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SPATIAL INEQUALITIES OF HABITABILITY IN HERITAGE CITIES. THE APPLICATION OF MONITORING INDICATORS TO THE CITIES OF SAN GABRIEL AND SANGOLQUI (ECUADOR)

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I. INTRODUCTION

The habitability of heritage cities and the most appropriate methodology to approach this complex topic are addressed in this paper. Habitability is a problematic urban management issue of great interest in projects that intervene in the urban environment. The study analyzes two Ecuadorian cities, San Gabriel and Sangoquí, with the objective of defining a methodology to approach the complex analysis of their habitability.

With this end in mind, a multiscale proposal is prepared based on Geographic Information Systems (GIS) through a combination of spatial and social analysis tools. This methodology permits a more precise approach to the problem under analysis –habitability- within its own context- the cities of San Gabriel and Sangolquí-, allowing the selection of the indicators that best represent the habitability of each city. In this paper, the analytical process in both cities is presented, along with a comparative study of the results in each case.

II. UNDERSTANDING HABITABILITY AS A MULTI-FACETED AND DYNAMIC CONCEPT

Human beings have always concerned themselves with shaping and adapting their habitat with a view to *improving their wellbeing* (Solanas, 2010), as their knowledge and technical

resources advanced. However, it was not until the 19th c. and a wave of various cholera epidemics in Europe that legislation was passed on minimum hygiene requirements with which houses should comply for the purpose of combating the outbreak and the propagation of illnesses. These requirements, at first related to lighting and ventilation of the enclosed space, extended the scope of action from the interior reform of houses to the reform of cities, with the installation of health networks, the introduction of green zones, projects to open major trunk-roads, and the enlargement of traditional roadways.

At the end of the 19 c., the management of urban health, a basic condition of habitability, was assisted in the built environment through technical advances such as sewerage systems, generalized access to clean drinking water and the cleanliness of thoroughfares.

The most up-to-date definition of habitability, as it appears in the *Real Academia Española de la Lengua* [Royal Spanish Academy of Language], is as follows: "*The quality of habitable, and in particular that which, in accordance with legal regulations, a premises or house is said to have*[1]*";* such that it is directly associated with legal regulations that define the standards with which a house should comply to be considered habitable. The concepts basis for its legal definition, such as health and comfort, may be found, which have been defining the conditions or requirements that should be met, many of which are now included in current legislation.

Habitability in terms of health considers the dwelling as a "*determinant of the health"* of the individual inhabitant (Solanas, 2010) and analyzes the health risks at both a physical and a psychological level.

Habitability in terms of comfort or convenience "*is defined as the set of environmental conditions accepted as sufficient on the part of the users to carry out their everyday activities, and is in general restricted to the conditions that relate to hygro-thermal, acoustic and visual aspects, as well as being circumscribed to the scale of the house*" (Dálençon, et. al., 2008).

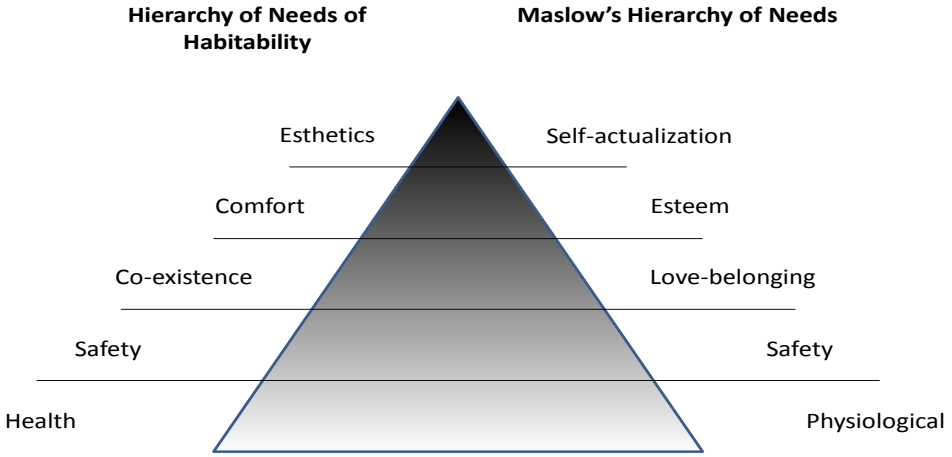
Today, beyond legislative aspects, habitability tends to be considered from an increasingly broader approach, which takes in different scales "home, immediate environment, habitational complex" and a multitude of factors to take into account, such as those relating to physico-spatial, psycho-social, thermal, acoustic, luminous, and safety aspects. etc. Habitability is redefined and analyzed in each project in accordance with the objectives and ends that are pursued.

