Regenerating vernacular villages for ecotourism spaces -
The case of Aldeia da Pena in São Pedro do Sul - Portugal

Sara Lopes Fernandes¹, Luis M. Ferreira Gomes², Claudia S. Beato³

¹Master in Architecture, University of Beira Interior, Covilhã, Portugal
²Department of Civil Engineering and Architecture, Beira Interior University, GeoBioTec (U.A.), Covilhã, Portugal
³Department of Department of Civil Engineering and Architecture, Beira Interior University, CITAD, Covilhã, Portugal

lmfg@ubi.pt

Abstract. In the last decades, Portugal has witnessed frequent rural depopulation with the abandonment of agricultural land, forest, and even some villages. On the other hand, the ordinary citizen, in a tourist view, begins to look more and more for spaces linked to the virgin nature and even to spaces associated with traditional agriculture, being, therefore, an opportunity to revitalize certain spaces, especially when they are of unique vernacular heritage. The case of Pena Village, almost in its totality, preserves its architectural trace and original materials. All the houses are built with local stones, essentially schist rocks, including their roofs, fitting into the landscape in an invisible and perfect way, which makes any citizen there to feel like an element of nature itself. Thus, in the present paper, after a brief characterization of the Village of Pena, the methodological aspects and the formulated concept are presented, and then a proposal for the revitalization of the village is presented, with the purpose that it functions as a global housing unit, consisting of several separate buildings, with various infrastructures and equipment needed for Ecotourism.

1. Introduction

In Portugal there is an increasingly strong trend of depopulation of rural areas, giving way to urban concentration. After depopulation comes the abandonment of agricultural and forest land, resulting in a territory full of weeds and invasive trees. As a consequence uncontrolled fires have resulted and a successive trend towards desertification of the territory. On the other hand, the ordinary citizen, in terms of tourism, begins to seek more and more spaces linked to virgin nature and even spaces associated with traditional agriculture. Thus, in this situation the authors argue, that it is an opportunity, especially for some small villages to be revitalized and in some cases rebuilt, converting many of the buildings in accommodation units, so Ecotourism in its various aspects will be a sustainable reality. Tourists, when arriving at remote locations, will find cozy spaces, with the typical vernacular architecture of the region, built with local materials, where they can live unique experiences with locals, from simple walks in nature, to participation in agricultural activities that remain cultural and environmental and economic sustainability issues.

Aldeia da Pena, located in the center of Portugal (Figure 1), is a very unique case, because due to its isolation, difficult access and several crises over time, it is almost completely abandoned. Because of this, the vernacular architecture is preserved, so any ordinary citizen
considers this a magical place, not only for its natural beauty but also, among others, for its architecture in harmony with nature, as can be seen in Figure 2. Therefore, there is a global objective with the present work to show the potential of that place by transforming the village into a “Horizontal Hotel”, recovering the various houses essentially for accommodation, but also for basic and other complementary equipment, in a way that the citizen has a stay in the place at least of eight days, with several “occupations” of tourism and leisure.

The present work was developed within the scope of the Master's thesis of the first author [1], and it should be noted that it is a purely academic work, but, even so, it intends to contribute with basic elements for the local and national authorities achieve the present proposals or others that can suit the place.

2. Characterization of Pena Village and Methodological questions

“Pena was a Castro or Pre-Roman fortification and the seat of a medieval district. A 1096 document already refers to Pena (Dip. Et Ch. Nº 877). And after that, documents referring to it range from 1103 to 1114. It is a typical settlement. It is located between cliffs, in a great depression almost like a funnel…” [2]. The settlement must be very old. There are prehistoric remains in its vicinity, both in the Serra de S. Macário and Monte Redondo, which give the certainty that the primitive man inhabited that region [3]. However, it was not until 1527, with the publication of the Cadastro do Reino de Portugal that it was certain that there was a permanent population, which does not mean that it did not exist before. At the time, there were 6 families; in 1758, there were 7 families with 33 people; on August 22, 1977, on a visit from Figueiredo [3], he found 7 families, saying that for the most part, he did not give arable land. In 1991, there were 13 residents, and in 1999 there were already only 7 residents [4]. Currently, there are two families living permanently with only 6 inhabitants. Ms. Augusta, and Mr. Arouca, a long-term couple; they live on local agriculture, animals, honey they produce and the
handicrafts they present to visitors in a small shop which they designate as a museum. In it can be found miniature houses representative of the village with vernacular materials, candles made with the use of the honeycomb cut into strips, and towels with lace made by Mrs. Augusta. The second family consists of a younger couple and their 2 daughters. Mrs. Ana and Mr. Alfredo Brito left Lisbon a few years ago and decided to come and live in the village where Ana had roots. They have animals such as cows, pigs, chickens, goats, sheep and horses, they make heather honey, liqueurs, sausages when they kill animals, they have agriculture and manage the Adega Tipica da Pena, with a terrace. Local gastronomic delicacies are served to visitors accompanied by green wine.

