

The Territory crossed by the Águas Livres Aqueduct in Lisbon Metropolitan Área

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1. Abstract

The "new city", much more complex from the formal point of view, discontinuous and occupying territories increasingly more extensive [1], is the contemporary city. It's the dystopian city, the polynuclear city, the Metapolis François Ascher describes [2]. Given the dynamics of urban phenomena, which has a lack a reference model [3], new approaches are needed for analysis and intervention that they can answer to the fundamental questions in urban planning of contemporary cities. Namely, through new forms of analysis that are established on the biophysical and landscape values of the area but also on more immediate issues imposed by the new processes that the contemporary city and the design of its urban form are exposed.

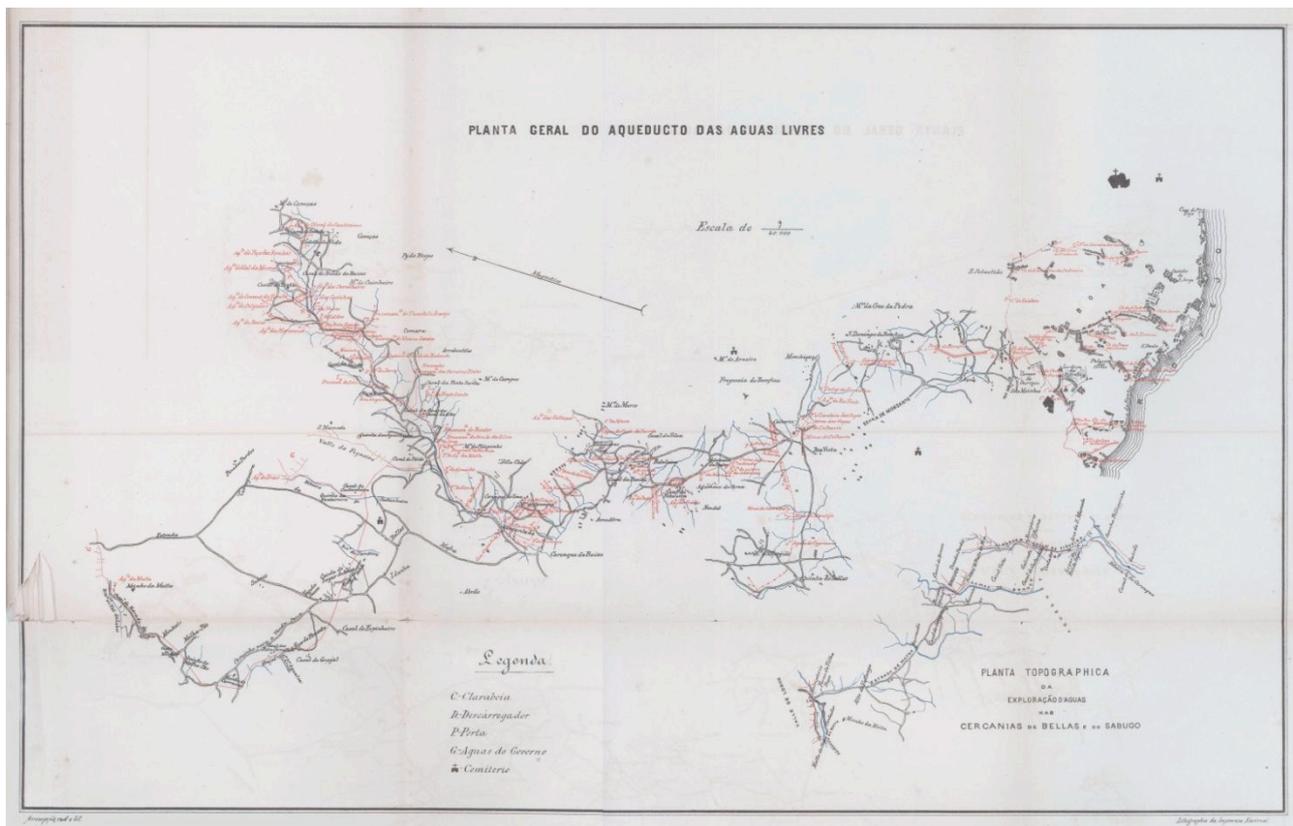
The case-study presented, focuses on public and open spaces to demonstrate that these urban spaces are the ones which must be considered in its many aspects [4], changes of use and morphological patterns, to witness the relationships between the territory and infrastructure networks. Such changes and relationships put these spaces as the link able to relate the new paradigms of growth of the cities of the future not only for its permeability to different events and urban phenomena, but also as direct players in it [3] [4]. As a specific case study arises Águas Livres Aqueduct in Lisbon, trying to reflect on: (1) the role of the Águas Livres Aqueduct while driving force and creator of public space in the city of Lisbon and its metropolitan area and therefore defining urban form, (2) the role of the aqueduct as an important element for the analysis of urban evolution of the city of Lisbon and the metropolitan territories crossed by it, and (3) new approaches and methods for the analysis of territorial dynamics occurring in the Lisbon Metropolitan Area.

