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# Initial assessment of multi-risk social vulnerability for Iberian earthen traditional architecture

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## Abstract

In the Iberian Peninsula the existing earthen (above all vernacular) buildings are hardly socially recognized. The current heritage is vast, rich and valuable but has suffered (and continues to suffer) from the effects of abandonment and lack of maintenance. This, in conjunction with unsuitable interventions, worsens the resistance and durability of this architecture. The RISK-Terra project (financed by the Spanish Ministry of Science) aims to provide a scientific study of different hazards (natural, anthropic, and social ones as well as deterioration and transformation dynamics).

The aim of this paper is to focus on initial assessments of the project relating to social hazards (abandonment, depopulation, loss of social reputation, demographic pressure, tourism development...) in order to prevent and mitigate possible damage through specific compatible actions and/or tools aimed at increasing possible social resilience.

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## 1. RISK-Terra, framework of the study

The RISK-Terra project (financed by the Spanish Ministry of Science, led by Universitat Politècnica de València researchers) aims to provide a scientific study of natural, anthropic, and social hazards as well as deterioration mechanisms and transformation dynamics currently affecting the earthen architecture of the Iberian Peninsula. The

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aim of the project is to establish strategies for conservation, intervention, and rehabilitation in order to prevent and mitigate possible damage through compatible actions and/or actions aimed at increasing resilience. In this context a first multi-risk assessment of social vulnerability factors is presented.

## 2. Resilience of earthen architecture

According to the official definition of the United Nations Office for Disaster Risk Reduction resilience is “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions” (UNISDR 2009).

The close relationship between earthen architecture, as part of vernacular buildings, and resilience was first stressed more than twenty years ago (Oliver 2006): “vernacular dwellings and buildings are related to their environmental context and available resources, they are customarily owner or community built, utilizing traditional technologies. All forms of vernacular architecture are built to meet specific needs, accommodating the values, economies and ways of living of the cultures that produce them”. Oliver’s description points out the existence of numerous parameters in the constitution of a local building culture, above all the role of the ‘micro-climate’ and various environmental conditions. Thus, indigenous knowledge and vernacular culture become very specific and localized and can represent the specific responses given by human beings in the pre-industrialization age to environmental, socio-cultural, and economic challenges by processing available natural resources for their survival (AA:VV. 2014). In this framework the paper presented will stress social vulnerability parameters related to earthen architecture as factors or processes, which increase the susceptibility of a community to the impact of hazards and treats (UNISDR 2015).

## 3. Multi risk social vulnerability for Iberian earthen traditional architecture: a first assessment

Earthen architecture is widely found in the Iberian Peninsula (Sánchez 1995- Maldonado 2002...etre otros) both in monumental architecture and in vernacular heritage, studied in this text. This heritage is an essential part of peninsular culture, both for its remote origin and its various techniques, adapted to natural and cultural surroundings. However, earthen architecture and its building techniques have gradually disappeared, been abandoned or replaced by new standardized techniques, especially from the mid-20<sup>th</sup> century. This was due to a process stemming from a lack of knowledge and the avoidance of this traditional architecture, considered to be poor quality and linked to underdevelopment. It is important to analyse factors directly linked to architecture and technique (Mileto et al. 2012) in order to identify possible responses to these problems. However, it is just as important and crucial to carry out a diagnosis of risk factors, linked to cultural and social analysis parameters, as stated below.

### 3.1. Depopulation of rural areas with earthen architecture

Population density is one of the most influential factors in the conservation of earthen buildings. This factor is not directly linked with the constructive technique used but with the conservation and abandonment of traditional buildings. Since the mid-20<sup>th</sup> century many rural areas in the Iberian Peninsula, mostly inland, have suffered a loss of population. This is partly due to the start of industrialization which caused the population to move to the cities, as well as the high levels of poverty and abandonment in small inland towns which remain very isolated, even today. In addition, the harsh climate with cold dry winters and hot summers characteristic of most of the inner Iberian Peninsula meant that many of these villages became holiday locations. The new standards of comfort and the financial expense of adapting old dwellings to these have also meant that part of the population only lives in these small nuclei in the summer months.

It is interesting to note how the areas with the highest occurrence of earthen construction located correspond to the most depopulated areas in the Iberian Peninsula. More than half (52.8%) of the locations with half-timber, 65.9% with rammed-earth, and 65.2 % with adobe, were located in areas with a density population of 20 inhab/km<sup>2</sup> or lower. This is partly due to the wealth of earthen architecture in these areas, and to the fact that in areas with fewer inhabitants and numerous abandoned constructions, earthen buildings are easier to identify as protection elements or renderings have often been lost and it is possible to collect direct data objectively (Mileto et al. 2019).

