

Article

Complementary Qualitative Methodologies for the Analysis of Intra-urban Socio-environmental Vulnerability in Barcelona (Spain). Case Studies

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Abstract: The city of Barcelona, like other cities in the world, suffers strong internal socio-economic inequalities. Numerous works have sought to detect, quantify, characterize and / or map existing intra-urban differences, almost always based on quantitative methodologies. With this contribution, we intend to illuminate the complementary role that qualitative methodologies can play in studies on urban socio-environmental vulnerability. We consider aspects that are not quantifiable but that may be inherent to many such vulnerable spaces, both in the constructed environment and in the social ambit. These questions are considered through selected neighborhoods of Barcelona which have been shown (in prior works, mainly studies of quantitative manufacturing) to possess elements of vulnerability including a high presence of immigrants from less-developed countries, low per capita income, aging populations, or low educational levels. The results reveal the multidimensionality of vulnerability in the neighborhoods analyzed, as well as the essential complementarity among methodologies that detect and support possible public actions aimed at reducing or eliminating intra-urban inequalities.

Keywords: Socio-environmental vulnerability; Barcelona; spatial analysis; qualitative methodology; GIS

1. Introduction

Urban socio-environmental vulnerability is a social phenomenon currently arousing much interest in the scientific community. The concept refers to the existence of intra-urban inequalities, established by differences in the social composition of a population through spatial distribution, as well as how this issue affects uneven behavior in the face of social, urban, economic, demographic and / or environmental problems. From this perspective, it is important to investigate the factors, causes and consequences being generated, as well as possible solutions, in order to improve the situation of those groups deemed most vulnerable to diverse threats.

In the orbit of vulnerability are found concepts such as exclusion, marginality, and poverty, which though not synonymous may be mutually reinforcing. Socio-environmental vulnerability is a broader concept that affects a potentially larger part of the population [1]. It is evident that the poor are by their very nature vulnerable in economic terms. But here we are dealing in dynamic concepts, which are not necessarily always related. The present contribution is focused on the social approach to vulnerability: to show how socio-spatial structures and processes are indeed dynamic, and may determine the daily lives of disadvantaged people and groups [2].

This contribution might be inserted in an even broader line concerned with the measurement of environmental injustices at the local level, focused on the unequal behavior of diverse external externalities vis-à-vis sensitive or vulnerable groups such as children or the elderly, or populations with lower educational levels or income. The multifaceted character of the conditions impacting the phenomena in question must always be taken into account.

This paper is a continuation of a series of prior works [3-4], fundamentally quantitative in nature. From these emerged a synthetic indicator of relative socio-spatial vulnerability, which was then applied to all neighborhoods in the city of Barcelona. In this particular contribution, we apply a qualitative methodology (fieldwork) to that city's four most vulnerable neighborhoods, in order to detect non-quantifiable urban and social deficiencies.

The following section briefly addresses the question of urban socio-environmental vulnerability in the scientific literature, also highlighting sources of information and methodological issues. Next the qualitative analysis is presented, and finally some concise conclusions are offered.

1.1. Vulnerability in the scientific literature

Socio-environmental vulnerability is in itself a multidimensional and multifaceted concept [5] [6], and there is no consensus regarding its definition or measurement [2]. From a strictly etymological conception, it usually implies physical, economic, political, or social susceptibility; that is, the potential of a population to be affected by an external issue or destabilizing phenomenon, whether of natural or anthropic origin [7], and which, if not resolved, could lead to more critical levels of disadvantage, poverty, and exclusion [8].

However, it must be borne in mind that when social inequalities are analyzed in any area, reference is inescapably made to personal issues having to do with the individuals who live there. That is to say that vulnerability, like any similar phenomenon under study, has a clear social component. It does not affect all populations (individual, household, group, society) equally, but represents a factor of internal risk corresponding to the susceptibility or predisposition of each to suffer harm [7]. It is this incapacity or difficulty of certain people or groups in the face of threat (risk) and / or propensity for later recovery that we understand as socio-environmental vulnerability. As noted by Mateos [6], based on prior studies and from a social and economic perspective, vulnerability is not a supervening condition, but rather a dynamic state. It influences diverse factors such as the unequal distribution of resources, the action or inaction of individuals, and historical patterns of domination and social marginalization. In fact, the most persistent cases of vulnerability reveal profound deficiencies in public policies and institutions, historical exclusions and cultural practices, and long-established social norms.

