

Chelas Valley and Coina Wetlands Agricultural Parks

Magalhães, Manuela R.; Silva, João; Leitão, Manuel; Saavedra, Andreia; Müller, Ana
*Landscape Architecture Research Centre “Prof. Caldeira Cabral”, Instituto Superior
Agronomia, Technical University of Lisbon, (CEAP/ISA/TUL)*

1. Introduction

Over 70% of Europe’s population now lives in urban areas (EEA, 2006) and there is a substantial rural-urban migration causing a rapid expansion of the peri-urban interface, where domestic and industrial modifications of the environment interact strongly with agricultural production (Brook & Davila, 2000). Portugal, as the rest of Western Europe, has been through a profound process of urbanization beyond former city limits over the past decades, and even in regions where the population is decreasing, urban areas are still growing (Piorr, Ravetz & Tosics, 2011). As the urban pattern gradually distanced itself from the traditional compact city model, the urban fabric became scattered and fragmented, unfolding itself at the expense of the surrounding rural landscape (EEA, 2006).

Today, the non-built areas take on a major importance in metropolitan areas planning process. As urban life demands the existence of open green spaces to contribute for the quality of the urban environment and the wellbeing of the population, urban voids are essential to the implementation of green corridors and ecological networks.

In order to materialize these networks, there is a need to design also at site scale and the creation of agricultural parks reveals itself as a significant strategy, which integrates production, recreation and conservation functions and applies the principles contained in the European and international recommendations, including the European Sustainable Cities Report (European Commission, 1996), which states that the objectives of sustainability are more easily achievable acting from small areas, and involving the communities most directly concerned.

If food production is a permanent function of urban and peri-urban agriculture, it is above all its multifunctional role that matters to address through the latest advances at a conceptual level, framed from the perspective of sustainable urban development.

This paper aims to provide a framework for the design and implementation of two agricultural parks – Chelas valley and Coina wetlands – embedded in the context of municipal ecological networks. Both projects correspond to the preliminary study phase and were recently carried out in the Landscape Architecture Research Centre “Prof. Caldeira Cabral” of the Technical University of Lisbon (CEAP / UTL). The Chelas Valley project had its origin on an initiative of Lisbon’s municipality, while the Coina Wetlands agricultural park saw its beginning in the scope of the European project “Naturba – Interreg IV-B SUDOE”, whose purpose is to develop urban sustainable projects on cities fringes in order to overcome land use conflicts.

2. Background and Literature Review

Urban growth is occurring at an unprecedented rate worldwide with 65% of the population expected to reside in urban areas by 2025. Portugal has experienced some of the most rapid increases in urban development in the EU, focused around major cities and the coast (EEA, 2006).

Although there is legislation in Portugal for the protection of soil and other natural resources, urban planning did not always comply and edification proliferated in areas of high ecological sensitivity. That's because urban development and agriculture compete for the same land, as agricultural lands adjacent to existing urban areas are also ideal for urban expansion (EEA, 2006). It's in the non-built areas of higher ecological value, preferably the ones with fertile soils, that is now possible to establish urban and peri-urban agricultural projects, included within the scope of ecological networks and metropolitan agri-food planning.

On the past few decades, urban and peri-urban agriculture has been practiced in Portugal as an informal productive sector, not legitimized in the municipal and regional planning process. More recently, the importance of this activity to local economies and the promotion of social cohesion and interaction has been defended and affirmed, relying on municipal and national programs supported by international development agencies (including IDRC, FAO, UNCHS, UNDP, CIRAD, NRI, CGIAR, GTZ, ETC and others) (De Zeeuw, 2003).

On the other hand, there has been recognition by policy makers of the importance of green spaces and urban agriculture for mitigating persistent environmental urban problems such as floods, waste and wastewater disposal or the heat island effect. Also, growing concerns about unemployment and urban poverty, the quality and cost of food, the cumulative energy costs and food insecurity have increased the interest in growing food locally in cities, including in community gardens.

Despite the importance of this recent legitimacy, urban and peri-urban agriculture should be embedded in the implementation of Municipal Ecological Structures, by its compatibility with the protection and management of essential areas to the maintenance of ecological balance (Magalhães, 2007).

