EARTH CONSTRUCTION AS CULTURAL VALUE

REAPPROPRIATION OF ADOBE'S CONSTRUCTIVE CULTURE IN AVEIRO



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the Master's degree in Architecture

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INTRODUCTION

Espace as a cultural Identifier

Faced with several technological manifestations present nowadays, we live an exhaustive system of consumption and waste. This unconscious behaviour has defined a generation accustomed to a industrial production system. Progressively, we are faced with the decline of technical and specific knowledge, resulting from popular traditions. We have replaced hand-crafted work, a reflection of local culture, with scientific and rational methods, bearers of a foreign culture.

The characteristics that have been produced over many generations are weakened by a unitary methodology that simplifies the identity expression of a culture. A lot was lost in terms of cultural expression and vernacular construction. Earth like many other natural materials, has been devalued after compared to synthetic ones and once our perception of beauty turned out for manufactured materials.

I remember when my grandmother used to tell me about her life in the state of Paraná in Brazil, where she lived in a typical rammed earth house. With delight, she would describe how earth properties would adapt to the hot-dry climate. Despite its appearance, as she would consider, it was more comfortable than living in a house made of ceramic bricks and concrete, as she owned in the state of São Paulo.

Regardless of the emotional bond, the motivation to approach earth architecture comes from the responsibility of preserving and recovering vernacular construction into contemporary demands. Earth construction has been a means that contributes to the current ecological transition, once it is accessible, sustainable and durable. It rises upon the need to preserve and protect social and environmental heritage, reaching a visual correspondence that addresses a varied public.

Earth construction will never be the single response to contempo-

rary architecture, and it cannot replace the technicity that others materials provide. The discussion raised here considers a fine line between tradition and culture. Presuming there are still societies that rely on local traditions to develop their techniques and protect their heritage. The interest in keeping alive a local tradition of constructive culture is due to the importance of sustaining a holistic approach to architecture in socio-cultural, socio-economic, bioclimatic and technical development. It is necessary to base collective practices of solutions for the sustainable development of regions facing insufficiency of resources and the devaluation of their local cultures.

Portugal, among many other European countries, calls our attention to an enormous heritage in earth architecture. This heritage has been for many decades, unrecognized in the core of local cultures. Earthen construction in Portugal has an original and authentic constructive heritage that forms the Popular Portuguese Architecture, enriched by the local traditions that need to be preserved.

As is the case of Aveiro, in the centre of Portugal, a city estimated by a significant constructive culture of adobe. This culture has been gradually weakened and lost by locals due to the difficulty of keeping the knowledge alive and passing it along to other generations and due to new construction regulations. It is before these motivations that address the subject deepened during the present work: How to reappropriate adobe's constructive culture in Aveiro.

OBJECTIVE, STRUCTURE AND METHODOLOGY

The current work rises from the willingness of convening earth constructive culture to generate a socio-cultural awareness through the development of a cultural project asserted in two design dimen-

sions. One based on theoretical consideration, where will be raised the most relevant issues referring to the decline of the adobe's constructive culture in Aveiro, and another one, to situate the theoretical dimension into a practical case.

The first three chapters will be mainly dedicated to reveal and expose the challenges and paradoxes concerning earth and vernacular construction, but more specifically, referring to adobe's constructive culture in Aveiro. The first chapter is dedicated to defining what is a cultural expression in architecture, introducing terminologies and concepts to identify constructive culture and participatory architecture. The second chapter will focus on earth technical variations and performances to identify the main challenges on the continuity of earth construction. And the third chapter will focus on the cultural aspects involved in the adobe technique in Aveiro, settling the most relevant aspects to the conservation and continuity of earth constructive culture.

The last chapter will focus on converging the main principles raised throughout the theoretical part, based on socio-cultural, socio-economic, environmental and technical approaches, to apply into a practical case study. The project that will be designed addresses the village of Santo André de Vagos located in Aveiro district, where a cultural centre project will be developed to enabling strategies of social and cultural interest to reappropriate adobes' constructive culture in Aveiro.

Given the attention to reappropriate a practice of construction focused on socio-cultural strategies, the methodology approaches will focus on finding the most current issues. This strategy will be achieved through technical visits to the community and interviews with the local inhabitants to be able to and develop a project that will value the local materials and technique.

"All the peoples who have produced architecture have developed their own style that is as specific to them as their language, their clothing or their popular traditions" [1]

FATHY, H. (1969)

CHAPTER **ONE**

ARCHITECTURE AND CONSTRUCTIVE CULTURE



1. The preparation of the earth for the manufacture of adobe in Aveiro. Credits: Luis Pinheiro

I.1 - CULTURAL EXPRESSION IN ARCHITECTURE

I.1.1. Espace as a cultural Identifier

Space, (*spatĭum,ĭi*), can be interpreted in several ways. First studied in philosophy, it was always associated with mathematics and metaphysic. Along with the notion of time was classified as a simple means to categorized things. This notion came to a new perception after the mathematician and philosopher René Descartes considers space an absolute matter, identifying the body and the senses into spatiality. The principle of spatiality will then achieve three different dimensions: mental, physical and social.

> *N. Chomsky postulates, a mental space endowed with defined properties: orientations and symmetries. He generously gives himself the passage of this mental space of language to social space where language becomes practical.*[2]

The philosopher Henri Lefebvre in his discourse *La production de l'espace*, uses the example of the linguistic N. Chomsky, who distinguishes all these dimensions in one act. He starts in a '*mental space*', which is the capacity of discernment by orientation and symmetry, he takes this capacity into practice (physical space), within a materialized space (social space).

The materialized space evokes the sense of appropriation, positioning and attachment, where is kept everyday practices and a specific way of living. In the book, *The Practice of Everyday Life*, by Michel de Certeau, the author "*contends that everyday practices like speaking, walking, reading, writing, travelling, dwelling and cooking are significant as they construct their specific logic and space*."[3]

The author gives the example of the Spanish colonizers who imposed a new way of living to the South American Indians. In this case, the sense of space involves much more than just a territorial sense, but an invaded space, that will be submitted to new rules and unwanted changes.

1 FATHY, H. (1969). Architecture for the poor. pp. 130-131

2 LEFEBVRE, H. (1974). La production de l'espace. In: L'Homme et la société. pp. 15-32.

3 CERTEAU, M. (2013). Chapter 3 Michel de Certeau and Resistance as the Practice of Everyday Life. pp. 56-80.

This notion of space that suggests the bond we create with other individuals, marked by traditions, art and rituals, defines a way of living, defines a relational space that interferes in our social well-being. Is this notion of space that will be discussed in the present work, as a dynamic living tissue, that shares sense and significance, not as a simple technical knowledge, but as cultural expression.

I.1.2. Ethnicity, Boundary and Social Space

> *Everything refers in fact to this differentiation which makes possible the isolation and interplay of distinct spaces. From the distinction that separates a subject from its exteriority to the distinctions that localize objects, from the home (constituted on the basis of the wall) to the journey (constituted on the basis of a geographical "elsewhere" or a cosmological "beyond"), from the functioning of the urban network to that of the rural landscape, there is no spatiality that is not organized by the determination of frontiers.*[4]

Boundaries are set by different factors, relating and interconnecting a group of people or things that correspond to a certain culture; these groups differentiate themselves in socio-cultural practices, in biological and ecological variations, in communication and fundamentals. Ethical boundary, also known as *"social organization"*, set social boundaries by daily life practices creating cultural marks. These practices generate an ethnic identity that is transformed by social acts as a product of an individual or collective performances.

However, ethical boundaries or identities are not immutable. It is shaped according to a socio-cultural context, policies and social space. "*Ethnic identities are also rooted in place context, because different social compositions lead to varied expressions of group identities*"[5]. According to H. Lefevbre, *"social space is a social product"*, as they are attached to a society production system.

4 CERTEAU, M. *op.cit.*, p. 11.

5 SMITH, J. (2012). Ethnic Identities, Social Spaces and Boundaries. In: *Polyphonic Anthropologie: Theorical and EmpiricalCross-Cultural Fieldwork*. pp. 188-202.

"*De plus, la pratique spatiale consiste en une projection « sur le terrain » de tous les aspects, éléments et moments de la pratique sociale.*"[6]

In the simultaneity of the various existent spaces, the *"architectural space"* intervenes as a social product, socially built, composed of different cultural expressions reflect a period that testifies for many generations. The identity of a group of people is found in the architectural space. It is expressed from the urban landscape to the rural areas, almost as a geographical identity, where cultural expressions are symbolically transmitted to physical space, interacting between past and present, which connects to the memory of a place.

I.1.3. Temporality in the Territory. Memory in Heritage

The identity of a society is defined through space, but also through the notion of time (*Tempus,ŏris*). The Latin word for time carries both meanings, space and time, or room and duration; until A. Einstein considers time into a "*common coordinate system*"[7]. The perception of temporality will be then, introduced by the need to regulate the capitalist system of production; where time will be perceived as a continuum border between past, present and future.

Temporality implies the ongoing work of a group of individuals who characterize themselves through their customs and thus differentiate themselves from other groups. Time, or the sense of temporality, is part of continuous work of building a place, and now the word place will replace the word space, once it is used in an abstract sense, while the word place is used to transmit the idea of a realness, where we live and "*give names, assign senses, feelings and meanings*". [8]

The sense of place is also found in the definition of landscape, creating a bond within men and nature. Still, landscape differs

6 LEFEBVRE, H. *op.cit.*, p. 11

7 (2005). Space. In: *The Grammar of Graphics*. pp. 359-360

8 SANTOS, P. Lugares como espaços de memória. In: *Cultura e Arquitectura: Incursións Antropolóxicas no Espacio Construído*. pp. 91-108

from nature because it is continuously modified by the daily practices of a group of people. D. W. Meinig has defined a symbolic concept of landscape when he stated: "*We regard all landscapes as symbolic, as expressions of cultural values, social behaviour and individual actions worked upon particular localities over a span of time.*"[9] This concept of landscape gives an allusion to a personal perspective upon it. It reflects the idea of different personalities perceiving a place differently because each person carries a distinct image of reality. But the author also quotes time within the landscape. Once again, he reinforces the fundamental of memory into place.

In "Invisible cities" by I. Calvino, the author discusses city and memory, saying that cities are not made of architectural elements "*but of relationships between the measurements of its space and the events of its past (...) The city, however, does not tell its past, but contains it like the lines of a hand.*"[10] Memories have the power to interconnect past, to present through feelings and meanings, assigning importance to heritage values. Heritage otherwise attributes value to social identity by preserving local culture, as traditions, language and even, building, consequently in-depth in historical heritage.

Therefore, cultural value comes from the notion of space as a dynamic living tissue that crosses temporality when a group of people set boundaries by their socio-cultural practices. The practices of everyday life, when passed through generations, strengthen cultural and social fundamentals. The material dimension of a constructive process carries an immaterial one inherited from cultural memory. But how keeping the memories held from constructive practices alive? How continuing transmitting principles and traditions from generation to generation? So far, it was discussed the importance of social space for the establishment of cultural values. From now on, it will be discussed how to perpetuate these practices throughout architecture, considering a holistic approach that goes beyond one-off experiences.

9 MEINIG, D. (1979). Symbolic Landscape. *In: The interpretation of ordinary landscapes.*

10 CALVINO, I. (1978). *Invisible Cities*. pp. 10-11.

I.2 - GLOBALIZATION: BETWEEN TRADITION AND CONTEMPORARY NEEDS

I.2.1. THE EVOLUTION OF GLOBALIZATION IN VERNACULAR ARCHITECTURE

Throughout history and time, groups of people have acquired different forms of culture, producing a social system that contributed to the spread of more complex societies. In search of resources and energy, many of these civilisations sought to increase their potentials through colonization, a repressive and violent system that divided local traditions into colonies and third world workers.

> *The anxiety to develop faster and to elevate the people's lot in the shortest possible time results into undesirable situations. (...) Unfortunately, the impact of such acceptance appears rather late. The changes begin to affect the working method and lifestyles of the people.*[11]

Increasingly, through the industrial revolution, new ways to transform energy were invented, tools that released humanity from depending directly on the environment. Many nations tried to adapt to modern needs, and it was assumed that modernity would come uniquely from economic progress. Quickly, without questioning, many nations started to respond to development in deprivation of their natural environment, submitting their values to limited solutions and conditions. The phenomenon of globalization reached a point in nature and humanity where the decrease of natural resources and ecological disasters have completely taken over.

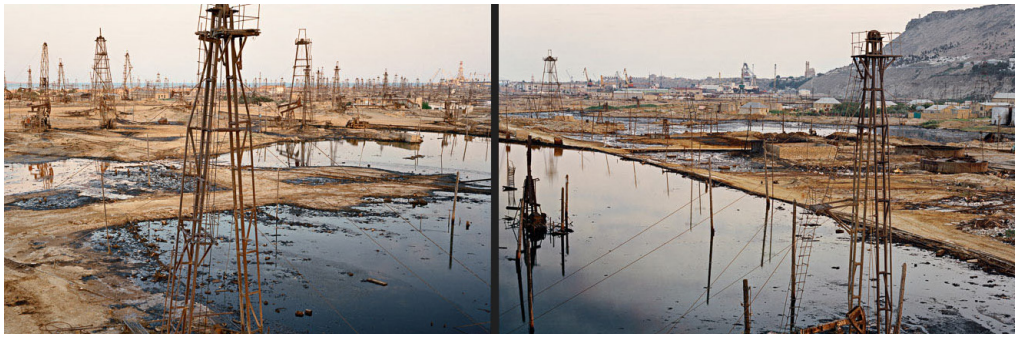
> *Humans cut down forests, drained swamps, dammed rivers, flooded plains, laid down hundreds of thousands of miles of railroad tracks, and built skyscraping metropolises. As the world was moulded to fit the needs of Homo sapiens, habitats were destroyed and species*

[11] DOSHI, B. (2005). Values and Scales. Musings of an architect. In: *Balkrishna Doshi: Writing on Architecture and Identity*. pp. 56-65

2 Edward Burtynsky series of photographies on the environmental changes due to the process of globalization







> *went extinct. Our once green and blue planet is becoming a concrete and plastic shopping centre.* [12]

In response to the dilemma of technology, architecture faces an uncoordinated development based on new technological materials and a modern construction system in loss of natural local elements and constructive culture. The exaltation of one in deprivation of another causes inequality, reflecting a system of extremes that settles a wall between what is modern and what is old. This misconception of 'modernity' creates a culture based on propagating what is made abroad, weakening the manifestation to local materials.

> *Les architectes se sont alors déguisés en industriels et ont embrayé avec enthousiasme sur leur nouvelle modernité : elle était jolie lorsqu'elle était jeune et ingénue mais elle s'est vite révélée une technique de déshumanisation. Tout ce qui existait était interdit car cela pouvait rappeler le passé : donc une horreur... Ils ne supportaient que du neuf et construisaient tout comme des usines. En plus, c'était laid et personne n'a jamais aimé ça...* [13]

The evolution of globalization does not depict a discourse against technological development. Technology is certainly a relevant improvement of society, and it ought to be used in order to contribute to our daily tasks, reflecting a more permissive contact between man and nature, instead of a result of conspicuous production and consumption. The manifestation of cultural expression in architecture has profoundly contributed to a new era in design, where tradition takes place, not as a means to stagnation, but as a tool to reconsider contemporary approaches. To maintain tradition alive and mostly, to rethink how to use natural resources in response to contemporary needs. As designers and planners, we need to consider nature as a *"mode of interaction of each cultural form"* [14] bringing together nature as part of cultural expression in a society.