Although anyone may be vulnerable at some point in their lives, some groups are more sensitive than others. The United Nations establishes three large groups: 1) the poor and informal workers; 2) women, migrants, minorities, young people, the elderly, and persons with disabilities; and 3) entire communities or regions.

The absence of a single definition demonstrates the variety of causes that may motivate or encourage vulnerability. Its relationship with risks and threats is evident, and this in turn may be the cause of its origin. The literature reveals two categories of hazards: those of natural origin (environmental hazards) and those of human origin (social hazards). The latter are of greater interest to the social sciences, but are less defined or consolidated. In addition, they are precisely the hazards that appear in urban areas, linked to those groups most sensitive to the impacts mentioned above. The diversity of causes that motivate human vulnerability would also explain why it has been studied from many perspectives, with different approaches, definitions, and methodologies that depend on the particular risk being considered [1]. From this plenitude, various types of vulnerability (socio-demographic, socio-economic, environmental, residential, subjective) have been discerned.

With regard to the measurement of vulnerability, numerous attempts have been made in recent years to create indicators and measures from different perspectives and methodologies. In the academic literature, approaches are common that analyze inequalities through variables and

dimensions of demographics (age, race, sex, country of birth, education, occupation, etc.), economics (social status, income, savings, etc.), or another type (housing, endowments, social networks, security, etc.), usually referenced at the individual or household level. Many studies opt for analytical methodologies that transform and combine the variables used, building indices of socio-economic status or social vulnerability [9]. Some of the references cited thus far offer extremely valuable statements on the use of quantitative methodologies over time.

Less often, works that seek to measure vulnerability have been complemented by qualitative methodologies. This was the case for example in the Catalog of Vulnerable Districts, included in the Observatory of Urban Vulnerability, developed jointly by the Ministry of Development and the Department of Urban Planning of the Polytechnic University of Madrid. Elsewhere, a working group at the University of Granada led by Carmen Egea has long experience in the use of mixed methodologies. More recently, geo-demographic analysis has been incorporated into urban social geography, which (beyond providing a general index) focuses on the formulation of a specific geo-demographic classification to typologies of hazard and place, more heavily weighting the most significant variables to a specific geo-historical context, and based on mixed methodologies.

2. Objective, materials, and methods

Starting from the above considerations, our objective here is to show the role that fieldwork can play as a complementary, qualitative methodology in studies on urban socio-environmental vulnerability when detecting deficiencies or non-quantifiable social and urban problems.

The information sources used in the quantitative analyses pre-dating this work [3-4] were the statistical data provided by the Statistics Department of the Barcelona City Council (Municipal Register) and, occasionally, data from regional organizations. The year of reference is 2015.

The digital geodata layers of the city, with their respective divisions, were likewise facilitated by the municipal administration. The selected scale of analysis was the neighborhood and the "populated urban area" (AUP). The latter indicates the residential or mixed-use urban space where the population has greater presence in their daily lives (see Figure 1).

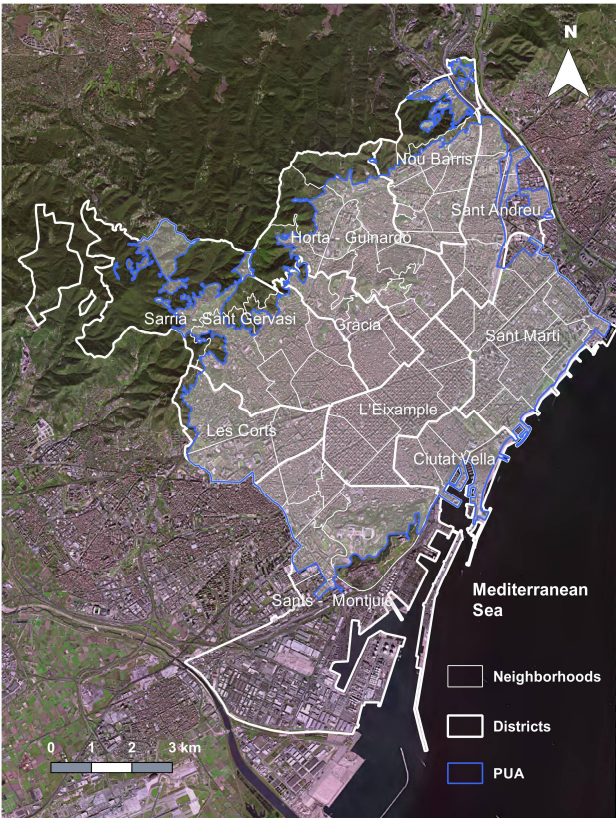


Figure 1. Territorial delimitations in Barcelona. Source: [3]

