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1043 REVIVING CASTRO VALLEY'S WINTER VILLAGES: USING HERITAGE, ECOSYSTEM SERVICES, AND CULTURE TO PROMOTE A SUSTAINABLE LIVELIHOOD IN A PROTECTED AREA

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ABSTRACT

Most rural areas in Europe evolve towards either intensification or abandonment. Villages in Portugal which are located in remote protected areas tend to be affected by farm abandonment often becoming uninhabited, derelict and exposed to fire hazard and ultimately leading to the loss of cultural landscapes. We developed and applied strategies for intervening in the Castro Laboreiro winter villages, towards a multifunctional landscape based on ecosystem services, heritage and culture. For that purpose we used participatory methods and developed strategies for restocking the wintervillage by defining a set of activities to diversify local economy and improve resilience. Additionally we show how the particular case of village of Pontes can be retrofitted based on its existing resources such as food, energy and water. We further suggest cultural events targeting newcomers and local population to improve social cohesion.

Keywords. *Heritage, Ecosystem services, Farming abandonment, Restocking.*

1 INTRODUCTION

Traditional farming based on a balance between ecosystem services and people, have sustained cultural landscapes in Europe. However current trends in rural areas of Europe are causing either land use intensification or land abandonment (Verburg et al, 2013). In the particular case of remote protected areas, landscapes have been mostly affected by depopulation and farm abandonment.

In Portugal, migration and urban exodus (Baptista, 2001) have affected rural spaces during the second half of the 20th century, as people were looking for better job opportunities, education services and infra-structures (Ribeiro & Silva, 2014). Within protected areas, population is plummeting, causing villages to be abandoned while wilderness is taking over (Rodrigues, 2010). Although rewilding is considered a positive change (Honrado et al, 2017), many problems emerged from rural abandonment, such as increasing fire hazard and derelict heritage (van der Zanden, et al, 2018). These problems have brought a new discussion on how to promote rural renaissance, a challenge addressed by the European Network for Rural Development.

According to Huang (2015), there is a need to rethink and integrate concepts like multi-functional agriculture and ecosystem services (Huang, 2015). As such and according to Knickel et al (2003) agricultural production should be diverse and oriented at non-food use, including medicinal herbs, agro-forestry for wood or biomass production. Zárate and Dornberger (2017) also consider tourism as a relevant service (e.g. handicraft, rural tourism, agro tourism, educational tourism, sport and recreational activities) as it brings consumers closer to producers.

Ecosystem services provided by rural areas are very important according to the Millennium Ecosystem Assessment – Portugal (2009). In fact some of these services like water and soil-related services, climate stabilization and biodiversity conservation (Pereira et al, 2009) are being considered for financial compensation. As some studies have shown, payment for ecosystem services can promote nature conservation and increase income generation in rural areas, food security and sustainable development. Becker Guedes & Seehusen (2011) state these payments would contribute for community cohesion and avoid rural migration.

In this paper we will assess the case study of a protected area, the National Park of Peneda Geres (PNPG) where farming is no longer the main source of income but where people's presence is critical to maintain a cultural landscape. A specific goal is to find out what are the potential strategies for reviving villages in a protected area.

1.1 Examples of intervention in rural Portugal

Portugal countryside has been the target of some top-down initiatives. Since 1999 governmental funding has been invested under the program Historical Villages, targeting village's retrofitting while creating jobs and attracting tourists (Lousada, 2008). Portugal has also benefited from European programs like LEADER which has created opportunities for developing rural areas through cultural initiatives and knowledge transfer (Farrell et al, 2000).

