

GREATER RESISTENCIA STUDY CASE: GREENFIELD AND INCREASED DENSIFICATION

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ABSTRACT. *This paper focuses on one of the relevant issues of the phenomena of urban expansion and densification, i.e. the lack of planning of public greenfields. At the regional level, since 2001, Resistencia City Council has been promoting a growth in height by increasing built-up areas in central districts that have complete infrastructure, through the implementation of the Ordinance 5403/01 - **high density**. On the other hand, in the last 10 years the population growth of the city (16%) has been followed by an increase in the supply of open space per inhabitant (85%). However, this increase is not reflected in the inner city areas, where the higher population density is located. This paper aims to analyze and relate the results arising, so far, from the densification of central areas and its relationship with the availability of open space in central districts of Greater Resistencia City.*

Keywords: *Increased densification, greenfield availability, environmental quality.*

BACKGROUND

This work is linked to two projects in the Urban and Regional Planning Institute of the Faculty of Urban Architecture: Observatory for the New Sustainable Policies. These are 'The Greater Corrientes and Greater Resistencia Study Case', and 'The Metropolitan Studies Workshop' to conform with the Universidad Nacional del Litoral (Argentina) and the Universidad Mayor de San Andrés (La Paz, Bolivia). Approved on 03/20/2009 by Resolution of the Secretaría de Políticas Urbanas of Ministerio de Educación de la Nación no. 249/SPU.

The processes of expansion and urban densification

While the phenomenon of urban sprawl afflicts developed and underdeveloped cities, there is no agreement about it between planners and policy makers. The basic dimensions of the policy debate on the expansion of cities are certainly not new. The age-old question underlying this debate is still whether expansion should be resisted, accepted, or welcomed, considering that really successful experiences are hard to find.

As Angel et al. (2005, p. 3) made clear for the World Bank of 90 cities, that belong to developed and underdeveloped economies, concluded that the densities in developing country cities were found to be some three times higher than densities in cities in industrialized countries, and that densities in all regions were found to be decreasing over time. If average densities continue to decline at the annual rate of 1.7% – as they have during the past decade – the built-up area of developing country cities will increase from 200,000 km² in 2000 to more than 600,000 km² while their population doubled.

The central message of this study is quite clear: Developing country cities should be making realistic – yet minimal – plans for urban expansion, designating adequate areas to accommodate the projected expansion, investing wisely in basic trunk infrastructure to serve this expansion, and protecting sensitive land from incursion by new urban development.

Basic models of the city

According to Falcon (2007), in environmental terms, it can be said that there are two models of cities; those that sprawl and those that are compact. The dispersed model is characterized by isolated low density, away from city centre buildings. It can be said that this model is less sustainable given that its peripheral location leapfrogs over natural

environments, cutting off essential greenfield corridors that ensure the biodiversity of the ecosystem. Peripheral locations imply higher requirements for cars travel, and increased urban costs, regarding the supply of services and infrastructure. However, these places offer people a better quality of life because of their proximity to nature, whether in private backyards or surrounding parks, and the increased availability of private space with lower real estate costs.

The compact model is characterized by buildings in height, of medium to high-density, concentrated in a greatly compacted built-up core. This model can be considered environmentally sustainable, since it reduces car travel, energy consumption and the costs urban services and infrastructure. Despite this, the low availability of land increases real estate costs, reducing living space and diminishing quality of life. Given that with the compact model, a decreased quality of city life and a lacking of private space is on offer, then the supply of greenfields should be increased. It is necessary to promote a greater "permeability" of the urban area, allowing nature to be 'introduced' in the city. Thus, increasing access of citizens to greenfield spaces, promotes recreational, social and sports activities, and by considering the green 'system', through its components, allows access to nature, linking it with both urban activities and suburban systems.