There are already some European places like Guipúzcoa and Barcelona (Spain), Milano (Italy) or Toulouse and Île-de-France (France) that have practical examples of agricultural parks, implemented in the context of ecological networks. For instance, the Baix Llobregat agricultural park (BLAP) in Barcelona is part of one of the twelve linked areas which make up the Network of Natural Spaces managed by the Department of Natural Spaces of the Provincial Council of Barcelona (Maranges, n.d.).

The BLAP was not an imposed land protection device, but rather a farmers' initiative to preserve their livelihood, the value of which was ultimately recognized and valued by governments and the broader community. It emerged as a bottom-up initiative rather than the more usual top-down bureaucratic policy-making in Europe (Kazancigil, 2010; Brunori & Rossi, 2007). The viability of agriculture in metropolitan areas has been defended internationally in agro-urbanism projects, seeking the integration of this activity in the planning process through the involvement of stakeholders in the governance of metropolitan landscapes (DERF, 2001; Biasi, Pujol, 2005). So, the need for good governance is critical for the future of urban and peri-urban agricultural areas, underpinned by stakeholder participation throughout the planning process and implementation, for attaining effective outputs (EESC, 2004; Piorr, Ravetz & Tosics, 2011).

Another example of agro-urbanism metropolitan projects is the Île-de-France region, where this approach has been developed also as a bottom-up initiative of the local collectivities and agricultural associations, and integrated in the planning process with the scope of maintaining the periurban agriculture mostly in the Regional Green Belt (Biasi, Pujol, 2005).

Hence, a positive outcome of the agro-urbanism projects is the contribution for the planning of agri-food systems at metropolitan scale as a wide socio-political construction that considers all stakeholders, including the development of food networks through short circuits for marketing local produce. The importance of planning agri-food regional systems and agro-urbanism projects has been recently recognized and supported in European and American urban planning (Biasi, Pujol, 2005; APA, 2007; Forman, 2008). However, in Portugal, the integration of the agri-food system in the planning, designing and functioning of the metropolitan areas is still beginning, in the scope of the implementation of Municipal Ecological Structures.

3. Methods

3.1. Site study

Chelas Valley, with an area of 13 hectares, and Coina Wetlands, with an area of 82 hectares, are located in Lisbon Metropolitan Area (LMA) (Figure 1), Portugal's most populated region. Both sites are located along streams that flow into Tagus River, which splits LMA in north and south bank. They are surrounded by dense urban fabric and located in former farming land, semi-abandoned in the mid-nineteenth century due to industrialization. Since then, both sites continued to be informally cultivated by some residents as a mean to strengthen their household economy or just as a hobby. They do it in an unplanned way, most of the times under precarious conditions, such as low quality of the irrigation water, the poor quality of materials or the lack of supporting facilities. The crops are mainly edible horticultural species and there are also some fruit trees scattered throughout both areas with the purpose of harvesting certain types of fruit while providing shade.

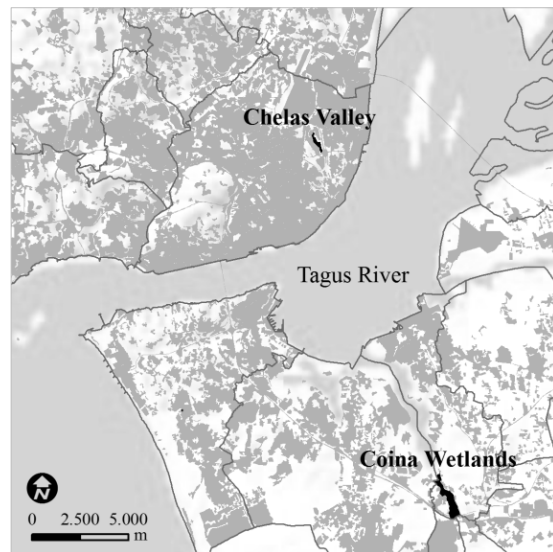


FIGURE 17 – LOCATION OF BOTH PARKS IN LMA.

In Chelas Valley, the soil derives from a limestone geological substrate, low in organic matter, with the exception of the parcels which have been continuously improved with the incorporation of compost. Due to gradual abandonment of the site, some infesting species, such as giant cane (*Arundo donax*) proliferated and were controlled only in the areas of permanent cultivation. In Coina Wetlands, the soil is alluvial and rich in organic matter. The water table is permanently near the surface and there is some vegetation with high conservation value, such as the spiny rush (*Juncus acutus*), lesser bulrush (*Typha angustifolia*) and common reed (*Phragmites australis*), as well as willows (*Salix alba*) and poplars (*Populus nigra*), typical species of the riparian gallery.