Some studies have shed some light on the impact of these investments. A study by Gonçalves et al (2013) considered 8 active villages in Northern Portugal, including Gimonde and Rio de Onor, both located within a protected area, and inhabited by 76 and 341 villagers, respectively. The study showed that using endogenous resources, promoting community participation and inter-territorial cooperation can overcome depopulation challenges and increase social cohesion. In Portugal there are some initiatives towards restocking in rural areas. Since 2000, a Portuguese initiative (Novos Povoadores) has been engaged in helping newcomers starting a business in depopulated villages. Other initiatives in Portugal show that foreign investors bringing capital and knowledge to inland regions can promote sustainable jobs and a new livelihood. For example, in Idanha a Nova, the company *Sementes Vivas*, which produces seeds in an organic/ biodynamic regime, has generated local jobs, together with the organization of workshops and annual conferences which contributed for the region promotion and attracted newcomers, many from abroad. Also in Idanha, the municipality has developed a program called *Recomeçar* which created an online database for promoting the sale of its heritage and farms.

Grassroots movements like Permaculture Portugal, Transition Town⁹⁰ (Fernandes-Jesus et al, 2017) or the eco village's movement have also brought initiatives that are spreading in the territory. For example, in the village of Amoreiras (Campos et al, 2016) the Amoreiras Convergence Centre (ACC) has promoted several actions during 7 years to increase governance. Generating a documentary entitled «My dream village» was the first step towards designing a permaculture plan for the village (Vizinho et al, 2014). These

⁹⁰ www.transicaoportugal.net

initiatives proved that the participative process is important for a better acceptance of the proposed actions towards sustainability. In the Sistelo village, located within a protected area, a private investment called Quintalogica has developed a strategy of breeding goats for landscape management, biodiversity conservation and tourism. Other examples can be found across the border, like in Leon, where a community has restock an abandoned village called Matavereno, now self-sufficient. In Navarra, the village of Lakabe, after being occupied by squatters in 1980, has become a self-reliant homeplace for 60 inhabitants (GEN, 2013). In Portugal the village of Rio de Onor is a reference of a multifunctional settlement located in a remote region of Trás-os-Montes, within the Natural Park of Montesinho. In most protected areas in Portugal located in remote areas, farming village's economies depended on communitarian work. In order to preserve these areas pristine, protected areas in Portugal have not developed heavy industrial activities, while farming and livestock were kept as the main source of income.

1.2 The case study in the National Park

The National Park (figure 1) is a top protected area since 1971, which is located in one of the most underpopulated regions of Portugal (6 in/Km2). With 702 Km2 over a granitic region, the Park aims to preserve biophysical ecosystem services like biodiversity provisioning, watershed regulating and landscape aesthetic values for cultural services (PNPG, 2009).

Our case study is located in the valley of Castro Laboreiro and comprises 89 km2. The valley is divided by a river which runs north to south, from the high plateau to the village of Ameijoeira at the border with Spain (figure 2). The land cover includes crop fields, scrublands and oak forest (figure 3). The steep valley slopes make farming difficult and the oak forest coverage has been increasing for the last ten years (Rodrigues, 2010).

The local altitude ranges from 300m to 1340m, creating several microclimates. Temperature goes from -10°C to 35°C and rainfall can reach up to 3000 mm per year. Due to these natural conditions, shepherds adapted to a life of transhumance: in winter time they lived on lower grounds, moving to higher grounds in the summer to provide pastureland to their flocks and herds (Lima, 1996; Geraldés, 1996). The different climate conditions also caused a specialization of certain crops in the high plateau (pasture and fodder) whereas most fruit trees and vegetables were cultivated in the low meadows in holdings smaller than 1 ha taking advantage of the milder valley climate (Carvalho-Ribeiro et al, 2016).

Since water availability can be critical during summer, the Laboreiro river and its tributaries were often retained in dams or diverted to irrigate crops and supply households. All of these processes of adaptation are still visible in the landscape representing an important part of the valley heritage. In fact, the valley irrigation system includes one aqueduct, three dams, more than 18 water tanks and several canals. Both the irrigation system and the forest management (a source of firewood and pastureland) relied on important communitarian cooperation.

It is our aim to revive the valley maintaining its balance between nature and people. We first collected the local's vision for the valley and then used participative methods to determine the strategies for reviving the valley based on a sustainable livelihood.

