

COMPREHENSIVE ASSESSMENT OF URBAN VULNERABILITY. THE CASE OF THE CITY OF VALENCIA.

Author:

RAFAEL TEMES

Institution:

DEPARTAMENTO DE URBANISMO, GRUPO DE INVESTIGACIÓN "VLCURBANBIGDATA", ETS DE ARQUITECTURA DE VALENCIA, UNIVERSIDAD POLITÉCNICA DE VALENCIA. CAMINO DE VERA SN. 46021- VALENCIA

INTRODUCCIÓN

Nowadays it is noticeable that the most of the legal system is focusing on the territorial developments. The developable plot is the piece of land in which the legislation applies its best efforts, both to define its administration and to limit their possibilities.

This situation is not surprising if we look at the evolution of the cities have had in the last 100 years. From the first laws on the expansion of towns to the latest regulations on regional terrain the law reserves a key role for technical and specific management systems to transform land in new developments. In the last two decades the most profound and important changes are those related to the incorporation of these spaces, as it is demonstrated in the Spanish Sustainability Report 2014, developed by the Spanish Observatory of Sustainability (OSE)¹. These are irreversible revulsions both in the interior and the coastal strip, with an annual rate of 27,666 ha / year, that means 76 ha a day.

However, while dealing with this situation in Spain, we might realize that more than a quarter of the territory of the European Union can be considered as urban area. From the second half of the twentieth century, especially in the early 70s, substantial change occurred in the way of acting on the cultivated fields. This process has been followed by the strong and conscious heritage protection movements for defending the legacy of the historic city, in response to the former planning methods that had been more concerned about the real estate markets than in the conservation of urban heritage.

Recently, these reflections which had been initially linked to the preservation and maintenance of the built city, have begun to find new dimensions and scenarios of application. Beyond *the city-heritage*, list of singularities, we find that majority of the citizens live in *ordinary city*. In this city the real existence of spatial fragmentation is evident, which clearly reveals unequal parts of the same reality. And it is not only a physical issue evidenced by gaps or lines that segregate certain neighbourhoods or urban areas. It is a deeper issue, where physical segregation is nothing but the crystallization of different ways inhabitants have had access to the economic, social participation and education.

Today the economic crisis has shown us a different city. The focus has been removed from urban centres to the peripheries. The focus has shifted from new growth to consolidated areas, and an awareness of the increasing urban inequality compared with emerging sectors has appeared. This new city, defined and built in the last 20 years, is in the words of Secchi, *the city of the future*².

There is no doubt that we find ourselves in a moment of transition from a model of extensive growth, with the growth of markets, towards a new model, by trying to recover the appropriate capacity and

reviewing the hitherto done. If we pay attention to the potential of new existing homes in Spain, according to the residential sectors in Spain Report 2014³, there are developed areas can accommodate more than 2.3 million homes. In the specific case of Valencia, we talk about a potential 273,000 homes situated in 45% of urbanize terrain and in 11.6% of buildings.

As a complement, if we review the existing city, we can see that 8,5 million homes were built between the 60s and 70s. 1 million of these homes are in the Valencian Community and at least are 50 years old. Observing the city from this double perspective, inherited buildings and what is going to built, gives us in a simplified way of looking at the future of our cities, where it is necessary to find a proper balance between the occupation of new land and intervention in consolidated urban areas.

This duality of the contemporary city is not new. In the nineteenth centuries cities grew smoothly thanks to the internal reform and plans for extensions. Perhaps the key lies in the proportionality and intensity of developments.

Research background

The present paper aims to focus on one of the two perspectives that in our view define contemporary cities in southern Europe. In particular we were engaged in assessing how to act in consolidated urban areas where social and housing exclusion processes are intensifying significantly. The work presented in this article has been carried out in 3 phases.

