

Causes of the disappearance of vernacular housing in Tochimilco, Puebla

Causas de la desaparición de la vivienda vernácula en Tochimilco, Puebla

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Abstract:

This research aims to explain the factors involved in the decline and subsequent disappearance of vernacular dwellings in Tochimilco, Puebla and determine possible strategies for their conservation. The methodology with which the investigation was carried out was the review and analysis of documentary sources, interviews and city of Atlixco, Puebla and interviews and information of the inhabitants of Tochimilco which address different aspects cultural, social, economic and architectural. In terms of the limitation that has the job of field research, was the difficulty of entering the House as in the majority of cases only was able to get to the courtyard and entering some houses; but nevertheless the cadastral map and information of citizens and inhabitants to verify such information. The contribution of this work contributes findings favoring to the rescue of vernacular architecture as a tendency of the construction processes of dwellings in indigenous communities. Also in the academic field — reassess traditional building processes as part of culture building.

Deterioration, Conservation and Awareness

Resumen:

Esta investigación tiene como objetivo explicar los factores que intervienen en el deterioro y posterior desaparición de la dwelling vernácula en Tochimilco, Puebla y así determinar las posibles estrategias para su conservación. La metodología con la cual se realizó la investigación fue la revisión y análisis de fuentes documentales, las entrevistas e información de Catastro de Atlixco, Puebla y entrevistas e información de los habitantes de Tochimilco que permitieron abordar diversos aspectos culturales, sociales, económicos y arquitectónicos. En cuanto a la limitación que tiene el trabajo de investigación de campo, fue la dificultad de entrar a la dwelling pues en la mayoría de los casos solo se pudo llegar al patio y entrar a algunas dwellings; sin embargo se utilizó el plano catastral e información de catastro y de los habitantes para contrastar dicha información. La contribución de este trabajo aporta hallazgos que favorecen al rescate de la arquitectura vernácula como una tendencia de los procesos constructivos de la dwelling en comunidades indígenas. Además en el campo académico permite revalorar los procesos constructivos tradicionales como parte de la cultura edificatorio.

Deterioro, Conservación y Concientización

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1. Introduction

This research work was based on qualitative research, interested in capturing the reality of the people studied, where the researcher induces the characteristics and conditions of the study problem. To achieve the above, it is necessary to use research techniques and instruments such as questionnaires, directed interviews and systematic observation, regulated or controlled.

The vernacular architecture is identified by different names such as folk, primitive, autochthonous, rural, anonymous or "science of the people"; from the point of view of cultural practices it is a cultural object that arises from the needs and interaction of social groups (MOYA, and others, 2014). The names of architecture without architects or vernacular architecture were used for the first time by Bernard Rudofsky, (1964) with his catalog of photographs of architectural solutions throughout the world and his work "Dwellings and Culture" (1969), states that the construction of a house is a social spatial unit, a cultural phenomenon, the result of social, functional and religious processes that allow the creation of an adequate environment to the way of life of a community (RAPOPORT, 1972, page. 65).

The interest for this architecture is not new and architects like Amos Rapoport, Rudofsky, Paul Oliver, Valeria Prieto, Luis Moya, Agustín Agudo, Celestino Candela, Lájara, Ricardo, Sainz, López Morales, José Ángel Campos, Gerardo Torres Zárate, among others, have valued and aroused interest in vernacular dwellings.

As a result, the interest in this subject comes from constantly seeing in different places of the state of Puebla where there are populations that still have an important vernacular architecture that express the culture and life of the inhabitants. Therefore, the present investigation focuses on the dwellings of Tochimilco, Puebla.

2. Tochimilco

Tochimilco means "Sementera de los Conejo", is a prehispanic population originally formed by 4 neighborhoods and with the arrival of the Spaniards a total of 8 neighborhoods; it is currently a population with 13 auxiliary boards. It is a population that is located in a risk zone, located in the foothills of the Popocatepetl volcano and has important resources. (INAFED, 2016), (figures 1 y 2).



Figure 1 Territory of the Atlixco Valley
Source: document in the Huaquechula Convent



Figure 2 Territory of the Atlixco Valley
Source: Microrregiones Unit, Municipal Information Cards (SCIM) Municipalities ZAP Rural SEDESOL, October 2016

The population is mestizo and indigenous with traditions of Nahuatl origin; with an important population of migrants in the state of Puebla, its surroundings and the United States; the inhabitants are supported by agriculture and remittances resulting from migration (INEGI, 2010).