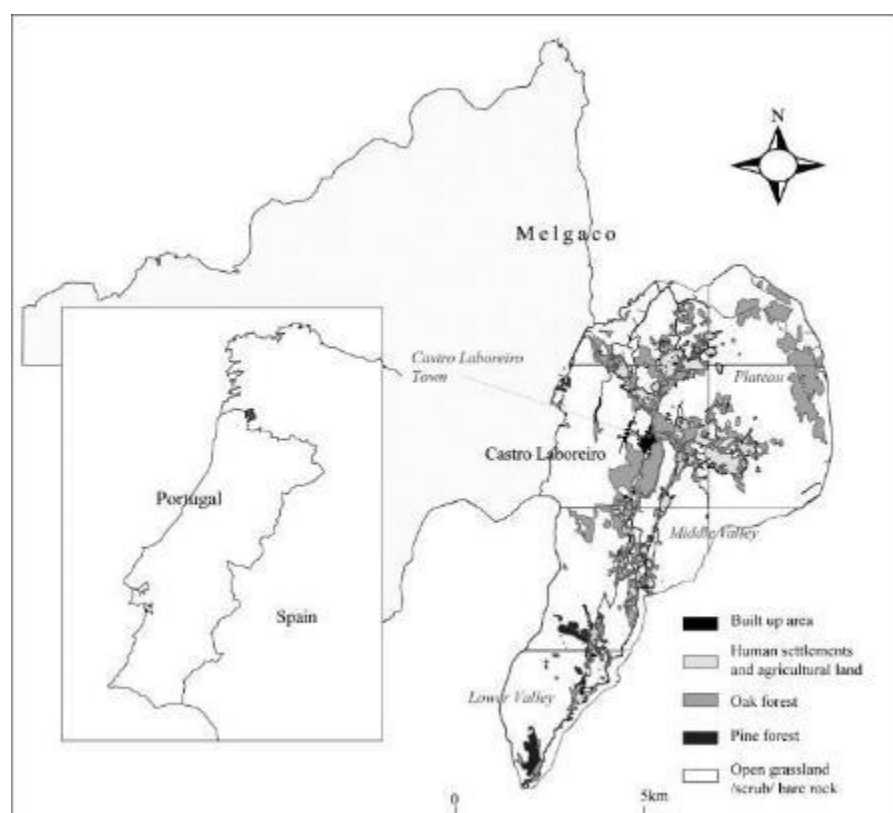


Figure 1. The National Park of Peneda Geres (PNPG, 2009) and the parish of Castro Laboreiro
 Source: Carvalho- Ribeiro et al, 2016

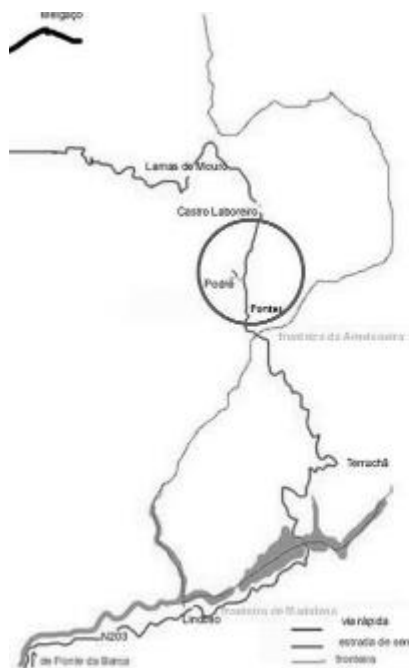


Figure 2 and 3. Location of the Castro Laboreiro valley. The valley and two of its winter villages surrounded by oak forest (credit: Ines Cabral)

2 METHODOLOGY

In order to assess the Castro Valley revival⁹¹ we used several methods. Interviews about heritage and the future for the region were conducted in September 2017. We then analyzed the state of ESS and the impact of a restocking. In addition, a workshop was organized in the context of a participative action-research (Greenwood, 2000), since people need to co-design and co-build a re-settling strategy for the abandoned villages. Finally a database was created to promote investment in heritage and some guidelines were listed for the Pontes village retrofit plan.