In the first phase, as development of the research project "The urban transformation", the basic research "Penelope's tapestry"⁴ was launched. It deals with residential transformations of urban areas without heritage value. Without discussion, this study was an important reference point in the work reflecting the value and the role that consolidated structures will play in the city for the coming years. Not surprisingly, it was the first systematic and documented study about the renewal that took place in Valencia Region, focusing especially in the city of Valencia. A specific analysis methodology was made which helped demonstrate the necessary continuation of the research so as to anticipate and plan the horizons of future intervention.

The same concern to identify and evaluate dysfunctional or problematic areas within the city paved the way to a second phase of this work. On this occasion the experience was in the hands of the Government Department of Planning and Housing of the City of Madrid who, within the strategic lines of the Operational Programme 2007-11, focused on the aging built areas and building stock in the city. Madrid's administration, following the footsteps of other urban initiatives on the same topic: Law 2/2004, of June 4, to improve neighbourhoods, urban areas and towns that require special attention in Catalonia (Spain, 2004); Program Izartu Territorial Cohesion of the Basque Country (Spain, 2001); Comprehensive Rehabilitation Plan of Castilla y Leon (Spain, 2012); neighbourhoods recovery Program (Chile, 2012)), proposed establishing a methodology for symptoms of vulnerability. Based on this requirement, the General Department of Planning of the City of Madrid, decided to design a "Bank Indicators" who valued the "comprehensive vulnerability" of the consolidated city.

In the city of Valencia we sought to implement the model of these works four years later. This study outlines the steps taken so far in the comprehensive analysis of the potential vulnerability detected in the city of Valencia.

URBAN OBSOLENCE - URBAN VULNERABILITY

The city is often defined as the "space" of social relations⁵. These relationships have often turned into egalitarian, conflictive and segregating social organizations. While this has always been the case (the exclusion of groups with differential features has been part of the urban definition). However, when these factors increases it becomes a priority in urban policy.

We have mentioned other aspects from the recent years⁶, where the concept of vulnerability has acquired special relevance in the social science. This term has been widely used in the case of geography, referring directly to the chances of being negatively affected by a geographical and / or climatological phenomenon, and has also been used by the economy in relation to the macroeconomic response to external shocks⁷. However, it is in the social sciences where it has had a special boom in the last decade. As reported by Prof. Vignoli Rodríguez⁸ this boom seems to have initiated the studies of Caroline Moser and his group at the World Bank, which were synthesized in the known asset / vulnerability framework. However, the notion of vulnerability has far exceeded this initial delimitation has been used as a component of growing importance within the complex of social and demographic disadvantages that are outlined in "late modernity"⁹.

This paper uses the notion of vulnerability in a comprehensive and holistic manner¹⁰. We use the definition of Professor Alguacil. According to Alguacil vulnerability is a "term that refers to the downward social mobility leading to social and housing exclusion. It often refers to both social groups as to territories or areas at risk, linking space and social structure. "

Whether considered as spatiality or projection on an urban environment, the understanding of vulnerability is not without definitions and objectives – although ambiguity often defocus accuracy of this concept. We can talk about areas of special attention; Sensitive areas; Damage, degradation or decline areas; Areas in crisis or difficulties; Disadvantaged areas¹¹. Whatever we call them these are city areas characterized by the presence of clearly regressive social, urban and economic indicators. In other words we are talking about areas of the city where vulnerability exists at all levels and dimensions of society and is integral part of to the human condition, so that it affects every person and the whole society¹². It is therefore a holistic concept that involves multiple dimensions, for which we must also adopt comprehensive measures to address the problem with certain solidity.

The city of the future - built 50 years ago

Before elaborating the methodology used to determine the area within the city of Valencia where the potential for generating comprehensive vulnerability scenario is most probable, is necessary to justify the figures and horizons of foreseen aging in the building stock in our cities. Certainly they are clear indicators of the beginning of the building obsolescence described above.