The access to the village is done through a very steep road where only one car passes at a time, despite the having two-way traffic. The main road access has a slope corresponding to the difference in altitude, between 984m asl in the area of Serra de S. Macário to 672m asl in Aldeia da Pena, at a distance of only 2.5 km. Cars are generally at the entrance of the village and the rest is covered on foot. Only a few inhabitants drive motor vehicles to their homes. The village is built in altitude between the 650 and 680 m asl. The village lost at the bottom of the hills (Figure 2) invites you to contemplate, with its unique setting in a landscape that combined the typical schist houses with punctual granite details, mostly with slate roofs. Traveling the paved paths in granite or soil, we cross countless times with the small and large animals of the residents.

The village is crossed by the riverside of Pena (Ribª da Pena) with two branches (Figure 3), one of which crosses the houses with its crystalline waters, but very cold and the other more sheltered, NW of the previous one, initially in an area of the valley very closely embedded, upstream of the village, and then crosses an area with only rocky and green fields. This stream gives life to the village, because it is from there that the fields are watered. Its flow never dries, so it is used, in the hottest months of the year, by locals and some visitors, for bathing. There are about 10 dwellings of reasonable quality, another 10 that have not been inhabited for a long time and, for this reason, are in poor condition of conservation. Some are only occupied during holiday seasons, especially in the summer and in some cases when the emigrant owners decide to return to their place of origin. The remaining clusters are either in ruin or serving as a shelter for the cattle and other animals of the inhabitants. Figure 4 presents some photos of some landscape elements of the village's frame and of some buildings in some cases in complete ruin, in order to better frame the reader. As with many of the villages around it, Aldeia da Pena also began to have a very pure architecture and despite the various changes made over time, this village is one of those that preserve the most vernacular features valued by the population.

In houses with two floors, the kitchen remained on the upper floor to facilitate the escape of smoke through the tiles. However, with technological advances and the emergence of new materials, the village gradually lost its “virgin” state, and currently, some of the houses that are found here, have been adapting to the needs and technological evolution. Despite this, the village continues to have numerous traces of its primordiality. The houses built in massive schist stone walls, and the narrow and tortuous streets, give this village its picturesque character.

In order to respond to the needs of the village and move forward with solutions, it was necessary to survey the individual conservation status of the existing building. Figure 3 shows all the buildings numbered and identified by colors, in order to differentiate them individually in several modalities. The aspects that were taken into account were: i) the state of conservation of the building; ii) know if there is a need for any type of intervention or mere arrangements to maintain the initial design; iii) if it is under construction, unfinished, vacant or in ruins; iv) building functions. Table 1 presents the synthesis of the current function of each building, the state of conservation, and future perspectives (rehabilitation, restoration, or maintaining the function).
From the data collected and analyzing the structured color plan (Figure 3), it is possible to verify that there are two distinct zones: i) the North zone, needier, aged, abandoned and in ruin, with a predominance of orange and red colors; ii) the South, more cared for and active.