2.1 Interviews on the vision for the region

We surveyed a heterogeneous group of 13 residents whose age ranged from 40 to 60 years old, of which 8 were women and 5 were men, with diverse occupations (from farming to tourism) and with different education levels (primary school up to college level). We used questionnaires⁹² and semi structured interviews (table 1). Our goal was to get to know their visions on the future of local heritage and the region. A total of 7 respondents owned houses in the winter villages. A total of 11 respondents agreed with the importance of retrofitting the valley and its traditional livelihood based on organic farming. They also mentioned agro-forestry activities as important but with less livestock. Eco-tourism and nature conservation goals were approved unanimously. Two interviewees considered that not all villages should be recovered due to their non-economic viability and potential negative ecological impact. Although some respondents preferred retrofitting their own village, many considered that the most traditional looking villages should be prioritized such as *Bago de Baixo e Dorna*.

Furthermore questionnaires showed that the majority of respondents were not acquainted with the on-going retrofitting project in Pontes which indicates a lack of participation in the valley governance.

Table 1. Questions and answers on the future of the valley heritage

Question	Options	Answers		
What kind of improvements should be taken in the valley?	<ol style="list-style-type: none"> Better infrastructures Incentives for ecotourism Incentives for organic farming Incentives for livestock breed Incentives for forestry Incentives for nature conservation 	Most agreed with the importance of retrofitting the valley and its traditional livelihood based on organic farming, some agro-forestry activities, little livestock (self-sufficiency), eco-tourism and nature conservation goals.		
What type of heritage should be retrofitted and under which priority?	<ol style="list-style-type: none"> House Watermills Communal Stoves Water tanks Forest houses Bridges Chapels Schools Dams 	Most respondents considered that both the houses and the water infrastructure should be prioritized. Bridges, chapels are already preserved. Forest ranger houses and schools should get a new usage.		
Do you agree with the valley retrofitting? How?	<ol style="list-style-type: none"> All villages Some villages Some parts of a village 	A total of 11 respondents agreed with the valley retrofit and 2 disagreed. The majority (9 respondents) considered that all buildings within the villages should be retrofitted. Only 4 respondents considered intervening in the best preserved buildings should be the way forward.		
Which winter village should be retrofitted first?	<table border="0"> <tr> <td> <ol style="list-style-type: none"> Laceiras Ramisqueira Joao Alvo </td> <td> <ol style="list-style-type: none"> Pontes Mareco Bago Baixo </td> </tr> </table>	<ol style="list-style-type: none"> Laceiras Ramisqueira Joao Alvo 	<ol style="list-style-type: none"> Pontes Mareco Bago Baixo 	Although some respondents preferred retrofitting their village, many considered that the most well preserved villages should be prioritized such as Bago de Baixo e Dorna (village 7,12)
<ol style="list-style-type: none"> Laceiras Ramisqueira Joao Alvo 	<ol style="list-style-type: none"> Pontes Mareco Bago Baixo 			

⁹¹ www.casaecarvalho.blogspot.com

⁹² www.patrimoniocastroje.blogspot.com

4. Barreiro	13. Bago Cima
5. Podre	14. Curveira
6. Assureira	15. Bico
7. Dorna	16. Cainheiras
8. Entalada	17. Ameijoeira
9. Alagoa	18. Varziela

2.2 ESS and restocking

In the valley the human made/artificial and natural systems are combined and deeply connected. This relationship was developed over centuries, creating cultural and ecological settings that can be termed ‘cultural landscapes (Plieninger, 2014). Nowadays Castro valley’s cultural landscape is going through a land cover change due to farming abandonment. One way of identifying these changes is using an ESS framework (Berkel et al, 2011) based on provisioning, regulating, supporting and cultural services.

In table 2 we identify the present changes and predict the impact of restocking while suggesting mitigation strategies.