This contribution is organized into three parts. The first part introduces an analysis of the Águas Livres Aqueduct while remarkable technical infrastructure, and its symbolic value in the city. The second part seeks to earn on current methodologies and approaches available for morphological analysis of the territory in order to assess their applicability in a possible methodological framework. And finally, the third part presents an analysis of the Águas Livres Aqueduct that seeks to assess: i) the level of integration with the urban landscape, ii) its level of integration with the public space and iii) public spaces and free spaces that had its genesis and / or promotion with the construction of the aqueduct iv).

2. The Águas Livres Aqueduct

The Aqueduct of Águas Livres made available the arrival of water in the city of Lisbon in 1748 and has its starting point located at Olival do Santíssimo, and its arrival point in the city of Lisbon, at the Mãe d'Água das Amoreiras. The level difference between these two points is approximately 80 meters throughout a territory of approximately 18 Kms. The entire aqueduct network sums however approximately 60 Kms long. The 80 meters height between the two mentioned geographic points (Amoreiras and Caneças) responded to a precise project and solutions that could guaranty the best quality possible to the water conducted in the Aqueduct. Namely throughout the following principles: i) the water velocity could not be very fast in order to avoid the degradation of the infrastructure materials; ii) but the water velocity could not be also very low in order to avoid the deterioration of the water chemical proprieties.

The 60 Kms of the Aqueduct entire extension covers a territory that goes beyond the city limits, which includes a significant part of the Lisbon Metropolitan Area, crossing 5 municipalities and 26 parishes. The aqueduct is therefore a key element for the analysis of the territories he traversed in a metropolitan perspective, as generating element and enhancer of a possible new approach to planning for these territories and should be seen as a backbone of urban planning at a metropolitan level.



Picture 1 - General Plan of the Águas Livre Aqueduct. Fonte: Museu da Água de Lisboa

The construction of the aqueduct enabled the city of Lisbon witness a new scale management of water resources, which led to a new interpretation of its territorial range. This new scale now depended on the scale of provision of natural resources, including water and its management. The Águas Livres Aqueduct thus assumes an important role in the transformation of public space in Lisbon and its territorial organization, leading to significant changes in the nature of geographical places and morphology of Lisbon. [5]

Analysis of cartography of Lisbon outskirts, for the nineteenth and twentieth centuries, and aerial photographs from the twentieth century shows that the territories crossed by the aqueduct, suffered significant transformations [6]. The construction of the aqueduct meant also transformations within the city of Lisbon, with the creation of new public spaces, and the renovation of existing ones.

In addition, certain patterns become possible to be recognized over the area but also in the city. These patterns correspond to specific elements, which can be identified by its recurrence, including: i) the patterns of division of land (farms), ii) the driving elements and distribution of water (wells, aqueducts, fountains, etc.) iii), as well as public spaces (parks, gardens, squares, etc.).

