

URBAN REGENERATION WITH A HABITABLE AND RESILIENT VISION FOR THE CONURBATION OF TOLUCA

¹ Jesús Enrique DE HOYOS MARTÍNEZ, ² Georgina Alicia GARCÍA LUNA VILLAGRÁN, ³ Veronica ZENDEJAS SANTÍN

^{1,2,3} *Autonomous University of the State of Mexico
Cero de Coatepec, Ciudad Universitaria, Toluca, Mexico*

¹*jedehoyosm@uaemex.mx*

²*ggarcialunav@profesor.uaemex.mx*

³*vzendejass@uaemex.mx*

Abstract

This article analyzes the situation of three case studies in the urban area of Toluca including the raising of the quality of life in the urban population, through intervention in distinct qualitative and quantitative indicators which allow for comprehensive, timely and efficient observation of the issues facing cities when it comes to the design and development of neighborhoods. These interventions consist of regenerating urban areas, creating urban spaces with vision, habitable and resilient attending to problems of social exclusion, of housing and environments in a holistic way, guaranteeing the habitability of massive housing. The article will focus on an analysis of three case studies in the metropolitan area of the city of Toluca

Keywords: Urban Regeneration, Habitability, Resiliency

1. INTRODUCTION

To understand the current situation of cities on a global level, it is necessary to point out that in the last few decades, according to the population and housing censuses from INEGI, the population of the world has registered several significant changes, with a rise in the population. At the beginning of the 20th century, most of the population was concentrated in rural areas, while the cities had a lower population. By the midcentury, this situation was reversed, with a higher percentage of the population living in urban areas. In the case of Mexico, in 2010, 78% of the population was concentrated in urban areas (87, 622,499 inhabitants) and 22% lived in rural areas, while by 2015, 20% of the population was rural and 80% urban. Where can we find problems of vulnerability and lag in urban areas in Toluca to resolve the needs of social inequality and exclusion?

This situation has caused an urban agglomeration in the suburbs of the main cities, as well as migratory movements of country dwellers to the city in the hopes of better opportunities which creates a higher demand for basic services, irregular settlements and marginalization in the urban population. What are the physical and functional characteristics of the inner-city and inner-urban home in the city of Toluca which can attend to the needs of habitability? What would the product of this process look like?

It is important to mention that this process of population growth in the urban agglomerations promotes the increase of urban sprawl and with it the risks and vulnerability, which is why we ask the following question. What capacity do we have to confront natural disasters with the onset of climate change, as well as the safety and adaptability of the settled population? Unorganized growth, social exclusion, inequalities in basic services, as well as access to a dignified dwelling, problems with mobility and urban connectivity, water and drainage access, energy, as well as housing developments located too far from places of work and insufficient public transportation. All of this makes us reflect on the following. What are the current conditions of the natural environment in the cities which guarantee the use of natural resources for the development of city infrastructure? This has caused dispersed communities, weakness in the social structure, uninhabited homes, and a negative impact on the environment, which has made us focus on habitability and resilience.

2. THEORETICAL REFLECTIONS ON HABITABILITY AND RESILIENCE HABITABILITY

The first structural concept of the proposal is habitability, understood in urban spaces as a habitational condition where the dwelling is physically integrated into the city, with good accessibility to services and equipment, surrounded by quality public space. This is not the case when the dwelling is in good conditions, but located far away in a vulnerable, marginal area with difficult transportation routes (Alcalá, 2007) in Moreno (2008).

In this context, the term inhabit is fundamental to this reflection and it is important to outline an approximation of the notion of habitability and its implications in the complex process of design. (De Hoyos Martínez, et al. 2015). "...a human being lives, acts and constructs his space, as his life unfolds around him. Uncertainty and chance are part of man's life story..." (De Hoyos Martínez, 2010) and part of the construction of his home.

In this sense, the idea of inhabiting has three components: time-space, the human and the relationship with the non-human. The relationship between special elements are transformed by processes; and temporal elements, which are transformed by cycles, like human and non-human activity, including information and communication. (De Hoyos Martínez, et al. 2015). Therefore, inhabiting is expressed in a specific space and time, in which the social and cultural moments define ways of being in that place, where rhythms, pauses, movements, attachments and displacements unfold (Ricoeur, 2002). We will add to this discussion the vision of permanence and fluctuation developed by Milton Santos in the analysis of social space. Human relationships play with space and location as these humans deal with actions and emotions (Maturana, 1993).