Table 2. The state of ecosystem services and recommended strategies for a restocking scenario

ES	Trend	Strategies
Provisioning	Since 1940, provisioning services (such as the production of food by agriculture and cattle breeding), have declined in the area due to farm abandonment (Rodrigues 2010).	Newcomers should adopt organic agriculture according to land cover availability per village and small livestock introduction for self-sufficiency.
Supporting	Services (such as soil formation, nutrient cycling and conservation of genetic diversity) have improved due to farm abandonment (Carvalho-Ribeiro et al, 2016)	Resettling should not imply the use of local gravel. Retrofitting villages should be planned to accommodate more habitats for local and endemic species attracting species to the villages, thus reducing people’s wish to access pristine areas. It is also important to control Invasive species introduced by newcomers, through education.
Regulating	Certain functions (erosion control, carbon sequestration and climate regulating) have improved due to pasture grazing decrease and oak forest land cover increase (Carvalho-Ribeiro et al, 2016). However fire hazard has increased due to oak forest expansion which is no longer grazed.	Restocking implies traffic and noise increase thus a low carbon based transportation is recommended. Also fire hazard can be reduced if villagers are engaged in prevention by using forest materials for pellets production or using small scale livestock shepherding. Sewage and water availability are significantly affected by restocking or tourism increase. Rainwater harvesting and local water treatment plants (based on reeds) are some potential strategies to mitigate impact.
Cultural	Since farming is no longer part of people’s livelihood and culture, their identity and heritage conservation has been affected (Carvalho-Ribeiro et al, 2016).	Cultural activities need to be fostered so empowerment and social cohesion can be achieved. Wilderness on the other hand, has been a significant contribution to tourism and education. Preparing and informing newcomers is a vital part of a successful restocking of the valley and relies on knowledge exchange with the locals.

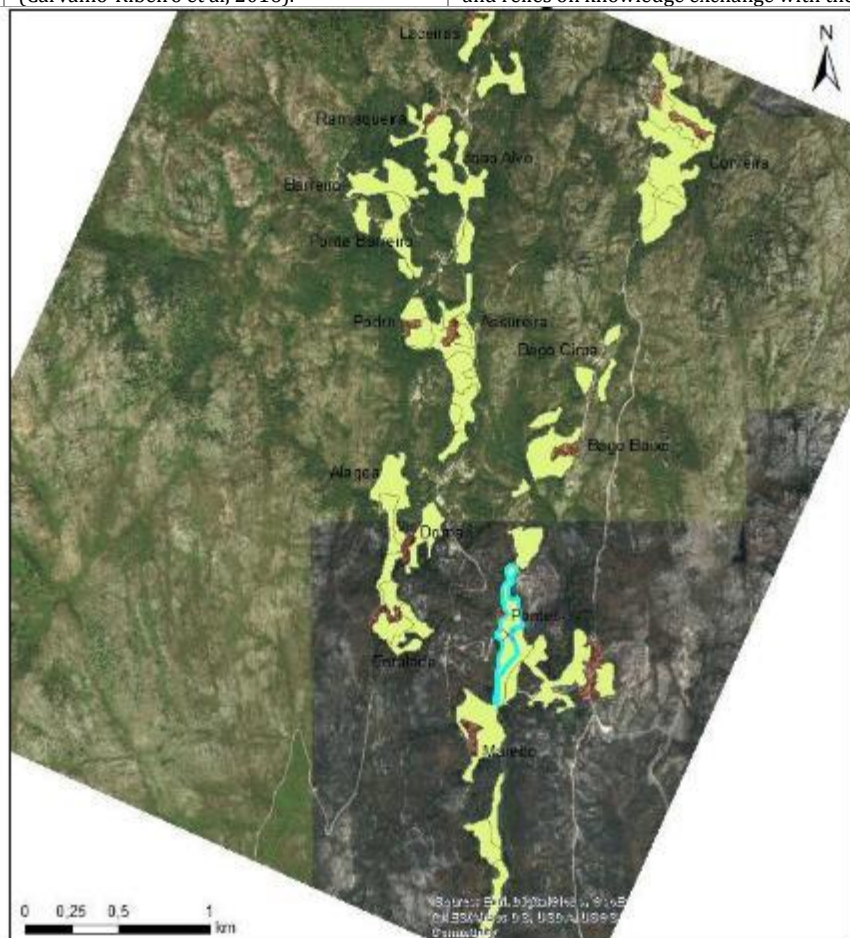


Figure 4. Distribution of the selected (12) winter villages in the valley of Castro (credit: Ines Cabral). Villages are shown in red and crop fields are shown in light green. Pontes crop fields are highlighted in cyan.