Greenfield spaces and urban planning

At present, as it is being defined by the Research Institute in China¹; at the level of urban design, within cities, the natural and social ecosystem may not be organically integrated into the shape of urban space. This may contribute to an ecologically disorderly urban landscape and a chaotic environment. Greenfield spaces are an essential part of sustainable urban planning. As has been highlighted in previous research, those free, public spaces, associated with a strong presence of vegetation, are key elements of urban intervention, which can supply order to the territory, providing environmental and social benefits to the population.

Design of recreational greenfield space in the urban area must take into account key-factors, such as standards of square metre/inhabitant, density of population, cultural features, social facilities, environmental features, and parameters such as diversity, connectivity and associativity. In a city, it is not enough to meet the amount of 10 square

¹ The "study case of techniques and ecological methods for the urban design" The Institute For Urban Planning Studies Of Guangzhou Urban Planning & Design Research Institute, China

metre/inhabitant as suggested by the World Health Organization (WHO); typologies of open space and its distribution largely determine the quality of the urban landscape. Therefore, several, small open spaces can provide great psychosocial benefits and fewer large, remote Greenfield, suburban parks, also bring significant psychosocial benefits. The ideal greenfield systems are a balanced combination of green zones of different sizes and uses that complement each other. (Falcon, 2007)

Quality of life and greenfield space

According to Velázquez (2008), key issues of the natural environment that must be considered are the elements that benefit and frequently affect and influence the quality of life of the population. From a quality of life perspective, there are aspects of the 'natural' environment which must be considered as part of the basic needs of the population. It is also essential in quality of life population assessment that key factors of the natural environment where population lives are included, such as education, health, housing, etc. The 'quality of life measurement' is also related to the goal of becoming a basic tool that includes the implication of policies and strategies for improving the quality of life of citizens (Velázquez, 2008).

OBJECTIVES

- To analyze the situation arising in relation to the recently approved legislation that allows intensification of central districts of Greater Resistencia
- To confront that regulation with the offer/availability of greenfield spaces in that city.

METHODOLOGY

The chosen methodology was suggested by the United Nations-Habitat to generate urban observatories, ensuring that information obtained led to the determination of key indicators that will be useful for building an urban management policy framework.

The work has grown in 2 research stages:

1. Cognitive-exploratory: survey of data relating to the study case, main uses by block, building typology, estimated population density.
- Compilation of cadastral data, secondary information produced by researchers from the Institute of Urban and Regional Planning–FAU-UNNE and technicians of the Municipality of Resistencia.
 - Data collection and systematization of bibliography related to processes of urban expansion, open spaces and sustainable development.

2. Analytical: processing, systematization and analysis of relevant information on key-indicators. Graphics and elaboration of tables. Analysis and conclusions.

DISCUSSION RESULTS

Urban phenomenon in Greater Resistencia

Recent decades have brought enormous change to human settlements around the world. The Greater Resistencia Metropolitan Area (GRMA) of Chaco is no exception to this phenomenon; its process of urban growth has been adding surrounding municipalities to the original core, expanding rapidly into territories of flood prone vulnerability with high environmental value, dominated by wetlands and associated ecosystems (Schneider, 1999). The city is situated on the western bank of the Parana river, opposite the city of Corrientes, in the northeast of Argentina. This urban conglomerate includes Resistencia and satellite cities, such as Barranqueras, Puerto Vilelas and Fontana, forming the Greater Resistencia Metropolitan Area (GRMA).

The city is located in a flood plain, surrounded by protection walls known as an embankment, forming polder systems, which limit the possibilities for growth. See Figure 1. As such, the GRMA faces several challenges: The GRMA must prepare itself to accommodate growth of 6,799 inhabitants/year according to The National Statistic and Census Institute (INDEC). If the city actually continued to grow at this rate, Resistencia city would need to incorporate 1,180 new dwellings per year and a minimum of 30 net hectares of potential development land. As a result, local government needs to find policies that privilege densification of safer central areas that have complete infrastructure (PDER, 2006).

