

“Options to Achieve Smart Growth in Greater Resistencia (Argentina)”

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ABSTRACT

Making a city “smart” is emerging as a strategy to mitigate the problems generated by rapid urbanization. (Chourabi et al, 2012)

In response to the increasing use of the concept, this paper explores different strategies and provides an overview on recent practices aimed to achieve “smart growth”.

Furthermore, this document proposes to discuss policies and initiatives applied by local government in Greater Resistencia (Argentina), a middle size city protected by embankment to prevent further flooding from Paraná River. The city has the challenge to accommodate over 7,000 new residents per year within the polder which limit opportunities to grow within it.

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1. Introduction

The world’s settlements pattern of growth has been changed. A major feature has been development of new forms of city and metropolitan areas, some of unprecedented size. (Schneider,1999). More than half of the World’s population now lives in urban areas. This shift from a primarily rural to a primarily urban population is projected to continue for the next couple of decades (see <http://www.unfpa.org>). Such enormous and complex congregations of people inevitably tend to become messy and disordered places. Cities, megacities, generate new kinds of problems. Difficulty in waste management, scarcity of resources, air pollution, human health concerns, traffic congestions, and inadequate, deteriorating and aging infrastructures are among the more basic technical, physical, and material problems. Another set of problems are more social and organizational in nature rather than technical, physical or material. (Chourabi et al, 2012)

Since 1960s, most developing country governments showed little or no interest in spatial matters; however the relentless growth of national populations and the tendency for people to concentrate in ever larger cities have generated much more concern over the patterns of human settlements. Urban areas are growing at a very fast rate in the developing world compared to the developed world and the neglect of urban issues has given rise to significant social and environmental problems. The scale of urbanization, with its current implications for the meeting the needs of those with relatively low levels of income, is unprecedented. Cities in developing countries are frequently unable to provide the basic infrastructure and services needed and 30-60% of people in many of the larger cities are living in squatter settlements. (Schneider, 2005)

In addition, urban sprawl is a common label for the low-density, auto-oriented spread of metropolitan regions pervasive throughout cities. The concept of sustainability, smart growth is seen as a way of combating sprawl and building better communities. Smart growth strategies aim to channel new development into existing urban areas and away from undeveloped areas and to improve the viability of alternatives to the car.

The unprecedented rate of urban growth creates urgency to find smarter ways to manage them. Ensuring livable conditions within the context of such rapid urban population growth worldwide requires a deeper understanding of the smart city concept. Although there is an increase in frequency of use of the phrase “smart city”, there is still not a clear and consistent understanding of the concept among practitioners and academia. (Chourabi et.al; 2012)

Much more discussion have been found regarding the concept of smart city but is the purpose of this paper focus on exploration of recent practices to make cities better for living and compare what is been doing in Greater Resistencia (Argentina). This methodology will lead to assess how far is this city prepared to tackle its issues in smarter way.

2. Methodology:

This research has been developed through various stages:

1. Literature review and an analysis framed around urban planning policies, initiatives and practices on smart and sustainable growth at a wide range of scales
2. A general overview of approaches to achieve sustainable growth such as land uses policies, revitalization, technologies implemented with particular reference to the chosen city, and comparison to experience in developed countries such as United States of America.

The research has also used information gathered from a number of sources, such as:

- Information produced by researchers at the Institute of Urban and Regional Planning - Facultad de Arquitectura–Universidad Nacional del Nordeste (UNNE) (Argentina) and from urban managers of Resistencia City Council.
- Data collection and revision of bibliography.
- Selection and analysis of reference cases, regulations and processes developed to address similar problems.
- Analytical stage, i.e. the processing, systematization and analysis of relevant information.
- Conclusions and final recommendations

