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Productive Waterscapes in the West-South of Europe: Using Circular Economy Theory to Drive the Change from a Linear to a Circular Paradigm of Water and Greenways

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Abstract

Re-thinking, re-design, re-use are the keywords of the ecological economy that seek to link social, economic and environmental aspects together. These fundamental principles can be observed in the theories proposed by the Ellen MacArthur Foundation and are the basis of the new discipline called “Circular Economy.” Recent studies seem to advise that the transition to sustainability (Foro Springtif 2015) is being stopped for political, cultural, economic, and infrastructural reasons. This article shows and discusses, through presenting different case studies, the situation of the circular economy applied to peri-urban greenways and waterfronts. Presenting obstacles and opportunities, the researchers want to give some advice and trace a method capable of shifting from a linear economy to a circular economy in urbanism and land management.

The focus on the historical link between cities and water, shows that the linear economy is in a continuous relationship of love and hate, thanks to the force of the water and the engineering knowledge of the human beings: a strong relationship when water was used for the industrial revolution, of distance and fear when the water was wide and polluted. In the last decade, this relationship seems to be skipped. Thanks to climate change, flood events appear to occur with increasing frequency and intensity, but municipalities allow industry and logistical compounds to settle near the rivers, affecting the aquifer.

The paradigm shift to a circular economy should include a democratic society where citizens are promoting different lifestyles and push the decision-makers to develop new strategy and policy. This new vision is well applied in different contexts but doesn't seem to be able to face and influence the protection of the last ecological corridors present in peri-urban areas, the reclaiming of derelict and polluted industrial areas, and the development of a virtuous approach to new industrial and logistical settlements.

The conclusion of the paper collects positive case studies, using them to show some methods and strategies able to drive the change through a new balance between ecological restoration and economic development. Re-thinking, re-design, re-use are keywords of the ecological economy that seek to link social, economic and environmental aspect together.

Introduction

The paper seeks to critically consider the path of knowledge in waterfront management under the changing climate scenario. Due to climate and human phenomena, cities are addressing peri-urban waterfronts with different strategies. Depending on the importance citizen giving to water the ‘blue’ is conceived like a risk or a value. To understand the real importance given to water in the entire process is good, in order to analyze the relationship between productive areas of cities and rivers and basins. The authors,

collaborating between Milan and Alcalá de Henares (Madrid) are researching the reclamation of rivers, channels and artificial basins. Studying the two case studies helps to show variance in a real multidisciplinary screening. We make the argument that the study of the realities present in the south of Europe would give a sum of positive or negative values, such that they would help to understand and redirect to a virtuous model for the creation of a territorial blue line for the greenways.