In demographic studies of our country the period between 1957 and 1977 is known as the years of the "Spanish baby boom". During those years almost 14 million children were born - that meant 2.5 million more than in the twenty years before, and 4.5 million more than in the next twenty years. Today the generations born during the two decades of the 'baby boom', represent one third of the entire population of Spain. Something similar happens with the cities also. If we study the growth between the decades of the 60s and 70s in our cities we get the attached map (Figure 1). The black coloured areas show the municipalities where building construction has meant more than 33% during the studied period. While nationally 21% of the municipalities are affected, the situation assessed is even more intense in numbers of buildings and dwellings in those municipalities that host the provincial

capitals and have a concentration of major tourist resorts on the east coast. Such as the Andalusia coast and the Canary and Balearic coasts.



Figure 1. Spain city growth between the decades of the 60s and 70s (coloured in black those cities with more than 33% of their consolidated areas built up from 1959 to 1979).

Font: Author

Referring to the number of buildings, more than 30% of the entire building stock in Spain was established during this period. If we observe accurately what happens in the city of Valencia, we would see that here the situation is even clearer. If we talk about buildings, 36% of the building stock was established during these 20 years, and it means almost a half of all households were constructed in this two decades.

ANALYSIS METHODOLOGY. EVALUATION OF POTENTIAL PHYSICAL OBSOLESCENCE OF THE CITY

In this paper, because of the limited scope, we decided to focus only on one aspect of the analysis. As we have mentioned before, we value the vulnerability comprehensively, including physical (related to construction), social and economic factors (concerning citizens). However, the paper will focus on the analysis of the structure of the building to explain the method used for the city of Valencia. The proposed methodology had to allow for a prioritization of intervention by quantifying the highest possible degree of accuracy, the affected areas and their priority. In order to identify and quantify the areas at risk (those which are given the worst rates of building quality, age, accessibility and construction material) it was necessary to define what factors or indicators were the ones that define the risk of threshold.

The "Horizon Renewal" that was finally valued was 2030-40 as it is the highest intensity range of predictable cases. Not surprisingly, in Valencia City, more than 36% of the buildings and almost 50%

of all dwellings were built between the 60s and 70s. In that timeframe, the massive and simultaneous reception of the highest percentage of buildings occurred. On the other hand, and in reference to the indicators used to indicate the risk and level of physical obsolescence, we tried to use information from the most reliable sources. This information should be updated in time, and could reach the lower level of aggregation which, in this case, would be located in the urban plot (as the minimum unit). With this background, and after ruling out other sources, the physical analysis of Databases Urban Cadastre assigned to this investigation by the Regional Office of the Register of the Province of Valencia was used as the main information. The indicators used to assess the situation of physical obsolescence of the city were divided into two known types: 'limitations and factors'. We define 'factors', criteria or indicators that enhanced or decreased a certain situation, while 'limitations' are those indicators that restricting the availability of any area or category. Thus we summarize in the Table 1 below the applied factors and limitations:

Table 1. Limitations and Factors (1^a Phase)

Limitations and Factors	Denomination	Critic Limit	Font
Factor	Age of the building	Decades 60-70	DataBase of Cadastre
Factor	Apparent quality of the building	Simple quality	DataBase of Cadastre
Factor	Construction materials	Reinforced concrete frames and mixed systems	DataBase of Cadastre
Factor	Accessibility	Elevator buildings > 2 levels	Industry Ministry
Limitation	Buildings and urban protected areas	Buildings or areas included in the Catalog	Current PGOU of Valencia (1988)