![Figure 2. Village of Pena, photo taken in February 2017](image1)

![Figure 3. Pena village building state in 2017 (see Table 1)](image2)
Table 1. Summary of the state of the building in the village of Pena, in relation to the current function, state of conservation and future perspectives [1]

| Nº building | Colour/situation | Occupation            | Conservation state | Future perspectives |
|-------------|------------------|-----------------------|--------------------|--------------------|
| 1           | Green            | Post office           | Preserved          | Rehabilitate       |
| 2           | Green            | Housing               | Preserved          | Preserved          |
| 3           | Yellow           | Cemetery              | Less preserved     | Restoration        |
| 4           | Yellow           | Chapel                | Less preserved     | Restoration        |
| 5           | Green            | Housing               | Preserved          | Preserved          |
| 6           | Green            | Museum/shop           | Preserved          | Preserved          |
| 7           | Orange           | Granary               | Unoccupied         | Preserved          |
| 8           | Orange           | Agglomerate           | Unoccupied         | Rehabilitate       |
| 9           | Orange           | Granary               | Unoccupied         | Rehabilitate       |
| 10          | Green            | Housing               | Preserved          | Preserved          |
| 11          | Green            | Housing               | Preserved          | Preserved          |
| 12          | Yellow           | Housing               | Less preserved     | Preserved          |
| 13          | Green            | Housing               | Preserved          | Preserved          |
| 14          | Yellow           | Storage room          | Less preserved     | Preserved          |
| 15          | Orange           | Agglomerate           | Unoccupied         | Rehabilitate       |
| 16          | Green            | Housing               | Preserved          | Preserved          |
| 17          | Yellow           | Housing               | Less preserved     | Preserved          |
| 18          | Yellow           | Housing               | Less preserved     | Preserved          |
| 19          | Grey             | Housing               | Construction       | Preserved          |
| 20          | Green            | Housing               | Preserved          | Preserved          |
| 21          | Red              | Agglomerate           | Ruin               | Build              |
| 22          | Green            | Adega típica (restaurant) | Preserved | Preserved          |
| 23          | Orange           | Housing               | Unoccupied         | Rehabilitate       |
| 24          | Orange           | Housing               | Unoccupied         | Rehabilitate       |
| 25          | Red              | Housing               | Ruin               | Rehabilitate       |
| 26          | Red              | Agglomerate           | Ruin               | Rehabilitate       |
| 27          | Green            | Housing               | Preserved          | Preserved          |
| 28          | Orange           | Agglomerate           | Unoccupied         | Rehabilitate       |
| 29          | Orange           | Agglomerate           | Unoccupied         | Rehabilitate       |
| 30          | Orange           | Threshing floor       | Unoccupied         | Rehabilitate       |
| 31          | Orange           | Housing               | Unoccupied         | Rehabilitate       |
| 32          | Yellow           | Housing               | Less preserved     | Preserved          |
| 33          | Green            | Housing               | Preserved          | Preserved          |
| 34          | Orange           | Granary               | Unoccupied         | Rehabilitate       |
| 35          | Green            | Housing               | Preserved          | Preserved          |
| 36          | Yellow           | Housing               | Less preserved     | Preserved          |
| 37          | Green            | Housing               | Preserved          | Preserved          |
| 38          | Grey             | Housing               | Preserved          | Preserved          |
| 39          | Red              | Agglomerate           | Ruin               | Build              |
| 40          | Red              | Agglomerate           | Ruin               | Rehabilitate       |
| 41          | Green            | Housing               | Preserved          | Preserved          |
| 42          | Orange           | Agglomerate           | Unoccupied         | Rehabilitate       |
| 43          | Green            | Housing               | Preserved          | Preserved          |
| 44          | Red              | Agglomerate           | Ruin               | Build              |
| 45          | Red              | Agglomerate           | Ruin               | Build              |
| 46          | Red              | Agglomerate           | Ruin               | Build              |
| 47          | Orange           | Agglomerate           | Unoccupied         | Rehabilitate       |

* Legend: green - no intervention required or very few apparent interventions; Yellow - some interventions; Grey - under the building or unfinished; Orange - abandonment, despised; Red - ruin, agglomerate

The traditional architecture of the village under study is, above all, that of housing (Figure 4), with everything that is connected to it in an essentially agricultural economy: housing, beef cattle, «shops» or porches for the storage of implements and agricultural products, haystacks, threshing floors and granaries. The essential materials for construction were, over the centuries, stone, wood and thatch: stone for the walls and, on the threshing floors; stone still, in «slabs like
boards», on the roofs; wood, in locks, floors, doors and windows; and thatch, on roofs, which is currently in total disuse.