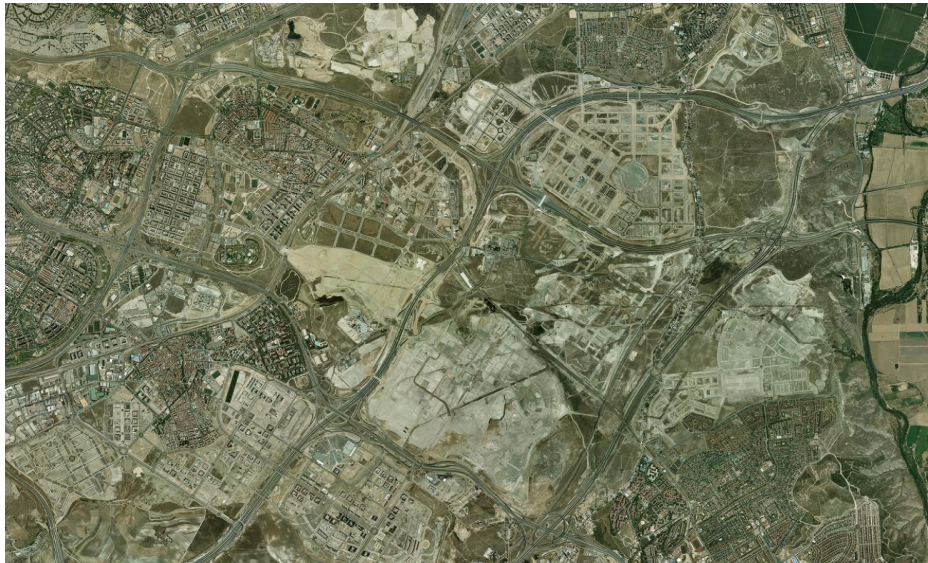


Figure 1. The 2008 financial crisis paused developments

Goals and Objectives

During the whole of the 20th century, a close relationship of localization of the industrial buildings near water elements was achieved: both for the necessary use of water in the production processes, and for the reckless use of the same water courses as places in charge of discarding the waste liquids and polluted industrial production. Now, however, after the decline of the manufacturing and mining industry, new possible scenarios of redevelopment and recovery of vast areas of land are opening up. These areas are disputed between virtuous ecological reclamation intentions and the re-conversion towards a development of a logistics networks consequent to the international economic system. Together, with the work that is de-localized, the relative share of costs in terms of environmental pollution is "exported". For this reason, on the one hand the economy is seriously impoverished, while on the other it obtains a sort of environmental opportunity, in which new recovery scenarios are opened up. The possible restoration of blue linear systems with high environmental and landscape ecological value, such as watercourses, becomes an opportunity. With the transformation of the riverside from industrial rails to urban waterfronts, the theme of water, both of its quality and of its quantity, is concomitant and urgent, as much as it is full of possible design inventions.

Methods

The tendency to simplify the phenomena related to urbanism and landscape may seem simplistic and naive, but it is fundamental to define the trends and polarization that affect developments in current contexts. Reading the post-economic crisis scenario and its effects on the city today is not easy due to the contradictory messages that a market in difficult recovery and a fearful society exchange. It is undeniable

that this communication and complexity has repercussions on the built and natural environment. It seems useful to us to develop and clarify the two main trends that can be observed in the society defined as climate change:

- Economic recovery is associated with new development models. These are linked above all to the intangible and to the logistics. While the first model, that of new technologies is inextricably linked with the city, the second is defined by its network connection and, therefore with the support in existing infrastructures. It is therefore clear that defining a system of elements of an economic development network is based on the construction and creation of new gray lines capable of supporting technological development. We call grey-line all that consumes soil, interrupts ecological corridors, reduces the permeability and quality of soils and divides the human being from contact with the cycles of the seasons, of the agricultural production, etc. In this case, we can graphically define the development of these examples as lines in which most endogenous relationships are in consumption, in impact, in transformation, whereas the closure of cycles remains as a wish and not a characteristic.
- Unlike the linear or market economy, there is a second trend that today appears in the society that proposes a circular model, in which the whole cycle tends to close without causing exogenous impacts. The model of the circular economy, far from being confused with degrowth, proposes a model based on the life cycles of animals, seasonal cycles, product transformation and the inclusion of waste in production cycles. However, this technically sustainable and decisive model clashes with the lack of a consolidated technique and results. A different model is not proposed, but a volatile and unequal market is brought back to a balanced and resource-friendly system in the future.
- Contrary to the first two systems that both propose the preponderance of an economic system with respect to an ecological system, there is the theory of Happy Degrowth, which proposes a constant re-evaluation of the growth paradigm and proposes the elimination of all those superfluous actions typical of the consumer society.

Each city can be analyzed according to these three trends and the balance between them. Brescia and Alcalá are examples and models. Being historical cities, it is possible to reconstruct a development model in which to observe the weight of past choices, outline current trends and recent developments and read the pushes towards the near future facing the city.

Case One: Alcalá de Henares

Alcalá de Henares, a Roman city prior to the founding of Madrid, is part of the Valle del Henares (Henares Valley), geographic element and infrastructure system of international importance. The Henares river, in its middle term, has been a cradle since Roman times. Guadalajara, Complutum, Sigüenza, and Brihuega represented concrete examples of a Roman *villae* system along the Via Augusta. With the Arab conquest, the area moved to form part of Al Andalus (Andalusy) and became a frontier and defense against the kingdom of Castilla. The fortress (Alcalá), Alcázar and towers were the landscape of the southern shore, primarily protected by the river and its particular formations and then by the geographic position of dominion of the valley.



Figure 2. Valle del Henares, del Sorbe al Jarama, año de 1770



Figure 3. Drawing of Alcalá de Henares made in the year 1565 by the Flemish painter Anton van der Wyngaerde, known in Spain as Antonio de las Viñas

In 1499 Cardinal Cisneros founded the first Renaissance, humanist and universal university within a block of the historic city which today is called *Manzana Cisneriana* and which is the reason for the recognition of the city as a UNESCO World Heritage Site. His position was clear and the relationship with the river was narrow and interdependent. We can find in the words of the Mayor of Alcalá de Henares in 2001 a clear recognition of the preservation of the environment like hardware for a circular economy:

The idea of environmental and sustainable recovery of the Henares Islands like paradigm of the Local Circular Economy. Alcalá has been a moderate exception to the industrial and residential occupation of the meadow of the river, even though the old Alcalá residents evoke with nostalgia the great fertile valleys buried today by all known neighborhoods; However, for various socioeconomic reasons, large extensions of fertile plains have been saved from urban depredation, and can be an example of application of the concepts of the circular economy, provided that society recognizes its history and recognizes them as essential elements for the maintenance and enhancement of the Natura 2000 Network and ecological corridors.