3. Discussions and Results

3.1. Background

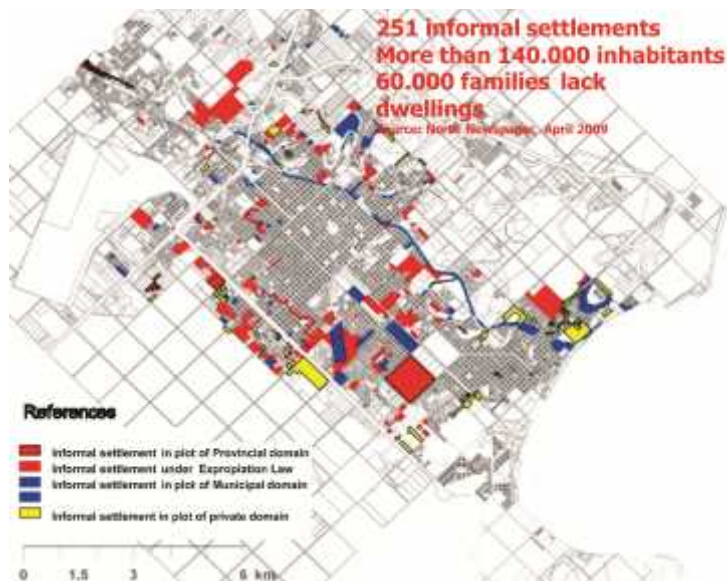
Recent decades have brought enormous change to human settlements around the world. As we have mentioned before, urban growth concerns all countries but, present acute problems in developing countries. The Greater Resistencia Metropolitan Area (GRMA) of Chaco, (Argentina) is no exception to this phenomenon. The city is the capital of Chaco Province, is an urban conglomeration of 385,726 inhabitants (National Census, 2010).

GRMA 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). Please see Figure 1



Source: Google map. www.google.com.ar/maps
 Figure 1: Greater Resistencia Metropolitan Area

The city experienced continued growth from 1920 until 1940, and the authorities worked to provide affordable housing and infrastructure facilities for the people. But since the 1960s, they have lost control of the situation, leading to the appearance of the first unplanned settlements. Indeed, the city is continuing to grow towards riverine areas part of wetland of Black River system. Over the decades, there has been further serious flooding and, following the catastrophic floods of 1982 and 1983 that flooded 70% of the urban area and affected 30% of the population, the government decided to take concerted action to protect the city, its citizens and their properties. Therefore, before 1982 the unplanned settlements were located mainly in flood prone suburban areas. After that period, Resistencia started to grow towards higher ground directed by government agencies. Today, a large majority of society located in informal settlements, (62% of the total number of inhabitants of Greater Resistencia) continue to reside in underserved areas and on plots that are prone to flooding. (Schneider, 2005).



Source: Barreto et.al, 2013
 Figure 2: Informal Settlement located in Greater Resistencia

The concept of a smart city itself is still emerging, and the work of defining and conceptualizing it is in progress. The concept is used all over the world with different nomenclatures, context and meanings.

Thus, the word smart in the label smart city can contribute to an understanding of how the term smart is being loaded. Smart city is required to adapt itself to the user needs and to provide customized interfaces. In the urban planning field, the smartness in smart growth is treated as a normative claim and ideological dimension. Being smarter entails strategic directions. Governments and public agencies at all levels are embracing the notion of smartness to distinguish their new policies, strategies, and programs for targeting sustainable development, sound economic growth, and better quality of life for their citizens. They associate smart with achieving policy success in their jurisdictions. The smartness in smart technologies also merits attention. (Taewoo, 2011)

“The use of Smart Computing technologies is to make the critical infrastructure components and services of a city. This include city administration, education, healthcare, public safety, real estate, transportation, and utilities - more intelligent, interconnected, and efficient”.

A city striving to make itself “smarter” are aimed to be more efficient, sustainable, equitable, and livable. (Chourabi, 2012)

3.3. *Different strategies of smart city*

As was mentioned before, one of the main challenges for next years will consist in how cities achieve sustainable development and, this is related with how decision makers, stakeholders and planners find strategies to deal with urban growth.

According to Handy (2011) highlighted, the American Planning Association (2002), “Compact, transit accessible, pedestrian oriented, mixed use development patterns and land reuse epitomize the application of the principles of smart growth”.