Figure 4. Photos of some points of interest in Aldeia da Pena. a) Aldeia da Pena with all the natural surroundings; b) Pena Geobookshop; c) houses and main access to the village; d) to i) village houses; j, k) details of the roof; l) chapel; m) canastro (granary), n) Stream of Pena, o) mill in complete ruin
3. The intervention proposed

All the proposed interventions went through several phases of improvement that gave rise to the final project. Visiting the site at different stages of the year (summer and winter); the description of the intentions of the municipal entities, together with an approach made to the inhabitants about the aspirations and needs, were central and decisive in the main ideas and conclusions of the work. The acquisition of a series of architectural references, namely associated with recoveries of very old villages [5-7], and analysis of several recoveries from them also helped to optimize the interventions proposed.

The history and evolution of the village over time were valuable for the concept of the final proposal. This place, its characteristics and the historical values present. That is why the concept goes through “The Path in Time”. In the past, there were people who needed a place to hostile their survival needs, built and lived, but, over generations and their evolution, newly arisen needs that led to the search for a new place and abandonment occurred. At present, there are clusters and ruins with a history of the past. Life in this place is not over, but it needs to regenerate itself so as not to fall into the forgotten and return to put more life back on with the story. The path is the future without disconnecting and forgetting the past. So, taking all those aspects, Figure 5 presents an ideographic scheme that portrays the concept.

The concept is based on grabbing the past and recovering it for the future. Recover the ruins or agglomerates, spaces and natural potentials that are forgotten, thus maintaining a landmark in history, through regeneration / recovery or even construction. This Village has several potentials and a history to appreciate, but it also has several needs to build, in order to make it alive again. The continuity of an existing history, with the valorization of heritage linked to economic, social and environmental needs, is the main focus of this concept.

Figure 5. Ideogram of the concept “The Path in Time”. The link between the Past, the Present and the Future

In the map of Figure 6, the areas of greatest intervention proposed for the Village are identified and numbered, and it should be noted that the various spaces were the target of an urban project, presented in the work of Fernandes [1]. However, it is emphasized that for the project to be properly executed, it is necessary to move on to the next phase, that of detailed building development. Figure 7 shows an example of the Northeast sector of the village, where the location of the existing heritage already valued and the location of public spaces to be valued are shown.

Regarding the most common buildings (rural accommodation, public sanitary facilities), it should be noted that the various proposals are based on the definition of sustainable construction, in a place with historical memories. The designed solutions were developed through existing limits in the areas of implantation (the place of ruin), to suppress space or add
in order to create functional and alternative spaces to develop these places. The lack of more area, or the non-linear deformations that needed to be suppressed, were motivating factors. The need for a spa to support the natural pool and a tourist office / museum was central, but in the absence of spaces (ruins) to integrate them, volumes were installed discreetly in the alignment of existing walls; these support land / slopes and form levels that overcome the slopes of this place.

Figure 6. Identification of the planned places for interventions in the Pena village

About the materials to be used for the execution of the proposal, they are natural and mostly local, such as shale, slate and granite stones, in addition to wood; the only “unnatural” ones are glass, concrete and iron; these will be used in the recovery of accommodation, slabs and in the dam, pool and bridge structure, some support walls should also need this to guarantee its durability and safety.

It should be noted that Urban Equipment is also provided, such as: urban benches, night street lighting and garbage dumps. The benches are made up of simple blocks of schist stone, the dustbins contain a metallic structure inside (which helps to place and maintain the bags), covered in slate (dark color, which is hidden in the middle) and with a lid wood. The bins are divided into 4, helping to separate the garbage and so that it is not scattered throughout the village. To facilitate identification and location, these are flagged, conservation and cleaning of the space is a measure to be implemented. Street lighting will be focused on wooden poles and strategically placed, thus spreading with nature. The signage of the place must be placed on wooden structures, with information engraved in slate stone. In the landscaping arrangements in
lounging or play spaces, typical vegetation of the area will be used, especially oak, black oak, holly, arbutus, hawthorn, chestnut, heather and gorse; next to the clusters of these types of vegetation, among others, there will be a description of them on an information board.