Font: Author

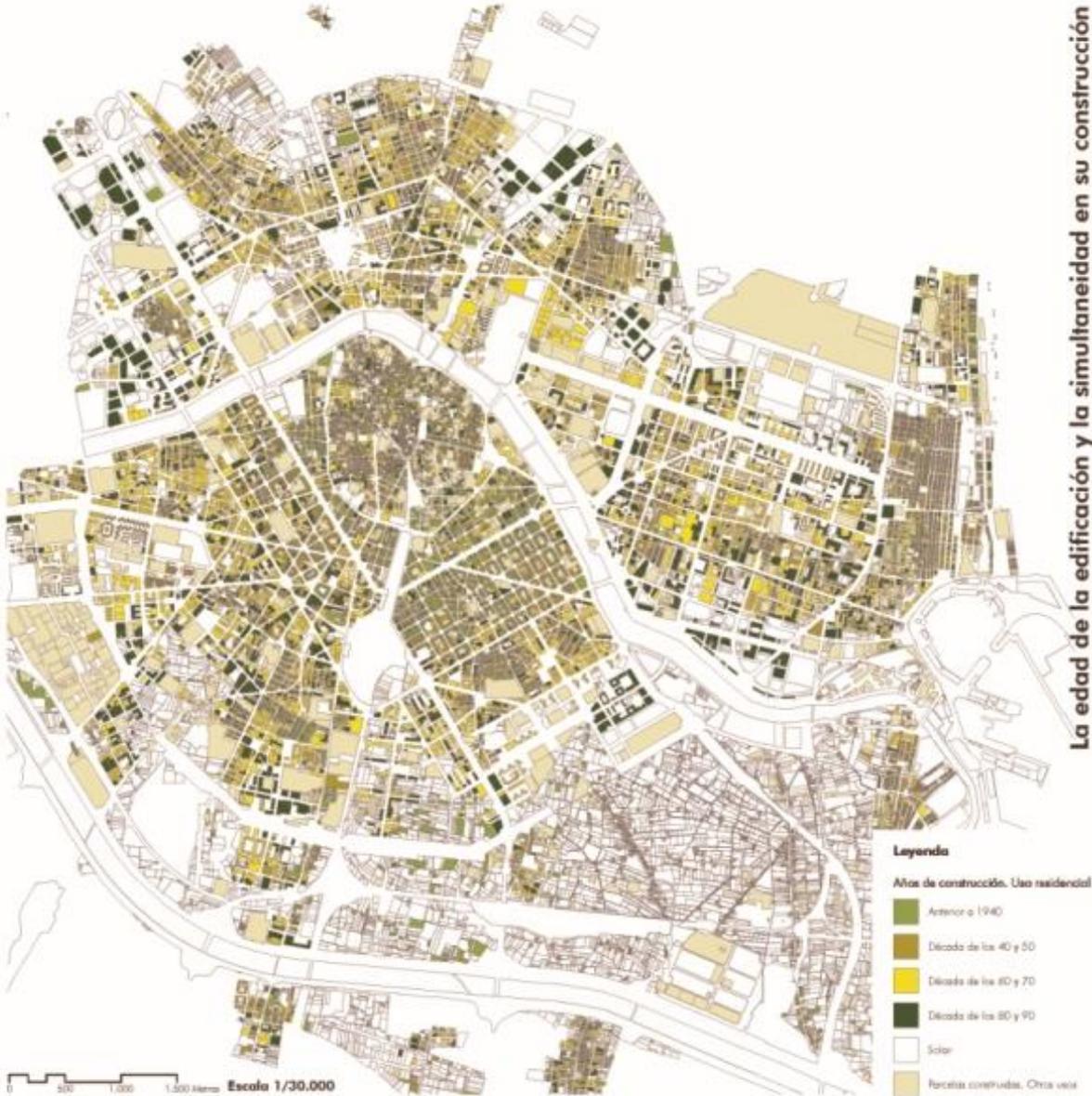


Figure 2. Age of the building. City of Valencia. Font: Author

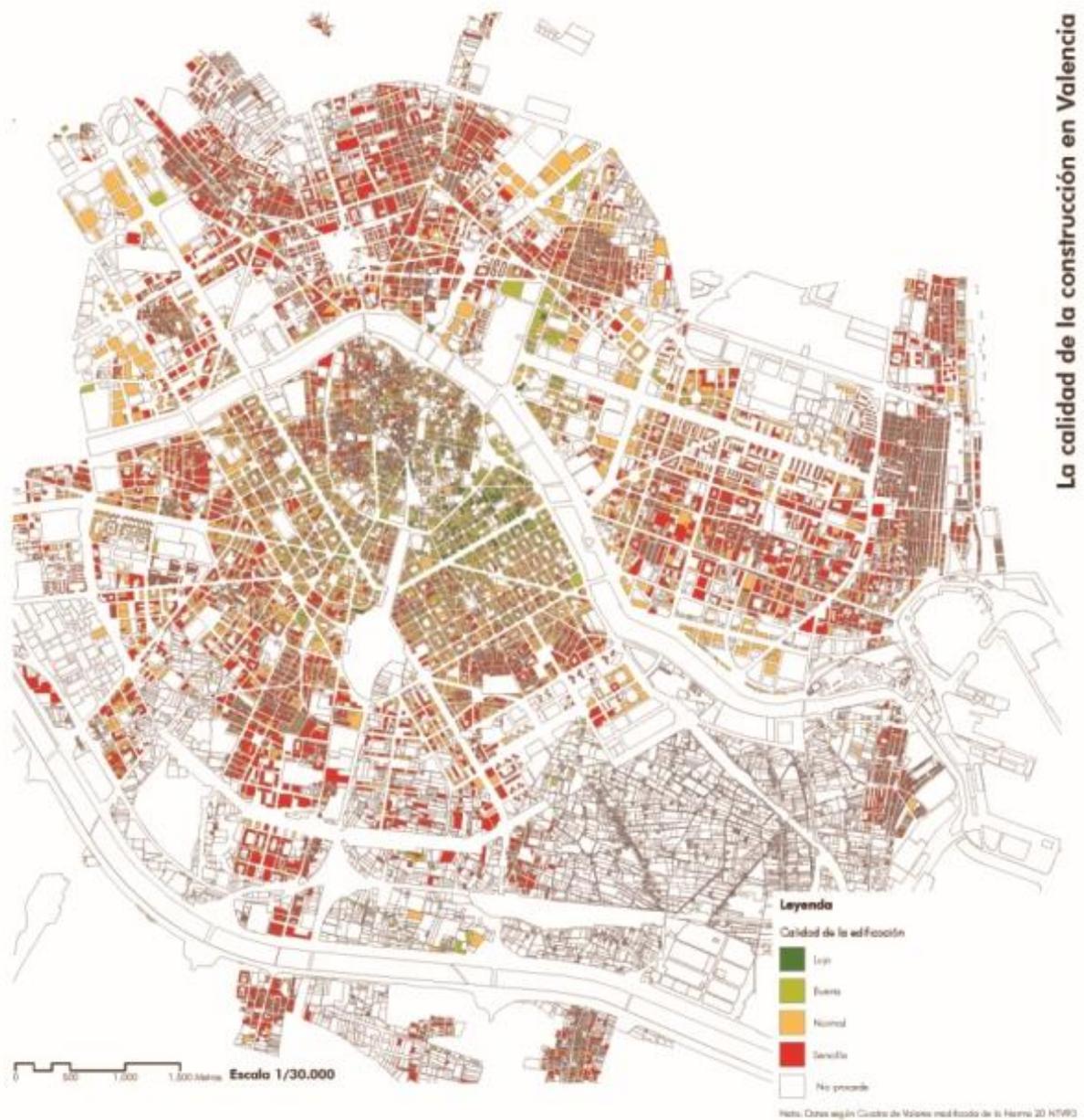


Figure 3. Apparent quality of the building. City of Valencia. Font: Author



Figure 4. Construction materials. City of Valencia. Font: Author

We used Multicriteria Evaluation Techniques (EMC) combined with Geographic Information Systems (GIS) as a tool for analysis and representation to determine the basic scenarios of potential physical obsolescence. We have applied this evaluation technique without considering any weighting. We followed the phases below:

1. Typification of variables
2. Linear summation of the indicators obtained to identify areas with the greatest potential of physical obsolescence from standard deviation above the mean.
3. Delimitation based on indicators of contrast and morphological homogeneity criteria

Within the initially deduced areas were identified morphologically 135 transformation scenarios. Then they were divided into a ranking of 13 different classes that can be seen in the detail on the attached image (Figure 5).