At both sites there is an informal trail network, already with some degree of sedimentation, which should be taken into account since they represent the most frequently used itineraries by the farmers and other pedestrians.

As to land ownership, Chelas Valley is exclusively Lisbon municipality's property, while the majority of Coina Wetlands belongs to private owners, some of them related to the real estate business. In the future, this may add in some difficulties around the project implementation in Coina Wetlands. Nevertheless, regarding the potentialities, both sites prove suitability for the establishment of agricultural communities based on a combination of multifamily-oriented production units with areas of conservation and recreational functions, along with soft mobility infrastructures based on the existing trail network.

3.2. Planning procedures

The first step of the design process consisted of several meetings with the municipalities' technicians in order to clearly define the intervention objectives, along with a set of technical studies to be carried out. Considering the landscape as a system, these studies concern its two main sub-systems: the ecological and the cultural. (Magalhães, 2007)

About the ecological sub-system, studies were conducted and cartography was made to determine components such as slopes, hydrography, land morphology, types of soil and an assessment of its capacity to produce biomass, soil permeability and natural and semi-natural vegetation of high conservation value. The cultural interpretation of the sites included the built heritage, road network, power lines, evolution of land use and land ownership.

In order to achieve a better site interpretation, the field visits were of critical importance. They permitted a better understanding of the dynamics inherent to the biophysical and cultural components of the space. In these visits, there were two main priorities: to rectify some features in the cartography such as the typologies of open spaces and the dimensions of the horticultural units; to establish a connection with the farmers and other stakeholders in order to realize what were their cultivation methods, their motivations and expectations, their necessities, their difficulties, among other issues.

The following phase was a landscape plan (Figure 2) based on the ecological suitability of the land to several uses. This proposal was based on a multifunctional framework and took into account, as much as possible, the stakeholders' necessities. For future project implementation, there is a need for a more detailed design of the space in order to integrate these areas with each other and within the Municipal Ecological Structures.

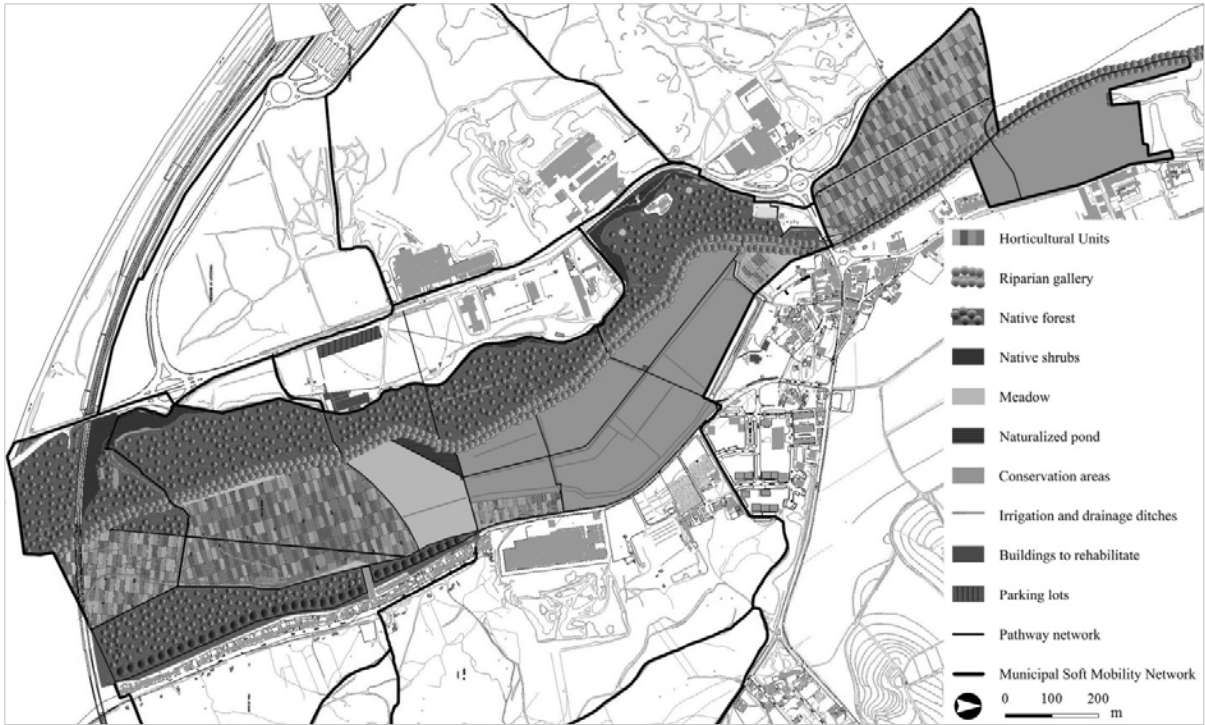


Figure 18 – Coina Wetlands Agricultural Park Landscape Plan.