3. The dwellings in Tochimilco

The study conducted in Tochimilco yielded the following data: the use of dwellings predominates with 91.06%; the houses of a level correspond to 86.28%; 2 levels 13.34% and 3 levels 0.38%. The most common form is rectangular 73.57%; irregular corresponding to the topography of the place with 23.76% and square 2.67%. The main dwellings of the family are located in the front, but can house up to 7 houses inside; around a patio, where the slope of the roofs is directed to dislodge rainwater (figures 3, 4 y 5).



Figure 3 New dwellings and historical dwellings Tochimilco, Puebla
Source: Vázquez, 2016



Figure 4 Vernacular dwellings Tochimilco, Puebla, Vázquez 2017



Figure 5 Set of vernacular dwellings, the main house is located towards the street and the secondary ones around the patio
Source: Vázquez, August 2018

According to the analysis of the spatial configuration, the following data were obtained from the Cadastre support of the city of Atlixco and from the interviews:

Regarding the type of material, the adobe dwelling dominates the dwelling made with partition or block with 62.52% (historical dwellings 26.56% and vernacular dwellings 35.96%) in its original state, a modified dwellings and new dwellings 16.59% of 21.09%.

According to the above, it can be observed that there is still an important vernacular dwellings but it tends to disappear; it should be considered that most of the new architecture corresponds to the growth of the population (figure 5).



Figure 6 Vernacular dwellings without windows and with rectangular door
Source: Vázquez, August 2018

4. The causes of disappearance

The concepts of modernity and development are used as synonyms, as they are parallel processes; but there are differences. Modernity uses progress as an instrument of control and domination, and development as a transition or growth where potentialities are expanded and quantitative and qualitative growth is reached, or at least the conditions of life are transformed (DÍAZ, 2009, page. 133).

Consequently, the vision of modernity is based on a practical confidence in the material dimension and the technical capacity of the human being; where the technique is based on the use of a mathematical consistency ratio and not on socio-cultural processes that have a certain degree of uncertainty or magical order (ECHEVERRÍA, 2007).

The need for dwellings is solved in part by dwellings programs and these do not consider the adobe architecture because they do not consider it has no commercial value because it is a symbol of poverty and delay; which is why it is better to discard it, despite the fact that institutions such as INFONAVIT in the past supported the conservation of this architecture, in addition to not offering credits for its repair.

This has led to the loss of constructive tradition and therefore, the techniques used to repair homes are inadequate, coupled with the abandonment and deterioration of old buildings lead to create buildings that have nothing to do with the society where they are inserted (Guerrero, 2008, page. 112).

In the case of dwellings in Mexico, the SEDATU (Secretariat of Agrarian, Territorial and Urban Development) considers that modernity in dwellings is "Promote access to dwellings through well-located, decent dwellings solutions and in accordance with international quality standards. " (SEDATU, 2013). The foregoing, manifests the exclusion of vernacular architecture as part of modernity to close the gaps of social inequality.

In addition to this situation, industrialized materials companies promote the idea that the use of prefabricated and concrete materials will improve living conditions, supporting the concept of modernity and using the media to promote their products.

At this point, science and technology created economic gaps, contributing to the social inequality and distribution of wealth by establishing new social and economic hierarchies. However, at present, this process has been accelerated by the revolution in telecommunications and the emergence of artificial intelligence, which generates the breaking of borders (Guerrero, 2008, page. 112).

The concepts of modernity arrive more quickly than in other eras due to digital technology and the constant migration of the inhabitants in high levels of poverty. In zones where migration is constant, they absorb constructive elements with different characteristics of the habitat, influenced by other schemes. It is a process that mixes local and global knowledge influenced by the mass media, which results in diverse forms and transitions of dwellings (ÁLVAREZ, 2012, pp. 15-16).

This situation is observed in the study area, because the population according to (CONEVAL, 2018), located Tochimilco in 2010-2014 in poverty level to 78.5% of the population, which is subdivided into extreme poverty 30% and moderate poverty 47.6%. The vulnerability for social deprivation of this population is 18.9% and by income is 1.5% for which there is a large migration to the interior of the country and beyond to improve living conditions, their livelihood and the maintenance of their homes.

The vernacular dwellings in Tochimilco are generally rectangular constructions of 4 meters wide by 8 meters long and irregular dwellings approach these dimensions. They are built with volcanic stone foundations, adobe walls, tile roofs, sheet, wood and tile.

The construction of adobe with roofs of wood and tile is a common practice in the State of Puebla as a rational way of using local materials that allow comfort in indoor temperatures in homes (GONZÁLEZ, 2016, page. 2).

