GREEN FOR THE REGENERATION IN SUSTAINABLE URBAN PLANNING. THE CASE STUDY OF CÓRDOBA IN ARGENTINA

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HIGHLIGHTS

• Densification process has started, causing the loss of green areas for public use.
• Strategy for public green spaces.
• Rapid urban development.

ABSTRACT

This work proposes a method for urban planning aimed at pursuing the sustainable regeneration of the central neighborhoods of the city through the reorganization of settlement patterns and the protection of its environmental heritage and biological resources. The design approach uses green spaces in all their various forms, increasing soil permeability, with a connecting system of the public spaces and institutions, increasing the energy efficiency of buildings and renewable sources in order to transform the city into a complex productive, livable and sensitive ecosystem. The application of the method focuses on the famous Barrios Pueblos of Güemes and Observatorio which are threatened by a flawed urban legislation that allows for the exclusive vertical development of residential buildings, thus affecting the urban equilibrium of these areas of significant historical value. The planning support methodology focuses on all the aspects related to the wider use of green materials within the city.

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1. **Urban issues of Córdoba**

The ecological problems started around 1893, with the application of urban models promoted by the modernist movement and the importance of automobiles in cities, encouraging the unlimited expansion of the urban area. This phase is known as the process of urban dispersion that persists to this day, making the city as one of the largest in the world (Diaz Terreno, 2011). The city has a negative sustainability performance since the municipal urban plans do not take into account any form of sustainability criteria. The excessive increase of urban development manifests itself not only in the indefinite extension of the urban area, but also in the intensive densification of the central and core areas of rich historical and architectural heritage, thus undermining the integrity of the whole area. In addition, there is a lack of planning that allows private interests to make decisions on either the urban development or future of the city. Planning both urban production and construction is based on neoliberal policies with private interests in mind, which are only focused on their own economic benefits.

In fact, the city has suffered a significant setback in recent years. On the one hand, there is evidence of a general degradation of the available offer, both green spaces and accompanying facilities. On the other, the city lacks of a qualified structure of public spaces according to its metropolitan urban development, in scale and distribution. (Figures 2a).

From an environmental perspective, the city of Córdoba is undergoing a growing landscape deterioration, characterized by a rapid urban development that expands the territory taking up soil and resources, fragmenting natural spaces, consuming biological resources, deforesting, sealing and waterproofing large natural areas, destroying biodiversity and producing dispersion with increases in commuting time. In consolidated areas, a densification process has started, causing the loss of green areas for public use and urban forestry, with an alarming increase in housing density, traffic, along with, as consequence, air pollution and noise.
Figure 2: Degraded areas a), Green areas in project area b).

It is therefore important to consider a strategy for public green spaces oriented both towards the strengthening of the system based on the available spaces, as well as its completion and adaptation to the leap of scale that the city has manifested in various aspects (figure 2, b).

A first methodological approach is developed in order to create 4 sustainability parameters to diagnose a given urban space. The first step is to analyse the chosen area for a diagnosis on a larger scale.

2. METHODOLOGY FOR SUSTAINABLE URBAN PLANNING

The proposed methodology is presented as a support tool for the planning of sustainable development of the city of Córdoba. In Latin America, there are significant socio-economic differences within the same city. For this reason, a methodological approach of progressive detail in analysis and planning is needed for the interpretation of urban dynamics, which are divided into three territorial units: City, Area, and Neighborhood.

The first territorial unit analyzes and studies the city of Córdoba regarding the urban phenomena and the evolution of urban plans since its foundation. It explores issues concerning Córdoba and Latin American cities. The City territorial unit analyzes the climate of the region as well as examples of architecture and urban planning focusing on sustainable intervention and planning actions, criteria...
and methods.
The second territorial unit analyzes an area including ten central districts. The method of formulation of problem and solutions trees helps to identify and assess the most alarming problems. An elaboration of a diagnosis is carried out to identify the problems by specifying the strategies and future plans with the creation of a sustainability matrix (Fasolino et al., 2014). This methodological approach is developed to analyze and plan the selected area. It identifies the problems of each parameter and are linked with the solutions and goals. This matrix becomes a solution strategy through which specific projects will lead to increasing the sustainability levels of these ten districts.