Socio-economic development as a determining factor for the purposes of habitability

The different approaches to habitability appear to respond to various socio-economic conditions, or to different needs. If Maslow's pyramid of needs is taken as a reference, which identifies the existence of a hierarchy of human needs and upholds the idea that as the most basic needs are satisfied, human beings develop higher needs and desires, then the same logic could be applied to habitability, as shown in Figure 1, in which the needs of habilitability are hierarchized and contrasted with Maslow's hierarchy of needs.

1 Real Academia Española © All rights reserved http://www.rae.es/rae.html [Last accessed May 2013]

Figure 1
HIERARCHY OF NEEDS OF HABITABILITY IN CONTRAST WITH MASLOW'S HIERARCHY OF NEEDS



Source: Author's own work.

This hierarchy allows us to understand why aspects such as health, safety and comfort are of a higher priority in countries with less socio-economic development or in more marginalized areas in terms of habitability; while in those that boast a certain development and that have already satisfied those needs, habitability centers more on comfort, esthetics and conservation.

This aspect is important, in order to understand that habitability is a concept and an object of study with different degrees of acceptability. Its analysis should therefore begin at the most basic level, and in so far as the most basic problems are solved, it should move on to consider the following aspects in the hierarchy. This obliges us to consider the situation in which a city is found before trying to replicate pre-existing models or analyses.

III. GENERAL METHODOLOGY: THE INTEGRATION OF VARIABLES, TECHNIQUES AND TOOLS IN THE STUDY OF HABITABILITY

The methodological process followed in this study was based on an **integration of data analysis techniques** from different disciplinary fields, such as: cartographic analysis through Geographic Information Systems, statistical analysis through multivariate (factorial and cluster) analysis techniques, and the incorporation of the expert criteria through social analysis tools.

The different techniques are presented below that were employed for the analysis of habitability (Figure 2), which successively transform the variables employed in the analysis on the basis of the results obtained from the implementation of each of the techniques that were used.

Figure 2
METHODOLOGICAL PROCESS

Source: Author's own work.

The first part begins with a reflection on the state of the art of habitability in the context of Ecuador. This state of the art leads to a preliminary selection of the dimensions and variables to consider under the concept of "habitability".

Having completed an initial analysis of habitability in Ecuador and its possible dimensions, this first approach was validated and completed through a semi-structured interview with the *Directora de Planificación del Instituto Nacional de Patrimonio Cultural* [Director of Planning of the National Institute of Cultural Heritage Planning] of Ecuador. Once this first approach had been validated, surveys with technical experts from each municipality were completed, in order to identify the main problems of habitability in each one. This step permits a selection of specific variables to be drawn up for each city, which are then analyzed through statistical cartography and statistical analyses, and modified by the results of each of these analyses.

These last two (cartographic and statistical) analyses serve to analyze the spatial patterns of the variables under analysis and their relevance to both cities, and to select the most significant variables in the measurement of the habitability conditions as well as the interrelations between those variables. Likewise, those variables that are not significant for variable measurements or those that duplicate measurements may be discarded, thereby filtering the selection of variables for each city, which permits a classification of its (census) districts (in this case) in accordance with their degree of vulnerability in relation to habitability. It is important to point out that the cartographic and statistical analyses were completed at the scale of the census district, as this unit is the smallest-scale division with homogeneous and reliable public data on the population, the environment and the housing units. The aim is to guarantee the possibility of replicating the methodology in other cities in the country and even in other Latin-American cities with similar characteristics, as well as to design a system of indicators that is applicable and renewable at the lowest possible cost.

IV. ANALYSIS OF THE HERITAGE CITIES OF ECUADOR: THE CASES OF SAN GABRIEL AND SANGOLQUÍ

This study is structured in a context of political good will[2], availability of financial resources[3] and the commencement of a decentralization process in which different actions are

2 At this stage, a series of political instruments were established in support of a change of model and organization in the country and that place heritage on the political agenda. The most important are; the Constitution 2008, *Plan Nacional del Buen Vivir* [National Plan for Good Living] 2009-2013 and the *Código orgánico de organización territorial, autonomía y descentralización* (COOTAD) [Organic Code for territorial organization, autonomy and decentralization].