The facets or components of vulnerability considered were diverse and varied, depending on incidence and the availability of data. Variables were combined related to: *education*, given that persons with low or no training show limited capacities for self-protection and personal care, or limited recourse to existing defense facilities; *age*, which makes some people more fragile than others in the face of external factors; demographic *mortality* indicators that reflect living conditions and are an expression of extreme vulnerability; *income and professional status*, key to assuaging the vulnerability of individuals and certain groups; *immigration status*, supposing the individual has moved geographically; and *size of household*, in the number of members that compose it, reflective of housing shortages. All these facets can greatly impact on the intensity with which socio-environmental vulnerability is manifested.

The research crystallized in a Synthetic Index of Relative Socio-spatial Vulnerability (ISVuSAR), resulting from a principal component analysis (PCA) with Varimax rotation, and in normalization of the variables linked to each of the above facets by matching amplitude and eventual transposition. This allowed classification of the neighborhoods of the city (see Figure 2).

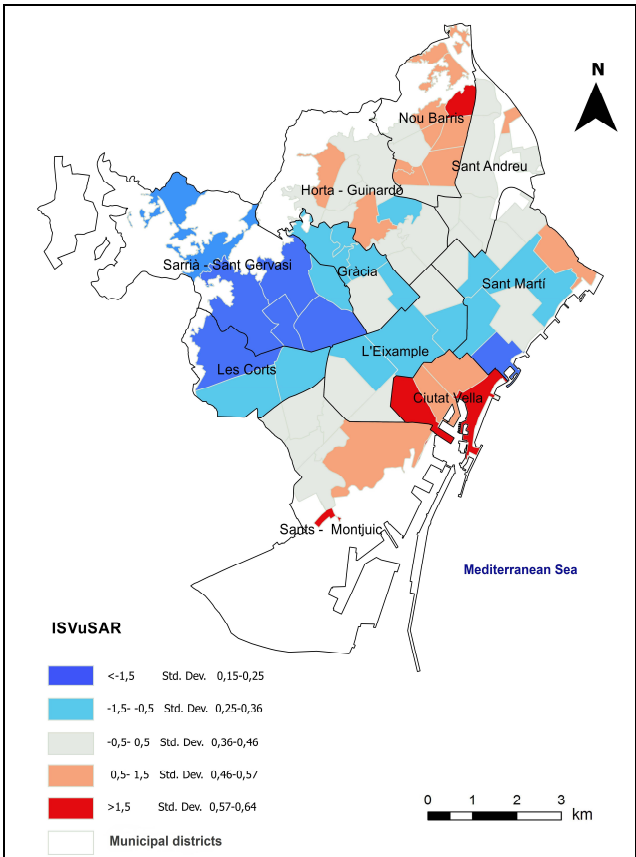


Figure 2. Map of the ISVuSAR results by neighborhood (AUP) of Barcelona. Source: [3]

As regards using fieldwork and other sources as qualitative methodological tools, to complement previous analysis, an intensive fieldwork approach was developed in October 2017 for the selected cases, later completed with relevant information from scientific publications, reports, press releases, and websites, as well as interviews with neighborhood associations. Dossiers were prepared by theme and neighborhood into which non-quantifiable aspects or components of socio-environmental vulnerability were collected. These aspects were further divided into two categories: the constructed environment and the social sphere. The former involves issues such as deficiencies in infrastructure, green space, public space, transport, facilities, or housing, whether such deficiencies are owed to status, age, deterioration, or other factors. The social sphere refers to problems linked to endowments and facilities at the association level, to the presence of ethnic groups facing integration difficulties, to the physical exclusion of the natural environment, to the presence of marginal activities, or to insecurity, whether latent or explicit, among other aspects.