Currently the Águas Livres Aqueduct is nothing more than static picturesque scenario, an observer in the urban fabric, which continues to "move" around it. According to Françoise Choay [7], the reappropriation of urban landscape and heritage from the point of view of their identity, is a form of resistance to increasing globalization. The urban landscape, should be viewed from a dynamic point of view to be legitimate in the light of the city of the future.

2.1. The on-demand dynamics of a Living Infrastructure

The territories crossed by the Águas Livres Aqueduct are the subject of an investigation, inserted in a research master's thesis promoting a new methodology that seeks to identify the complexity, heterogeneity and dynamics of the Lisbon Metropolitan Area.

The research aims to identify the potential of identity of the landscape crossed by the Aqueduct, by reading, interpreting, and recognising the construction of this landscape, earning about the existence of patterns of occupation of the territory. It also seeks to identify a formal logic that redefines the identity of this landscape, supported on the infrastructure of the Aqueduct.

These territories now form an integral part of the Lisbon Metropolitan Area and have been for centuries and most recently, subject to urban dynamics that currently require new approaches in the search for new realities and understanding of transitions happening "on-demand".

In the case of the metropolitan area of Lisbon, the Aqueduct strongly mark the urban and peri-urban landscape, working as a connecting link and measurement element of the changes that these territories have had over the years.

The Águas Livres Aqueduct is a structuring element of these landscapes, that for centuries and in different aspects, was and it still is a living infrastructure. An infrastructure that is here considered as an instrument to consolidate a new approach to analysed these territories, as well as the planning approach. Moreover, it reveals that the administrative boundaries are not important nor relevant or determinant in an analysis of urban and metropolitan dynamics.

3. The Methodological Approach

The research presented here leans especially on the development and adaptation of a methodology for landscape analysis of the metropolitan area of Lisbon. This methodology is based on a holistic approach to landscape, trying to integrate the various dimensions of the landscape: the ecological, the cultural dimension, the socio-economic and the sensory dimension [8].

This approach allows the creation of an open, flexible analysis, which can be supplemented and enhanced at any time according to the most immediate changes occurring in the territory and landscape [8], that because the parameters considered fundamental for the identification of each landscape unit may be different as well as their combination [8].

The holistic approach views the landscape as a complex whole that is more than the sum of its parts [9] As the human perception works holistically inherently, an holistic approach can be used in landscape analysis with clear spatial associations between different components and complex patterns of occupancy and use, revealed for example in aerial photography and / or cartography [10].