3. RESILIENCE

The second structural concept is urban resilience. According to Mirriam-Webster, resilience is an ability to recover from or adjust easily to misfortune or change. (Mirriam-Webster, 2017). It is important to point out that resilience is a term from metallurgy and is understood as the physical phenomena of the ability of metals to resist impact and

recover its structure once it has been exposed to an extreme force. We can also say that resilience is not the search for contradiction and solution. For this reason, it is compatible with the concept of sustainability. (Álvarez Vallejo, et al. 2016)

Pointing out that we live with violence, security issues, a lack of materials, a need for peace, as well as a better relationship with nature, is directly related to the need to be sustainable. Sustainability invites us not to destroy or pollute the world, or at least to leave it in the same condition we enjoy today, so that future generations will have the same opportunities to live as we do now. This is called social resilience. (Álvarez Vallejo, et al. 2016)

It is possible to establish that resilience is a concept associated with the adaptation of changes in different sciences or areas of knowledge.

On the other hand, the level of resilience in urban systems, since it is a human creation, depends upon human behavior and creativity. Extreme changes and transformations are part of human evolutionary history. Man's adaptive capacities have made it possible, not only to passively persist, but to also create and innovate when limits are reached (Gunderson & Holling, 2002) (Table 1).

TABLE 1. CHARACTERISTICS OF DIFFERENT VISIONS IN UNDERSTANDING NATURE
Source: (Gunderson & Holling, 2002)

Nature	Stability	Processes	Policies	Consequences
Flat	None	Stochastic	Random	Trial and Error
Balanced	Globally stable	Negative reaction	Optimize or return to equilibrium	Pathology of surprise
Anarchic	Globally unstable	Positive Principal	Precautionary Principal	Status quo
Resilient	States of multiple stability	Perception of the exterior and internal reaction	Maintain variability and diversity	Recovery on a local scale or adaptation; unexpected structural changes
Evolutionary	Environment of changing stability	Multiple scales Unknown structures	Flexible and actively adapted	Active learning and new intuitions

This research project aims to use the resilient model as a foundation to study urban systems, specifically those in deteriorated areas. (Zaragoza. 2015) Schuschny (2014) confirms that urban resilience refers to the ability of a city exposed to threat to resist, absorb, adapt and recover from its effects in an efficient and timely way, which includes the preservation and restoration of its structures and basic functions.

4. HABITABILITY AND RESILIENCE ANALYSIS

With the beforementioned concept analysis of the two structural concepts of the proposal, we will go on to study the regeneration of urban spaces in Toluca, with the objective of attending to the necessities and growth of the city, through specific projects.

In the last few years, the population of Mexico has seen some significant changes. The population has gone from being mostly rural and agricultural to city dwellers. This situation has affected the growth of the city and there have been changes in every other structural element including the social, territorial, urban features, vital infrastructure, housing, the urban image, and the social and economic make-up. These changes have had positive and negative impacts. Some of the negative impacts are failures in habitability and the low resilience of these cities.¹

Habitability will be determined by the correlation between man and his surroundings at distinct levels of the territory, evaluated according to its capacity to satisfy human needs (Moreno & Haydé, 2008). Habitability is defined as the level of satisfaction the inhabitants have for their dwelling when it comes to their needs and interests, with the objective of finding a measure of habitability and identifying the implied variables. According to Alcalá (2007), urban habitability is a housing condition where the dwelling is integrated into its urban environment, with accessibility to services and features in an effective way. The dwelling must be surrounded by quality public spaces. A lack of urban habitability is when the dwelling, even if it is in good condition, does not have good services, is difficult to access and is in a marginalized area.

Habitability is understood from two angles: internal or interior habitability and external habitability, which refers to the next systemic level or the immediate urban environment, in other words, the relationship between the dwelling and the surrounding neighborhood including porches, garages, facades, patios, sidewalks, buildings, etc. According to Landazuri y Mercado (2004) when we talk about habitability and dwelling needs, we need to mention that Maslow established five needs which are expressed in Figure 1.