3. Results and Discussion. The most acute dimension of vulnerability: case studies

Socio-environmental vulnerability manifests in different intensities, as we have seen. It would be impossible here to rigorously detail the many investigations into vulnerability in Barcelona carried out in recent decades. An article by Sargatal [10] gives a very complete review of the main contributions focused on the historical center, and the methodologies used. There is noticeable and increasing interest from diverse disciplines in the approach to, and knowledge around, socio-spatial reality. Similarity to the our topic moves us to highlight works by Martori and Hoberg [11-12], Martínez *et al.* [13], Domingo and Bayona [14], and Subirats and Rius [15], which from diverse methodological approaches have deepened knowledge on the reality of the city.

In this work, we focus on four neighborhoods to which the ISVuSAR has ascribed higher values (1.5 times the deviation). These are the Trinitat Nova, Raval, Marina del Prat Vermell, and Barceloneta neighborhoods. For these areas, aspects or qualitative problems stemming from both the constructed environment and the social sphere have been analyzed using the proposed methodology.

Trinitat Nova is a neighborhood of the Nou Barris district, located on the northeastern periphery of the city, on the mountain slopes of Collserola and on the left bank of the Besós (Figure 3). The neighborhood occupies an area of 0.80 km² and numbered 7,257 inhabitants in 2016 (down from 8,110 in 2008). Its physical boundaries coincide with the streets Aiguablava, Via Favència and Garbí, and Avenida Meridiana.



Figure 3. Location of the Trinitat Nova neighborhood. Source: own elaboration

This dormitory quarter (monofunctional) is a clear example of massive collective social housing from the Franco regime. Its poor construction quality (aluminosis and carbonatosis), together with the gradual socio-economic and environmental deterioration of the site (Figure 4a), were the bases for two major urban interventions carried out in recent decades (Figure 4b). The first, in 1997, followed the city's Urban Plan and involved area remodeling through special planning (PERI), improvement of accessibility via the metro, and integration into the ECO-City Project (financed by the European Community within its Fifth Framework Program for Research and Development). The second intervention, the Trinitat Nova Urban Initiative of 2007-2013 (20 million euros) continued the process of integral urban regeneration supported by European and municipal funds. Currently, the

Barrios Plan of 2016-2020 (<http://pladebarris.barcelona/es>), promoted by the Barcelona City Council, consists of ten plans involving 16 city neighborhoods in the city, targeting integrated actions in education, social rights, economic activity, and urban ecology, with a planned investment of more than 150 million euros. Of the four cases here analyzed, three (Trinitat Nova, Raval, and La Marina del Prat) are featured in some of these plans. Trinitat Nova will, without a doubt, see the reduction or elimination of a good many existing problems.



(a)



(b)

Figure 4. Trinitat Nova. (a) Housing pending demolition; (b) New homes.

Source: authors (November 2017)

The Trinitat Nova neighborhood, largely populated by the working class and immigrants, exhibits socio-demographic characteristics that could clearly be improved, as repeatedly demonstrated by historical and current association and protest movements. The Community Plan of Trinitat Nova (and its corresponding diagnoses), launched in 1996 on the initiative of the Neighborhood Association, has led to development of an innovative instrument and integrator of concerned social agents. Blanco [16] offers an interesting comparative analysis of the urban regeneration policies developed in the Raval and Trinitat Nova neighborhoods, two areas of Barcelona where family income is the lowest. Trinitat Nova presents a very high percentage of population without education (8.6%), a low rate of population with higher education (5.7%), a high percentage of foreign residents (around 24%), an unemployment rate around 18%, and the highest rate of teen pregnancy in the city.

Qualitative analysis reveals problems linked to the urban environment, including: the presence of architectural barriers; noise and pollution from road transport infrastructures; deterioration of public spaces, especially in the vicinity of the Les Freixes urban gardens; and problems (currently being addressed) related to the antiquity, poor state of conservation, and lack of basic facilities within residential buildings. Special attention is needed to resolve issues deriving from a substantial increase in the Property Tax (IBI) borne by tenants of new officially protected housing (three or four times the prior rates).

The social environment is further defined by the physical exclusion of the neighborhood with respect to the city as a whole (barrier effect), derived from its geographical position and the layout of large transport infrastructures (Meridiana and Dalt Avenues). The lack of youth-oriented, sports facilities and economic activities is also significant. The latter are present only in the commercial spaces of new buildings constructed during regeneration, or in the traditional market. According to *El Diario*, "While Barcelona averages one commercial establishment for every 28 inhabitants, in Trinitat Nova there is one for every 180 inhabitants" (eldiario.es, 21 January 2016). Added to this is the persistence of marginal activities, and latent insecurity near the housing blocks to which relocation of inhabitants affected by demolition of old structures is pending, as well as the difficulties of integration of certain groups (Gypsies from outside Barcelona and mainly Pakistanis).