The most representative material of these dwellings is adobe; the word adobe comes from the Egyptian "thobe", translated into Arabic as "ottob", extended in the Mediterranean by the Roman Empire, arrived in Spain by Muslim interventions (RAMÍREZ, 2011, pages. 30-31). With the arrival of the Spaniards in Mexico the constructive tradition was maintained because the inhabitants had an extensive constructive tradition. In Mexico there is a wide sample of this material in many pyramids located in the country were used adobe bricks made with sun-dried clay. The adobe buildings are threatened by water, wind, seismic effects, animal attack, the growth of wild flora and incompatibility with materials such as concrete and steel. (RAMÍREZ, 2011).

The main causes of deterioration of adobe and vernacular architecture are the environmental (climatic and air pollutants), biological (bacteria, fungi, lichens, algae, mosses, plants and animals) and anthropic (vandalism, overexploitation of structure, accidents), interventions and lack of maintenance (MARTÍNEZ, MARTÍN, & CARO, 2003)

Humidity is the main cause of deterioration in the vernacular dwelling of Tochimilco, because it promotes the development of bacteria, fungi, lichens, algae, mosses, whose spores are introduced by the wind into the cavities and the nutrients serve to feed plants, insects, birds or rodents that degrade the material. Also, the grass and roots of trees seek moisture by fissuring the walls or creating cracks through which the water leaks leaving cavities where animals seek refuge (PEÑA, 1997, page. 87).

Regarding anthropic actions acts of vandalism are a clear indicator of the social exclusion that takes place in cities, no matter how much they are condemned and criminalized as brutal and illogical acts (JORDI, 2009, pages. 4-5).

In Tochimilco there is no vandalism and the dwellings, although they are not maintained, are not affected by this emergent phenomenon of the cities, as the population has cohesion and vandalism does not occur in the community.

On the other hand, the overexploitation of the structure is presented when building on top of the building, it is presented in two ways: it is placed, chains, castles and reinforced concrete roofs modifying the building and in very tall constructions the height is divided with independent structures or embedded to the walls and this overloads the vertical elements. The intervened buildings modify their structural composition or damage the adobe walls by the elimination of beams, holes are generated for installations or the placement of incompatible materials that cause pushes that weaken the adobe and the lack of maintenance is evident.

The level of poverty in Tochimilco does not allow the maintenance of its buildings, deteriorating inexorably and in the case of migrants they bring with them resources that apply to the development of the countryside and buildings. However, they bring Tochimilco concepts of modernity that cause the transformation of the dwellings with incompatible techniques or the total demolition of the vernacular dwellings.

Changes in temperature coupled with humidity promote the disintegration of the material, caused by the contraction and expansion of the adobe due to the effects of the combination of solar radiation and cold. It is because the clays with the contact with the water expand and with the action of the sun they contract causing cracks or scabs (PEÑA, 1997, page. 86).

Tochimilco is a region with climatic changes throughout the day; the water absorbed by the adobe reaches the freezing point and the strong heat of the morning contracts the adobe causing superficial cracks in the walls. The wind affects the adobe because it eliminates the loose material leaving small cavities where spores and soluble salts are deposited.

To avoid the absorption of moisture from the subsoil in Tochimilco the constructions are above ground approximately 60 centimeters; however in relatively new constructions they are placed at ground level and the walls are damaged from their base and that constant humidity deteriorates the building.

The intense rain in the buildings where there are no eaves wash out the material and the puddles cause them to moisten the base of the wall appearing fluorescent when the water or cement in the mortars contain soluble salts. The cement has displaced the quick lime as a material of the mortars used in joints or in coatings affecting the adobe with the soluble salts of the cement.

Tochimilco is located in a seismic and volcanic zone, being close to the Popocatepetl volcano it has constant small earthquakes and with earth movements it is fast (GUTIÉRREZ, 2014, page. 137).

The constant emissions of ash, remain in the atmosphere for a long time and accumulates in the roofs and substances of the ash that weaken the building materials (MARTÍNEZ & GÓMEZ VÁZQUEZ, 2006, page. 168).

The effects of earthquakes on adobe buildings can be serious, since the dynamic loads modify the cohesion between the particles of the adobe blocks. It is common that these walls are cracked in the corners of the dwelling and the structural work of the whole is lost and before the earthquake each element absorbs independently to these telluric movements. Situation that could be observed in the earthquake of September 19, 2017.