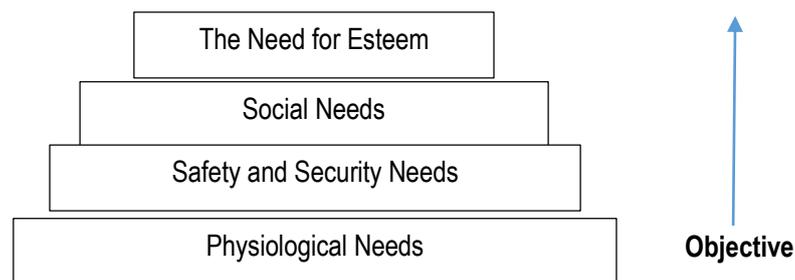


FIGURE 1 - BASIC HABITABILITY AND DWELLING NEEDS
Source: Maslow's Pyramid (Moreno and Haydé, 2008)

They are organized into two large blocks that establish a growing and accumulative sequence from the most objective to the most subjective. The subject must cover his or her needs, in this order, from the lower levels (more objective) and to be more motivated, satisfies needs from the higher level (more subjective).

¹ In this context, habitability refers to the relationship and adaptation between man and his environment while resilience refers to man's capacity of adaptation when confronted with change. These two variables allow for the integration of a habitability and resilience analysis for Toluca.

In the first block, four types of needs are established. The fourth type of need is that of esteem. The next block of needs is called self-actualization needs (virtues, desires, aspirations, potentialities, among others). These include psychological aspects which are individual and subjective. The first three are more generalized and objective:

Physiological Needs. These are the most basic needs including material elements which need to be satisfied and which are needed for human survival. When seen from an architectural point of view, we are talking about a dwelling which has the minimum infrastructure necessary to complete basic physiological needs within the space.

Safety and Security Needs. These include a safe, orderly life, absent of dangers and risks to personal and family integrity. In this case we could say that once a dwelling is acquired, it should be able to offer a healthy and safe environment to the resident, and it should be situated in an environment which is suitable for living, with no danger to the life of the inhabitant.

Social Needs. These needs are about the willingness to recognize and be recognized by our peers. We feel an attachment to places and belonging to a social group. In this case, we refer to the urban environment which facilitates contact, social relationships, friendship and association.

Urban habitability, apart from internal conditions of the dwelling, also includes the natural and physical environment which allow for the satisfaction of the inhabitants. In that sense, urban habitability does not include the capacity for adaptation of the dwelling or the city when confronted with a contingency. Resilience, according to Becoña (2006:1), is the capacity to overcome adverse events and be capable of being successful in development despite adverse circumstances. The term refers to the existence of prevailing risks in urban spaces due to the segregation and exclusion with which the city has been developed. With respect to resilience in a city, the United Nations developed a manual (ONU, 2012) for leaders of local governments with the purpose of developing resilient cities, considering the following variables:

- It is a city in which disasters are minimum because the population lives in dwellings and neighborhoods with adequate services and infrastructure, as well as having reasonable building codes and there are no informal settlements.
- There is a local government which is inclusive, competent and responsible for sustainable urbanization.
- The local authorities and the population understand the risks and create a shared local database about the losses associated with disasters, threats, and the risks one is exposed and vulnerable to.
- The residents are empowered to participate, decide and plan their city jointly with the local authorities. Local indigenous knowledge, abilities and resources are valued.
- Measures have been taken to anticipate disasters and reduce their impact. Technologies are being used to monitor and create early alerts to protect infrastructure, assets and members of the community, including houses and property, cultural heritage, the environment and economic wealth.

- There is an ability to minimize physical and social losses derived from extremes in weather, earthquakes or other natural or human threats.
- The city can respond, implement immediate recovery strategies and quickly restore basic services necessary to restart social, institutional and economic activities after a disaster.
- A higher resilience is developed to the negative environmental repercussions, including climate change and reducing greenhouse gas emissions.

With this foundation of habitability and resilience, we can conclude that there are two processes within which urban regeneration is the main objective. Urban Regeneration is a process which, when applied to the causes and specific factors of deterioration, will allow for the development of these functions, as well as the improvement of conditions in the environment. Urban generation is a comprehensive, vital and dynamic concept. The city functions in a systematic, comprehensive way, with constant change, regenerating is generating again, as well as undertaking not only environmental and physical aspects, but economic and social ones as well (COPEVI, 1976).

The Toledo Declaration, (2010) defines comprehensive urban regeneration as the achievement of intelligent, sustainable and socially inclusive. When it comes to being sustainable, we are referring to the resilience and socially inclusive part of habitability, central pillars for this research.