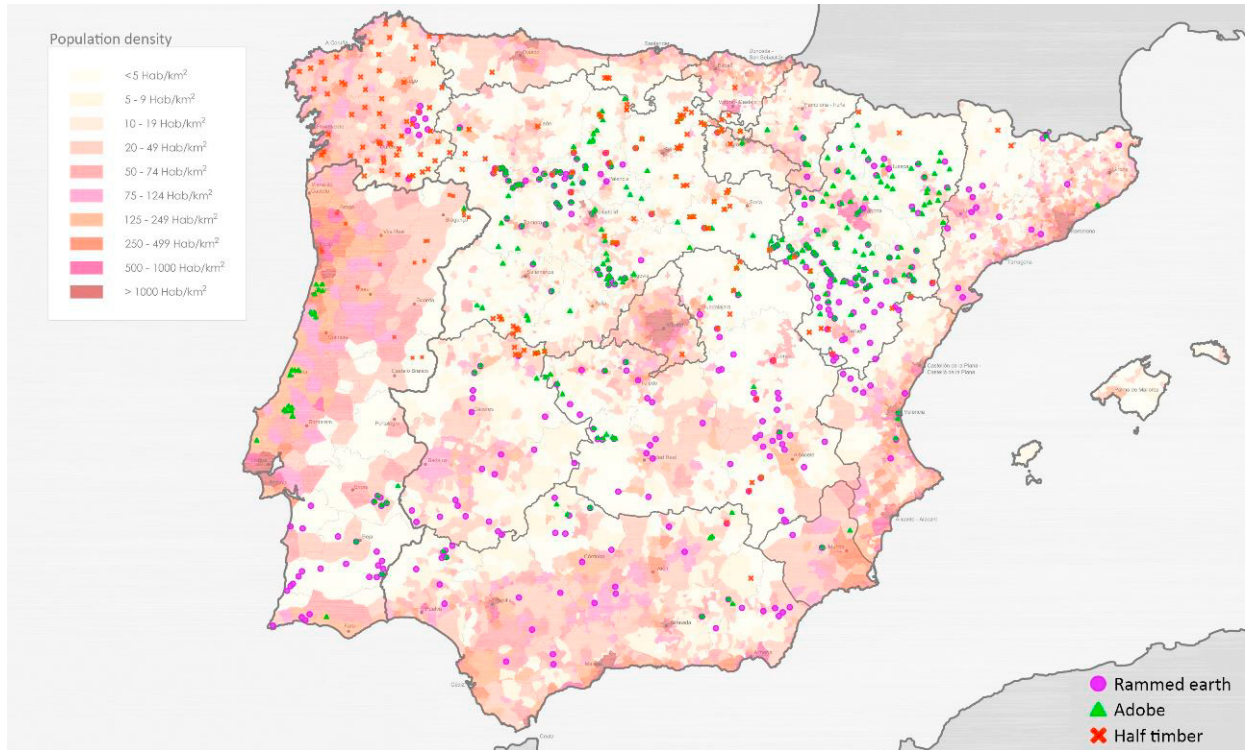


Fig. 1. Population density and vernacular earthen techniques. Source: Own elaboration based on the *Atlas Nacional de España* and distribuição da população, Slideshare, 2008.

### 3.2. Functional obsolescence of earthen architecture

In traditional earthen architecture in the Iberian Peninsula there are three main groups of buildings found. These can be classified as abandoned buildings in disuse, buildings retrofitted and adapted to new residential or functional demands, and museumized complexes.

The first group is widely found in the territory analysed and is characterized by gradual abandonment and a slow but inexorable progressive degradation (Poza -Fernández 2010). Many buildings have lain empty for decades, leading to what is currently an irreversible condition as their continued lack of maintenance means that they are classed as “ruins”. The second group - also abundant - includes buildings which following different thought processes have been intervened in recent decades; in most cases these have been converted into second homes and/or spaces linked to tourism, or adapted to new uses and purposes as a result of generational changes. These actions do not usually value earth as a building material and instead tend to conceal, adapt, and mix the original construction using constructive techniques which are not always compatible or respectful (such as prefabricated materials, cement products and by-products, resins and synthetic products among others).

However, not many museumized earthen architecture complexes are found in this context, and they tend to be the result of some degree of political/regulatory support or are simply buildings considered exceptional. Within the framework of the RISK-Terra project, the percentages of buildings belonging to each group are being analysed, although the first two - abandoned buildings and retrofitted buildings - account for the greatest number of case studies. This is, without doubt, cause for alarm. Buildings in ruins constitute a major loss of material wealth, while in many cases, the actions executed in retrofitted buildings distort, conceal, or devalue the autochthonous constructive features carried out using earth as a building material.