For its part, the Raval neighborhood, long regarded as Chinatown or a rogue area, is located in the Ciutat Vella district (Figure 5). Its defined boundaries are Parallel Avenue to the south (dividing it from the Poble Sec neighborhood); Sant Pau and Sant Antoni Avenues (separating Raval from the

Sant Antoni district); and Pelayo Street and La Rambla, marking the division from the adjacent Gothic Quarter. Two large urban projects, Rambla del Raval and Illa Robadors, are located within the zone.



Figure 5. Location of the Raval neighborhood. Source: own elaboration

The Raval presents two significant demographic features. On the one hand, it has a very high population density (around 44,000 inhabitants per km², or 47,000 inhabitants within an area of 1.07 km²). On the other hand, almost half of the population (47%) is of immigrant origin, coming from less-developed countries. Furthermore, analysis shows that more than half of the houses are of small size (56.5%) and that around 40% of persons over 75 years of age live in one-person homes.

From the social perspective, this complex neighborhood is an authentic laboratory for urban studies [13], characterized by its curious socio-economic mix, with more-or-less differentiated areas tending to correspond to the country of origin of the inhabitants. Thus, areas of higher income tend to coincide with inhabitants of national origin, along with a significant number of European immigrants of fairly recent arrival. On the other side, the percentage of extra-European immigrants is extremely high, with a clear predominance of Filipinos, Pakistanis, and Moroccans.

This neighborhood first emerged as a suburb beyond the medieval wall, and it is rich in cultural and architectural heritage (Mercado de la Boquería, Contemporary Art Museum, Contemporary Culture Center, Güell Palace, etc.); but this is currently marred by marginal activities linked to drugs and prostitution (traditional, perhaps), as well as notorious "narco-flats". And yet given its central location, it is undergoing gentrification at high magnitude, served by intense tourist activity (festivals, fairs, congresses, cruises, etc.). This has led to the dispersal of longtime residents to the city's peripheral zones, and to a gradual denaturalization of the neighborhood's traditional character [17].

Our qualitative analysis reveals multiple problems linked to the urban environment such as: the lack of green spaces (the Jardins de Sant Pau del Camp and Rubió i Lluch being exceptions, in addition to the Plaza de Josep Folch); noise pollution and garbage (Figure 6a); difficulty in physical mobility due to the layout and narrowness of streets, and to problems derived from the scarcity of parking; and housing issues including superannuation, poor maintenance or reform, overcrowding, lack of basic facilities and, more recently, tourism outsourcing. Regarding the social environment, the main problems detected here include: difficulty of immigrants to integrate, with clear spatial differentiation by group; the gradual orientation of economic activities towards tourism, with the consequent loss of traditional trade; explicit insecurity, evidenced by robberies of tourists; the marginal activities described above; and the increase in real-estate pressures driven by gentrification (Figure 6b).



Figure 6. El Raval. (a) Rubbish and deterioration; (b) Neighborhood demands.
Source: authors (November 2017)

The third neighborhood under analysis, La Marina del Prat Vermell, is located in the Sants-Montjuïc district (Figure 7) and presents certain singularities. It is currently inhabited by only a thousand people (1,143 in 2016), of whom approximately one fifth are immigrants, and with much lower density (around 80 inhabitants per km²). It is among the neighborhoods with the highest percentage of residents without education (7.8%), and of the four most vulnerable neighborhoods discussed here, it suffers the highest rate of unemployment (19.4%). Also high is the proportion of undersized houses (77.1%), mitigated by the city's lowest rental and sales prices, per square meter (396 euros and 684 euros, respectively).



Figure 7. Location of the La Marina del Prat Vermell neighborhood. Source: own elaboration

This small neighborhood's origins were oriented to agriculture and livestock, and it is located between Montjuïc mountain and the Zona Franca industrial sector. The stamp of the Primo de Rivera regime was visible in the promotion of cheap "Eduardo Aunós" houses of 1929, the demolition / relocation of which in the 1990s made room for today's constructions. Some historic industrial (often obsolete) buildings survive, along with scattered residential nuclei (Figure 8a).