In the third territorial unit, the organization of settlement space of the Güemes and Observatorio districts is designed by analyzing and comparing six urban systems that will result in the proposal by means of a progressive analysis: the first step is the analysis of the whole area of these two neighborhoods, followed by a more detailed analysis of each block in its singularity, and, finally, the analysis of the lots composing each block.

These three territorial units became a strategic tool to understand the reality in which the city is immersed, resulting in a complex project of urban and ecological regeneration or restoration based on sustainability criteria.

The methodological matrix identifies each problem and associates corresponding possible solutions so as to create a system of choices for a sustainable and inclusive development of the selected area (Figure 3). The preceding model table can be applied to any block or set of lots. All the boxes are interrelated by mathematical formulas. They form a set of interconnected variables since if one changes the others also change. The majority of each category or variable is divided into Existing, Normative and Proposal; it is therefore possible to compare the three and make any necessary explanatory and comparative charts of the current situation, how the norms and the designed future should be.

The arboreal density along with the absorption surface play a fundamental role in mitigating floods, reducing heat islands, improving air quality and creating microclimates. In addition, a survey of the density of the arboreal vegetation provides a project and planning tool for the generation of new plant and animal ecosystems (Fasolino, 2014).

The methodology concludes with the building loans (Jacobs, 1997). This means that it is possible to transfer the building capacity of a lot, where foresee a green public space, to other strategic areas where more density is allowed by the city regulations, so as to avoid the deterioration of the image of historic neighborhoods by building in height, and to protect the architectural heritage of the city.

3. **Sustainable Urban Regeneration of the Güemes and Observatorio Districts**

Güemes and Observatorio have great artistic and theatrical potential. They are both proposed as contexts to develop new activities. New mixed-uses that lead to a sustainable urban development and reorganization.

The main design and transformation axes are: the architectural heritage, the green spaces with focusing on new urban gardens, the recovery of obsolete and unused spaces as opportunities for the future design and finally, tourism and arts as the engines to promote new activities that stimulate and enhance the identity of the neighborhoods. The main concepts of the project are sustainability, democracy, public spaces for all and care of people and ecological restoration. A change of urban laws and regulations is required since applying current legislation would lead to a failure of the settlement organization. In fact, the current laws lack any tools, as well as fail to take into account the formal
### Figure 3: Methodological table

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aspects and different urban scenarios, thus generating a homogenization of criteria in a complex reality.

Regarding the Güemes - Observatorio Project, there is a correspondence between the analytical phase of six urban systems and the resulting design and planning of the same. In the first place, the analysis starts with the system of free and obsolete areas by mapping all the empty lots and buildings that will be demolished due to deterioration. A total of 99 lots with a possible change in use were detected. In addition, metal sheds were mapped, which occupy large areas in the different blocks and waterproof the soil. Most are now unused and in a risky structural condition.

The use of building loans as a transformation tool is essential in order to propose new uses and functions that will lead to an urban regeneration with new mixed uses compatible with the identity of Güemes and Observatorio. The transferred volume is equal to the maximum building volume stated by current urban laws.

With reference to the settlement system, a progressive detailed analysis of the entire area is initially carried out on the seventy blocks of these two districts, and then on the existing lot coverage area of each block, uncovered area and pervious surfaces, comparing the actual situation with the proposed one. This is followed by an individual analysis of the block lots. This method is a very useful tool for the study of the current state, the state that would exist if the current legislation was applied, and the hypothetical proposed state of every block and lot in the different analyzed items.
With these data, it is possible to create graphs comparing the different items and subsequently draw up maps.

Regarding the green system, only seven green spaces were identified in the selected project area. The project includes 40 new green spaces, 23 of which are urban organic gardens. The lands for cultivation are public property. A new regulation for horticultural areas is foreseen, with the planning and programming of gardens that can be assigned to residents and the opportunity to dedicate a portion of horticultural areas to educational and cultural activities. (Figure 4)

Building loans are implemented to transfer the building capacities (old residential use) into other areas (Jacobs, 1997) so as to realize the new green spaces (new use). The transfer will be equal to the difference between the maximum construction volume that is allowed by legislation and the existing volume in order to prevent the destruction of any historical buildings driven by speculation and capitalism.