2.3 Workshop on the winter village of Pontes

After the interviewing survey, we discussed with professionals (architects) some revival strategies. A workshop was organized in September 2017 involving 6 architects who were introduced to the concept of ecosystem services and the method CAAAP (Cabral, 2008) which was then applied to a winter village, Pontes. The method CAAAP contains a selection of parameters from International and national building environmental assessment schemes (e.g. LEED and BREEAM, LiderA) and integrates the local characteristics of vernacular architecture and the management plan of a specific protected area (Figure 5). The method includes requisites to retrofit the heritage according to 5 parameters: 1) the ESS of the protected area, 2) the local carrying capacity of the village, 3) the local vernacular architecture features, 4) the energy and water self-sufficiency, 5) the capacity to promote innovation and education.

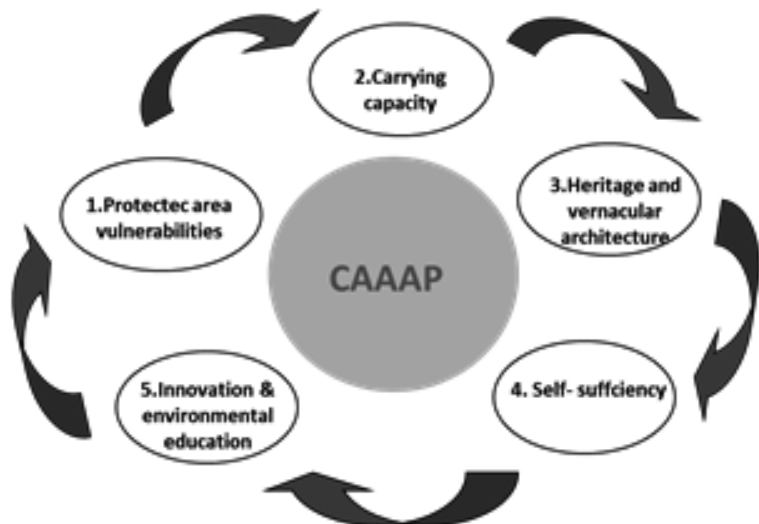


Figure 5. CAAAP method- Environmental Certification of Architecture in Protected Areas.
 Credit: Cabral, 2008

The workshop consisted of visits to two museums in the region, consulting the park management plan, fieldwork in Pontes and a brainstorm session (see blog)⁹³.

As part of the CAAAP method we first identified the natural capital risk of the region upon reading the park management plan. In the valley we identified the most critical risks related to buildings in Pontes: gravel extraction sites as points of increasing erosion, and the proximity of the village to oak forest as a fire hazard. In the past, villagers used to log in the nearby communal forest, mainly for construction. Nowadays, there is still some tree trimming for firewood. Honey production occurs on the fringes of the village. One husbandry takes place close to the village, namely a herd of endemic cow breed still uses the pastureland near the river Laboreiro.

Pontes’s low altitude (740m) provides a microclimate for edible tree species. The village is the most distant winter village from the town of Castro. On the west side it is protected from winds by a rock formation. The village is facing east and has a small creek that runs from North to South. In the past the fields used irrigated water from an aqueduct connected to the dam of Pontes. The village has 22 houses, clustered into three groups (Sampaio, 2010). Only the central cluster (5 houses) is partially being retrofitted (figure 6 e 7) for tourism⁴. It will later include a restaurant, a communal stove, a windmill and a threshing floor. The houses are two stories high and are typical houses of vernacular architecture built with local granite and oakwood, where heating was provided by local firewood (Correia et al, 2014).