With other nearby neighborhoods (Polvorín, Can Clos, Can Tunis), La Marina del Prat Vermell represents a fragment of Barcelona's urban history, about which an interesting urban transformation

project is under consideration by Barcelona Urban Planning Management (BAGURSA). The project was initially proposed in 2004 as part of a major urban renewal drive that included 22 @, La Sagrera, Plaça de les Glòries, and Can Batlló [18]. The new resultant neighborhood will cover 80 hectares and feature 11,000 homes (slightly less than half of them public) to accommodate 30,000 potential residents (<http://www.bagursa.com/lamarina/proj.html>). This process has been made possible thanks to modifications to the Metropolitan General Plan of 1976, through requalification of the land from industrial to mixed-use. The urban renewal project will mean development of the area around the inhabited nucleus, favoring the location of economic activities, along with significant additions of public facilities and spaces to help unite the old Free Trade Zone socially and urbanistically. This project's the lack of sensitivity to architectural and industrial heritage is perhaps its most controversial aspect, with the Bausili and Santiveri colonies and the Bertrand and Serra factories [19] slated for removal.

Today, problems linked to the urban environment have mainly to do with the scarcity and poor accessibility of urban transport (currently accessible only by bus, with plans for metro extension), and to the lack of parking and poor quality of certain buildings, despite their fairly recent construction (Figure 8b).



(a)



(b)

Figure 8. La Marina del Prat Vermell. (a) Homes of the Bausili Colony; (b) Deterioration of modern buildings. Source: authors (November 2017)

In terms of the social perspective, the neighborhood's problems are expressed in: a lack of endowments and facilities (there are no schools or nurseries); the physical exclusion of the area, given its distance from the core city; the social uprooting of inhabitants, many of whom had been relocated from other areas; and latent insecurity and the presence of marginal activities linked to drugs, despite the adjacent Mossos de Esquadra Police Station.

Finally, the neighborhood known as La Barceloneta is also located in the Ciutat Vella district (Figure 9), but its population volume and density, although quite high (16,000 inhabitants in 1.24 km², or 12,900 inhabitants per km²), are lower than in nearby Raval. The percentage of foreign residents (31.3%) is the second highest among the neighborhoods analyzed.

This old seaside district (the beach neighborhood), traditionally popular and working class, is strong in character. Urban contrasts exist between the maritime front (the promenade and beaches of San Miguel, San Sebastián, and Barceloneta-Somorostro) and the western border (Moll), and between large corporate headquarters buildings (Gas Natural or Mapfre), casinos, and hotels (Arts) and the residential nucleus, where traditional housing coexists with novel social housing (the MTM project, Figure 10a). All of this shares an area limited by the sea and by urban pressures to densify the use of space. Notable are successful drives by local associations (the Ostia and the Platform in Defense of Barceloneta, now united as "La Barceloneta diu prou") to halt projects deemed harmful to the neighborhood [20].

Worthy of further note is recognition of the important role of the public space as useful and consistent, and the existence of facilities including schools, sports centers, and hospitals, all of which

condition the urban impact or more traditional buildings of lower height, whose progressive growth contrasts with the narrowness of the streets.



Figure 9. Location of the Barceloneta neighborhood. Source: own elaboration

Within the neighborhood, problems related to the urban environment include: the lack of green spaces (only Barceloneta Park, located at one extreme, is significant); difficulty in physical mobility, both for vehicles and pedestrians, given the narrowness of streets in the residential nucleus; the small number of surface parking spaces; housing concerns related to antiquity, poor maintenance, lack of facilities and sometimes over-occupation (infamous "houses of rooms", Figure 10b). The excessive supply of tourist homes in the core neighborhood is also a current concern, driving out traditional residents and prompting fierce neighborhood protests (2014 saw many mobilizations under the slogan "La Barceloneta is not sold", seeking to publicize the proliferation of tourist apartments derived from transformation of older housing into modern flats destined exclusively for rental by tourists). Finally, as elsewhere, the neighborhood has experienced a significant increase in housing prices (a more detailed analysis of the evolution of this market in La Barceloneta can be found in Pareja and Simó [21]).