Institutions also define urban regeneration as a road to economic recovery and a way to guarantee a model based on sustainability and the integrational of social, economic and environmental aspects. Urban regeneration does not only refer to physical transformation, but also proposes solutions to the problems experienced by the lower classes (Castrillo María, et al. 2014).

Aparicio Mourelo Angel and di Nanni Roberta (2011) point out that urban regeneration is a heterogeneous process because the analysis of the existing experiences about this topic show much diversity in the designing and management of these programs. These differences are due to many reasons, for example:

- Peculiarities of each territory: social, economic and urban.
- Institutional framework, establishing sectorial powers within administrations
- Ideological perspectives have an impact in the prioritization of several different issues involved in exclusion processes of urban territory.

Urban generation should consider the specific needs of each territory, participation from citizens and the sectors involved. This ensures the comprehensive part of the projects and better results in each case. It is important to point out that urban regeneration is applied in existent spaces, not only in constructions like home or offices, but urban regeneration can be part of an entire city or part of it, prioritizing the most unprotected urban spaces.

We consider that the city is associated with a system where the elements cannot act individually because the elements influence each other. For this reason and with the objective of solving the problem of social inclusion,

habitability and resilience in the city of Toluca, several distinct indicators will be used. We will consider norms and planning tools for decision making. The methodology is triangular because it will consider qualitative and quantitative data to achieve the development of these cities in a complex manner.

5. CONDITIONS OF HABITABILITY IN URBAN HOUSING DEVELOPMENTS AND THEIR IMPACT ON THE PROBLEM OF UNOCCUPIED HOUSING IN MEXICO

In the last few years, the housing supply has mostly been situated in zones far from downtown centers which has had negative effects on the territory including: the unorganized growth of urban sprawl, demand for public transportation, higher costs of transportation, work and service areas further from home, more air, ground and water pollution, all of which are affecting quality of life in the population.

The national fund for worker housing, the Instituto Nacional del Fondo para la Vivienda de los Trabajadores (INFONAVIT), has implemented a program called Venta e Intermediación de Vivienda Económica (VIVE). This program resells abandoned homes bought through INFONAVIT, allowing registered workers to obtain houses at reasonable prices, after being appropriated and put up for auction. The objective is to gradually eliminate the problem of abandoned homes, which can be seen in north cities in states like Chihuahua, Tamaulipas, Baja California, Sonora and Sinaloa.

These homes will be assigned to any of the real estate development companies, who will refurbish and sell with a subsidy from the housing commission, Comisión Nacional de Vivienda (CONAVI). This model will bring benefits like: higher percentage of recovery of abandoned homes, freeing of fixed assets, and less reserve spent on new credit.

The social benefits of the program are: access to home ownership at a discount, rehabilitation of the environment, strengthening of the social fabric, higher home values and higher quality of life for families. According to the 2010 census in the State of Mexico and the municipality of Toluca, homes are distributed in the following manner (Table 2).

TABLE 2: TOTAL HOMES, PRIVATE HOMES, HOMES IN TEMPORARY USE 2010
Source: INEGI, Censo General de Población y Vivienda 2010

Area	Total Homes		Total of inhabited private homes		Private homes in temporary use		Uninhabited private homes	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Toluca	238,047	100%	199,789	83.93%	9,539	4.01%	28,693	12.05%
State of Mexico	4,495,144	100%	3,749,106	83.40%	207,425	4.61%	538,220	11.97%

With this information, it is important to point out that the quantity of uninhabited homes in the State of Mexico and in Toluca shows the urgent need to inhabit these homes. We will present an analysis of the current situation in two INFONAVIT housing developments in the suburbs of Toluca. The first case is that of Colinas del Sol in the

municipality of Almoloya de Juárez and the other is Conjunto Urbano Lerma. Both are far from the downtown area. The inhabitants are low to medium income earners. Accessibility is insufficient and both have problems with crime. These aspects are indicators of habitability.

6. UNINHABITED HOUSING DEVELOPMENTS: THE CASE OF SANTA CLARA, CEDROS RESIDENCIAL AND COLINAS DEL SOL

The first case study corresponds to the housing developments called Santa Clara and Cedros Residencial, both on the Eastern side of Toluca, in the municipality of Lerma. There is a total of 4,375 inhabitants according to the census called Inventario Nacional de Vivienda 2015 and a total of 2,678 existing homes. Only 1,394 of these homes are inhabited while 1,284 homes are uninhabited (Figures 2 and 3).