Figure 6. Winter village of Pontes: buildings under construction are shown in red
 Source: adapted from Municipality of Melgaço, 2017

⁹³ <https://m.facebook.com/aldeiadepontes/>

3 RESULTS

The workshop exercise predicted key elements of the re-settling/ reviving strategy for Pontes and its implications for the region. The first strategy consists of a portfolio of long term (non- seasonal) activities compatible with nature conservation. The second strategy includes a database for advertising the heritage in Pontes as well as in other villages. The third strategy is a list of design guidelines for self-sufficiency of buildings and villages.

3.1 Portfolio of activities in the village

Current tourism is the main summertime source of income, so in order to diversify it we developed a calendar of complementary seasonal activities for the villagers and tourists (Table 3)

Table 3. Activities along a timeline for the valley of Castro

Art retreats/ construction techniques workshops / handcrafting/ organic produce/ husbandry				
December-February		March-June	July-September	October-November
Mountaineering	Snow	Honey production	Water sports	Mushroom harvesting
tourism	Water cycle			Smoked meat
				Biomass harvesting
				Honey

The activities recommended for winter time are mountain trekking, snow tourism and activities based on the water cycle. During spring time, recommended activities are honey production and pedagogic activities. During summer, water based activities should be fostered like canyoning. In the Fall there should be a combination of activities like mushrooms harvesting, logging for pellets production and sausage smoked preparation. Participants also mentioned that some long term activities should take place, such as artist retreats, as well as workshops on traditional building techniques. Organic farming, husbandry (e.g. goats local breed for fire control) and handcrafting are also potential permanent activities. Senior tourism, generation mixing cultural events and therapeutic tourism were also suggested.



Figure 7. The winter village of Pontes and its central cluster of houses (credit: Justnature). Photo at right shows buildings under retrofitting at the time of the workshop.

3.2 A database of buildings

Due to the vast derelict heritage in the valley of the wintervillages, we developed a tool compiling the houses available for sale. This database, called *Bolsa de Casas Castrejas*⁹⁴, provides information on at least 5 buildings per village. Each village is described as well as the house, its conservation status and available services. The goal is to promote the webpage both nationally and internationally (mostly in Germany and Netherlands) so investment can take place integrated in a holistic strategy for the valley. Unlike the database for Idanha, (e. g. Banco de Terras)⁹⁵ which is only in Portuguese, the *Bolsa de Casas Castrejas* is available in English.

3.3 Strategies for Pontes food viability and energy self-sufficiency

We developed strategies for Pontes that can be replicated for other villages. We estimated a total of 219 houses in the valley, scattered in 12 villages, which means an average of 20 houses per village that need retrofitting. This means each village can host at most 60 people, i.e. an estimate of 3 inhabitants per house. In our study for Pontes we considered that 30 people were residents and 30 were tourists (1 tourist per house).

We propose mitigating the environmental impact of retrofitting the village by using low energy embodied materials and reaching energy self-sufficiency, since buildings consume large quantities of resources (e.g. materials, water and energy). We used previous studies for Pontes that showed energy self-sufficiency is possible for at least 13 clusters (22 single houses) occupied by a maximum of 60 people. This means retrofitting a total floor area of 1697m², which requires 333 MWh per year, for lighting, water heating, indoor heating/ cooling, appliances, public illumination and also transport with electrical vehicles. The key energy sources are wind energy (82%) and solar energy (18%). During winter a micro-hydropower plant is required to provide 5% of energy requirements.

To reduce the building embodied energy and energy consumption, we considered using low impact materials). Selecting wood for structural elements, cork for insulation, wood for window frames and the incorporation of ashes in concrete allowed a reduction of energy consumption of 54%, which represents a reduction of CO₂ emissions of 64%. Adding these savings to the overall village consumption represents a total of 687 MWh/year as opposed to 1493 MWh/ year of a conventional retrofit (Cabral, Coelho and Machado, 2013).