Fig. 2. (a) Abandoned building in Congosto de Valdavia (Palencia, Spain); (b) Inhabited building in Sao Teotonio, Beja (Portugal).

### 3.3. The historic vocation of earthen architecture

Many traditional earthen buildings in the Iberian Peninsula are in remote hard-to-access areas, which still have poor connections to inhabited nuclei and roads. In the 21st century access to these buildings is still complex, given the mountainous river areas and limited infrastructures (Módenes-López-Colás 2014). In addition, this “isolation” causes many earthen buildings to be greatly impacted by an absence of many basic services and installations. It should be noted that as a high percentage of traditional earthen buildings are closely linked to agricultural use, including stores, deposits, enclosures, shelters, hay-stores, spaces for tools, felling, and animals. Traditionally, these buildings have been located on the outskirts rather than in central and key areas of towns. In regions with plains and plateaus this translated into many complexes scattered throughout municipalities, while in hillside or mountainous areas earthen architecture is often found near the slopes or ridges outside the towns.



Fig. 3. (a) Building in Calatañazor (Soria); (b) Building in Guadix (Granada).

### 3.4. *The limited cultural recognition of traditional earthen constructive techniques*

In recent decades earthen architecture has been of interest to the academic and scientific fields, with international experiences assessing the constructive details of the different techniques and their current importance (AA.VV.2011), as well as their future potential for construction against a backdrop of sustainable and respectful construction policies (Weber-Yannas, 2013).

However, aspects such as social recognition in different rural situations, specifically in the Iberian Peninsula must also be borne in mind. There is a notable difference between the level of appreciation shown by non-specialist collectives (young people, elderly, residents, etc..) to earthen architecture as “quality architecture” and that shown in the academic and scientific fields, where this architecture is more highly regarded (AA.VV.2016).

In most cases, some of the figures most involved in earthen architecture (including inhabitants, owners, politicians, developers ...) continue to discredit this type of construction.

This is even more so in many rural settings, where there continues to be a very poor valorization policy (thanks to local/municipal/regional awareness campaigns), highlighting the value of “earth” as a major factor to be taken into consideration in their traditional architecture and DNA.

To this it should be added that in many cases, earthen buildings are owned by people not enrolled in the census in these rural areas. The owners of most of the buildings analysed do not reside in these towns full-time. Over time the “attachment” to the rural environment shown by the different generations gradually wanes, both for buildings that are retrofitted and in disuse. This leads to a certain increase in “alienation” in relation to the true historic idiosyncrasy of these towns (Micle 2014). These rural nuclei, once inhabited year-round, have gradually been transformed into holiday spots, as if they were holiday complexes.

### 3.5. *The problem of the transfer of know how*

The preliminary study carried out to date regarding the social risk of traditional earthen architecture has revealed a low percentage of respectful actions (intervention/retrofitting/construction). Two clear trends have been detected: experimental interventions and self-build interventions. These isolated cases, with a clearly experimental approach, aim to research or promote earth in the framework of very specific academic or professional experiences. In many cases those involved in these projects are highly skilled in the techniques and also have access to budgets with additional funding.

Furthermore, several actions were also detected within the sector of “bio-construction”, characterized by self-build practices using materials such as earth, with a low environmental impact, or materials which are recycled, recyclable or can be extracted using simple and inexpensive processes (Minke 2006).

Both trends eventually showcase a rather disheartening panorama for the transfer of technical know-how in relation to earthen architecture. There is also a certain degree of vulnerability of earthen architecture in rural settings, as it is usually subjected to interventions by local developers. These are not always open to experimental logic and tend to favour basic constructive resources (cement, synthetic and industrial products) which do not help the mid- to long-term endurance of earth as a building material.

## 4. Conclusions

All the parameters mentioned (depopulation, geographical dispersion throughout history, functional obsolescence, limited cultural recognition, and the problem of know-how transfer) examine complex issues merging different tangible and intangible nuances characteristic of heterogeneous disciplines. Hence the value of the RISK-Terra project, as it aims to incorporate a global study of the issue, which cannot be examined in merely architectural and constructive terms. What has been presented thus far is only the beginning of a long-term project which in the future will incorporate interviews and surveys of different collectives from different backgrounds where these parameters are of special interest.

Therefore, following this initial identification of factors, a detailed analysis is to be carried out on “pre-crisis scenarios” (enclaves where earthen architecture is in acceptable condition and has been maintained and recognized for its inherent qualities); “crisis scenarios” (where earthen architecture is in a critical phase and highly vulnerable);

and “post-crisis scenarios” (where very few earthen constructions remain, following decades of neglect and lack of cultural recognition). Based on this analysis, future plans include a characterization of the actions of adaptation of the different enclaves in response to the social risk factors identified.

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