12 YUVAL, H. (2015). *Sapiens. A brief history of humankind.* p. 123
13 KROLL, L. (2010). Brève histoire de la modernité. *In*: *Construire ensemble le grand ensemble : Habiter autrement.* pp. 38-43.
14 DOSHI, B. *op.cit.*, p. 59

I.2.2. WHY VERNACULAR ARCHITECTURE?

Recently, vernacular architecture has been emphasised as a mean for sustainable architecture. Vernacular, originated from Latin vernaculus 'domestic, native' (from verna 'home-born slave'), started to be used in architecture in the 17th century, concerning a domestic and functional building rather than public and monumental ones. This exhaustive system of production and consumption has brought humanity into consciousness for new alternative approaches to interact with nature, preserving and respecting it. The word 'vernacular' refers to the value of something handcrafted, containing a personal interpretation that was, therefore, made out of natural resources. This perception of vernacular was also employed in architecture to identify a group of people by their local materials.

Although, this conception of vernacular exists due to its opposite sense. It means that in ancient traditions everything was composed of craftwork and local material. Our ancestors did not have this perception of merchandized and standardized goods. The term 'vernacular architecture' begins to be used around the late eighties, when writers, sociologists and architects reintroduce a disregarded traditional and popular architecture. Its definition may be divided into two main concepts, the idea of tradition and the idea of transmission.

> In vernacular architecture they (traditions) may be related to the appropriation, preparation and working of certain building materials and resources, which can require specific knowledge and skills. But the means of transmission can be far more varied; they confirm that vernacular technology is closely related to 'know-how', acquired as efficiency is tested over time. [15]

The term may also refer to buildings made by "people in tribal, folk, peasant and popular societies where an architect, or specialist designer, is not employed." [16] It means that vernacular is also an expres-

[15] OLIVER, P. (2006) Built to Meet Needs. Cultural Issues in Vernacular Architecture .

[16] VEGAS, F. (2014). Defining sustainable architecture. In: *Versus, Herritage for tomorrow* . pp. 35-40

sion of popularity or a 'people's architecture', which releases a new (or ancient) concept of construction, where the community was an active part of a project, guiding the architecture to a "beauty conscience"[17], interplaying with the ecological diversity, economic and social approach, inherent skills, traditions and symbolisms.

[17] FATHY, H. (1969). Architecture for the poor. p. 18

I.2.3. Sustainability. The in-between.

As the word '*vernacular*', '*sustainability*' has recently been commonly used to express the architecture's loss in an appropriate environmental approach. The concept of sustainability takes into account energy optimisation and material's life cycle, to conceive an architecture that reduces the impacts on the environment, to preserve it.

The term can be associated with '*vernacular architecture*' because it concerns the interaction between people and the local environment, compelling the habitants of a certain region to self-adaptation toward finding local means to be protected and relish from nature, providing a sustainable construction regarded of technical development. Other terms such as '*passive ecological*', '*bio-architecture*', '*echo--tech*', etc... are meant to point out an architecture which interact with the environment and act as a complement of social, economic and cultural development.

I.2.3.1 Environmental Sustainability

A path towards sustainability could be find in the combination of both, tradition and contemporariness. We have seen through history that the technicity of constructing was essentially composed of resources available and know-how. After many decades, humankind rejects their constructing method giving space to industrialized materials that require innovative technology and new speciality. Once realized the harm modernization caused not only for the environ-

ment but also to cultural identity and steady economic progress, we have started to seek a balance between ancient and contemporary. After all the policies and regulations supported around the world to rethink '*Our Common Future*' [18], a common-sense started to spread.

> *These conditions required an urgent transition towards environmentally-friendly sustainable strategies, the main goal of which is to preserve the planet's life-support system and restore the appropriate balance between human and natural habitats.*[19]

Sustainability intends to "*respect environmental context and landscape, benefit from natural and climatic resources, reduce pollution and waste material, ensure human indoor comfort and mitigate the effects of natural hazards.*" [20]

I.2.3.2 Socio-cultural Sustainability

According to Goodland socio-cultural sustainability is "*achieved only by systematic community participation and strong civil society. (...) and requires maintenance and replenishment by shared values and equal rights, and by community, religious and cultural interactions.*"[21]

We have now seen within participatory architecture and the influence of cultural expression in architecture the apparent distinction between material and immaterial values. As construction sites are not made exclusively of technical knowledge but the transmission of a culture and is that acting of sharing a technical knowledge that transcends from tangible to intangible value. Then, socio-cultural sustainability aims to generate a conscience around the commission of social and cultural significance, promoting *the protection of cultural landscape, the transfer of construction culture, the improvement of creative and innovative solutions, the recognition of intangible values and the encouragement of social cohesion.* [22]

18 Brundtland Report. Published in 1987 by the United Nations through the Oxford University Press.

19 VEGAS, F. *op.cit.*, p. 23.

20 VEGAS, F. *Ibidem*

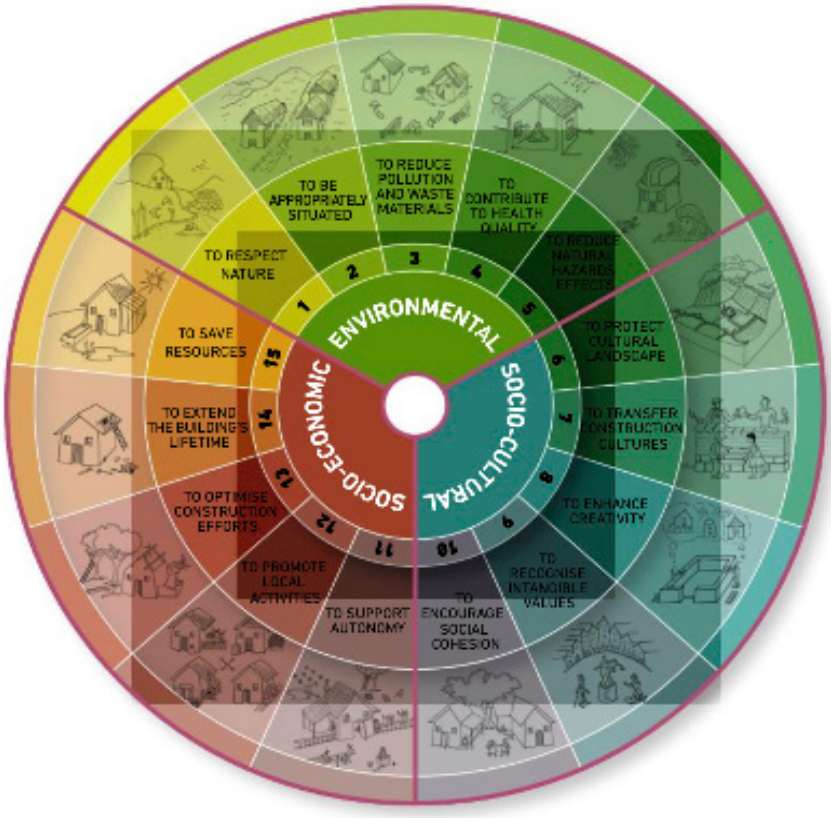
21 GOODLAND, R. (1995). *The concept of environmental sustainability.* pp. 1-24

22 ACHENZA, M. (2014). Socio-cultural Sustainability in Vernacular Architecture. *In: Versus, Herritage for tomorrow* . pp. 41-49

I.2.3.3 Socio-economic Sustainability

Economic strategies may contribute to sustainable development when used to strengthen a local community to settle its values through their craftwork. This initiative occurs mainly in rural areas where the community can use the local resource to produce self-sufficiency and energy-saving policies. It optimises the community development by the system of communal life supported by sharing knowledge, material and energy. Socio-economic principles consist of *supporting autonomy, promote local activities, optimise constructions efforts, extend building's lifetime and save resources.* [23]

[23] CORREIA, M. (2014) Socio-economic Sustainability in Vernacular Architecture. *In*: *Versus, Herritage for tomorrow* pp. 57-63



Wheel of environmental, soci-cultural and socio-economic sustainable principles.

In: CORREIA, Mariana, DIPASQUALE, Letizia, MECCA, Saverio, 2014. *Versus, heritage for tomorrow : vernacular knowledge for sustainable architecture.* Florence : Firenze University Press. p.27.

I.3 - CONSTRUCTIVE CULTURE AND PARTICIPATORY ARCHITECTURE

I.3.1 Constructive Culture. A contemporary path to Tradition

A considerable method to contribute to the perpetuation of a culture is to keep on responding to contemporary needs through history, tradition and culture. Architecture performs singularly in all these cultural elements, as it may be defined as an expression of art in the landscape to reflect the particularities of a group of people, following specific conditions of the environment to create shelter and fulfil human needs. Therefore, architecture should not be a personal expression of art. However, it should attend communal interests, attempting to the individuality of each society aiming at timeless principles.

A constructive culture relates to the immaterial and material dimension of construction. It explores the interaction of a human being with its environment, contextualising the practices adopted in the creation process of your habitat. The term originates from the words '*culture*' and '*construction*' that comes from a distinctive nature. While the term '*construction*' may be applied to a technical domain, the word '*culture*' comprehend an anthropological study of a society, as we have seen.

When combining both dimensions is possible to assume the complexity of constructive practices, also relied on an ethical sphere where resources and know-how are manipulated in accordance to the principles of a certain culture. The concept of constructive culture holds on cultural diversity, supporting the local development of a region. That process takes into account the sociological, economic, environ-

mental analysis concerning a cultural value.

> *The vernacular architectures have always reflected, in their production, the societies that produced them. And today this is no different. However, as a consequence of a set of transformations that occurred in the corporate structures, on a global scale, intensified by the processes of industrialization, urbanization, modernization, globalization, etc., they modified if deep the production gears of these popular habitats.*[24]

But how to respond to the housing production process in contemporary society? To begin to answer to that question is necessary to look at constructive practices in ancient traditions. When analysing a group of people (as Eskimos or South American Indians) living in a specific physical and climatic context, we noticed that they ought to differ from other groups in available resources and constructive process. Therefore, their philosophy of building will change considerably. They will logically have another system to organize, to memorize, to transmit their ideas and even to represent themselves in society.

Constructive Culture is right in the middle of both contexts, material and immaterial concern. It defines the production process and the interaction between an individual and its natural environment. T. Ferreira, in *traditional and contemporary constructive cultures*, illustrates the tradition of the community of Djenné in Mali,

> *Every year the same ritual is repeated. During the dry season, the population of the city of Djenné, Mali, gathers in celebration to carry out the maintenance work of earth plaster of Djenné's mosque (...) Generation after generation, the local population has transformed the need to carry out this work into the city's largest cultural event.* [25]

The example of Djenné community is characterized by solidarity and tenacity (sense of place and community), that even currently

24 FERREIRA, T. (2014). Traditional and contemporary constructive cultures: A comparison between building process. In: *Vernacular Heritage and Earthen Architecture.* pp. 153-158

25 FERREIRA, T. *Ibidem.*

uses this method of gathering to perpetuate customs and protect their heritage. Therefore, whether a house or a public building, they should both express a social process of designing, planning and production, rather than a transported architecture, created as a merchandized tool.

I.3.2. Participatory architecture: Keeping knowledge alive.

"*Autant que de bâtir, il s'agit d'utiliser l'architecture comme un vecteur de transmission de savoirs, un art de la relation.*" [26] Architecture as an art of relationship, built by the interaction between humankind towards its environment, aims to transfer knowledge and establish a dialogue between past, present and future, by preserving heritage and strengthening constructive culture through participatory planning.

Territory, a place of social development, to which we designate values, symbologies and bonds, must be analyzed according to its cultural, ecological and economic dynamics to promote the good social being and preserving the ideology that citizens should exercise the right to the city. The participatory process is a citizen's interest. Instead of standard typologies, often created by a single actor, remote from the social context of a community, it is necessary to intervene with participatory practices, transgressing the strict model of repetitive design, creating the principle of decision-making collectively.

> *The maturing of skill is an experience of considerable spiritual value to the craftsman, and a man who acquires the solid mastery of any skill grows too in self-respect and moral stature (...) Each craftsman individually gains in understanding and dignity, while the village collectively acquires a sense of society, of interdependence and brotherhood that only such cooperative achievement can give (...)* [27]

26 BOUCHAIN, P. (2010). *Construire ensemble le grand ensemble : Habiter autrement.* p. 19

27 FATHY, H. (1969). *op.cit.*, p. 21.

The Egyptian architect, Hassan Fathy, relates the role of spirituality and dignity to architecture, making clear that the social dimension rises from a sharing system of knowledge. He also affirms that the participatory process should start at the design process until the construction site, where the youngs have the opportunity to learn by developing a sense of significance and value to manual work.

Once, the young generation is able to recognize the importance of craftsmanship they are capable of understanding the beauty of the local product. And therefore, to promote cultural organizations to strengthen this living organism that is the territory that will keep on growing throughout tradition and community activities. By doing that, a village will achieve absolute harmony and persistence to its visual identity. Where they will be guided by their sense of creativity, an expression of their own identity, rather than attempting to a transplanted architecture. Consequently, is necessary to include a community as an active part of a project to create the symbol of a society which is their cultural expression and identity.

CHAPTER **TWO**

EARTH CONSTRUCTION TECHNIQUES

From technique to social challenges



3 Essay reproducing the preparation of the adobes in Aveiro. Credits: Luis Pinheiro

II. Earth construction techniques

From technique to social challenges

Throughout human evolution, ever since the first civilisations, earth has been employed in different kinds of construction, from shelters to large cities. The oldest identified structures date from over 9000 years. [28] Contrary to the collective image of a vulnerable and fragile material, earth has proven its capacity through diversity and universality. It certainly comes from the fact that it is the material most found and accessible once transporting raw material from distant regions was not an option.

When noticing the adaptability of earth structures, the first construction techniques started to evolve. Throughout time and based on the quality of the earth and the tools available, earth structures were made of wood frameworks covered by mud or adobes, and then stacked up to build a surface, compressed earth. However, a distinct technical constructive procedure was not only a matter of resources or tools, it implied a different social behaviour. For instance, to build with adobe is different from building with rammed earth, because apart from the different environmental conditions needed for each technique, it requires a varied rhythm and hierarchy during the construction site, as the number of people and the needed interaction between them.