Figure 7. Identification of public spaces interventions (in black) and location of the existing valued heritage (orange) in the NE area of Pena village

Regarding Passive Systems to be used, it should be noted that the use of rainwater is already a system used in the village, with several collection tanks; in the pedagogical farm, similar use is foreseen, for cattle and other animals, but which can also be used by green spaces. The replacement of individual tanks by a Wastewater Treatment System was also one of the solutions for the treatment of domestic water.

In the proposed buildings, the use of passive systems is imminent, the water heating will be done using solar panels placed on their roofs. To make the project more environmentally friendly, it is proposed to deploy renewable energy sources such as solar and surface geothermal.

The maintenance and cleaning of spaces should be carried out periodically: removal of garbage, removal of dry and wild vegetation without resorting to pesticides; watering the soil whenever its humidity level is not sufficient for the maintenance, cleaning of public infrastructure (sanitary facilities and showers), maintenance of the Natural Pool, among others. These aspects could be a partnership between the inhabitants and the municipal entities.

4. Conclusions
According to the evolution Portugal is having, the future of Aldeia de Pena, in the municipality of S. Pedro do Sul, according to the authors’ understanding, will be regenerated with the purpose of serving Ecotourism in particular. Its vernacular architecture is still well marked and all its natural surroundings will enhance the tourism sector that should never be mass. Thus, it is
urgent that the local and central political powers pay attention to the present case, as this will lead the place to be a jewel of Portuguese vernacular architecture to be preserved and enjoyed so as not to forget the past, taking pleasure in it contributing to the local and regional economy, while strengthening the identity and culture of people.

Thus, it is emphasized that in the present work the main elements of a global proposal are presented, which tries to maintain all pre-existences and everything that appears as much as possible again, fitting in the same architectural and landscape harmony. It is understood as an academic contribution to the society. For the project to be carried out, it will be necessary to move on to the next phase, that of the detailed development of buildings and all other infrastructure and equipment. It will be important that the priority is given to improve the accessibility, and the whole area of the village is infra-structured, namely in the drinking water network, sewage network, electricity and telecommunications networks (buried), and water capacity is assessed, because the village with a full occupation, according to the current rules, will certainly consume a lot of water in its multiple activities.

Acknowledgment(s)
Municipality of S. Pedro do Sul should be thanked for all its support, from the provision of topographic bases to the logistical support during the various technical visits to the site. The second author also thanks to the GEObiOTEC Unit - UID / GEO / 04035/2020, and the third author thanks the CITAD Research Center, in Territory, Architecture and Design, from Lusíada University, Lisbon. This work is financed by National Funds through FCT - Foundation for Science and Technology, I.P., within the scope of the “CITAD Reference” Project (Project UIDUIDB/04026/2020 and UIDP/04026/2020).

References
[1] S. L. Fernandes, “Regenerar a Aldeia da Pena (São Pedro do Sul) para Espaços de Ecoturismo”, Master’s thesis in architecture (in Portuguese), University of Beira Interior, Covilhã, Portugal, 160 p., 2018.
[2] Clube, “O Ceboliniha”, Em Memória do Padre Alberto Poças Figueiredo, Edição S. Pedro do Sul. 38 p., 1998 (in Portuguese).
[3] A. P. Figueiredo, “A Pena”, Separata, Edição da Assembleia Distrital de Viseu (1982), Viseu. 24 p., 1979 (in Portuguese).
[4] M. A. Ribeiro, “O maciço da Gralheira – Da Freita ao S. Macário”, Um guia com algumas crónicas. Edição Câmara Municipal de Arouca. 201 p., 1999 (in Portuguese).
[5] J. Fernandes and R. Mateus, “Arquitectura vernacular: uma lição de sustentabilidade”, Proceedings of the National conference: Sustainability in Urban rehabilitation - the New paradigm in the construction market, Bragança, L. et al (eds) IISBE, pp. 205-216, 2011 (in Portuguese).
[6] A.H.P., “Aldeias Históricas de Portugal”, Programa PROVERE. [Online] 2017 [Accessed 10.2.2020] Available at: http://provere.aldeiashistoricasdeportugal.com/provere2 (in Portuguese).
[7] P. A. X., “Aldeias de Xisto”, Programa ADXTUR – Agência para o Desenvolvimento Turístico das Aldeias de xisto, [Online] 2017 [Accessed 10.2.2020] Available at: https://aldeiasdoxisto.pt/aldeias (in Portuguese).