FIGURE 2 AND 3 - INHABITED AND UNINHABITED HOMES IN LERMA, STA. CLARA AND CEDROS RESIDENCIAL HOUSING DEVELOPMENTS
Source: INEGI 2015 Inventario nacional de vivienda

47.95% of the homes are inhabited and 52.05% are uninhabited. We have been able to identify the accessibility conditions as well as the fact that they are located within an industrial zone, with ground contamination and located close to the contaminated Lerma river. In the case of Santa Clara, it is in an area with an elevated risk of flooding. The situation in Cedros Residencial is different even though it is located next to the Lerma river. It does not have flooding, but the administration of the regulations is not optimal. On the main avenue, many home fronts have been converted into small businesses which have modified the look of the area. There is also a lack of shopping, education and health service options. These are the main reasons these homes have been abandoned by the inhabitants.

The number of uninhabited homes is so high in this area, when we look at the situation from the point of view of habitability, we can see that the homes lack functionality. Comparing this situation to Maslow's pyramid, immediate attention is needed in this area to fulfill the following needs: physiological; health and safety; and social and esteem.

During the census called Inventario Nacional de Vivienda 2015, the number of homes with public services was analyzed: electricity 8000, water 750, drainage 615, garbage pick-up 513. With these results, we can see that only a small number of homes have all of these services. This puts the inhabitants into a dilemma, owning a home without public services and a very low quality of life.

In 2013, the inhabitants of these housing developments formally asked officials at all levels of government to regulate the infrastructure including the water treatment plant, the insufficient electricity and above all, security measures because the municipality has not undertaken the necessary crime prevention measures even though the housing development is 7 years old.

With respect to the second case, Colindas del Sol is in the municipality of Almoloya de Juarez and it just north of the municipality of Toluca. The total population in 2010 was 1,249 inhabitants in private inhabited homes. The census Inventario Nacional de Vivienda 2015 reported 5,986 homes. 2,581 were private, inhabited homes, while 3,361 were uninhabited private homes. Uninhabited homes were at 56.14%, a higher percentage than inhabited homes at 43.11% (Figures 4 and 5).



FIGURE 4 AND 5 - INHABITED AND UNINHABITED HOMES IN COLINAS DEL SOL
Source: INEGI 2015 Inventario nacional de vivienda

The main cause of abandonment in this housing development is the location. It is very far from where most inhabitants work. The main access route is not in good repair and was not well planned. The homes themselves also have several structural issues. There are cracks in the wall, humidity from the roof, bad management of materials, a lack of interior design, visual contamination in public spaces and a lack of maintenance has allowed for increased crime. The population that inhabits this housing development do not interact socially, so there is no motivation to collaborate as a community.

In the census Inventario Nacional de Vivienda, an analysis was conducted concerning public services: electricity 339, water 340, drainage 340, garbage pick-up 340. The total number of homes was 5,986. There were 2,581

inhabited homes, which is 50% of the housing development. The analysis of the public services shows that a very small number of homes has these services and that the inhabitants have a quality of life issue.

7. CONCLUSIONS

Through an analysis of the two structural concepts (habitability and resilience) of urban regeneration, we recognize that the objective needs to be attending to marginalized communities. This analysis has also allowed us to see the problem of uninhabited homes in housing developments, particularly those in suburban areas. The lack of habitability is caused by residing far from basic services and low quality public spaces. Taking this into account and the fact that urban regeneration is applied to consolidated urban areas, it is important to deal with these problems which continue to grow as does the urban sprawl.

On the other hand, we must consider the temporary nature of supply and demand. When these homes were offered for sale, there was a much larger demand for these housing developments. The situation has changed, there is now a decline in these housing developments because of a lack of maintenance, and the inhabitants' relationships with each other and their environment prove that the inhabitants do not feel a sense of belonging.

It is important to highlight that the problems we see in these housing developments comply with the conditions of heterogeneity needed for urban regeneration. The main problem in Colinas del Sol is a lack of security (crime). In the case of Santa Clara, the problem is ground and air pollution from the industrial zone. Cedros Residencial has a problem accessing services. All of them are unable to confront environmental risks related to climate change, have a problem with crime and a population which does not appear to be adapting.

There is an urgent need to develop projects which not only refurbish the homes, but pay attention to the conditions surrounding the homes. To achieve urban regeneration which leads to habitability and resilience, it is imperative to work with the sectors involved in infrastructure, seeing as though the major reasons residents are leaving are the distance and the conditions of the access routes.

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