Other provisioning services, like food and water self-reliance are also critical for the valley population restocking plan. We based our calculations for Pontes on a previous study done for Evora (Coelho, 2013). Since water is not so critical in Pontes (rainfall is around 3000mm per year) we only considered necessary to provide rainwater collectors and distribution system within the village.

⁹⁴ <http://home.uni-leipzig.de/idiv/casas-castrejas/>
⁹⁵ <http://bancodeterras.recomecar.pt/>

For the local food production we had to determine the food shed necessary for 30 people. According to Coelho (2013) the average human daily intake is 2200Kcal per adult, 2500 Kcal per senior and 1300 Kcal per child. We considered a group of newcomers with 1 child (5%), 25 adults (82%) and 4 seniors (12%) based on a population composition of the semi-rural town of Evora. The total food needs will require an estimated bio productive area of 11ha (annual).

We then measured the farming area around the village of Pontes which comprises of 12 ha (see figure 4). This area is presently allocated for pasture but in the past it was mostly comprised of cropfields. If we consider that crop fields usually need 80% of land cover (9ha out of 11ha) and livestock uses the remaining 20% (2.2 ha), we estimated up to 20 goats could be bred in Pontes. The village would also be able to expand pastureland to communal land (oak forest). We only considered the food needs of 30 residents, thus excluding tourists. Dietary choices of the population can ultimately reduce the overall food footprint if a vegan lifestyle is adopted (Saavedra et al, 2017).

4 DISCUSSION

Reviving villages in a sustainable way can be the best strategy for a protected area as it allows ecosystem services and cultural landscapes to be preserved simultaneously. For our case study we applied several strategies developed in rural Portugal and adapted them to Castro Valley. First, and inspired by the database «Bolsa de Terras» (Idanha) we created a website containing the heritage of 12 winter villages to be advertised among newcomers. Second, and based on the Amoreiras documentary called «My dream village» we assessed the villagers vision for the valley by conducting semi-structured interviews (including questionnaires), validating our hypothesis that the valley revival is a shared goal among the interviewees. Third, as part of the strategy to convert the valley into a modern multifunctional rural space, we developed a portfolio of permanent activities, for the winter village of Pontes. Both in the case of the vision for the valley and the portfolio (as well as the making of the Bolsa de Casas), we used participative action research methods, so we could assess the stakeholders interest in the matter, and at the same time inform them about the challenges and solutions for promoting the restocking.

Finally and inspired by the village of Lakabe food and energy self-reliance, we also propose guidelines for a restocking of 60 people in Pontes. Finally we addressed the social and economic challenges of a restocking intervention for the winter villages. As the national market may potentially provide investors but not settlers (summer houses are more popular than residences), we consider also important to promote the Bolsa de Casas castrejas, abroad. Integration will thus be an important challenge to be addressed.

Future for the region needs to tackle the integration issue. In light of the present social weak cohesion among Castro community is (and recent newcomers tend to struggle to feel integrated) we consider that promoting cultural events will improve dialogue and initiate a relief mode in a community that has been fragmented by migration. A way to achieve that goal according to Boal (1995) is communitarian theater, as it can promote knowledge transfer on local traditions and livelihoods and local natural assets. Exhibition of good practices in other case studies can eventually initiate a debate and foster interaction (e. g. Idanha Recomeçar programme, The Amoreiras village initiative, the Quintalógica in Sistelo and the eco village of Lakabe or Matavenero).

5 CONCLUSIONS

Reviving a rural area is a task that requires multiple approaches. We studied strategies applied in other initiatives and adjusted them to the specific case of the valley of Castro and its challenging location within a protected area where ESS are critical for humans but also for wildlife. We showed that balance between human restocking and the cultural landscape is possible in Pontes by estimating a new population according to local resources, if engaged in a portfolio of sustainable activities, but also including social and cultural strategies for better integration of newcomers. Future goal will consider Pontes case study to be replicated in other winter villages.

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