4. Results

The projects of Chelas Valley and Coina Wetlands Agricultural Parks have taken into account an integrated approach that considers the ancient interdependence between cities and the surrounding rural areas. It was intended to create conditions for the promotion of two multifunctional sites with solid bonds to the neighboring communities that could combine production, conservation and recreational functions, while contributing to the closure of the energy and waste cycles at local level.

The agricultural areas (Figure 3) proposed for both sites are an extension of the existing ones, which are already located in some of the most suitable locations for this activity. The production system was designed aiming the exclusion of fertilizers, pesticides and growth regulators. Based on the use of compost, manure, crop rotation and biological control of pests and diseases, the purpose was to contribute for the maintenance of organic matter in the soil, closing the nutrient and energy cycles internally.



Figure 19 – Overall view of the agricultural areas in Coina Wetlands (3D rendering)

With the purpose of a logical spatial organization and according to the sense of ownership and community, the agricultural areas were divided into Horticultural Units (HU), constituted by individual plots and a multifunctional support structure. The HUs, separated by fences from one another, are intended to accommodate an average group of 12 horticulturists each. The dimensions of each plot were calculated regarding the terrain morphology and the dimensions of the preexisting plots, which are a good indication of the average area needed by each farmer. The support structure (Figure 4) was designed to accommodate a variety of functions needed to the practical and sustainable management of the vegetable gardens. It includes a tool house, a hennery, a hutch, a pigeonry and a composter. The proposed support structures and fences,

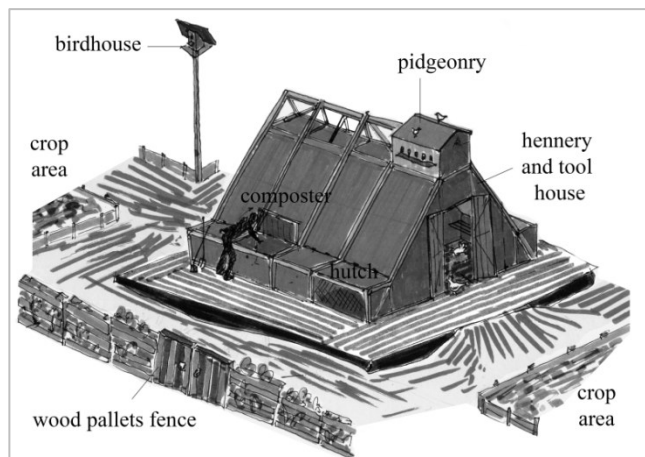


FIGURE 20 – SKETCH OF THE MULTIFUNCTIONAL SUPPORT STRUCTURE (LUÍS REIS DESIGN)

as other small-scale constructions should be built, as much as possible, making use of recycled or reused materials, such as wood pallets.

The irrigation network designed for Chelas Valley Agricultural Park, where the actual water for irrigation is polluted, is to be supplied from a borehole with a depth of 200 m to be held on the western slope of the valley. For storage and regulation of this water, a reservoir will be constructed with the possibility for rainwater usage as well. In Coina Wetlands, due to the almost permanent waterlogging, irrigation is done superficially through a network of ditches and floodgates, which ensures the distribution of water to the parcels. The ditches also ensure drainage of the land during the winter, leading the excess water to the river.

Along the streams, the projects also foresee the recovery of the riparian gallery, preceded by the cleaning of the margins and removal of invasive plants, especially the reed (*Arundo donax*). It were also proposed some native forested areas which, in addition to its ecological and productive functions, promote leisure, provide shade to visitors and conceal the network of overhead power lines that cut across the area of intervention, as well as roads and tall buildings closer to their limits.

