✓	✓✓	✓
Historical value	✓	✓✓	✓✓✓	✓
Ecosystem services	✓	✓✓	✓✓	✓
Location in protected areas	✓✓	✓✓✓	✓✓	✓✓
Territorial typology	Rural, periurban, urban	Periurban and urban	Urban	Periurban and urban

✓✓✓ relevant ✓✓medium ✓ low

Figure 4: Foodscapes typologies in urban rural transect.



Final remarks and further research efforts

The lack of productive urban land, the food insecurity, the uncontrolled urban growth, the lack of stable local food markets, the land use conflicts in the urban areas and a general lack of knowledge about the food production, fuel the debate about city and food in time of changes (Morgan & Sonnino, 2010). These and other external local factors have brought about a progressive process, which is common to many European metropolitan areas, such as those of Mediterranean costs (Salvati et al., 2012), due to which specialized, more profitable agriculture is pushed far from the city, while the agricultural and natural spaces that surround the residential areas become the basin for urban expansion. In the evolution of the urban rural relationship we can consider agricultural production not as the antithesis of the city, but of an integrated urban activity that contribute to the resilience of cities (Barthel & Isendhal, 2013).

The issues linked with urban food policy call for a framework integrating a wide range of sustainable food and agriculture system elements into a community at a site, or neighborhoods or on city region wide scale. A growing number of local governments across the world are rebuilding their food systems through innovative public policy. Increased attention for urban food systems responds to the need to place food higher on the urban agenda. Urban food systems are an increasingly important driver for many other urban policies such as health and nutrition, education, occupation, tourism, transport, waste and water management, adaptation to climate change and social welfare. A paradigm shift in both planning and policy formulation is required in order to ensure access to food, foster inclusion and innovation, improve environmental management, enhance rural urban linkages and provide policy guidance at both national and municipal level.

In face of those changes in foodscape in Rome's context, the urban-planning instruments over the years, those about landscape, as well as the rural development plans, during the years have not expressed a territorial set-up strategy linked to the environmental, productive and landscape factors of the Rome area agricultural ecosystem for the environmental system (Palazzo, 2005, Magnaghi 2011). In this sense, in terms of future research efforts, is relevant the role that the integration between different interdisciplinary approach (planning, agricultural economics, landscape ecology) in order to recognize the complexity of forms and values of agro-ecosystems. Therefore, in terms of decision making process the enforce of integration of policies and different governance's level involved, particularly refereed in the new asset of metropolitan areas in Italy. This paper focus on a preliminary on collecting data and identify models able to understand changing in both urban food and landscape system a detailed investigation into the current state of agriculture.

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