As these statements suggest, the connection between transportation and land use lies at the center of efforts in the U.S. to combat sprawl through smart growth strategies. Casual observation suggests that transportation and land use in are inextricably linked in at least two basic ways. First, transportation investments and policies influence development patterns: commercial development stretches out along highway 2 corridors, new subdivisions pop up after the new freeway opens, shopping malls and gas stations congregate at interchanges. Second, development patterns shape travel patterns: the design of suburban areas makes transit and walking a challenge, the separation between land uses in low-density developments makes driving a necessity. In this way, sprawl contributes to automobile dependence, but policies designed to fight sprawl can potentially help to reduce automobile dependence. While theory lends support to these apparent relationships, the empirical evidence is surprisingly mixed, at least with respect to the impact we can expect from smart growth policies that depend on these relationships. (Handy, 2011)

“As Handy (2011) point of view in her investigations “...the evidence suggests that highways influence land prices, population, and employment changes near the project”. They go on to say that the evidence does not support the belief that highways cause suburbanization, which is driven by a wide range of forces, but that highways clearly influence development patterns.”

3.4. *The GRMA urban patterns:*

The GRMA faces several challenges: 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 (Resistencia Strategic Plan, 2006).

Regarding the city model, in Resistencia we can observe both phenomenon: dispersion and urban concentration, in parallel.

3.5. *Urban sprawl Initiatives*

On the one hand, large costs and shortage of land availability, forces development of suburban areas without complete services or infrastructure, some of them being associated with great environmental vulnerability, such as wetlands located in a flood plain. The majority of the expansion it's being taken by informal settlements, about 36% of total population.

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The suburban development is extending through the north and south of Greater Resistencia. The development in the northern part was fuelled by Real Estate, Local Government and private stakeholder after construction of North embankment which enlarged protection of areas of high value of natural environment as part of the Black River's wetland system. This area was underserved though, was developed as low-density plots. Their prices were increased after government investment in construction of Highway National Route 16 which connects Corrientes and Greater Resistencia. Today the area has complete services and on one side of the highway have been developed as mixed uses such as commercial, like supermarket, mall, car market, cemetery and residential uses meanwhile the opposite side remains mainly as residential with low density exclusive neighborhoods. Please See Figure 3

Furthermore, a land use study by using GIS technology over northern area of Greater Resistencia between 1998 and 2005 revealed: that 10% of high value of natural environment and wetland systems were lost with sub-urbanization policy and, 6% low density residential land uses, were increased. (Schneider and Alberto, 2007).



Source: Schneider and Alberto, 2007
Figure 3: Suburbanization in GRMA

As a result, local and provincial government decided to enlarge protected areas, aimed to be developed in 25 years further as land use reserve for future growth but, the area resulted fully occupied in less than 10 years. Then this model privileged, low density and car dependence since, the population who lived there belong to high income status, then public transport is not a priority in this model.



Source: Greater Resistencia Strategic Plan, 2006
Figure 4: Greater Resistencia flooding protection embankment

As we have mention before, this model privileged few residents, meanwhile the majority of households remain outside this policy, resulting then not sustainable for the already mentioned reasons.

Therefore, the local government of Resistencia decided to implement another policy: 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. (Perez, 2012)

3.6. *The urban renewal process and pedestrianization of Main Street, Resistencia*

The revitalization has been regarded as activities or efforts to revitalize an area within a city, or part of a city, and return it back to its previous vitality. An area needs to be revitalized when it has suffered both socially and economically, as well as it having encountered degradation to the local infrastructure and utilities. The process of revitalization, then, includes improvement to physical, economic and social aspects, and sound approaches must be able to recognize, exploit and support the potential of the environment of an area or region, including its unique location, history, meaning, identity and image and local wisdom.

After implementation of Ordinance 5403/01, complemented by Ordinance 8775/07 Medium Density, current image of the city look very different from those of twenty years ago. 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. (Perez, 2012)

The business of constructing towers has enabled the central area to be renovated and promoted a partnership between private entrepreneurs, composed of real estate, shareholders and landlords, working together in the formation of a trust to support the construction of towers. This process has been encouraged by the local government along with the promotion of the revitalization of commercial areas and their transformation through the use of a pedestrian strategy.

With comprehensive intervention for Main street, Resistencia, the City Council has developed a pedestrian promenade of 400 metres in length named President Raul Alfonsín, characterized by its amplitude (width) of open views, facilitated by the removal of 'visual contamination' from excessive advertising canopies and bus shelters and the renewal of infrastructure and installation of underground wiring. The established design solutions include, for example, improved pavement circulation, better drainage, the creation of leisure spaces with street furniture ideal for social meetings, the redesign of shops to improve access for ambulances and fire engines, and the provision of traffic lights to cater for blind people. As noted in the Datachaco Newspaper in March of 2014, the centre has become "a nice place for meeting, walking, shopping, cultural, social and political events". (Purwastiasning. et al., 2015)

Therefore, the pedestrianization of Greater Resistencia's Main Street not only brought the current city center renewal, contributing to enhance the Metropolitan Area.