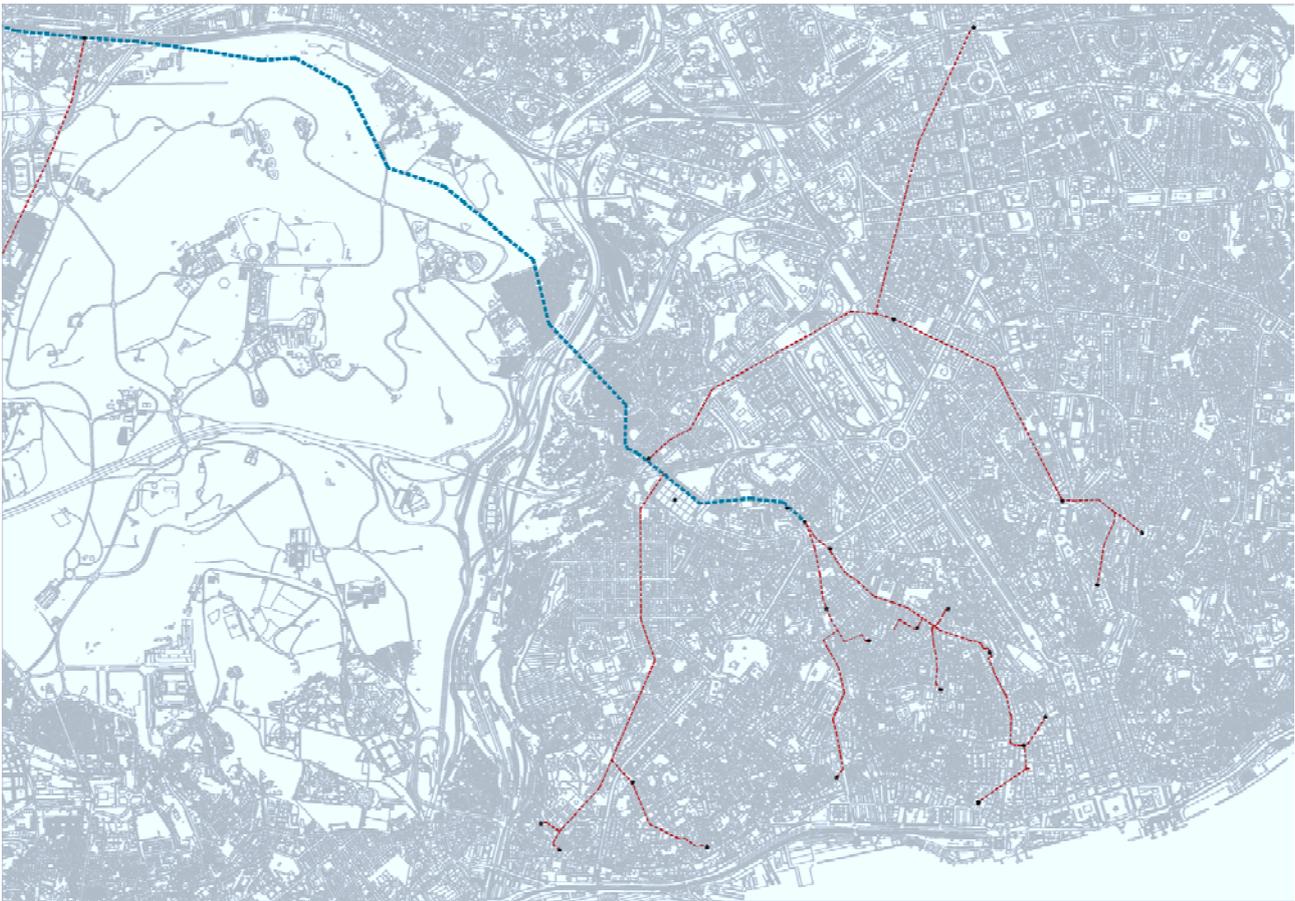
Methodologies based on holistic approach have been widely applied in studies on characterisation of landscapes in Europe. Professor Marc Antrop at Ghent University, and in Portugal, the work developed under the coordination of Professor Teresa Pinto-Correia at the University of Évora or the publication "Contributions to the Identification and Characterisation of Portugal Landscape", coordinated by Professor Alexandre Cancela d'Abreu are the main methodological references for the investigation.

Based on a holistic approach, we can distinguish two methodological complementary parts: the first part, is the study focused on the analysis of public spaces within the city of Lisbon, with direct relation to the Aqueduct; the second part consists in the identification and classification of landscape units along the main section of the Aqueduct. These landscape units are the elements that reveal the identity and the character of the landscape crossed by the Aqueduct.