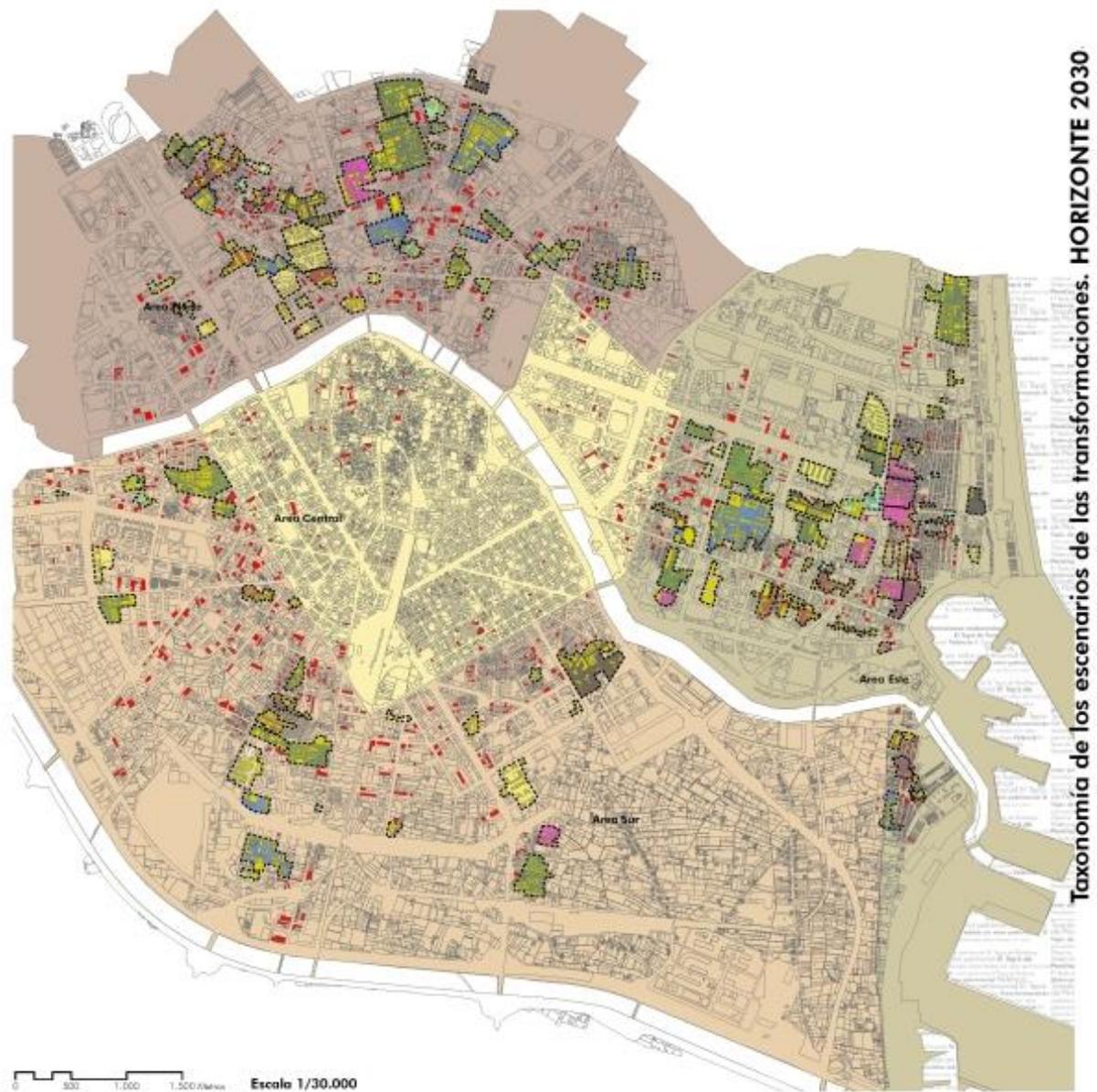


Figure 5. Mains scenarios with potential urban renewal of Valencia. Horizon 2030. Font: Author

CONCLUSIONS OF THE STUDY

The realization of this work highlighted the scarcity of sources allowing the characterization of the condition and liveability of the existing buildings. We need to "radiograph" the condition in which the

building stock is today¹³. Despite this, the research has shown that with the cadastral databases as gathering of valuable parameters we are able to characterize the buildings.

Meanwhile more than 85% of cases are defined beyond the expansion in Valencia, pointing to the periphery - built between 60 and 70 - as the main area of urban problems in the coming years.

The initially defined areas must now be combined with studies of social and economic profiles of the population to have a closer look at the potential vulnerable areas in the city.

We believe this research is a very effective tool for the government to develop city policy interventions, aware of an existing population which in most cases is as aged and vulnerable as their own homes.

Meanwhile, sources in the economic and social description of the people living in these neighbourhoods are based on municipal register renewals and other statistics that usually exist in the municipalities. In these cases, the major problem is being able to reference data at a smaller scale than the census tract aggregation allows.

On the other hand, the working method presented here is especially remarkable because of the ability to apply it in other areas, as well as the possibility offered to "monitor" in real time, and to monitor developments in areas from the "Bank of indicators" that comprehensively assess the vulnerability of neighbourhoods.

REFERENCES

- ¹ Fernando Prieto and others, *Informe SOS España 2014*, (Madrid: Asociación observatorio de la sostenibilidad, 2014), 90.
- ² Bernardo Secchi, "Le condizioni sono cambiate", *Casabella* 298-99 (1984)
- ³ Ministerio de Fomento, Dirección General de Arquitectura, Vivienda y Suelo, *Sector residencial en España 2014*, (Madrid: Centro virtual de publicaciones del Ministerio de Fomento, 2015), 5.