Therefore, the multiples variants of earth construction will be analysed, from now on, going through the most significant characteristics of the construction process, as the compositions of soil, implementation methods, additives and finishing. This chapter aims to understand the main technical principles of earth construction in the first foreground. And consequently, be able to identify the objections present in the application and performance of the technique. To finally understand the social challenges of promoting the diffusion and continuity of earth construction in contemporary times to fur-

28 MINKE, G. (2006). Building with earth. Design and technology of a sustainable architecture. p. 11

II.1 - EARTH CONSTRUCTION TECHNIQUES

II.1.1. TECHNICAL AND COMPOSITIONAL VARIETIES

Earth construction is categorised as any variety of construction made of raw earth without altering its properties. From a raw material that is usually considered fragile, it is possible to achieve considerably resistant and durable structures. By the quantity of water added, the mixture will originate different physical states of earth that depends on three fundamental proprieties: texture, plasticity and cohesion.[29] These criteria are the most important ones, all along with the technique applied, to provide a solid and durable material.

To classify and systematize the various process of constructions, *CRAterre*[30] created a diagram to categorize the eighteen possible solutions to earth construction, from ancient to modern techniques. The most important groups are **A.Earth as monolithic and load-bearing material B. Earth as a load-bearing material C. Earth as a filling for a support structure.**

Earth as monolithic and load-bearing material is composed of five main techniques: Dug out, Poured earth, Stacked earth, Direct shaping and Rammed earth. Each of the five variants is related to a distinctive constructive process that is made usually *in situ* and it consist, respectively, of either digging out the terrain and working the negative space, or filling in formwork to create walls and pavements, stacking up blocks of earth made roughly with mud and straw, or even directly shaping a wall.

In Portugal, rammed earth is one of the major used technique, which consists of compressing layers of earth into formworks until getting a consistent and massive wall. It was frequently employed in the

29 GUILLAUD, G. (1989). *Traité de construction en terre.*

30 *CRAterre; Centre International de la Construction en Terre*, headquarters in Grenoble, France.

South due to the local environment and resources, as wood and stone are not regularly available. The technique, was adapted to militarian constructions to build fortifications during the period of Muslim domination, offering a great heritage on earth architecture.[31]

Earth as a load-bearing material is composed of the manufacturing of units of earth that is usually moulded into blocks, after dried is used in construction to build walls and several architectural elements such as arches, domes and vaults. The techniques are varied, and it consists of either compressing earth into smalls wood square formworks as the tamped blocks; or compressing dry earth and additives with a manual, mechanical or industrialized compressing machine like the BTC's; or extracting a natural soil that is rich in minerals, and cutting it to create a rigid masonry, as the cut blocks and sod; or even exploring a mechanical system, evolved from the ceramic industries, that uses fine particles of earth to produce a homogenous material that is naturally dried, as the extruded earth and the machine moulded adobe. And finally, it also explores a manual system of production, as the hand moulded adobe and the hand shaped adobe, which is probably the most ancestral and known technique that consists of modelling the earth until getting to a square-shape block that is then sun-dried. [32]

Earth as a filling for a support structure is a technique that consists of the use of earth as a secondary component whether to fill or to finish a framework made out of wood or any other natural material present, like bamboo. Usually known in France as *Torchis*, in Portugal and Brasil as *Taipa*, *Pau a pique* or *Tabique* and in Latin America as *Quincha or Bahareque*. [33] Although the principle is the same, there may be some differences between those techniques. The earth mixture is generally combined with some vegetal fibre and employed in five different methods, the daubed earth, applied as a finishing material of a wood grid structure; the cob on posts with two functions,

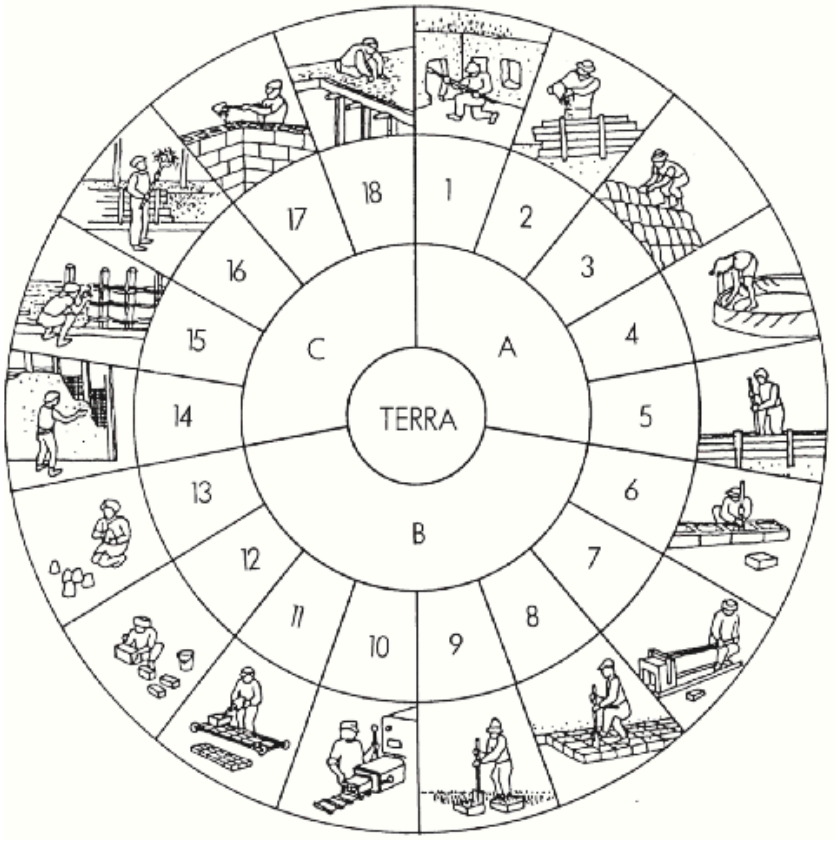
31 BEIRÃO, T. (2005). Rammed Earth in Contemporary Architecture. *In: Earth Architecture in Portugal*. pp. 35-39

32 FERNANDES, M. (2005). Técnicas de construção em terra. *In: 10ª Mesa Redonda de Primaveira; Terra: Forma de construir* . pp. 20-25

33 FERNANDES, M. (2005). *Ibidem.*

filling and finishing a wooden grid structure with adobes blocks; the straw-clay using clay earth with straw to apply either as flooring or as insulation; the fill-in technique, where the earth is used as insulation or reinforcing material to existent structures, generally between two panels of brick or stone; and the earth-sheltered space, that consists of the use of earth to protect and cover a roof structure usually made of wood and vegetal fibre.[34]

34 FERNANDES, M. (2005). *op.cit.*, p. 33



In HOUBEN, H. ; GUILLAUD, H; (1989). Traité de Construction en Terre. Marseille: Editions Parenthèse. p.15.

A - Earth as a massive and load-bearing material. 1.Dug out 2. Poured earth 3. Stacked earth 4. Direct shaping 5. Rammed earth **B- Earth as a load-bearing masonry material**. 6. Tamped blocks 7. Pressed blocks 8. Cut blocks 9. Sod 10. Extruded earth 11. Machine moulded adobe 12. Hand moulded adobe 13. Hand shaped adobe **C - Earth as a filling of a support structure.** 14. Daubed earth 15. Cob on posts 16. Straw Clay 17. Fill-in 18. Earth sheltered space.

However, these different compositions depend on infinite variants as the region where the earth is extracted, which will define the material properties, if it is drier or wetter, its granulometry and even its physical state. These elements may have a direct impact on the construction method used. It may define the customs held towards its local construction practices.

II.1.1.1 THE CLASSIFICATION AND COMPOSITION OF THE EARTH

Earth is a composite of different grains and dimensions. They are: pebbles (20cm-2cm), gravel (2cm-2mm), sands (2mm-60µm), silts (60µm-2µm), and clays (under 2µm). [35] Although the proportion of grains may change in function to the region, CRAterre has defined some conditions referring to the proportions of raw material need for the manufacturing of adobe, which should be between 55 to 75% sand; 10% to 28% silts; 15% to 18% clay. Normally soils that are composed of fine earth particles (sand and silts) with the proper amount of clay are ideal for adobe's manufacturing. [36]

II.1.1.2 HYDRIC BEHAVIOR OF EARTH MATERIALS

The soil, when mixed with water, originates several hydric behaviours of earth material in construction. Water has an attractive behaviour, performing as a glue between the different particles of earth, the smaller the particle, the better attraction between them. The water has to be proportionated to the amount of soil to acquire a specific state of the earth. There are five known states of earth used in construction. The first one is **dry-state** (water content: 0-5%), which has the least likely humidity, also nominated as solid-state with retraction. The second one is **wet-state** (water content: 5-20%), still with a scarce part of water, however more humid than the first one, also known as solid-state without retraction. The third one is **plastic-state** (water content: 15-30%), which contains a considerable amount of water but still able to be moulded without deforming. The fourth

35 FONTAINE, L.; ANGER, R. (2009). *Bâtir en terre. Du grain de sable à l'architecture.* p. 102

36 FERNANDES, M.(2005). Moulded Adobe. In: Earth Architecture in Portugal. pp. 45-50.

4 Classification of grains by size categories, the five main ones are pebbles, gravels, sands, silts and clays.



5 *Test de Carazas* helps to understand the three-phase nature of earth material: grains - solid particles, liquid water and air-filled pores. Credits: Thomas Noceto



one is **viscous-state** (water content: 15-35%), wetter than the plastic state, however, at this point is not possible to mould the earth into a bol. And the last one, is the **liquid-state** in which the earth can not be moulded without deforming, more likely used for structure's filling.[37]

II.1.1.3 Mechanization and finishing in earth construction

There are several methods available to prepare the soil to implement it in construction. Traditionally, that was made by simply mixing the elements or the wet loam with hands and feet, but also it could be made by using animal force, or even with a hoe or any manual tool. [38] However, nowadays, there are new ways based on the adaptation to a mechanized production system.

In the group of the adobes, a few techniques as the BTC, the extruded earth and the machine moulded adobe, contributed to explore mechanical productions. Some of them have evolved from ceramic industries, which creates much more compact and mechanically resistant bricks, allowing a quick-dry phase. As well as the rammed earth, which has also been increasingly developed, with the introduction of new tools, as the pneumatic ram, and even with a new system of production, like the pre-fabricated rammed earth, that also exists for the cob technique. These techniques have achieved success in the actual days, providing support for the development of housing construction policies and its standardisation.

And finally, earthen plaster has the most manageable application as it takes longer to dry, it is easier to work. Differently from cement products, that as it dries quicker, it requires more effort. The earth used can have a good balance of sand or be stabilized with vegetable fibres to avoid cracks. Even for finishing, in in some countries is possible to purchase bags mixture ready to be applied, both as coatings and floorings. [39]

37 FONTAINE, L.; ANGER, R. (2009). *op.cit.*, p. 27

38 FONTAINE, L.; ANGER, R. (2009). *Ibidem.* p. 39

39 DOMINIQUE, G. (2016). *Architecture en terre d'aujoud'hui.*

II.1.2. Antecedents and dissemination of adobe in Aveiro

Adobe is a significant technique that contributed to the earth constructive culture in Portugal, one of the main reasons comes from the evidence that Adobe may have originated in the Iberian Peninsula and only later adopted universally. Employed since the most ancient civilizations, the adobe, from the Egyptian terms *thobe* and the Arab *ottob*, means ordinarily sun-dried bricks. [40] The technique consists of moulding earth, combined with water and some additive to create blocks that are later sun-dried and then used in construction.

> *Far from the Mediterranean area where it probably evolved, adobe is today the most international and diversified form of earth construction. From the Pacific to the Indian Ocean, in walls, arches and vaults, adobe architecture has been a constant presence in the landscape for many centuries.* [41]

In Portugal, adobe architecture, was spontaneously born in propitiously humid surroundings where the alluvial soil is rich in minerals, sand and silts, providing the locals' inhabitants with the needed plasticity for the manufacturing of adobes. It is found between "*Estremadura (Alcobaça and Espinho), in the valleys of the Mondego, Tejo and Sado rivers and only in interior walls in the Guadiana river valley and the Barlavento Algarve*". [42] The region with the highest predominance of adobe is in Beira litoral (from Ovar to Leiria), where the Aveiro region is included. Although in the interior of Trás-os-Montes, Alentejo and Algarve, the technique's employment is not predominant, the adobe is, commonly, added with other earth techniques or employed in interior walls. The hand moulded adobe technique, is the procedure most found in Aveiro, and its compositions may change according to the region. There are two main types of adobes in Aveiro, that will be deepened in the next topic.

40 FERNANDES, M. (2005). *op.cit.*, p. 45

41 FERNANDES, M. (2005). *Ibidem.*

42 FERNANDES, M. (2005). *Ibidem.* p. 47

II.1.3. ADDITIVES ON EARTH CONSTRUCTION. LIME ADOBE IN AVEIRO

Throughout the centuries, organic and inorganic materials were applied to construction in view to consolidate walls and renderings. Among the first ones used were eggs, animal glue, casein and straw. Although, in the 20th century, with the appearance of synthetic materials, synthetic resin started to be used, as well as other solutions, like air lime and hydraulic lime. More recently, chemicals compositions like alkaline silicates, ethyl silicate and barium hydroxide, were also introduced. [43] However, some of these new inorganic substances are usually incompatible with ancient buildings. It can provide more solidity, but the chemical interaction between both materials will certainly cause irreversible damages.

The conditions referring to the proportions of raw material, settled by CRAterre, defines the fundamentals for the manufacturing of adobe which are not constantly found in the Portuguese territory, therefore, the use of additives in adobe manufacturing. In view to improve the mechanical resistance of the adobes the local inhabitants developed the custom of adding lime to the composition.

In the regions of Aveiro, Gandaresa and Bairrada, the average of clay in the soil is about 4% to 10%. However, in other regions, where the average of clay was higher than 18%, the tradition was to add vegetal fibre, usually straw, to stabilize the retraction impacts during the drying phase. [44] These characteristics led to two main different compositions of adobe in Aveiro, being designated, respectively, of lime adobe and earth adobe.

> *O papel da cal é mais vasto do que uma simples proteção dos materiais ou da casa contra o clima. Funciona, para além disso, como medida do grau de saber habitar das populações.* [45]

43 MARGALHA, M. (2005). *Lime as a wall consolidator. In: Earth Architecture in Portugal*. pp. 74-79.

44 FERNANDES, M. (2005). *op.cit.*, p. 46

45 TAVARES, A.; COSTA, A. (2019). "Adobe de Cal. Material e técnica a redescobrir no rasto da sustentabilidade". *In*: *O Barreiro*. pp. 88-101; Translated by the author: " The role of lime is wider than simply protecting materials or the house against the climate. It functions, moreover, as a measure of the population's degree of habitability."



6 Lime Kiln after kilning limestone, in Cantanhede.
Credits: Alice Tavares

Before cement, lime was the material with bond properties the most used in construction. After the popularisation of cement into construction, the use of lime was limited. Cement is not compatible with traditional masonry due to its high mechanical resistance.

However, the composition of lime is similar to the raw materials, providing a natural chemical reaction, fluidity, and absorption between both materials. This explains why lime is the base component to produce the mortar and the rendering, both made with lime and sand, usually corresponding to a proportion of 1:2 or 1:3, respectively. [46]

In Aveiro, lime could be used in two forms, Hydrated lime *Ca(OH)2* or quicklime *CaO*. The most currently used was powdered quicklime when mixed with water, creates a chemical reaction that heats up to 50 degrees Celsius, providing a unique performance on durability and resistance of adobe blocks.