Today is a visual respite in an urban continuum that begins in Madrid and ends in Guadalajara. Except for the Void of the Encín between Alcalá and Azuqueca and this one of Espinillos, one does not stop seeing "city" along 60 kilometers.'

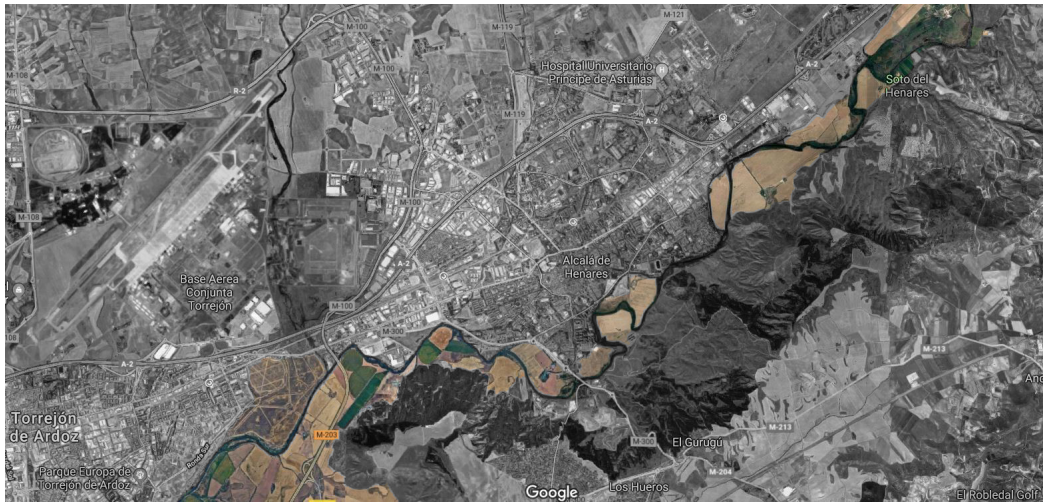


Figure 4. The Henares' Islands

The grey-line, like the great industrial development, is recognized with the paradigm of the 'Industrial Corridor': a strip of about 50 km closed between the connecting infrastructures that host the largest industries in the area and the establishments linked to the logistics of the Barajas International Airport and Madrid surroundings. With the creation of the Corridoio del Henares between the 1950s and the 1960s and the advent of industry, the city had a residential development tripling its surface area and population. It has occupied all the compressed agricultural spaces between the walls and the river.



Figure 5. The Corridor del Henares in the municipality of Azuqueca de H.

With the great crisis of 2008, Spain has seen a slowdown of a period of almost continuous growth following the advent of democracy. The bubble in which the citizens were immersed, a spiral of continuous growth and great revenues for the industry, are directly followed by a moment of depression and discomfort experienced by a large part of the population. The Spanish cities found themselves surrounded by immense expanses of building plots of which only roads, street lamps and sewers were built. The Spanish peculiarity due to its soil law has left an inheritance for about 10 years of an abandoned urban infrastructure with effects on the water cycle, the phenomenon of erosion and a feeling of abandonment that has pervaded the citizens of the outlying areas.

In 2008-09, *Salvemos el Henares* was created, a citizen platform that wants to bring more attention to the Henares River. In 2018, the municipality proposed a participation process for the new general plan. The first workshop was about “which idea of city has citizens.” As indicated in the Methods chapter, society answers to crisis situations in different ways. The linear developers are developing a logistic and infrastructure-based urbanism, capable in projects to attract a large amount of enterprise and global investors. The circular economy supporters are proposing, through a call for ideas, projects and protests, a different way to develop the empty space of the city, recuperate old farming and agricultural systems.

After more than 6 months of meetings and workshops, the municipality presented a development map of the ‘new Alcalá’. The participants were unhappy because the planning tools didn’t solve any of the critical point generated in the participation process.