- ⁴ Rafael Temes, *El tapiz de Penélope. Transformaciones residenciales sobre tejidos sin valor patrimonial*, (Valencia: Universitat Politècnica de València, 2007).
- ⁵ Julio Alguacil, "Barrios desfavorecidos: diagnóstico de la situación española", in *V Informe FUHEM de políticas sociales: La exclusión social y el estado del bienestar en España*, ed. Fernando Vidal, (Madrid, FUHEM, 2006), 155-168.
- ⁶ Rafael Temes, "Valoración de la vulnerabilidad integral en las áreas residenciales de Madrid", *Revista EURE - Revista de estudios urbano regionales*, 40 (119), 2014, accessed January 04, 2015, doi:dx.doi.org/10.4067/s0250-71612014000100006
- ⁷ Ricardo Ffrench-Davis, *Macroeconomía, comercio y finanzas para reformar las reformas en América Latina. Santiago de Chile*, (Santiago de Chile: McGraw-Hill Interamericana, 1999).
- ⁸ Jorge Rodríguez Vignoli, *Vulnerabilidad y grupos vulnerables: un marco de referencia conceptual mirando a los jóvenes*, (Santiago de Chile: CEPAL, Serie Población y Desarrollo, (17), 62, 2001).
- ⁹ Rodríguez, *Vulnerabilidad y grupos vulnerables: un marco de referencia conceptual mirando a los jóvenes*, 62.
- ¹⁰ Felix Arias Goytre. Coord. *Las desigualdad urbana en España*, (Madrid: Ministerio de Fomento. Dirección General de Programación Económica y Presupuestaria. Centro de Publicaciones, 2000).; Alguacil. "V Informe FUHEM de políticas sociales: La exclusión social y el estado del bienestar en España", 155-168; Carlos Egea and others, *Vulnerabilidad del tejido social de los barrios desfavorecidos de Andalucía. Análisis y potencialidades*, (Sevilla: Centro de Estudios Andaluces, Consejería de la Presidencia, Junta de Andalucía, 2008), 387.
- ¹¹ Temes, "Valoración de la vulnerabilidad integral en las áreas residenciales de Madrid", 122-127
- ¹² Organización de las Naciones Unidas, *Informe sobre la situación social del mundo 2003. Vulnerabilidad social: Fuentes y desafíos*, (Nueva York: United Nations Departamento de Asuntos Económicos y Sociales, 2003), 82.
- ¹³ Begoña Serrano and Rafael Temes, "Vulnerabilidad y riesgo sísmico de los edificios residenciales estudiados dentro del Plan Especial de evaluación del riesgo sísmico en la Comunidad Valenciana",