In the 19th and 20th centuries, the use of lime popularized in Aveiro coastal shore, increasing the implantation of lime kilns for the transformation procedure. Arnaldo Barreto is one of the last in carrying a lime kiln activity, where he declared "*when adobe houses were made, we sold lime by the meter, both for making adobe and for mortar. Then the cement blocks came and it was all over.*" [47]

Lime was an accessible material, representing 3% to 4% of the cost of an average house in Aveiro, contributing strongly to the local economy. [48] Its use is still nowadays of great interest in construction due to its minimal ecological impact. All these characteristics of earth constructions, related to technology, ecology, economy and society, will be from now on studied and related to the constructive culture of adobe in Aveiro.

46 RODRIGUES, P. (2005). Rendering of earth wall. *In: Earth Architecture in Portugal*. pp. 68-73.
47 TAVARES, A.; COSTA, A. (2019). *op.cit.*, p. 94
48 TAVARES, A.; COSTA, A. (2019). *Ibidem.* p. 93

II.2 - APPLICATION AND PERFORMANCE OF AVEIRO'S ADOBES IN CONSTRUCTION

The application of vernacular architecture relies on characteristics that imply an ecological impact according to its technical performance. Terra Incognita [49] points out a few facts for the technical and socio-cultural vulnerability of earth construction in Europe. They are the impact of "modernist" mentalities, the interruption of the knowledge development process and the loss of know-how, the insufficient specialized instruction, the pressure of construction standards inducing a loss of culture, the intervention of incompatible materials in rehabilitation practices and the difficulties in building a viable market. [50]

To talk it over the application and the performance of earth construction in Aveiro is necessary to go through some points into history to understand the constructive culture held, going from technique to social challenges. The option for demolition has been the solution to most technical problems leading progressively to the abandonment of earth structures in Portugal.

> *Cultural sustainability should, therefore, be in this equation. It is known that the lack of knowledge about the characteristics of adobe constructions makes the interventions in these buildings, in most cases, unsuitable and ruinous for the useful life of these constructions.*[51]

These mistakes, as stated above, is related to the "cultural sustainability" of the constructive culture in Aveiro, first associated with the technique teaching, once many buildings were constructed without discernment of the chemical characteristics of the materials employed in the construction. Then, the lack of political incentive omitted the regulation of the technique and the protection of the earth

49 "TERRA INCOGNITA – Conservation of European Earthen Architecture". Promote initiatives to raise public awareness of earth, its heritage and its current applications, and build and develop a European network of earthen construction.

50 GUILLAUD, GRAZ, CORREIRA, MECCA, MILETO, *et al.* (2009). *Terra Incognita. Découvrir une Europe des architectures de terre.*

51 TAVARES, A.; COSTA, A. (2019). *op.cit.*, p. 89

construction patrimony, leading to the decline of technical knowledge in the 50s and 60s of the 20th century. [52]

The mains barriers referring to the technical and social conditions of earth construction will be analyzed. An analysis grid based on technology, ecology, economy and society issues will be developed a to inform the project conception.

II.2.1. TECHNICAL PERFORMANCE AND ECOLOGICAL IMPACT

> *Les domaines des pratiques vernaculaires offret un stock merveilleux de dispositif ingénieux témoignant des effets spectaculaires que peuvent produire des techniques extrêmement économes en matériaux et en énergie. (...) Ces techniques comprennent des savoir-faire profonds, étendus et complémentaire.* [53]

Conventionally, in vernacular architecture, there was no such thing as 'ecological conscience'. Naturally, the act of constructing from a human scale perspective was enough to build an ecosystem based on saving energy and material during the entire life-cycle of a building process. The traditional methods of construction, were developed throughout the years, based on empirical observation and learning, responding to basic needs through technicity. Once we have turned our attention to the environmental transition and sought efficient ecological solutions, we started recognizing the importance of vernacular constructions and re-employed them into contemporary architecture.

> *La connexion de ces savoirs ancestraux et des connaissances scientifique modernes ne devrait pas être pensée comme les termes d'une alternative. (...) En pratique, la situation est extrêmement conflictuelle dans la mesure où le développement des sociétés traditionnelles est confronté à une action caractérisée de concurrence déloyale.* [54]

52 TAVARES, A.; COSTA, A. (2019). *op.cit.*, p. 89
53 FREY, P. (2010). *Learning from vernacular. Pour une nouvelle architecture vernaculaire.* p.38
54 FREY, P. (2010). *Ibidem.* p.41

Vernacular architecture attempted to use the local resources, as a mean to reduce expenses, as labour work and transportation, applying a system of production that does not require equipment or energy loss. This environmental and energetic impact is seen through the whole process of an adobe building life-cycle.



7 Aveiro's adobe building life cycle. Credits: Thaina Araujo

The principle of low-impact residue production was intended particularly in Aveiro's adobe buildings. The houses were made according to an estimated quantity of adobes, reinforcing waste reduction during the construction phase. Nowadays, the manufacturing of lime adobes in Aveiro is practically discontinued. The only adobe manufacturing still found is in occasional reproductions coordinated by the University of Aveiro [55], which is not enough to build new structures. However, from this frailty, it was possible to identify a different ecological property of lime adobe since they can be recycled and reused in new constructions.

55 Alice Tavares & Aníbal Costa, Department and Laboratory of Civil Engineering Of University of Aveiro

In Aveiro, the replacement of natural materials by industrialized ones into traditional vernacular construction is the cause of poor behaviour in earth structures. An intervention attended by proper maintenance could provide adobe's buildings with better life cycle conditions. Besides, the building regulation standards represents another technical difficulty in Aveiro. In some countries, the pressure for standardization induces rejection of the traditional know--how, but in others, like Portugal, specifically Aveiro, the lack of it also discourages the inhabitants and generates a form of repression and omission of vernacular architectures. [56]

The elements identified here have pushed society to misperceive the constructive qualities of adobe construction, but the performance of earth construction goes beyond it. In the Portuguese context, there are three principal earth technical performances to highlight.

II.2.1.1 Thermal performance and energy efficiency

The first one is the thermal performance of earth buildings. depending on the construction technique and the thickness of the wall. Earth thermal performance can be enhanced. It depends on by a range of climatic factors, like the building's orientation, the protection of the walls, and the size of the doors and windows. [57]

Besides, another important factor in thermal performance is energy consumption during the construction phase. Commonly, the production of materials requires the use of equipment that dispenses energy. For example, cement consumes 2.43 kW h/kg and glass 7.40 kW h/kg. Although in earth construction, the raw materials are usually collected from the surroundings, and the materials are made practically without energy loss. [58]

Earth architecture and construction meet society's ever-increasing

56 TAVARES, A.; COSTA, A. (2019). *op.cit.*, p. 92

57 NEVES, C.(2005). Thermal performance of rammed earth buildings. In: *Earth Architecture in Portugal*. pp. 185-188.

58 NEVES, C.(2005). *Ibidem*

interest in the use of low impact technologies, due to the exhaustion of some raw materials and the concern with the environmental damage done with their extraction and today correspond to an excellent possibility of allowing suitable and sustainable management with comfort and low-cost architectonic environment. [59]

Material	Quantity	Energy Consumption (kW/h)
Solid ceramic brick	1 brick	3,98
Reinforced concrete block	1 brick	8,50
Adobe (mechanised pr.)	1 brick	0,73
Adobe (manual pr.)	1 brick	0,00

9 Energy consumption for the production of several building materials. In: *Thermal performance of rammed earth buildings*

II.2.1.2 EARTHQUAKES IMPACTS

In 1755 an earthquake shooked the city of Lisbon, leaving 30.000 deaths. [60] In function of the recent seismic actions around the world, there are relevant possibilities that an earthquake might hit Portugal in the future. Therefore, there is an interest in preventing future damages by reinforcing existent and future constructions.

Earth structures are well known for their vulnerabilities in terms of natural phenomena, like earthquakes and floods. However, in the south, the most exposed region to the risk of earthquakes, it was possible to notice positively, through the years, the performance of rammed earth structures facing this phenomenon. The University of Aveiro researches concerning the structural behaviour of adobes have identified through essays that

adobe has technical characteristics very similar to the other materials used in construction (ceramic bricks and stones), namely, it also has mechanical and resistant characteristics very similar to traditional masonry walls, which are also present in Gandaresas houses in some areas. [61]

59 NEVES, C.(2005).*op.cit.*, p. 187

60 LOURENÇO, P. (2005). *Earth structures and earthquakes.* In: *Earth Architecture in Portugal*. pp. 189-193.

61 TAVARES, A.; COSTA, A. (2019). *op.cit.*, p. 95

II.2.1.3 MECHANICAL RESISTANCE TO FIRE EXPOSURE

Another environmental preoccupation in Portugual comes from forest fire endangerment in most of the territory. In 2017 the most noticed fire recently, have registered 523 fires in a single day, causing 65 deaths and 200 injured in Pedrogão Grande, where the central area of Portugal was highly affected. [62]

Due to the importance of this subject on the ecological agenda, earth buildings were also studied facing their mechanical and technical performance. Where was noticed that compacted earth surfaces remained structurally stable. Although, adobes surfaces presented a certain instability, once the mortar between the bricks has, generally, a poor composition that intensifies the fire between the layers of adobe, which does not happen in rammed earth structures. [63] Therefore, for an adobe wall, it would be necessary to study a different composition of mortar that would be able to resist fire exposure. In all matters, earth structures have an above-average resistance to fires, proving yet, the technical performance of earthen architectures in response to the Portuguese contemporary ecological needs.

II.2.2. ECONOMIC VIABILITY AND SOCIAL INFLUENCE

> *Un concept qui rencontre de plus en plus l'approbation du public est l'idée que la monoculture du produit industriel, et son corollaire de surproduction, soit incompatible avec une logique de développement économique locale. Ce concept impose un nivellement vers le bas des compétences et du savoir-faire en matière de projet et de construction locale* . [64]

One major challenge in terms of constructive continuity of earth construction is the dominant socio-economic system of production. When through modernity, society began to value and recognize pro-

62 SOUZA, S. *O Grande Incêndio Florestal de Pedrógão Grande e concelhos limítrofes (2017) – Relatório.* Available online: https://segurancaecienciasforenses.com/2017/10/16/o-grande-incendio-florestal-de-pedrogao-grande-e-concelhos-limitrofes-2017-relatorio/

63 BEXIGA, P. (2005). *How rammed earth houses stood up to the fire on the Monique mountain range.* In: *Earth Architecture in Portugal*. pp. 194-197

64 GUILLAUD, GRAZ, CORREIRA, MECCA, MILETO, *et al.* (2009). *op.cit.*, pp. 74-75

duction lines of innovative and synthetic materials, encouraging an international style, the traditional practices stood aside. The approval given to this mindset based on economic interest occasioned environmental and territorial impacts, as already seen, but the most consequential effect was on social and cultural matters.

Economic viability in earth construction is a controversial topic, with a diversity of opinions. However, it is a relevant issue to be considered if an approach of reappropriation of the technique is envisioned. According to the economist François Fourquet, the economy is "*a representation of society*" [65]. Therefore, if the economy is a response of a society, the imposition of economic laws brought from other prospects could originate an unwellness in a community. The impacts of a misplaced economy on a community may have broader consequences socio-culturally, leading to the loss of customs and traditions.

In Portugal, one of the reasons for the abandonment of the technique was precisely the economic necessities. Culturally, due to the insufficiency of supplies, the community, in a mutual engagement, had the appeal to collaborate. However, with the introduction of the ceramic industries in the region, the economic prospects were based on public and political interest, which through the years, and with a discourse pro-economic breakthrough, ceramics bricks started to replace traditional adobe manufacturing. [66]

The specialists believe that only awareness and initiatives to bring knowledge to communities about their cultural and architectural heritage could help prevail earth architecture and generate circular economy strategies, leading to the decline of carbonic and energetic footprint. "*The will, the technique, and the science should combine to defend and contribute to the continuity of the presence of adobe architecture in its territory of origin.*" [67]

65 FOURQUET, F. (2018). *Penser la longue durée. Contribuition à une histoire de la mondialisation.*
66 TAVARES, A.; COSTA, A. (2019). *op.cit.*, p. 92
67 TAVARES, A.; COSTA, A. (2019). *op.cit.*, p. 99

CHAPTER **THREE**

EARTH CONSTRUCTION IN AVEIRO

Reappropriation of adobe's constructive culture

8 Gândaresa house of Mrs. Rosa de Jesus located in Santo André de Vagos, in Aveiro.
Credits: Thaina Araujo



III. Earth construction in Aveiro

Reappropriation of adobe's constructive culture

Adobe's constructive culture has begun to reacquire a place of distinct interest in contemporary Portuguese architecture. This increasing importance and value given to traditional vernacular architectures arise, as seen, from socio-cultural, socio-economic, technical and environmental influences that have been re-thought and revalued in the actual days. Reinserting a constructive culture depends on multiple actions that should involve different actors in favour of not only preserving but also supporting the 'constructive continuity' of the technique.

> *La production du bâti par cette force de travail (de production manuelle et artisanal) impliquée dans la finalité sociale de l'édifice en construction rétablit le lien qui favorisent deux processus chez ses habitants : ils peuvent s'y reconnaître et se l'approprier.* [68]

The principles of "new vernacular architecture" has considerably enhanced the arguments towards the reinsertion of traditional techniques into contemporary construction. This concept has two main priorities, "*the harmony of human societies and their relationship with nature*" [69], responding to it through collective work, the employment of available resources at low cost, and the application of traditional know-how.

However, this interest still confronts the vulnerabilities of a technique's reappropriation cycle. Therefore, to enable new strategies to reinforce a constructive culture is necessary to go through all the characteristics that established it. Throughout this chapter, it will be analysed the cultural aspects involved in the origin and the dissemination of the technique, as well as the several actors involved in it, including the role of the architect in the actual days and the constructive traditions to finally settle the most relevant aspects in the conservation and continuity of adobe technique in Aveiro.

68 FREY, P. (2010). *Learning from vernacular. Pour une nouvelle architecture vernaculaire.*
69 FREY, P. (2010). *Ibidem*

III.1 - REGIONAL IDENTITY OF AVEIRO

The Portuguese territory has an elongated contour configuration that frontiers with the Atlantic Ocean at West and the Spanish territory at East. As a country defined naturally by a Mediterranian climate, the characteristics found will reveal the diversity of territorial dynamics through the relief configuration, the soil composition and the nature diversity. It differs from one region to another, originating multiple scenarios to human activities.

The occupation and settlement of the territory are shaped by human intervention that depends on three territorial compositions, altitude, relief and nature. The altitude will determine the climate, the temperature and the rainfall, while the relief will define the convenience or difficulty to transit and explore the earth, and therefore, nature will ascertain the conditions to labour activity. [70] In function to the primaries civilizations, the earliest settlements were established in mountainous areas due to the urge for a solid viewpoint to protection and defence. Where the abundant resource, stone, was combined with natural components to form the first structures, still found in Northeast Portugal.