Figure 10. La Barceloneta. (a) Social housing in MTM; (b) Small houses. Source: authors (November 2017)

Problems linked to the social environment are here fundamentally due to intensive tourism, which the neighborhood supports, also reflected in the commercial tertiarization towards this sector (hospitality) and in the lack (or expulsion) of local commerce. As a consequence, the (latent, at least) social uprooting of the residents is another growing concern.

In line with the above, Alamilla [22] offers an interesting analysis of the costs and benefits derived from tourism among a residential population. Chief among the costs would be a rise in consumption of alcohol, increased noise and crowding in public spaces, increases in the prices of goods and services, and mounting crime. Among the benefits would be the growth of commercial activity and employment and the conservation of typical local cuisine.

5. Conclusions

The detection and analysis of urban socio-environmental vulnerabilities, from both quantitative and qualitative perspectives, can be very useful for informing public actions aimed at reducing or eliminating intra-urban inequalities. In this work, we have sought to deepen understanding of these issues through the use of fieldwork and other qualitative sources, as a complement to quantitative methods, and we believe we have demonstrated the suitability of such research.

With regard to the four case studies, we offer the following reflections. In the Trinitat Nova neighborhood, time will tell whether the integral regeneration plan being undertaken is effective or not. The most colorful and evident urban transformation are already clearly visible. But these sorts of urban operations have been practiced time and again in many other cities, without managing to significantly improve the living conditions of inhabitants in terms of employment, education, ecology, economy, etc. We hope that this will not be the case in Trinitat Nova, and that European and municipal resources will serve to reverse current imbalances vis-à-vis other neighborhoods of the city, as the slogan of the Neighborhood Plan promises.

In Marina del Prat Vernell, interventions have tended toward urban renewal, ignoring the neighborhood's past and seeking to bring it in closer alliance with the city center. It remains to be seen whether the zone's geographical location makes it a target location for hotels and offices, which could serve as an economic boost and help diminish its traditional isolation.

Raval, an archetypal space characterized by a mixed uses and social collectives, is among the most studied of Barcelona's neighborhoods, from various perspectives. The diversity and multidimensionality of the socio-spatial phenomena in this neighborhood presents the main obstacle to the adequate and consensual implementation of urban policies. Here, more than anywhere in Barcelona, the participation of all relevant agents is necessary. This is no small challenge, but it must be confronted to alleviate the neighborhood's persistent vulnerabilities.

Like Raval, La Barceloneta is today characterized by a confluence of well-differentiated social groups, including immigrants, tourists, new urban tribes, and traditional residents. This is an example where urban processes and interventions have driven changes to the neighborhood's traditional residential function, mostly due to the increase in its tourist attraction. As recognized by Pareja and Simó [21], its potential as a gentrifiable space is very high, and this is seen clearly in the protests and demonstrations of residents carrying banners.

In this work, we set out to complement analysis of the multidimensionality and growing vulnerability of these neighborhoods, from a geographic / territorial perspective rather than a quantitative one. This seems to infer a further need to undertake (or to continue, in some cases) actions aimed at improving both the constructed environment and the social ambit, to ensure the right of people to the city itself, and a better quality of life to those who live there.