The methodology concludes with the building loans. This means that the municipal government would transfer the building capacity proposed by the actual urban regulations to other areas where they either want to strategically densify or simply protect the architectural heritage of the city. It is therefore possible to prevent the deterioration of the historic image of the central districts which are threatened by large enterprises that pursue the construction of high residential and commercial buildings. Public governments can rapidly stop real estate speculation in important historic areas with building loans.

Figure 5: New uses and functions
before undergoing a tedious and long process of change and readjustment of the urban laws in these special areas. In relation to the institutional system, there are currently 27 institutions in the project area. The proposal includes two new ones, the first one of which has already been planned by the town hall: a cultural center in the former Encausados prison. The second institution involves a high school specialized in audiovisual media with a broad curriculum including cinema, theater, painting, sculpture and many other forms of artistic expression. Finally, the reduction of the lot where the courthouse stands is proposed, taking advantage of the unused space to create a park of considerable size. These two new institutions, very important for the urban regeneration of the entire area, will generate a boost in new activities, fluxes of people and new infrastructures.

Finally, the mobility system is analyzed. The use of bicycles has many advantages: it is an ecological practice that promotes a healthy lifestyle, decreases the emission of toxic gases and allows for the decongestion of traffic. The proposal does not change the existing transport system but it extends it. Therefore, the project aims to combine the already existing bike lanes in the city center with new bike lanes in other areas of the city and project area. The project for the construction of the subway, however, has already been passed by the city council generating in the future a revolution in the way the Cordobese people move in the city.

As a result, the gross floor area and lot coverage have been reduced and the pervious surface has increased to 40% in every block and lot. The analysis and proposal of the different systems, helped propose new land uses and urban functions which can increase the sustainability levels of the project area. The new activities and public spaces are now more compatible with the identity of the two districts and complement the new mobility system.

The project leads to an optimum result in favour of sustainability. The area can enjoy a conscious development of the natural resources so that it can generate adequate benefits for the environment as well as the citizens in it. In turn, the blocks will evolve into self-sufficient green islands since they have sufficient permeable surfaces as well as green and mixed activities that generate the independence of the large urban and commercial axes developed by modernity in the city of Cordoba.

The main axes and objectives of the intervention aim to achieve the sustainability of urban life through the protection of the architectural patrimony, and art, culture and tourism as social engines. The green in all its forms and more specifically urban gardens will bring food growing back into the city where it has always been in sustainable societies (Figure 5).

4. DISCUSSION AND CONCLUSION

The results could lead into a profound change in how the Cordobese government think and manage the city. The current urban regulations encourage just one use, for example the residential use for a vast area of blocks, not taking into account mixed uses, nature, landscape, historic architecture, as well as many other specific elements in a city that is characterized by a medley of urban situations. It is important to raise awareness about the advantages of complex projects, with mixed uses, green spaces as a support for activities that promote life in open public spaces to integrate as many people as possible regardless of nationality, economic status, religion, gender, sexuality, age, etc. (Murillo, 2013). For this reason, shared housing is proposed to cover various social groups, such as university students, artisans, artists as well as the elderly residents of the neighborhoods.

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In summary, Latin American sustainable cities require advanced planning, both in the methods of interpretation of urban dynamics as well as in the construction of methodological tools adequate for the management and evaluation of their sustainability.

The proposed methodology has been applied in a fragment of the city, but a possible application in the transformation of the whole urban reality is required.

The project involves the regeneration of the area through limited changes of the urban system and without upsetting the complete current structure of the city. This is because public policies and strategies are insensitive to issues of sustainable construction, an aspect that cannot be overlooked in this project. In addition, new urban projects always require an interdisciplinary approach, with various knowledge tools and skills being required for their implementation. The interdisciplinary approach reaches to concrete solutions, more real and feasible; this is more appropriate in this changing and heterogeneous context.

In the conservation and activation of the economic development of the area, the project must guarantee the participation of the agents involved, public and inhabitants, the growth and cultural development of the area and the strengthening of identities (Murillo et al., 2011).

The importance lies in achieving a balance between the projects that allow for cultural development and those that allow for the acquisition of funds for investment and urban development.

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