Later, the civilizations, in search of more fertile lands, started to populate the riverbeds. And as the landscape changed, so the resources available. The architecture that originated in these circumstances expressed a new way of living through the value of different materials. The earth architecture emerges as a solution to construction in areas composed of clayey and sandy soil, given the lack of other resources. [71] On the Coastal Edge and in the South, where the conditions were not favourable to stone construction, the walls made of earth started to define the region.
The Beira Litoral, which is nowadays composed of the urban centres

70 BELO, D.; DAVEAU, S.; MATOSE, J. (2010). *Portugal: o sabor da terra: um retrato histórico e geográfico por regiões*. p. 42

71 RIBEIRO, O. (1993). *Portugal: O Mediterrâneo e o Atlântico.*

of Aveiro and Coimbra, is inserted in a geographic triangle, delimited by the Douro river at North, the Beiras Interiores at East and the regions of Ribatejo and Estremadura at South. Between all those areas is found the Vouga River Hydrographic Basin. [72] The inferior course of the Vouga River reveals a hydrographic dispersion, from where several branches reach the majority of the Coastal Edge region of Aveiro. Enriched by various minerals, the soil provides most needs in agricultural production and construction. At the intersection of the Atlantic ocean to the Vouga river, the Ria de Aveiro is born.

> *Located on the north-west coast of Portugal, Ria de Aveiro is a social--ecological complex coastal lagoon, whose natural capital is an important factor for the development of the municipalities surrounding the lagoon. Extensive saltmarshes and seagrass meadows contribute to the high biodiversity of this shallow coastal lagoon.* [73]

Aveiro [74] is characterised by the contrast between the lowland and the mountains, from the junction of the ocean waters to the river waters compose the saltmarshes, providing the sea salt which all along with fishing and pottery, developed the earliest means of commercialization in the region.

The commercial activities in Aveiro started to gain importance, and around the 15th centuries, the city, through the influence of the bourgeois class, persisted in growing and expanding itself. However, Aveiro experienced social instability with the crisis of the late 15th century. The invasions and attacks on the Coastal Edge left Aveiro in insalubrity conditions due to the incursion and stagnation of the water and consequently the economic decline. [75]

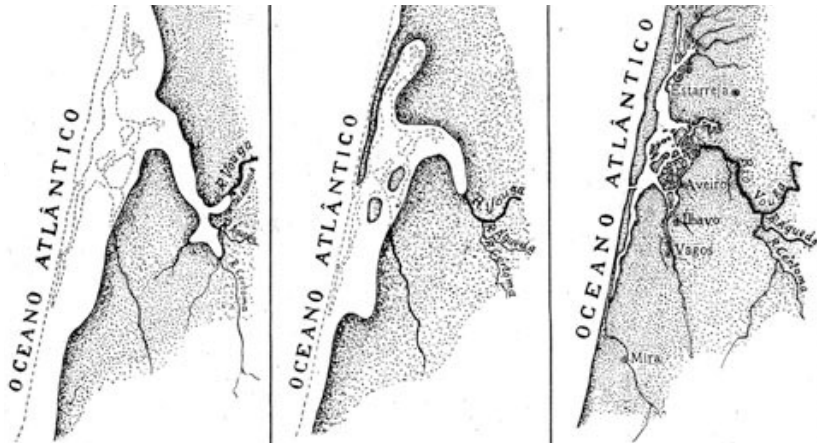
It was in the 19th century with the industrial revolution that Aveiro began to be noticed again, driven by the implantation of ceramic industries and the city planning envisaged by Luis Gomes de Carvalho.

72 *The hydrographic basin area of the Vouga River is 3 680 km2 (including the Ria area). The river Vouga originates in the Lapa mountain range, at an altitude of about 930 m, and runs for 148 km until it flows into Barra de Aveiro. Available on-line: http://sniamb.apambiente.pt/infos/geoportaldocs/Planos.pt*

73 X.*Global wetlands projet - Ria de Aveiro*, Available on-line: https://globalwetlandsproject.org/portfolio/portugal/

74 *The district of Aveiro occupies 197.58 km2 of area, counts 78 450 of resident population and is characterized by an area of essentially agricultural and industrial activities.* (2011 census).

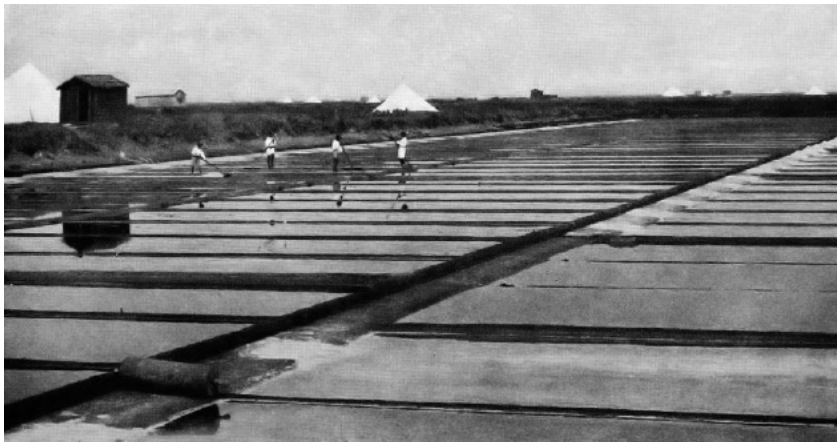
75 ARROTEIA, J. (1979). *A arquitetura popular portuguesa.*



9 Stages of the formation of Ria de Aveiro: 1. around 2000 years BC; 2. in the X century; 3. in the XV century
Credits: Amorim, G., (1941) Geografia de Portugal.



10 Works for the implantation of canals and dams done in the Ria de Aveiro, in 1993 and 1994.
Creidts: AMORIM, G. A barra e os portos da Ria de Aveiro 1808 - 1932



11 Sailors in the salt pans at the beginning of the 20th century.
Credits: AMORIM, G. A barra e os portos da Ria de Aveiro 1808 - 1932

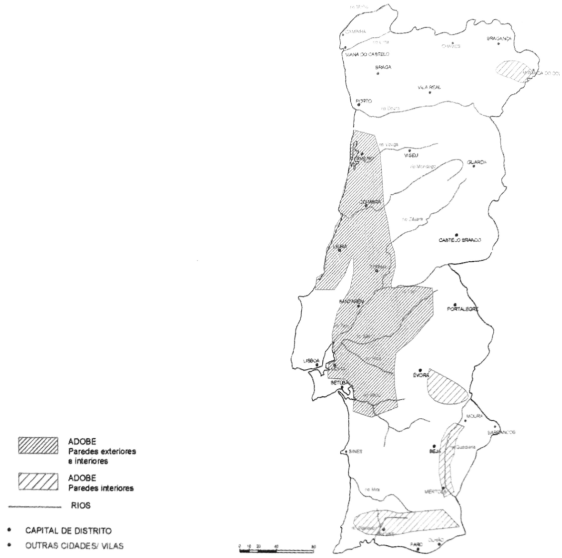
Although, the planning consisted of the implementation of channels and dams on the edge of Ria de Aveiro, to provide salubrious conditions to the city, these changes have altered its landscape, today marked by the transportation infrastructures causing a territorial rupture between nature and the city.

Even though, the city kept on evolving demographically through the implantation of infrastructures that has enable the habitants to produce an economic activity growth, justifying the implantation of the Aveiro Higher Education, in 1971, that also represents a branch of Aveiro's development. Today is one of the most influential urban centres in Portugal. The district of Aveiro still bases its economic strategies on the characteristics originating from its environmental conditions, as the saltmarshes, fishing and pottery.

The city growth is proof of human adaptation to its environment and the potentiality of a regional ecosystem to provide socio-cultural sustainability through natural provisions. As a memory of the city, prevails an architecture that outlines the evolutions of its inhabitants. The regional identity of Aveiro lay down on the historical heritage of the city, identified through the materiality that composes its landscape.

The landscape of Aveiro is composed of different architectural influences. Near the coastal edge, the inhabitants applied the pinewood, commonly used to build the traditionally called "*palheiros*" houses, which correspond to an elevated structure on staking. However, adobe buildings prevail in the city's landscape, representing 35% to 40% of the material employed in the region. [76] In Aveiro, adobe technique, can be found both in the urban centre and in the surrounding areas, being employed differently and expressing a distinctive identity in each territorial dimension. The next topic will focus on the visual identity of adobe throughout the multiples Aveiro's territory scales.

76 MARTIN, T.; VARUM, H.; VELOSA, A. (2005). *Caracterização do adobe em conostruções existentes na região de Aveiro. In: IV Seminário Ibero-Americano de Construção com Terra.* pp. 233-235.



12 Map of adobe distribution in Portugal.
Credits: Maria Fernandes





13 Between "Palheiros" and adobe houses. Architecture identity in the region of Aveiro. Palheiros houses in Praia da Costa Nova, Ílhavo.
Credits: Rico Fabello



14 Aerial view of the city of Aveiro
Credits: A terceira dimensão

III.1.1 – Rural contemporariness: from city to countryside

Due to the industrialization phenomenon, through the initiatives of the bourgeois class, the city of Aveiro regained its commercial and social dynamics. Despite the industrial impulse, the adobe technique continued to be employed in both urban and rural area. Although with a distinct visual identity, the buildings along Aveiro's canal were made according to the social status of the proprietor. Usually, with one or two floors, the façades were coated, sometimes simple, sometimes with great adornment, fitting the art nouveau movement.

As we move out of the urban context to the peripheral areas, the settlement pattern changes. While the urban centre of Aveiro developed in a nucleated/star-like model, the peripherical villages, in need to avoid the low-lying areas that flooded frequently, were formed in a linear pattern. As we get closer to the rural area, the architecture becomes soberer. This landscape transition may be justified by technical means, as the coastal environment in Aveiro is more aggressive, endangering the longevity of the buildings, being necessary more protection, more details. But, it may also be associated with social and moral values, once letting a house with apparent masonry was a compelling signal of poverty.

In counterpoint, the architecture developed in the rural context was based on a mutual aide, from the owner of the house and the neighbours, generating a unified cultural foundation of collaboration and solidarity. This act gave birth to the Gandaresa house, a housing typology that goes way beyond a simple technical constructive system, but settled on various qualifying cultural and technical characteristics. The rural contemporariness is, therefore, the "*demonstration that new uses, and new times, may not destroy the simplicity of rural architecture, but rather enrich it, making some of its main characteristics more visible.*" [77] Hence, all aspects that qualify this typology and its origins, will be studied in the following topics.

77 PEIXINHO, M. (2005). Signs of rural contemporariness. In: *Earth Architecture in Portugal*. pp. 146-149



15 Aveiro Art Nouveau Museum built with adobes.
Credits: Patrícia Sarrico





16 Gândaresa house made with adobes in Santo André de Vagos, Vagos. Details of the façade.
Credits: Thaina Araujo

III.1.2 – Gandaresa house. Between past and present

> *As we travel through the Gândaras region, we still find today a landscape sprinkled with buildings that have become one of the strongest identity factors of a people, a geography, and a culture - the Gândaresa house.* [78]

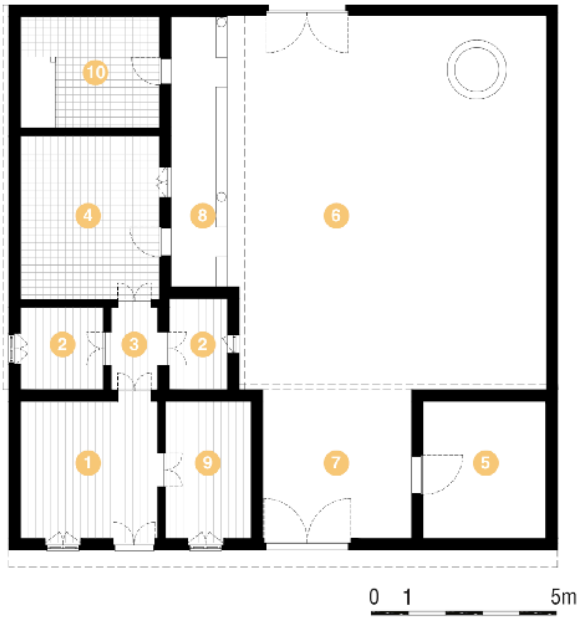
The Gandaresa house indicates a symbol of cultural value, both material and immaterial, as stated above. Reached its popularity in the 19th century, is found in the Gândara region, in the municipalities of Vagos, Mira and Cantanhade. The typology was usually associated with the family social and economic status, which defined different categories of Gândaresa house, as the plan varies from an "L", "U" and "O" shape. The façades usually arranged on the sequence "gate, window, door, window", reveals the house dynamics that hosts a simple rural life. The central open patio, or "*Eira*" as called locally, was intended for all agricultural and cattle-raising activities, where half of the house was destined to work, and the other half to resting. [79]

However, the Gândaresa house was also a social identity distinctive factor. This typology was dedicated essentially to economic activity, which only wealthier families could afford. And therefore, the more decorative richness, the more financial potential the family had. Consequently, the Gândaresa house has multiples technical and cultural characteristics that cannot be equalled, to an unqualified structure, solely by a modern mentality that devaluates vernacular construction.

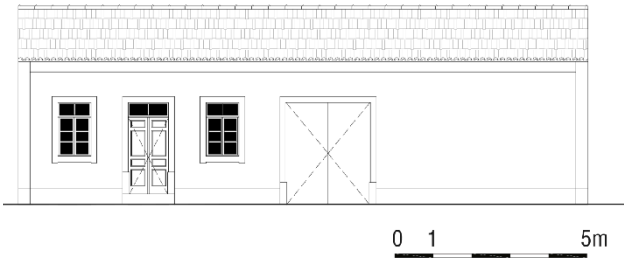
In the actual days, it is still possible to see the constructive qualities of the houses, even when without maintenance. Although, this architectural heritage has been ignored and neglected by the political authorities, whose has encouraged demolition policies. Due to the importance of implementing an awareness-raise strategy, to be able to inform the communities of the interest in this architectural heritage.

78 TAVARES, A.; COSTA, A. (2019). *op.cit.*, p. 117

79 TAVARES, A.; COSTA, A. (2019). *Ibidem.* pp. 116-130



17 The predominant plan design in region of Vagos, Cantanhede and Mira.
In: TAVARES, A.; COSTA, A. (2019). A Casa Gandaresa no território de Vagos, Mira e Cantanhede.



18 The predominant façade design in the region of Vagos, Cantanhede and Mira.
In: TAVARES, A.; COSTA, A. (2019). A Casa Gandaresa no território de Vagos, Mira e Cantanhede.



19 Gândaresa House, made with adobes, apparent on the side façade, in Santo André de Vagos, Vagos. Credits: Thaina Araujo

III.2 - REAPPROPRIATION OF ADOBE'S CONSTRUCTIVE CULTURE

III.2.1 - ADOBE A CULTURAL MANIFESTATION AND COMMUNAL INTEREST

The sense of community and place plays a crucial role in our lives, whether we notice it or not. Over time, the places we live, define and construct a '*sense of self*'. The sense of life in community manifests the need for commitment, where the previous generations relied on "*intimacy, affection, solidarity, commitment to the common good, supported by sentiments of trust and reciprocity.*" [80]

In the middle of the 19th century, in the district of Aveiro, in Portugal, two young people only got married when they had their home ready. The tradition was called "*Quem casa, quer casa*".[81]The process took both families involved in a communitarian construction site. As the families core were extensive, it was necessary to offer cooperation, so that more families could have access to their own house. "*The community generously provided for the needs of the families involved in the marriage, offering all the work.*" [82] Over the years, the process was expanded to the entire community. Not a person would question whether the family was rich or not. The gain was mutual and there was no interest in profiting from one's work.There were two dimensions to the construction process, the technique one, which was deepened in the previous chapter. And the cultural one, which consisted of the opportunity to change the routine, to teach and be taught, and especially to get to know their neighbour.