Regarding the city model, in Resistencia we can observe both phenomenon: dispersion and urban concentration, in parallel. On the one hand, large costs and low land availability forces urbanization of suburban areas that are without complete services or infrastructure, some of them being associated with great environmental vulnerability, such as wetlands located in a flood plain. Therefore, the local government of Resistencia has implemented the Ordinance number 5403, adopted on 29 May 2001, aimed at intensifying the urban land uses in central districts that have complete service and infrastructure. These areas support high densities (from 1,200 to 2,400 inhabitants per hectare), allowing the city to grow in height. According to Resistencia City Council assessment, since 2001 until today, they have built 153 towers within the high density zone, with heights varying from 30 to 40 meters. Meanwhile, in the same period, 108 buildings were built with the neighbors limits

typology, 30 buildings of perimeter free (detached) and 15 buildings semi-free perimeter (semi-detached), resulting in 302 buildings on average (up to 4 levels) in the middle density zone.

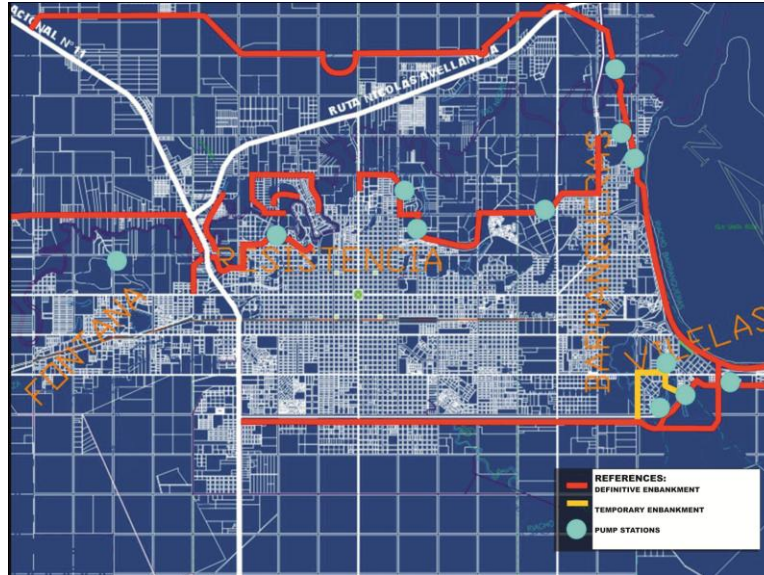


Figure 1: Greater Resistencia Metropolitan Area with enbankment systems. Source: Resistencia City Council Strategic Plan (PDER), 2006.

Greenfield spaces in Greater Resistencia

In recent studies carried out by Pérez (2010), with an assessment of green open spaces: the "Public State greenfield spaces" includes those recreational fields for public use, squares, parks and waterfront sidewalks considered by local authorities. A comparative table illustrates greenfield availability in the period 2001-2011.