3 A relevant measure to consider due to its influence on the conservation of heritage was the Emergency Decree of Cultural Heritage that implied the return of 37 million dollars destined for the recovery of the social memory and heritage, a sector never before addressed by the government.

initiated under the direction of the Heritage Coordinator Ministry and the National Heritage Institute to enhance the value of cultural heritage in Ecuador and to train the municipalities, so that they can assume responsibility for heritage protection and management. The main actions at a national level in this area are the establishment of the Network of Heritage Cities and the launch of the *"Heritage Cities"* network, to organize and to launch the establishment of the network, as well as offer training to the municipalities that form part of it.

Among all of the 22 national heritage cities (see Figure 4), special attention is paid to those of a medium-size (between 10,000 and 75,000 inhabitants), which filters out urban populations of below 10,000 inhabitants because they lack sufficient management structures, and those with over 75,000 inhabitants, given that they already have advanced heritage management infrastructure. From among this group, the cities of San Gabriel and Sangolquí were selected for analysis, given their particularity of having started their heritage institutionalization process at the same point in time, within the FOCAD project[4] that also provides the framework for this study.

The analysis was done at the scale of the census district (minimum unit with statistical information available) and corresponds to data from 2001, the most recently available at an intra-urban level.

V. CONCLUSION

This process has served to define a multi-scale model that allows the process of habitability in heritage cities to be analyzed and to measure the concept of habitability in heritage cities. The method is based on 4 phases of work (1. Representation of the concept; 2. Processing of the selected variables; 3. Construction of the system; and, 4. Validation) and combines different types of analysis relating to geographic and social analysis, with an emphasis on the spatial analysis of the different indicators analyzed through GIS. It leads to the establishment of an inhabitability index that serves to compare the different degrees of habitability from different areas of a city.

It is important to point out that the indicators for the measurement of vulnerability linked to the conditions of habitability should be based on fundamental aspects, depending on the context and the degree of elemental problems that it may previously have solved. These indicators may vary from questions like housing without hygienic service to aspects of perceived comfort. In any case, the minimum indicators to consider in the case of Ecuador, common in both cases under analysis and replicable in other cities thanks to the use of census data, are as follows: *percentage of the population dedicated to the primary sector, percentage of the population of low status, percentage of the population with no studies, average inhabitants by bedroom, percentage of houses with earthen floors, percentage of houses with no shower, percentage of houses with shared services, percentage of houses that cook with wood or coal, and percentage of houses with sewerage connected to cess pits and septic tanks*. This selection can vary, depending on the context in which the work takes place, and should have previously been analyzed to carry out a good selection of the variables to be analyzed.

4 San Gabriel constitutes the official pilot project of the FOCAD project. Sangolquí started the process in a similar manner to San Gabriel and it followed the same route, with the help of the Cultural Heritage Institute.

On the other hand, regardless of the aspects that were measured, it has been demonstrated in this study that the demographic and social data can offer an idea of the degree of inhabitability or vulnerability without any need to input specific data on housing. This flexibility can facilitate this sort of analysis, as the data that are most frequently available are usually on the population. In any case, it should not be forgotten that these data should also be analyzed with knowledge of the context, as on some occasions there are groups of the population, such as the indigenous or immigrant population, who are either the most or, on the contrary, the least vulnerable, depending on the context.

Although additional indicators can be included that may enlarge, complement and help to interpret the degree of inhabitability and its causes, it is considered that there should be a core formed of the most indicative variables, and then other descriptive indicators that allow us to complement and to interpret them; which population lives in the most extreme situations, what other variables reflect their systems of life and their conditions, what are the effects and conditions of the environment the characteristics, the location, etc.

Finally, on the basis of the comparative results of the statistical analyses, it may be said that there are a series of common aspects in questions of habitability, which regardless of the indicators that are employed to measure them, form a common structure for the conditions of inhabitability and which can serve to replicate the method designed for Latin-American cities that are similar to those under analysis. This structure is centered on the following themes; lack of infrastructure or basic housing services, housing units made with low-cost materials, forms of co-existence that imply overcrowding or a low-quality of life with few opportunities or possibilities.