The entire process was an occasion for young people showing their qualities while being useful was the most relevant capacity "*generally, it reinforced their self-esteem and the conviction that they could also one*

80 FRADA, G. (2019). "Manifestação cultural e comunitária do Seixo". *In*: *O Barreiro.* pp. 08-22; Translated by the author

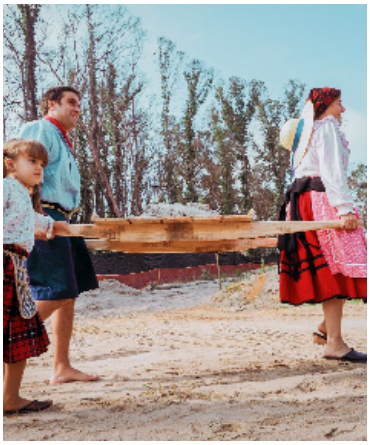
81 "*married people need a home of their own*"

82 FRADA, G. (2019). *Ibidem.*





20 Preparation of the site and raw materials for the manufacturing of the adobes. Seixo, Mira.





21 Transporting the adobes from the Barreiro to the settlement, the place where the house would be built. It was done by a couple, where usually women and children participated. Seixo, Mira.





22 The exhibition of the adobes outside for drying and the moment of fraternisation at the end of the day. Seixo, Mira.
In: FRADA, G.; TAVARES, A.; PERREIRA, M.; FERNANDES, M.; Castelhano, M. (2019). O Barreiro. Associação Cultural e Recreativa do Seixo.

day be responsible for their family."[83] From preparing the site terrain called "*Barreiro*"[84] to extracting the earth, making the utensils, everything was provided on-site and required laborious work that was, at the end of the day, rewarded by a traditional meal.

In an interview with Mr Adérito Ferreira, an ancient "*adobeiro*"[85] in Vago's town, affirms the cultural manifestation in the communal interest of serving and supporting one another, "*a cheerful atmosphere. The payment was usually a meal of potatoes, cod and wine. It was a friendly environment*."[86] This tradition gave sequence to many customs, that defines today not only constructive values but also culinary, artistic, environmentally and even economic.

This strong tradition in the past has been lost and nowadays we wonder how participatory architecture can promote and value a constructive culture? According to Gabriel Frada, co-writer of the book "*O Barreiro*", the origin of communitarianism in Aveiro developed through principles and traditions based on a social and political need for the community to interact between themselves. In such a case, only collective planning could produce a durable and sustainable development based on economic and environmental needs.

> *Un tel dévelopment par les habitants eux-mêmes implique en effet, outre une dignité retrouvée, une dynamique, une cohésion, une responsabilité vivante qui manque cruellement à nous logement sociaux d'aujourd'hui.* [87]

Although nowadays many of these principles have been weakened by a mentality where the "*greater purpose of the actions is the profit; relations are anonymous, impersonal, contractual. None of these characteristics could be applied to the barreiros.*"[88] It is about a social engagement that should be encouraged by the actors in the creation

83 FRADA, G. (2019). *op.cit.*, p. 16.
84 *Barreiro*. Local where traditional adobes were made.
85 *Adobeiro*. A person who manufactures the traditional adobes in Aveiro.
86 FERREIRA, A. 21st februrary of 2021. *On-line*. Complete interview in annexes; Translated by the author.
87 GRUET, S. (2010). Un engagement citoyen. *In: Construire ensemble le grand ensemble : Habiter autrement*. pp. 24-27
88 FRADA, G. (2019). *Ibidem*, p. 13.

and management of the territory. The architect, as an intermediary agent between natural environment and users, can foster participatory principles as a pillar of sustainable development and social progress.

Architecture should not be employed as a one-off experience. Rather, promoting socio-cultural, socio-economic, bioclimatic strategies based on the preservation and diffusion of the local constructive technique. In the book "*Construir ensemble le grand ensemble. Habiter autrement*" the authors engage the discussion of communitarian planning and social living by principles that promote constructive culture through participatory architecture. They are the development of neighbourhood solidarity, acknowledging territorial and cultural origins, raising collective and individual responsibility, and engaging the community to participate from the conception till maintenance and management of the building. [89]

Therefore, to be able to apply these principles of participatory architecture nowadays, within an already existing constructive culture, is necessary to identify the phases that compose the traditional construction process to raise conscious awareness about the crucial moves towards the continuity of earth construction in Portugal. Thus, the following topics will distinguish the main traditional aspects of the practising and teaching of adobe technique in the district of Aveiro.

89 GRUET, S. (2010). *op.cit.*, p. 25.

III.2.2 - Traditional knowledge and empirical experience [91]

To better understand the traditions held towards adobe's constructive culture in Aveiro, it is crucial to discern its procedure and the actors involved in it, where the practical and empirical experience set the traditional knowledge, of which we currently have information.

The practical empirical experience results of three distinctive factors. According to Richard Sennett, the author of the book "*The Craftsman*", specialized manual work is a product of the junction between a **craftsman**, his **atelier** and his **tools**. Adobe's constructive culture is no different. Everything starts with the craftsman, the adobe master builders.[92] They were the main actors responsible for the appearance of several adobes production units, the so-called *areeiros*, the atelier where the artisanal manufacturing of adobe took place, usually near the terrain site, to ease the transportation.The production occurred seasonally, respecting the environmental conditions, usually from May to September. Each *areeiro* was unique, and adobe's manufacturing attended to the needs of one family, the reason the tools were provided on-site, according to the size of the house and the bricks needed. The shovel was the same size as the mould to settle the loam, and the end of the shovel handle was square to finish the corners of the adobes.

> *La séparation de l'art et du métier a altéré ce rapport social; (...) la transmission de la compétence et le transfert de technologie se sont brouillés. L'espace social est ainsi devenu un espace fragmenté.*[93]

Once the trinity: craftsman, atelier and tools, were separated to give space to industrial production gears, the relationship between an individual and his work has abstained. To create unified social spaces is necessary to look up to these interactions and reproduce them in the actual days, given the need to talk about practice and technique teaching.

91 FRADA, G. (2019). "Manifestação cultural e comunitária do Seixo". *In*: *O Barreiro*. pp. 08-22; Translated by the author

92 *Mestres adobeiros*

93 SENNETT, R. (2008). *The Craftsman*. p. 200





23 Raw materials. The limestone is burnt, and as it decomposes it turns into a white powder, to which water and earth are added and mixtured to form the loam.




24 The addition and mixture of water and earth to form the loam.




25 The already dried adobe and the utensils used to make the adobes, proportional to the size of the adobe needed.

III.2.3 - From practice to technique teaching

A practice passed to three generations, as we could learn from the interviews we collected in May 2021 from three generations of the Ferreira's family. [94] Mrs Rosa de Jesus of ninety-three years old, remembers when her father has charged her of participating in an "*ajuntada*" [95], where she started by carrying the earth until she was able to execute each phase, from start to completion. Being a woman was no limit from contributing, "*we helped a lot, we worked just like the men, and even more than the men*." [96] Naturally, her children also learned the technique with the family and neighbours. Mr Adérito Ferreira is the last generation. He, like many other Portuguese, in the middle of the 20th century, had to stop the tradition to migrate to Latin América in search of better conditions. When returning, with other perspectives they acquired abroad, the earth house was of no interest to modern times and the new mentality.

However, the spirit of mutual aid is still very present in the community, and the interest in the subject accords a collective memory, which values what they thought had no value. As the current work aims to revalue and reappropriate adobe's constructive culture in Aveiro, a practical experience has taken place, searching to learn the technical and cultural principles in adobe's production. The goal of this encounter focused on capturing the knowledge and the collective memories of this family. And, therefore, the technical qualities of the abodes produced was of no concern, once the technical conditions were not in place to replicate the manufacture of the adobes rigorously, as made in the past.

Mr Ferreira, accompanied by his family, started by showing and explaining the raw materials and how it was provided. He used powdered quicklime that he mixed with water, creating a chemical reaction

94 Mrs Rosa de Jesus; Mr Adérito Ferreira and Ms Ana Ferreira, from the older to the younger generation, respectively.

95 *Ajuntada* - The *barreiro* was a gathering of friends who, voluntarily and by tradition, commanded by a chief, united their efforts to manufacture all the adobes necessary for the construction of the house for the new couple. *In: O Barreiro.* p. 22; Translated by the author.

96 JESUS, R. 20th march of 2021. *Santo André de Vagos*. Complete interview in annexes; Translated by the author: *Nós ajudávamos muito, trabalhávamos tal e qual quanto aos homens, e mesmo mais que aos homens.*



26 Practical experience. Mr Adérito, showing the chemical reaction created by water and the powdered quicklime.
Credits: Thaina Araujo



27 Interview with Mrs Rosa de Jesus, in Santo André de Vagos
Credits: Thaina Araujo

that heats up to 50 degrees Celsius. Then, he blended the quicklime with the earth provided on-site, creating a mixture that his family later helped frame into the moulds he had prepared for that day. Yet, for a completer report about adobe's manufacturing, we shall look back to the activities held in the Areal of Manuel Duarte.

III.2.3.1. Areal of Manuel Duarte

The *Areal of Manuel Duarte* was a commercial structure specialized in the fabrication of adobe. As the manufactures ran seasonally, the *Areal of Manuel Duarte* made available on the market the different varieties of adobe to sell throughout the year. The adobes contained specific proportions that were common to most *areeiros* in the region. They were six: 1.Mendões (interior walls), 2. 3/4 (interior walls), 3. de Muro (around properties, etc.), 4. de Parede (exterior walls), 5. de Poço (wall of the well) and 6. Estanca Rio (wall of a larger well). [97]

The first phase consisted of the extraction and preparation of the earth. It was a laborious manual work that employed six to eight people, and sometimes animal force. First was removed the superficial layer of earth, from four to five meters of depth, where lays the best soil for construction. The earth was then stored after removed all the impurities. And, the limestone, provided locally, was burnt *in situ* for four to five days. The proportion employed was usually 3:1, being three earth to one quicklime, and it was mixed to water to create a homogenous plastic-state loam. The loam was then transported, to the place where it was moulded.[98] The moulds did not have a bottom, being directly in contact with the soil. It was then filled up and trimmed with a shovel. The adobes were unmoulded, marked "*by stell*" with the owner's abbreviation and let to dry. After two weeks, they were pilled up at a ventilated and open-air space waiting for the opportunity to be sold. [99]

97 SANTIAGO, L., (2005). O Areeiro de Manuel Duarte - Esgueira, Aveiro. In: *Earth Architecture in Portugal*. pp. 260-263.
98 so-called *terreiro*
99 SANTIAGO, L. *O Adobo de Cal na Região de Aveiro. A fabricação de adobos no areal de Manuel Duarte.*

III.3 - CONSTRUCTIVE CONTINUITY.

THE FUTURE OF EARTH CONSTRUCTION IN PORTUGAL

When it comes to earthen construction preservation, it is necessary to reunite the four prospects most mentioned through this current work: culture, economy, ecology and technology, to respond to how earth construction will continue to evolve. Constructive continuity refers to all characteristics employed to preserve and promote the continuity of a constructive culture in the long term. Once new means of development that perform an ecological conscience, vernacular solutions have regained influence, acting as a main-key in this current ecological transition period.

Therefore the future of earth construction represents an urge to look out for ecological principles and mainly to social and cultural interaction in the core of society. The improvement of vernaculars constructive culture can only happen when there is a multi-generational interaction, sharing the *savoir-concevoir* and *savoir-bâtir*. This communication establishes an effective dialogue between the actors involved in a construction site, allowing freedom to study, analyse and exchange new solutions altogether.

To conserve and build new constructions with earth material is necessary to generate collective knowledge so that the younger generations keep on carrying and adapting the technique. This action should always be evaluated by the appropriate normalization that should adapt to the material and the technicity, which is still not the case and generates yet nowadays frailties in the continuity of the technique. In the following topics, it will be analysed the interaction between the different actors in earth architecture and how to reestablish this synergy in the core of a construction site.

III.3.1 - The contemporary challenges of earth construction. Design versus dwell

The duality of building and dwelling is a contentious subject in architecture that nowadays has been discussed through initiatives of participatory architecture. In those initiatives, equal communication between the multiples actors is the base of the design and the construction process, echoing the principles of an "*Architecture without architect*".[100] This term can reflect by instance, the *Quinta Monroy housing*, where the architect Alejandro Araveja in dialogue with the community, design "*the bones of a good structure and leaves its completions to the residents. When completed, the result is an architectural disaster but an economic and sociological success*." [101]

When contemporary architecture faces the necessity of discussing design and dwells openly, the vernacular architecture resurfaces once again as an opportunity to reestablish the bond lost. In the framework of the current work, it was mattering to set a practical case that would build communication between these two points of view, clarifying the most relevant perspectives of building and dwelling according to both architect and resident.

The architect interviewed was Mrs Odile Vandermeeren, a Belgian architect that has been working with earth architecture for more than 12 years in Africa, Europe and Asia. She was able to give a broader prospect about how earth architecture is perceived and lived in those three continents. The main points of interest raised during the interview [102] were later the basis to interview the Ferreira's family in Portugal, allowing, therefore, reciprocity of both perceivings of earth architecture, which the following images attempt to represent, compare and distinguish.

100 RUDOFSKY, B. (1987). *Architecture Without Architects: A Short Introduction to Non-Pedigreed Architecture.*

101 SENNETT, R. (2018). *Building and Dwelling. Ethics for the city.*

102 The complete transcript of the interviews is available in annexes.

THE CONTEMPORARY CHALLENGES OF EARTH CONSTRUCTION

DESIGN VERSUS DWELL

TIMELINE DIAGRAM - FROM CONSERVATION TO DIFFUSION

ON HELPING ONESELF IN ORDER TO BE HELPED

I helped others so that other people would help me too, that was our life (...) we didn't pay anything, only the lime. We exchanged time with each other (...) At the end of the day we had a party, and we ate together and stayed together until the end of the day.



It was a very, very, friendly environment, we were friendly with each other. (...) I really like living in an adobe house. Me and the other people in the village like it very much. I was born, lived and will die here.

MRS. ROSA DE JESUS

During the interview, Ms Rosa de Jesus explains the customs linked to the process of making adobes, emphasising the importance of helping and being helped in the adobe constructive culture.

ON WHAT WAS LOST.



A lot was lost. Let's start by the conviviality, the traditional of “quem casa quer casa” was lost, eating habits were lost, many things were lost, as well as the Gândaresas houses, because people started to work in other areas to have money and not goods, there were no more exchanges (...) If someone says he is going to build a house the "old fashioned way" and asks the community for help, listen, the whole village appears.