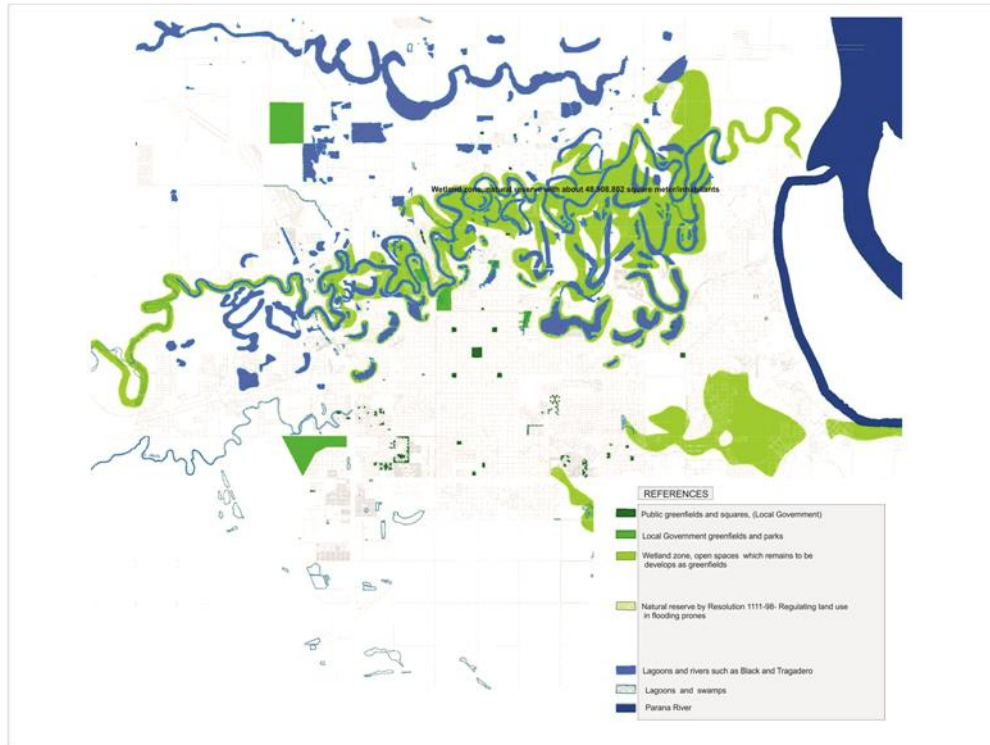
City	Years					
	2001			2010		
	Inhabitants	Greenfield spaces m ²	m ² open spaces/ ihab.	Inhabitants	Greenfield spaces m ²	m ² open spaces/ ihab.
RESISTENCIA	281,049	1,112,357	3.96	325,635 *	2,060,797	6.33

Source: Pérez, Malena (2010)

* Estimated by the Resistencia City Council according to population projections.

Compared to standards of green spaces identified by the World Health Organization (WHO), of 10 square metre/inhabitant, indicates that the city council has a shortage of supply, which has been declining in recent years. The greatest increase in m² of green open spaces has been the change with Caraguatá park (1,000,000 m²), located in the north of Resistencia. Another classification points out: "Natural reserve in urban areas, potential greenfields spaces"; covering those open spaces, public and private domain, which have not been included to public open spaces for recreational and hydraulic purposes. In Greater Resistencia, these spaces are associated with urban wetlands, lagoons which are part of Black River Riacho Arazá landscape. Many of them are protected for future urban developments by Resolution number 1111/98 of Water Provincial Management, considered areas of public domain, restricting flood prone land use closed to wetland area where only uses are allowed that do not generate negative environmental impacts, for example areas of recreation, leisure and sports. These spaces are also protected as RAMSAR site, part of "Chaco wetlands site", reserving approximately 48,908,802 m² of valuable natural resources, which are one of the main potentialities of the region (Scornik et al., 2010). See Figure 2.

Figure 2: Greenfields, parks and open spaces in Greater Resistencia Metropolitan Area



Source: Pérez, Malena (2010). "Sustainable indicators associated with urban landscape". Study case of natural environment in Resistencia urban area. Second Report Research project. Secretaria Gral. de Ciencia y Técnica. Universidad Nacional del Nordeste- Resistencia, November 2010.

According to previous studies, within the city built up core, the most common squares and boulevards, associated to a neighborhood scale, in theory absorb current demand, though in practice they are filled by users coming from other city areas, overloaded compared to the scale for which they were designed. Furthermore, according to city council projections, the population living in the city centre has increased considerably since 2001, the most recent census data.

In summary, the current open spaces in the Greater Resistencia built up area are insufficient; this situation will exacerbate and there are few opportunities to increase the availability of greenfield in state lands, accessible to all citizens. On the other hand, there are several natural areas, part of the wetland systems, protected by regulation for flood prone areas which it is possible to add to public open spaces and which can be used for recreational purposes.

Open space and densification in the city centre of Greater Resistencia.

As shown in Plan 1, the amount of green space in the city centre area, covering 100% of the population demand in the year 2001, whereas an average of 600 people per. / has.



Figure 3. "Typologies of open spaces within city centre of Greater Resistencia, distribution and ratio of influence" Source: Pérez. 2010.