3. 7. Policy to address growth in a polder city

If we look at Greater Resistencia experience, we can find different initiatives taken by Government to promote smart growth within the protected city. GRMA have managed to resist from most catastrophic floods who took place between 1982 and 1983 by building an embankment to round the city which, has successfully protected the city since that until present days. Government also approved different regulations in that time in order to solve the problem but, among others it's important to mention the Resolution number 1111/98 to address growth within the polder, restricting or allowing different land uses within flood plane. This experience had influence in others communities and motivated to follow its example. Community has been following this process as well.

In addition, the mentioned regulation contribute to creates "Natural reserve in urban areas, potential greenfield 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 and 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).



Source: <http://www.vivilaribera.com.ar>;
www.paralelo28.com.ar/2016/04/05/chaco-inauguracion-del-sarmiento-shopping-mall

Figure 5: New developments along Sarmiento Avenue

From this point of view, it can consider as good example of sustainable growth, since such as painful experience lead the government to take rush decisions that they had been avoiding for a long time. Community was also willing to follow this process by developing new neighborhood away from riverine areas which may be affected. Since 1998 every developer have to apply for land use permission in Local Government and Water Affair Administration which may be reject permission if the project is located in riverine areas prone to flooding, or they may request to change their building design to houses with lacustrine design. In this area is only permitted eventual uses such commercial "Sarmiento Mall" with car parking located on the ground floor or permanent residence may be design it as lacustrine houses. See Figure 5, the attached images.

3.8. Integrated Technology availability

Although the concept of smart city relies, among others, on a collection of smart computing technologies applied to critical infrastructure components and services. Smart computing refers to a "new generation of integrated hardware, software, and network technologies that provide IT systems with real-time awareness of the real world and advanced analytics to help people make more intelligent decisions about alternatives and actions that will optimize business processes". ICTs are key drivers of smart city initiatives. The integration of ICT with development projects can change the urban landscape of a city and offer a number of potential opportunities; they can enhance the management and functioning of a city. (Chourabi, 2012)

Analyzing the Greater Resistencia example, Local Government invested in Communication Technology, by implementing Wi-Fi zone in open spaces such us: The pedestrian Main Street named President Raul Alfonsin, Main Squares located in the city center and Municipal Branchs located in neighborhoods aimed to distribute this technology to every citizen not only in the city center. As noted in Norte Newspaper in May 2011, "Local Government announced Resistencia became a "Digital City with internet investment". The purpose is to bring communication technology available to all citizens,

so they can consult the web page and manage any enquires, pay taxes or download any Regulation from the web page by using internet free access". (Diario Norte, 2011)

Another investment in Technology has been in regards to Geographical Information System (GIS) Technology, a hardware program useful for planning purposes. Therefore, last decade, Local and Provincial Government and its different offices and Departments have also implemented GIS program. The main problem with this kind of technology is, lack of current updates data and coordinated information between different Government offices, skilled personnel, among others.

4. Conclusions:

As results of previous overview, many initiatives have been implemented in order to achieve sustainable growth within Greater Resistencia.

Important initiatives were taken by Provincial Government in order to protect the city to prevent further flooding from Black and Parana rivers and, the regulation of land uses to control further development over important wetland areas which have to be protected from urbanization.

Another key policy was the intensification land use in central areas with complete infrastructures and services as important option to developers rather than promote expansion along the highway connecting GRMA with Corrientes.

Current Integrated Technology and initiatives being implementing in developed countries aimed to achieve smart growth still remains to be applied in this regions but, on the other hand, we must highlight that important step were taken.

Furthermore, increasing concerns of managers and planners is related with informal settlements which will continue to grow, promoting urban sprawl mainly over plots prone to flood and underserved. As results, government is incapable to manage this phenomenon which is common to developing countries. Therefore, meanwhile these issues are not being successfully tackled, the possibility to achieve sustainable development and in Greater Resistencia will be remain unsolved then, "smart growth" will not be fully accomplished.

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