MR. ADÉRITO FERREIRA

Mr. Adérito belongs to the last generation that carries the knowledge and the know-how of the adobe constructive culture in Aveiro, and during the interview he spoke about the socio-cultural and socio-economic aspects that were lost with the abandonment of the technique.

ON PASSING ON THE KNOWLEDGE

I knew the houses on my village were built in adobe, however, I only became interested in the subject when you told me about it, because I was curious enough to ask my father, my grandmother about adobe. (...) there's still the culture of mutual help and I think that it would be possible to return to adobe construction because it's still a very cultural and friendly village. And this new generation is seeking for new solutions in traditional customs.

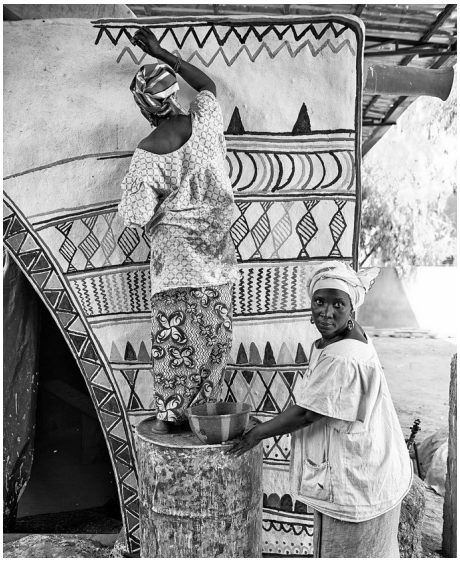


MS ANA OLIVEIRA FERREIRA

Ana Oliveira, talks about the importance of passing on the constructive tradition to the following generations, emphasising the possibility of continuity of the technique.

ON REINVENTING THE ARCHITECT'S PROFESSION

Credits: Odile Vandermeeren



In Africa earth is part of everyday life. (...) This basis still exists, this practice of getting together to build and participate in the effort, already exists, but it is being lost more and more. (...) we had to reinvent the profession of architect. It's not just the person who draws up plans and specifications and prescribes. You have to reinvent yourself, be a builder yourself. (...) Building together is about economic and structural efficiency and a relationship with the environment and nature.

MRS. ODILE VANDERMEEREN

During the interview she spoke about her experiences in Africa, Asia and Europe, highlighting the community aspect still existing in earth construction, and clarified the role of an architect in a participatory construction practice.

III.3.2 - Reinvented construction site. From conservation to diffusion

In Portugal, according to the researcher and architect Alice Tavares, when questioned about the challenge of preserving the cultural values of the vernacular architecture of Casas Gandaresas, she stated that it settles essentially on the political and administrative neglect of the rural heritage in Aveiro. The urban plans and construction regulations do not establish concrete measures regarding the preservation and diffusion of the technique in the region.

However, she continues asserting that building new solutions to this challenge would only be possible through initiatives based on the "*promotion of good practice measures, and scientifically based technical awareness-raising*". [103] Therefore, to begin considering new approaches to traditional earth construction and preservation is necessary to start on the communal roots of the local inhabitants by creating policies of awareness-raising and education.

> *La construction en terre demandait une main d'oeuvre abondante. L'investissement en travail propre des familles, la solidarité de voisinage, l'entraide sociale collective, jouaient un rôle important garantissant la réalisation du gros oeuvres des ouvrages dans des délais acceptable.*[104]

The traditional construction site had essential dynamics to maintain a constructive culture progressing, qualifying practice of cooperation that defines the characteristics of a constructive technique. Hence, holding this interaction active is fundamental to keep on preserving and essentially spreading the technique. However, the traditional constructions site was designed considering the weather constraints, once it was unmanageable to create an earth section during some periods of the year.

103 TAVARES, A.; COSTA, A.; PEREIRA, I.; FEEITOSA, M. (2021). *O desafio da preservação de valores culturais da Arquitetura vernácula das Casas Gandaresas.* O Congresso da Reabilitação Universidade de Aveiro.

104 GUILLAUD, GRAZ, CORREIRA, MECCA, MILETO, *et al.* (2009). *Terra Incognita. Découvrir une Europe des architectures de terre. p.86*

Nowadays, the earth construction site is in extensive development, where many countries have sought to improve mechanisms tools of prefabrication, modularization and serial production to attend to a more acquainted earth material and technique. These technological evolutions supported by initiatives of research and experimentation allows qualifying more specialised professionals. It provides a production gear more autonomous of the weather conditions and more time-effective, which introduces earth construction in the competitive market compared to other materials.

Besides the technical factors, the reinvented construction site is also about exploring social engagement in a participatory process. But when talking about a participatory construction site in the current days, the persistent question is, who decides?

> *The question is not about who decides, but actually about how the decisions are made. It needs consent. It needs compromise. If the group decides it is a group decision, then it is. If the group decides there should be a guideline, then there is. There, the group decides that no one decides. The project decides. A project can tell if it has the required qualities, ambitions and processes to become an interesting project for the group. Decision making is a product of design.*[105]

ConstructLab is an association of collaborative construction practice that differs from the "*conventional architectural process in which the architect designs and the builder builds*"[106] the projects designed generates new dynamics of solidarity and mutual support on the construction site rather than solely building. Similar initiatives like *Rural Studio* and other contemporary earth architecture studio, inscribe earthen construction and vernacular architecture as qualitative solutions to a new category of environmental techniques, adapt ing to industrial performances, offering a social and economic impact by the added value of human work generated.

105 CONSTRUCTLAB *et al.* (2019). WHO DECIDES? *In: How together.* pp. 42-44

106 CONSTRUCTLAB (2019). *Avaible at: https://www.constructlab.net/about/*

CHAPTER **FOUR**

LIVING IN EARTH CONSTRUCTION:

A PRACTICAL CASE



28 Ria de Aveiro water line mark

29 Map of the Portuguese territory marked by the main road network structures, highlighting their territorial dynamics.

IV.1 - TERRITORIAL ANALYSIS AT THREE SCALES

IV.1.1 - THE EXPRESSION OF THE RIA DE AVEIRO ON PORTUGUESE TERRITORY

The coastal areas represent ever-increasing importance regarding the most relevant territorial approaches nowadays, the environmental, economic, social and cultural strategies. Given the current urban context of sustainable development policies demand, the role of architecture has prevailed in the commitment for troubleshooting. In particular, regarding the loss of biodiversity, the control of erosive processes, the urban occupation in risky areas, the habitat destruction, and the decline of economic activities; are among the most relevant reasons striving a balance between the conservation of natural resources and the protection of nature in the socio-economic development of each region. [107]

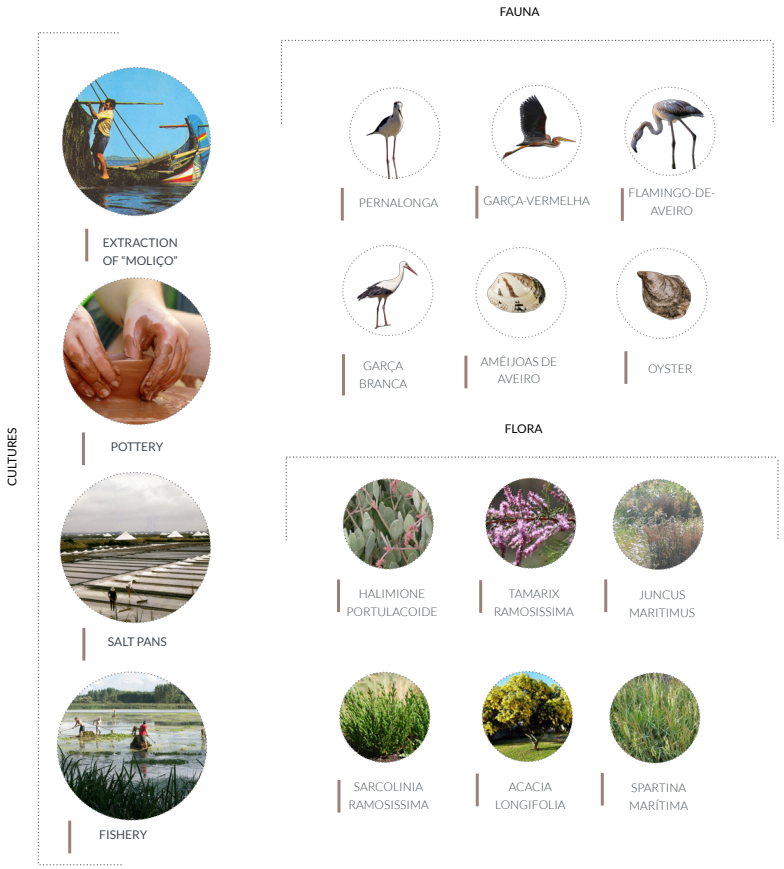
Ria de Aveiro can be considered a natural interaction system, connecting the society to the natural conditions that define the territory and its dynamics. The Aveiro's region, distinguished by these spontaneous synergies, is recognized on an international scale concerning its natural heritage of fauna and flora and diverse economic activities that generate resources toward territorial management.

Several initiatives mutually attempt to preserve and conserve the Ria de Aveiro. The project Polis Litoral Ria de Aveiro executes a programme of "*requalification and valorisation operations, in risk zones and degraded natural areas located on the coast, in priority intervention areas.*" [108] A fundamental goal is to define strategic plans to perform in four perspectives, the protection and defence of the coastal and lagoon areas to prevent risks; the protection and enhancement of the natural and landscape heritage; valuing resources as a factor of

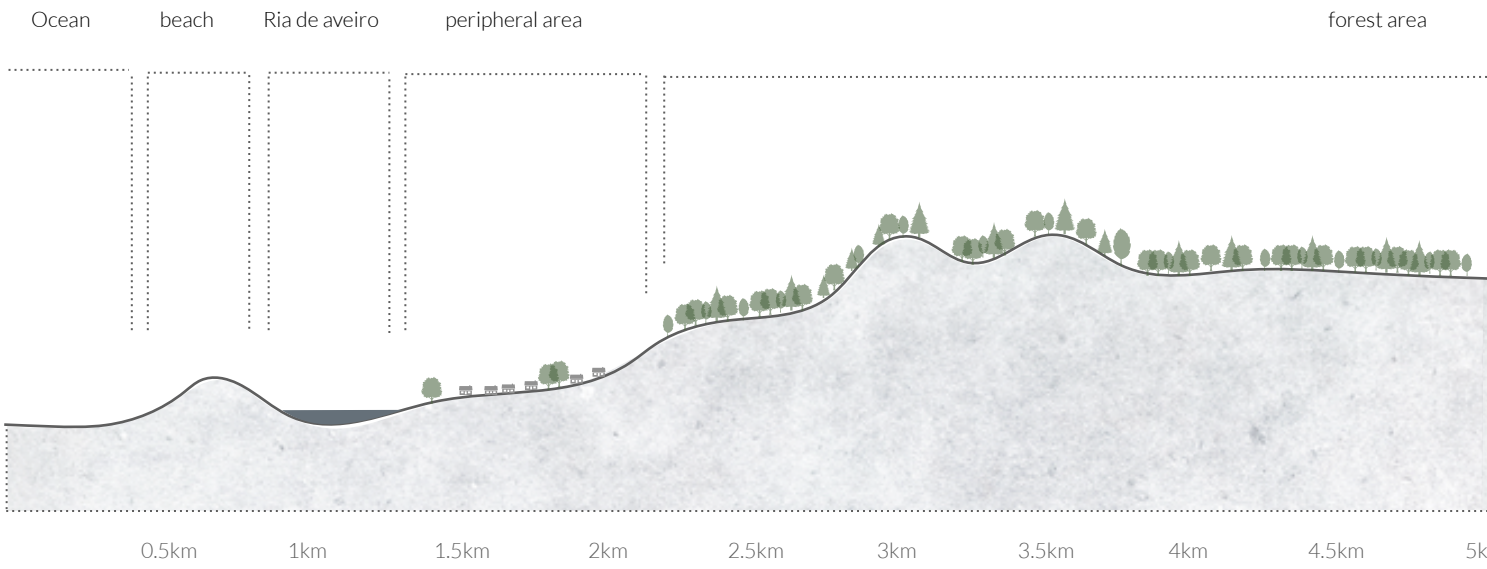
107 POLIS LITORAL RIA DE AVEIRO, S.A. (2015). *Ria de Aveiro Polis Litoral* . p. 2

108 POLIS LITORAL RIA DE AVEIRO, S.A. (2015).(2019). *Ibidem.* p. 3

30 The activities, fauna and flora in the originating from the Ria de Aveiro, including salt production, seaweed harvesting, shellfish gathering, fishing, aquaculture, agriculture, shipbuilding and recreational boating.
Credits: Thaina Araujo