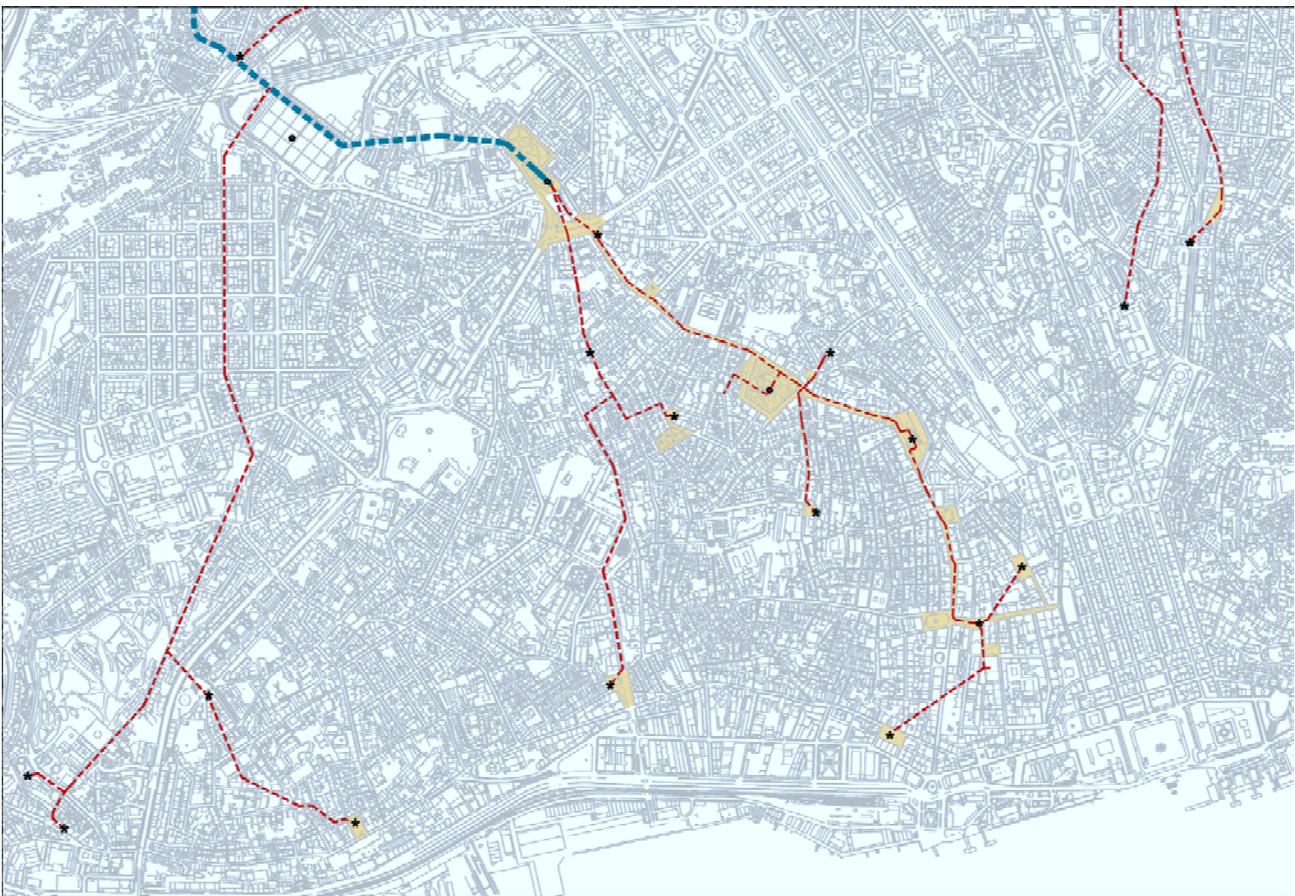
4. The Aqueduct and the Public Spaces of Lisbon: New patterns of a living city

It is in the city of Lisbon that new and important public spaces were created. In general urban spaces created during the construction of the aqueduct are linked to a water supply source - the fountain.