If the Ordinance 5403/01 (high density) objectives are accomplished, which attempt to fill the built up centre up to 2400 inhabitants/hectares and if it is considered that the WHO

suggestion is 10 square metres/inhab., this would mean a demand of 24,000 m² of greenfield space per hectare, approximately two and half squares for each urban block. Considering the Ministry of Social Welfare suggestions in relation to the central squares (1.5 square metre/inhab.), half of open spaces per each hectare of the city centre area would be needed. Therefore, for 256 blocks covering the city centre built up zone, 128 hectares of open space would be needed at the neighborhood level. See Figure 4 and 5.



Figure 4. "Current relationship between population density / square metre of greenfield spaces in city centre- STUDY CASE BLOCK 181". Source: self-elaboration



Figure 5. "Potential relationship of population density, according with Ordinance 5403/01/square meter of greenfield spaces in the city centre – STUDY CASE BLOCK 181"
Source: self- elaboration.

FINAL REFLECTIONS

In urban models committed to densification of the built up zone, it is essential to ensure the availability of greenfield space as one of the key issues that will sustain the model. The typologic study of open spaces in Greater Resistencia highlights the important surface of urban wetlands, about 48,908,802 square metres/inhabitants which remain to be formally included as recreational parks and also form a significant biotic reserve (Pérez, 2010). It is also important to point out that this reserve area could serve a city of nearly 5,000,000 inhabitants, taking into account the 10 square metre/inhabitant recommendation suggested by WHO.

Regarding planning of greenfield spaces, and the vision of a "system" it is suggested that: re-assessment is undertaken of obsolete public square spaces; natural environment areas that are related to urban wetlands in flooding prone areas are incorporated and preserved; all

typologies are linked through greenbelt corridors related to road traffic; and associated public headquarters, specific sidewalks and other components can make a contribution to building open spaces associated with cultural identity. The future challenge for planning is not only to find the way to contain urban growth but also to balance human, financial and technical resources to ensure issues such social, economic and environmental requirements are being addressed.

Techniques of urban growth management can be defined as a set of policies, in all their varied forms, used by the government as a set of regulatory powers in a comprehensive, rational and co-ordinated manner to meet public objectives for balancing economic growth with the aim of protecting and preserving natural and manmade systems. It involves an ideological commitment on the part of the government to create and strengthen institutional mechanisms for effectively using tax, expenditure and regulatory powers to systematically influence a community's spatial distribution of activities." (DeGrove and Metzger, 1993)

On the other hand, it is known that one of the reasons for government intervention is due to the presence of market failure. Market forces do not produce all the conditions necessary to sustain life, especially in cities; the State, therefore, has to intervene particularly with the provision of infrastructure and services and ensuring that some balance is reached between social costs and private benefits of urban enterprise. (Devas and Rakodi, 1993). Urban growth techniques started when government decided to intervene in economic markets to protect the poorest. For all these reasons, the Government should intervene to protect the most vulnerable population when the market fails, making available those things that the market threatens, so contributing to the general wellbeing of the population (Schneider, 1999).

One of the most common market failures is the "Real Estate Market". In Resistencia, where the Ordinance allows densification increased, land prone prices in central districts have been raised rapidly since 2001, threatening the natural environment and quality of life whilst also affecting the supply of greenfield spaces, which, as has been noted before, are also essential components of social welfare.

In summary, we believe that it is necessary to intensify built up areas in central districts, though, we must stress that it is also necessary to plan the proper supply of greenfield spaces with different characteristics, improving conditions of life according to the current and expected demand. Also, as emerges from this study, open spaces can be included with those currently offered; including greenfield areas, listed today as reserved by

resolution 1111/98 of Provincial Water Management, is another way of providing the 10 square meter / hectares suggested by World Health Organization. Finally, we wish to express the following concerns: We believe that it is necessary to promote within the built up zone of GRMA, have linkage of different open spaces composed of lagoons which are part of wetlands and the surrounding Rio Negro Valley, promote accessibility to the Ramsar site, and combine different scales of greenfield typologies with urban densities, to balance the supply of open space throughout the city.

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