Case Two: Brescia

In Brescia, the rural landscape at the beginning of the 1960s constituted the majority of the territory, that entered into our Italian cities. The search for sand and gravel deposits, together with the construction of the city, infrastructure and the development of the transportation system have contributed to the crisis of these important peri-urban farming areas.

The opening of new quarries was made necessary by the development of post-war construction. From the 1950s to the present, the city grew as the excavations became deeper. By killing the various levels of clay and the flooding of the basins, excavation turned into water through 'floating' boats. These large artifacts, real steel giants, are the only objects that remind us of the transformations that the territory has undergone.



Figure 7. Steel Giant. Memory of the Quarries activity

The quarry lakes, due to their peculiar nature, being aquifer basins made up of groundwater and inert materials, are perfectly compatible with the natural-recreational development of areas with a parked vocation. It is desirable to omit this discussion of the conversion of these areas to storage of inertia, dumps or areas of transformation. The conversion potential of these areas, excluding the option of restoring ancient fields, is 100%. In this portion of Brescia territory, following careful inspections, it was found that there are no pollutants in the soil or in the waters. These analyses first and foremost confirmed the



possibility of acquiring areas by the public administration and the management of associations. The possibility of being able to deliver to the city clean and safe areas has convinced more that the Parco delle Cave could have a positive result.

Figure 8. The first re-naturalized lake

Figure 9. One of the participated workshops organize at the Urban Center

The participatory process "Segni sull'Acqua" was an experimental program that made use of a series of traditional and tentative methods. The process was divided in three main phases: firstly, a preliminary analysis of a shared multidisciplinary analysis. Secondly, a brainstorming phase (using the Easy Awareness Workshop approach, critical issues and environmental resource analysis, weighted according

to indexes based on landscape, health, water, air, biodiversity, social relations and land use). Thirdly, design workshops for the formation of the perimeter of the new park and the mobility plan and access systems. Finally, process verification and re-modulation phase are carried out according to the territorial government instruments and the necessities of an executive project. The feedback of the private stakeholders were also taken into account. The results of this work were presented to the economic stakeholders who declared they were not able to support the citizens scenarios. For this reason, Segni sull'Acqua dictated the guidelines for the entire park and allowed the administration to have solid groundwork to include park areas and connection areas with the ecological network within a perimeter recognized through the General Urban Plan, but at the same time, the municipality must consider the economic balance of the stakeholders.

Discussion and Conclusion

In an additive design of a greenway, the sum is not always the product. It can be said, ten years after its first real hypothesis, the Park of the Caves of Brescia, and the Island of Alcalá de Henares are very important cases to study for those who are concerned with recovery of quarries and river areas undergoing transformation. The social and productive context was not sufficiently aware of the challenges and the technical components were not the most advanced. The peri-urban landscape in Italian and Spanish culture is still an area of resource exploitation, with low cultural value and low recognition of quality.

In this way, some common features can be traced to the urban development of the city:

1. The development of peripheral experimental districts, characterized by dense and high buildings, combined with a strong sense of belonging, is not accompanied by adequate green infrastructure. The peri-urban area and the natural area is seen as a collective "property" promoting the inclusion of areas in the public domain of land and in collective management. There is a clash between the collectivizing tendency and private interest.
2. The presence of citizens transferred from neighboring countries to the city favors and advances the need to create experimental areas of horticulture and biodiversity.
3. The creation of a positive sentiment towards abandoned natural areas promotes the creation of a movement against the destruction of natural resources and land uses, such as a landfill.
4. The empowerment of citizenship generates internal conflict in the environmental movement with respect to the proposed scenarios and solutions. There is a profound divergence between the recreational-environmental and re-naturalization proposal. These two apparently complementary visions struggle to find representation in projects developed by stakeholders and lead citizens to disbelieve in circular economy solutions.
5. The development of the urban conscience towards the preservation of the territory creates a problem when installing dumps and waste treatment plants that risk collapsing the urban management system locally. The risk call NIMBY Syndrome is transferred to the neighboring regions or to less developed countries.
6. The local economic system cannot, in the short term, modify its linear economic model in circular form. At the same time, the social and associative context is not ready to transform voluntary and

solidarity activity into an alternative economic system capable of moving change towards the circular economy.

The reading of these analogies, readable in the cases of Brescia and Alcalá de Henares, is useful for researchers to index the observed realities with the aim of proposing a methodology aimed at developing policies for the re-appropriation of the urban infrastructure by new citizens and develop critical actions in the development of policies for the creation of punctual policies integrated in a peri-urban vision of green infrastructure.

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