The earthquake of September 19, 2017 in Tochimilco severely affected historical buildings and a few vernacular dwellings (figures 7, 8, 9 and 10).



Figure 7 Aerial view of historic dwellings damaged by the earthquake of September 19, 2017
Source: Vázquez, August 2018



Figure 8 Bending perpendicular to the wall plane. Cracking in the intermediate height and additional vertical cracking, frequently occurs in long walls caused by the earthquake of September 19, 2017

Source: Vázquez, August 2018



Figure 9 Flexion perpendicular to the plane in the unconfined corners of loose walls, or in corners not effectively connected with the transverse walls, caused by the earthquake of September 19, 2017

Source: Vázquez, August 2018

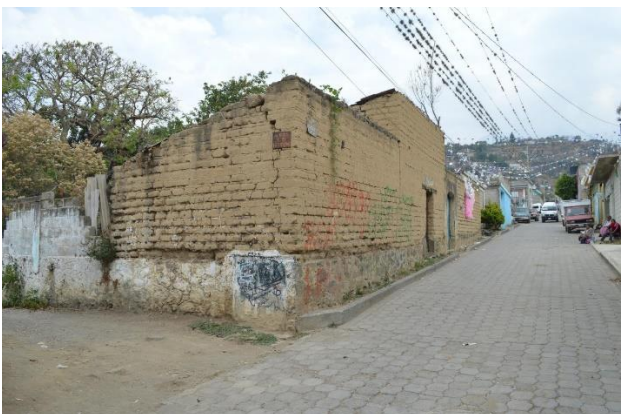


Figure 10 Flexion perpendicular to the plane in the unconfined corners of loose walls, or in corners not effectively connected with the transverse walls, caused by the earthquake of September 19, 2017

Source: Vázquez, August 2018

5. Conclusions

The vernacular architecture is not recognized by the community of experts in the area of knowledge, because it is built by the inhabitants without the advice of the architects. Although various authors and architects have supported the rescue of vernacular architecture; the efforts, although large, have not been enough to stop the disappearance of the adobe architecture.

This from the main objective, to integrate the quality of life for its inhabitants, attending to vulnerable groups; in granting, improving, conserving care for the environment, according to their daily activities in the local practices of the region within the framework of sustainability, contributing to the strategic applications in the formation of the implementation of pertinent actions to their shelter and recate.

In relation to the implications of the deterioration of the vernacular dwelling, it was observed that the natural causes are the most important in their permanence or disappearance as the population incorporates the constructive techniques that they consider can cope with the natural conditions.

In addition, being material economically accessible to the inhabitant living in poverty, allows him to erect with his scarce resources a dwelling that he considers worthy and the result of his individual and collective effort because the tequio still prevails.

This is in recognition of the implementation of a system adapted to the environmental conditions, in order to preserve and execute prosperous dwellings friendly to the environment: in terms of security, shelter; that is adapted to the living conditions and accessible materials within the region; in adequate use of its non-polluting resources or of destruction to the rural natural contexts and with the use of the labor of its inhabitants that minimizes the economic impact to the access of a dwelling.

This architecture in Tochimilco is put to the test by the constant telluric and volcanic earthquakes; the vernacular architecture in Tochimilco had some affectations in the earthquake of September 19, 2017, but the historical architecture presented severe damages by the natural effects.

For all the above it is considered that to maintain the architecture of adobe is necessary on the one hand to recognize the vernacular architecture as a viable architecture, the result of community participation, product of tradition and cultural value. On the other hand, it is recommended to consider it in the development plans of dwelling, because the current programs do not imagine this within their development strategies because they consider it inefficient to weather and seismic events.

In priority to the attention of the community in determining the actions of shelter, post-earthquake rescue and evaluation and intervention owed to the constructive system that determine the conditions of security, habitability and resilience on said historical and vernacular buildings. In recognition as a relevant production concept of your receipt or continuous maintenance.

However, as it has been shown the dwelling vernacular in Tochimilco remains standing despite the conditions of vulnerability. As for the historical dwellings they have problems due to the age of the materials and the lack of maintenance and inadequate practices of substitution of materials, but these are aggravated by the abandonment in which they find themselves.

All of the above, establishes the need to create strategies for the conservation of this type of architecture that includes recognition, preventive actions against the risk of loss due to unexpected processes and the capacity of its inhabitants to overcome these adversities. As well as sensitization and training both of architects and of the population for the maintenance of their dwellings and practices of intervention in maintenance programs, and thus face with mechanisms of adaptability in the face of the adverse circumstances that they face.

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