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References

- Morrone, A.; Scrivens, K.; Smith, C.; Balestra, C. Measuring vulnerability and resilience in OECD countries. Document prepared for the IARW-OECD Conference on economic insecurity, November 22-23, 2011, Paris (France).
- Sánchez, D.; Egea, C. Enfoque de vulnerabilidad social para investigar las desventajas socioambientales. Su aplicación en el estudio de los adultos mayores. *Papeles de población*. **2011**, *17* (69), 151-185.
- Moreno, A.; Palacios, A.; Suárez, P. Elaboración de un índice de vulnerabilidad socio-ambiental intraurbana apoyado en sistemas de información geográfica. In *Naturaleza, territorio y ciudad en un mundo global*; Allende, F. et al., Eds.; Ediciones de la Universidad Autónoma de Madrid and AGE: Madrid, 2018, 2629-2638.
- Moreno, A.; Palacios, A.; Suárez, P. Medición de la vulnerabilidad socio-ambiental intraurbana: un ensayo exploratorio basado en SIG. In *Aplicaciones geotecnológicas para el desarrollo económico sostenible*, XVII Congreso Nacional de Tecnologías de la Información Geográfica; Galacho, F. et al., Eds.; Asociación de Geógrafos Españoles: Madrid, 2016, 214-223.
- Alguacil, J.; Camacho, J.; Hernández, A. La vulnerabilidad urbana en España. Identificación y evolución de los barrios vulnerables. *EMPIRIA. Rev. de Metodología de Ciencias Sociales*. **2014**, *27*, 73-94.
- Mateos, P. La doble segregación urbana: desigualdades socio-espaciales y justicia ambiental. In *Actas del III Congreso Internacional de Desarrollo Local*; Márquez, J. et al., Coords.; Universidad de La Habana: Cuba, 2013, 3488-3510.
- Cardona, O. *La necesidad de repensar de manera holística los conceptos de vulnerabilidad y riesgo: una crítica y una revisión necesaria para la gestión*; Centro de Estudios sobre Desastres y Riesgos de la Universidad de los Andes: Bogotá, Colombia, 2003.
- Brooks, N. *Vulnerability, risk and adaptation: a conceptual framework*, Working Paper 38; Tyndall Centre for Climate Change Research, University of East Anglia: Norwich, 2003. Available at: www.tyndall.ac.uk
- Holand, I.; Lujala, P. Replicating and adapting an index of social vulnerability to a new context: a comparison study for Norway. *Annals of the Association of American Geographers*. **2013**, *65* (2), 312-328.
- Sargatal, M.^a. El barrio del Raval de Barcelona (1999-2008). Transformaciones urbanas y nuevos enfoques metodológicos para el estudio del centro histórico. *Biblio 3W. Rev. Bibliográfica de Geografía y Ciencias Sociales*. **2009**, vol. XIV, nº 824. <<http://www.ub.es/geocrit/b3w-824.htm>>
- Martori, J.; Hoberg, K. Indicadores cuantitativos de segregación residencial. El caso de la población inmigrante en Barcelona. *Scripta Nova. Rev. Electrónica de Geografía y Ciencias sociales*. **2004**, vol. VIII, nº 169. <<http://www.ub.es/geocrit/sn/sn-169.htm>>
- Martori, J.; Hoberg, K. Nuevas técnicas de estadística espacial para la detección de clusters residenciales de población inmigrante. *Scripta Nova. Rev. Electrónica de Geografía y Ciencias sociales*. **2008**, vol. XII, nº 261. <<http://www.ub.es/geocrit/sn/sn-263.htm>>
- Martínez, S.; Carreras, C.; Frago, L. El Raval de Barcelona, un laboratori d'estudis urbans. *Treballs de la Societat Catalana de Geografia*. **2015**, *79*, 125-150.
- Domingo, A.; Bayona, J. Movilidad, vivienda y distribución territorial de la población marroquí en Cataluña. *Estudios Geográficos*. **2007**, *68* (263), 465-496.
- Subirats, J.; Rius, J. *Del Xino al Raval*; Editorial Hacer: Barcelona, España, 2008.
- Blanco, I. Gobernanza urbana y políticas de regeneración: el caso de Barcelona. *Rev. Española de Ciencia Política*. **2009**, *20*, 125-146.
- Fernández, M. Asaltar el Raval. Control de población y producción de plusvalías en el barrio barcelonés. *URBS. Rev. de Estudios Urbanos y Ciencias Sociales*. **2012**, vol. 2, nº 1, 51-68.
- Badia, J. La Marina del Prat Vermell : ¿nueva centralidad urbana? Master's thesis, UPC, Barcelona, 2015.
- Granados, J.O. Els grans projectes d'actuació a la Marina del Prat Vermell i al Morrot de Montjuïc. *Biblio 3W. Rev. Bibliográfica de Geografía y Ciencias Sociales*. **2013**, Vol. XVIII, nº 1049(06). <<http://www.ub.es/geocrit/b3w-1049/b3w-1049-06.htm>>
- Makhlouf, M. Transformaciones urbanas desde la resistencia. Aproximaciones a un movimiento vecinal en la Barceloneta. Doctoral thesis, UB, Barcelona, 2016.

- 452 21. Pareja, M.; Simó, M. Dinámicas en el entorno construido: renovación, gentrificación y turismo. El caso de
453 la Barceloneta. *ACE: Architecture, City and Environment*. **2014**, 9 (26), 201-222.
- 454 22. Alamilla, C. Análisis de los impactos socioculturales desde la perspectiva del residente que el turismo
455 genera en el barrio de La Barceloneta, España. *ROTUR, Rev. de Ocio y Turismo*. **2016**, 11, 1-11.