Informes de la Construcción, 67 (2015): e104, accessed January 10, 2016, doi: <http://dx.doi.org/10.3989/ic.13.182>

BIBLIOGRAPHY

- Alguacil, Julio, "Barrios desfavorecidos: diagnóstico de la situación española". In *V Informe FUHEM de políticas sociales: La exclusión social y el estado del bienestar en España*, ed. Fernando Vidal. Madrid, FUHEM, 2006.
- Arias Goytre, Felix. Coord. *Las desigualdad urbana en España*. Madrid: Ministerio de Fomento. Dirección General de Programación Económica y Presupuestaria. Centro de Publicaciones, 2000
- Egea, Carlos and others, *Vulnerabilidad del tejido social de los barrios desfavorecidos de Andalucía. Análisis y potencialidades*. Sevilla: Centro de Estudios Andaluces, Consejería de la Presidencia, Junta de Andalucía, 2008.
- Ffrench-Davis, Ricardo, *Macroeconomía, comercio y finanzas para reformar las reformas en América Latina. Santiago de Chile*. Santiago de Chile: McGraw-Hill Interamericana, 1999.
- Ministerio de Fomento, Dirección General de Arquitectura, Vivienda y Suelo, *Sector residencial en España 2014*. Madrid: Centro virtual de publicaciones del Ministerio de Fomento, 2015.
- Organización de las Naciones Unidas, *Informe sobre la situación social del mundo 2003. Vulnerabilidad social: Fuentes y desafíos*. Nueva York: United Nations Departamento de Asuntos Económicos y Sociales, 2003.
- Prieto, Fernando and others, *Informe SOS España 2014*. Madrid: Asociación observatorio de la sostenibilidad, 2014.
- Temes, Rafael, *El tapiz de Penélope. Transformaciones residenciales sobre tejidos sin valor patrimonial*. Valencia: Universitat Politècnica de València, 2007.
- Temes Rafael , "Valoración de la vulnerabilidad integral en las áreas residenciales de Madrid", *Revista EURE - Revista de estudios urbano regionales*, 40, (119), 2014. Accessed January 04, 2015, doi: dx.doi.org/10.4067/s0250-71612014000100006
- Rodríguez Vignoli, Jorge, *Vulnerabilidad y grupos vulnerables: un marco de referencia conceptual mirando a los jóvenes*. Santiago de Chile: CEPAL, Serie Población y Desarrollo (17), 62, 2001.
- Serrano ,Begoña and Rafael Temes, "Vulnerabilidad y riesgo sísmico de los edificios residenciales estudiados dentro del Plan Especial de evaluación del riesgo sísmico en la Comunidad Valenciana", *Informes de la Construcción*, 67 (2015): e104, accessed January 10, 2016, doi: <http://dx.doi.org/10.3989/ic.13.182>