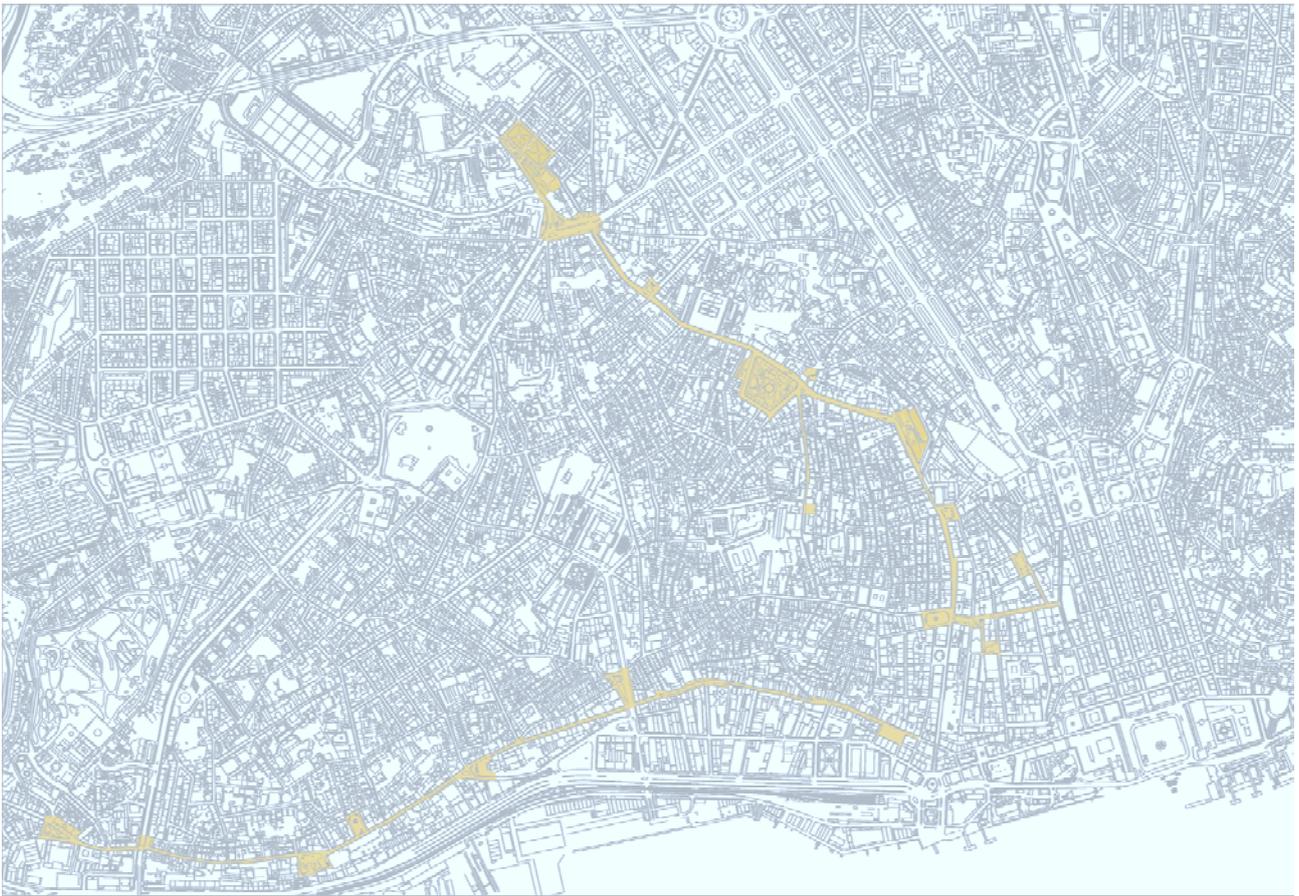
Before the construction of the aqueduct, the fountains have constituted important urban elements, since the water was always a rare commodity and so highly esteemed in Lisbon. [11] But with the Aqueduct these elements acquire a prominent role in the public space, not only for its water supply function, but also for its ornamental and recreational function. In all the projects, one notes the importance of the fountain as architectural element, as: i) infrastructure and the importance of the great work of water supply to the city, but also ii) the role of intervenient and modulator of a new urbanity.



Picture 2 - Network of the Águas Livres Aqueduct inside Lisbon city limits.



Picture 3 -Network of the Águas Livres Aqueduct inside Lisbon city limits and public spaces related.



Picture 4 - Principal axis of public spaces related to the Aqueduct in the city.