For the steepest areas, mainly located on the borders of both parks, the use of native shrub species such as strawberry tree (*Arbutus unedo*) and common broom (*Cytisus* sp.) was proposed in order to reduce soil erosion and visually demarcate its boundaries. In Coina Wetlands, where plant communities of great ecological and aesthetic interest like the spiny rush (*Juncus acutus*), lesser bulrush (*Typha angustifolia*) and common reed (*Phragmites australis*) are found, the principal management strategy is their conservation. Similarly to other sites in Portugal classified as Natura 2000, the centerpiece of EU nature and biodiversity policy materialized by a network of important ecological sites (European Commission, n. d.), the use of these areas must be restricted. Due to the previous existence of some small cattle flocks, several meadow areas were planned in order to maintain and possibly propel the extensive pastoral activity. Since both parks have a strong relation to water, the intention was to integrate some naturalized ponds to shelter aquatic birds. Apart from the direct productive and ecological services provided, all these areas can work as poles of attraction for visitors.

For both parks, an internal pathway network was designed based on the analysis of the preexistent trails and their surrounding connections. These networks, featuring specific signage, were hierarchized and organized in different typologies that allow crossing through the parks, either transversally or longitudinally, and simultaneously link them to the respective municipal's soft mobility network. In the areas where plant communities of high ecological value are found, the solution was to elevate the paths (Figure 5) in order to preserve them from an excessive load, while allowing water, air and animal circulation.

After some conversations with local farmers, the need of a local farmer's association was a relevant conclusion. Then, a place to host each Local Farmer's Association was planned, which should lodge the park administration and serve as the location for



FIGURE 21 – ELEVATED PATHS IN COINA WETLANDS (3D RENDERING)

farmer's formation on varied issues (ecological agriculture, nutrition, food safety, certification processes, etc.). Furthermore, there is a will to bring the farmers closer to the final consumers, encouraging direct selling and the creation of specific labeling identifying product origin, etc. For Coima Wetlands Agricultural Park, the location of this center is planned to be in one of the two abandoned historic buildings, which was previously the Royal Glass Factory, while the other must seek to host a sports facility because of its lack in the region. In Chelas Valley, this structure is to be constructed from scratch.

5. Discussion and conclusion

This paper focused mainly on practical issues about the planning and design process of two agricultural parks located in LMA, aiming the development of spatial and functional solutions with low environmental impact to support agricultural production. Agricultural production is not the antithesis of the city, as modernist understandings of urbanity suggests, being in many cases a fully integrated urban activity that should be considered of equal importance to other typical urban services like transportation, cultural events, sewage or energy supply.

The importance of the recent legitimacy given to agri-food planning through urban and peri-urban agriculture with municipal support was considered in the Chelas Valley and Coima Wetlands Agricultural Parks within the scope of the implementation of Municipal Ecological Structures. As stated, the creation of agricultural parks takes on an important role in planning today's metropolitan areas, contributing to the ecological balance of the landscape and to economic and social wellbeing. In fact, as it was learned from successful examples in other European countries, agricultural parks should not be isolated elements, but rather integrated in an ecological network.

Also, agricultural parks can be integrated in the scope of Agro-urbanism projects, if considered as political processes of decentralization or relocation of decisional power actuating in the reconfiguration of peri-urban territories. This can only be achieved according to the interests formulated within a political community and the other stakeholders, whose identity is defined based on the interests, rights and obligations of a variety of stakeholders. Inherent in these projects is thus the creation of a political and institutional design, which exceeds the planning and design project, to become also a project of environmental and landscape citizenship.

The design is founded on scientific knowledge from different disciplines and an active participation of the community will follow with the help of the municipalities involved. In the context of frequent marginalization of urban spaces by the users themselves, dialogue between the designers and those users can be rewarding, trying to take positive actions from that contact. Moreover, the responsibility in the technical areas requires the assessment of the effects and benefits of the recommendations given by the various project teams. From the conceptual to the implementation stage, must be ensured that every choice made leaves alternatives to those who will benefit.

These projects, as models of urban environmental effectiveness and fulfilling the ecological requirements, should act as pilot projects which can be replicated in other Portugal areas. As a strategy, the incorporation in the design process, in addition to environmental criteria, of ethical and social affairs, is of outmost importance. Thus, the next phase of Chelas Valley and Coima Wetlands Agricultural Parks should allow the creation of a cooperation network of public and private stakeholders around which common interests and goals are brought together to launch

specific actions in order to achieve the agro-urbanism territorial project, through a specific implementation and management plan.

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