The Aqueduct assumed an important role in the transformation of the public space and urban fabric of Lisbon, thus assuming a territorial organisation and leading to significant changes in the geographic nature of places. The aqueduct including its variously technical details constitutes a remarkable infrastructure as well as a generator of the evolution and construction of Lisbon public space.



Picture 5 - Rua do Século Square, with the fountain at the front. November 2012

5. The Lisbon Outskirts

While in Lisbon, landscape transformation was mainly due to the proliferation of numerous fountains around the city, which also led to the proliferation of numerous public spaces, in the territories surrounding the city, the transformation of the landscape meant primarily to urban development of 58.135 km long. This wide geographical aqueduct led to the emergence of new occupations and land use, the emergence of new settlements and the expansion of pre-existing ones.

The development of these urban centers, once away from the city, benefited from the opening of a number of new roads, built directly on the immediacy of the structure of the aqueduct. This physical approach of the urban surroundings of the city of Lisbon, also enabled the exponential growth of trade of food, which in turn led to an increase and intensification of production. This is evident in the proliferation of farms, especially in

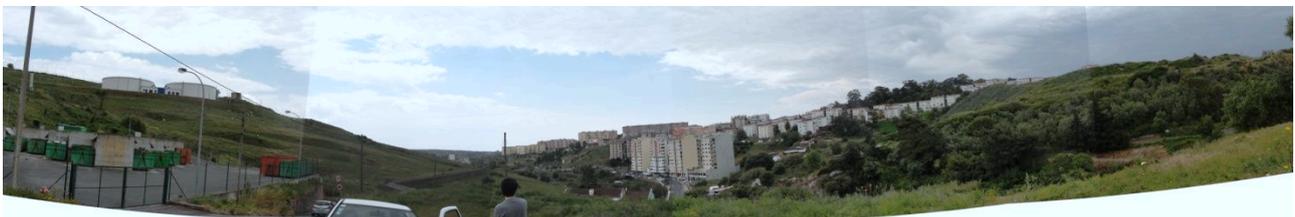
places of Carenque and Á-da-Beja, places always linked to agricultural activity. These farms, also used as summer homes of wealthy families are also important for the interpretation of the morphology of these territories, and together with the royal palaces, form a network of occupation and use of the territory, which derives directly from the aqueduct.



Picture 6 – Vegetable gardens near a section of the Aqueduct, near the principal road to Belas. April 2013



Picture 7 – The Aqueduct seen from the spring area, in Olival do Santíssimo. April 2013



Picture 8 – Serra de Carenque valley. April 2013

From the second half of the twentieth century, these territories have seen an exponential urbanization and the aqueduct began to play more of an Heritage role. A secondary place within the framework of modernity and development of the new Lisbon metropolitan area, which is beginning to develop.

It is in the late twentieth and early twenty-first century, that a new approach on this infrastructure starts. The urban renewal, in most cases heiress program Polis, highlighted the unique elements of Lisbon Metropolitan Area landscape. This is what happens for example in the municipality of Amadora, where a set of urban requalification of landscape character has as protagonist aqueduct. We assist in this way, to the reunion between the aqueduct and the city, even though, it's a "make-up" reunion and hidden in the middle of several layers.

6. Final Considerations

The main contribution of this investigation to the workshop is the idea – and the analysis of it - that for the city of the future and taking the case of Lisbon metropolitan área exemple, the public space is the principal and more importante nucleus of a sustainable and integrated urban development. Especially now with the proved failure or the "neoliberal urbanism", as described by Alain Bourdain, a new paradigms emerge [12].

It is important to understand in a broader context, the passage of the infrastructure of a paper on the production and supply of water, for a role associated with recreation and leisure. It is therefore that the Águas Livres Aqueduct shows capacity to establish itself and be the link of urban planning based on public space. For the different public and open space typologies, the Águas Livres Aqueduct is always present and in numerous situations. This fact is not achieved by any other infrastructure or urban element of the Lisbon Metropolitan Area. The aqueduct is the common element not only for the various territories, but also the one that establishes a bridge between the past, present and future of LMA landscape.

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