31 Corte longidudinal de 10 km manca as dinamicas territoriais de Aveiro.
Credits: Thaina Araujo

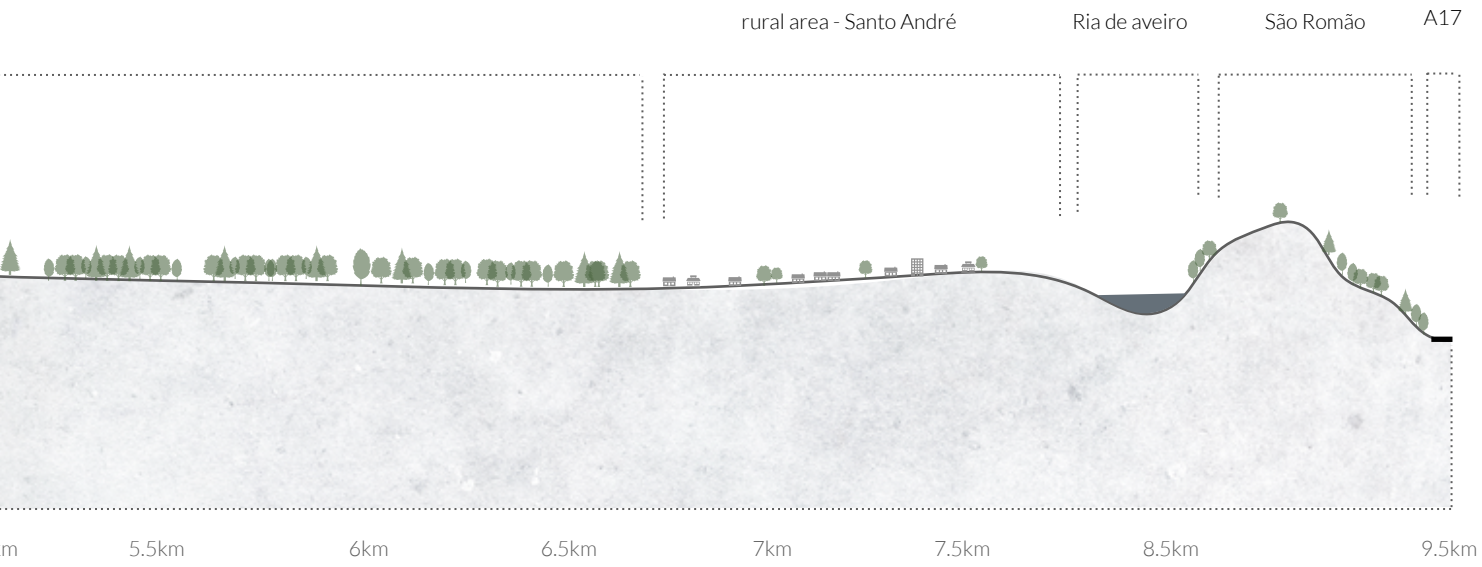


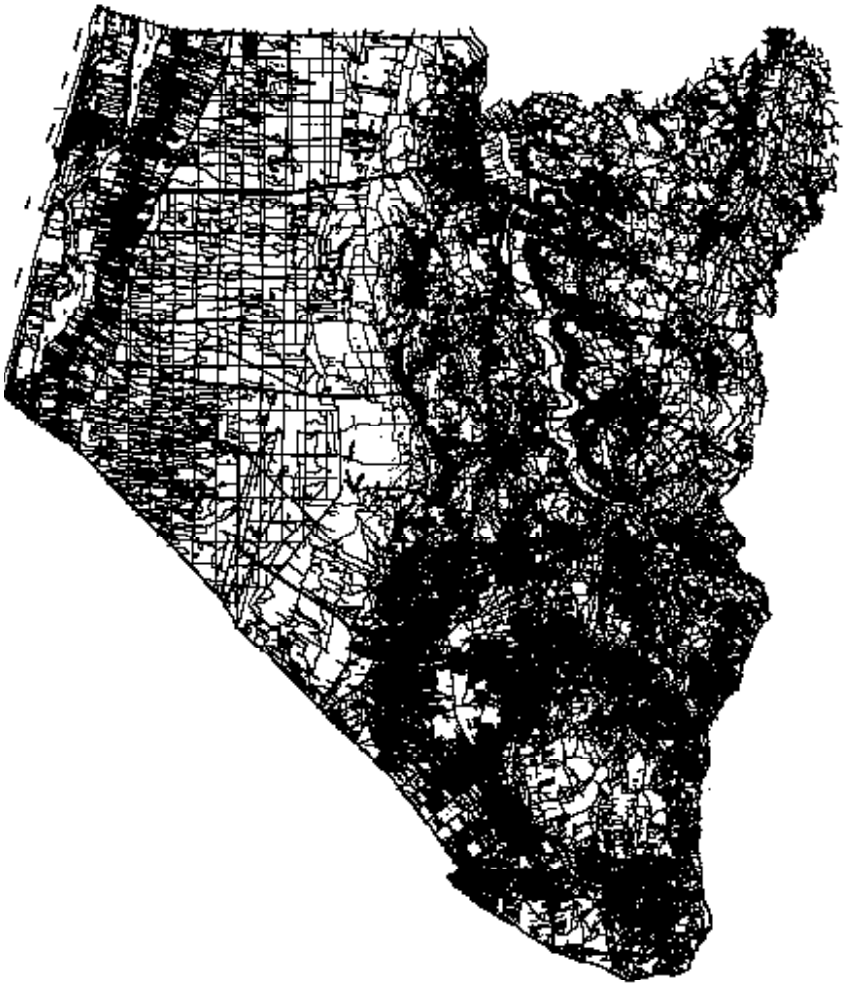
economic and social competitiveness; and promotion and stimulation of Ria de Aveiro activity. [109]

The principles set by Polis Litoral in order to boost and protect Aveiro on its major scale: Ria de Aveiro, are intended to be the primary elements of the current work for the architectural and urbanistic intervention that will be developed throughout this chapter. The first scale approached on the design procedure is the regional scale, considering the expression of this environmental heritage to the definition of a singular ecosystem identified on the scheme below.

The longitudinal cut represents the territorial dynamics in approximately 10 kilometres. From the Atlantic Ocean to the A17 highway, that crosses Aveiro and connects Lisbon-Porto, the landscape reveals itself with dynamism through the Ria de Aveiro that permeate the territory in two moments, a peripheral area, a forest area and a rural area. It is from this territorial dynamism that an ecosystem distinguished by a variety of cultures is performed. In the image at left, it is possible to perceive the most found species that lead to the most current economic activities.

109 GRUPO DE AÇÃO COSTEIRA. (2012) *Ria de Aveiro: amniente e economia sustentável*. p. 4. Available at: https://issuu.com/cmovar/docs/gac-ra_-_divulga__o_dos_projetos





32 The territory of the municipality of Vagos through the Road Network Current Structure and Hierarchy map
Credits: Camara Municipal de Vagos

IV.1.2 - A RURAL PERSPECTIVE ON THE PORTUGUESE TERRITORY

With a visibly rural character, Santo André de Vagos is a parish council of mostly ageing residents, located in the South of Aveiro's municipality, which sums 2033 residents and occupies an area of 12,44 km^2.[110] The parish council of Santo André de Vagos traces the origin of the municipality of Vagos. In 1190 the king D. Sancho I gave a charter to the territories of São Romão, which after the Administrative Reform of 1853, became part of the municipality of Vagos.[111]Since the Middle Ages, Vagos has continually had great importance to the district of Aveiro, given its strategic territorial location, limited by the course of the Rio Boco, a tributary of Ria de Aveiro, addresses the interest of the current work in this particular area.

The image at right outlines the ZEP - Zone of special protection of Ria de Aveiro. It is a humid zone, inserted in the Rede Natura 2000 and classified under the European Birds Directive, housing more than two hundred species of birds of high protection condition. This estuarine zone allows a great diversity of natural habitats where the marshes, reed beds, and riparian galleries stand out. [112]This particular zone has been exposed to the constant risen-level of its waters due to climate changes, besides the other climatic hazards already quoted, like increasing burning and fire exposure and earthquakes risk. Here are some other reasons justifying the interest and concern regarding the municipalities that compose ZEP and surround the estuarine of Ria de Aveiro.

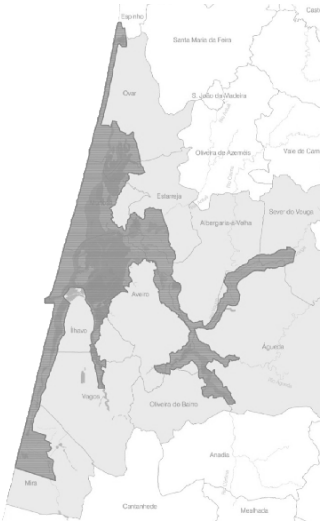
The municipality of Vagos has an important strategic location regarding the city of Aveiro, expressing itself as the greatest example of rural contemporariness, which serves to host the most relevant infrastructures to support the urban centre of Aveiro, without losing its rural/peripheral particularities.

110 INE (Instituto Nacional de Estatística) - *http://censos.ine.pt/xportal/xmain?xpid=CENSOS&xpgid=censos_quadros. Available at: http://www.freguesiadesantoandredevagos.eu*

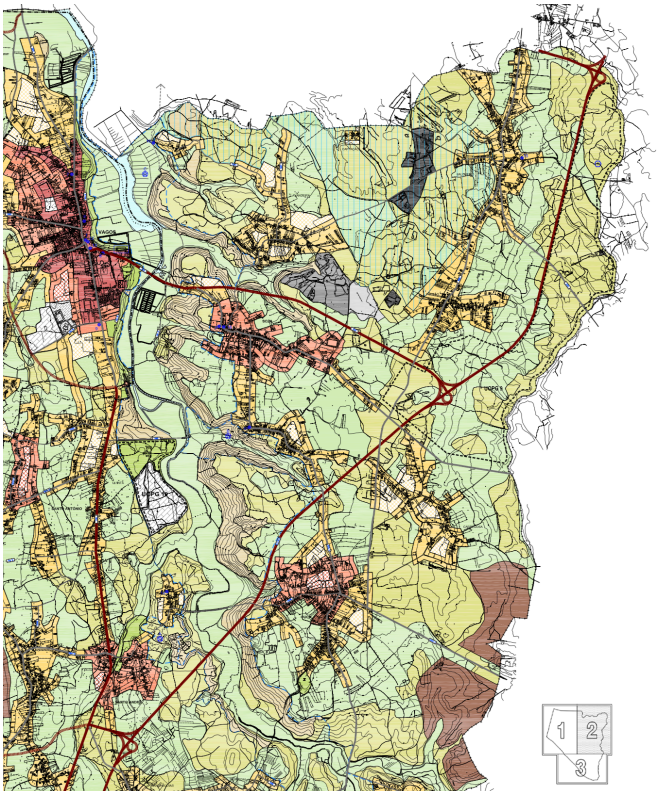
111 *Available at: http://www.freguesiadesantoandredevagos.eu*

112 Distribution of the population by age groups.

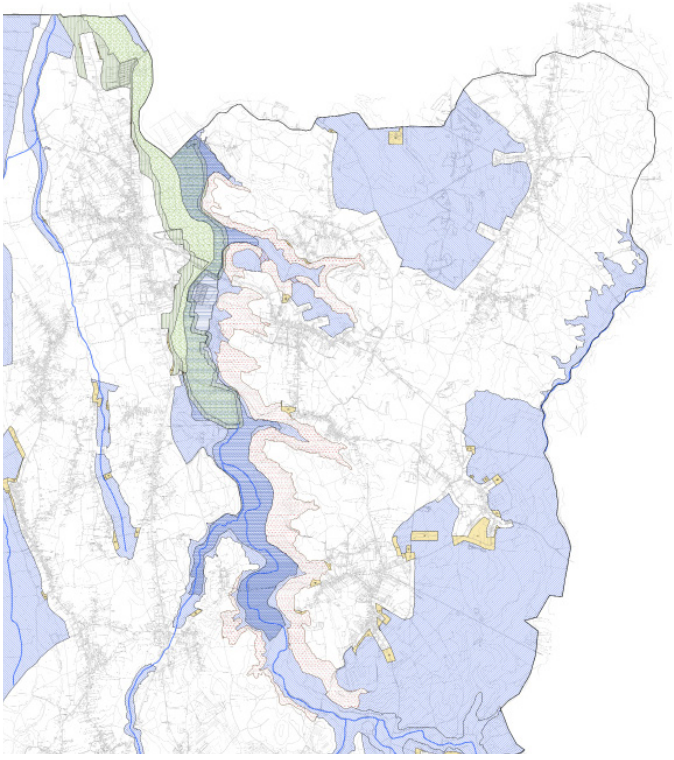
0-14	15-24	25-64	>65
303	230	1089	411
14,9%	11,3%	53,6%	20,2%



32 ZEP - Zone of special protection of Ria de Aveiro.



33 Territorial Management Plan
Credits: Camara Municipal de Vagos



34 Conditioning planning plan of the National Ecological Reserve of Vagos
Credits: Camara Municipal de Vagos

In a more detailed view over the territory dynamics of Vagos, at the southeast area, designated zone 2, where it is still able to reach out the branch of Ria de Aveiro, the Rio Boco, it is possible to analyse the territorial conditions and the visible spots of interest in the locality- The soil characterization of Vagos is essentially due to the presence of the Boco River and the Mira Canal, which is composed of silt loam, clay and muddy sands layers, defining the "*Argilas de Vagos*".[113] It explains why many clay exploration and extraction enterprises are located in the region, including the Vista Alegre Factory, the most relevant factory of Portugal in this domain.

113 The Vagos clay - Given that the dominant formation in the region is the so-called 'Argilas de Vagos', a formation consisting of various types of clays and with considerable possession. In: *Environmental Impact Study of Clay Quarry "Várzeas".*

Once the current work leans over essentially on the socio-cultural approach of earth construction, it is of higher interest looking upon the territorial dynamics that would enable a project strategy of social and cultural interest. Therefore, considering the Regulation of the first revision of the Municipal Master Plan of Vagos, it is possible to find some general dispositions about the territorial dynamics of Vagos and its principal necessities.

In the municipality of Vagos, the cultural heritage comprises an archaeological and built heritage, where the Gândaresas Houses have their value and interest classified. Still, from the heritage perspective, there are identified areas with specific aptitude, which correspond to certain zones of the territory that demands more detailed regulation. One of these areas are designated: Areas of Cultural and Recreational Aptitude.

The Areas of Cultural and Recreational Interest consist of areas denoted by the intersection of social work and the natural conditions of a region, leading to symbolical material or immaterial elements defining a specific local culture. These are places geographically denoted by their archaeological, environmental, historical, or ethno-





35 Gandaresas houses in the locality of Santo André, near the São Romão windmills.
Credits: Thaina Araujo

36 The old church and cemitery of Santo André de Vagos.
Credits: Thaina Araujo



37 The landscape of the city of Santo André de Vagos. Contrast between natural vegetation and the built space.
Credits: Thaina Araujo

graphic interest. The Areas of Cultural and Recreational Interest shown on the Council Planning Map are: (A) Conjunto dos Moinhos de S. Romão; (B) Conjunto das Azenhas do Boco; (C) Boco River Valley; (D) Nossa Senhora de Vagos Sanctuary; (E) Covão do Lobo lagoons. [114]

In those particular areas, there are allowed rehabilitation or the construction of new structures destined for "*tourism*, *culture*, *recreation*, *sports*, *commerce*, *services*, *and other uses that contribute to its promotion*." [115]However, of those five points of interest, only the first three are placed near the Boco River, which, therefore, dismiss the possibility of exploring the positions D and E. Article 43.º, section VII of the Cultural and Recreational Aptitude Areas Regulation further states that those areas located near to the Boco Rivers establish other dispositions,

> *b) Creation of access and circulation infrastructures along the river; c) Connection to nearby villages, with signage; d) Creation of paths for walking, horseback riding and cycling; e); f) Promotion of the navigability of the river; g) Promotion of tourism enterprises and rural tourism in conformity with the possible edificability in the space categories covered, in the scope of the requalification of the margins and adjacent lands.*[116]

These dispositions will be of great importance for the establishment of the project strategies in the following topics. By analyzing the Conditioning Map of the National Ecological Reserve of the Municipality of Vagos (image -), the map displays positions B and C as being areas of Maximum Infiltration, the Lagoon Protection Zone, and Areas with High Erosion Risks, which contradicts and difficulties a cultural interest project implantation.

114 Territorial Management Plan

115 *Regulamento da primeira revisão do Plano Director Municipal de Vagos. In: Diário da República, 2.a série — N.o 72 — 14 de Abril de 2009. Artigo 43.o.*

116 *Regulamento da primeira revisão do Plano Director Municipal de Vagos. In: Diário da República, 2.a série — N.o 72 — 14 de Abril de 2009. Artigo 43.o.*









38 The implantation of São Romão windmills in the city landscape
Credits: Thaina Araujo

39 Approximate view of the São Romão windmills. the details of the adobe masonry.
Credits: Thaina Araujo

40 Aerial view of São Romão windmills
Credits: Marcio Moura

IV.1.3 - Traditional landscape symbol. The mills of São Romão

Situated between the village of Santo André de Vagos and São Romão, the windmills of São Romão traces the landscape as a symbol of the daily life and the traditions held by the local people through history. These areas are traditionally known for the presence of windmills and watermills. The community's elders describe the existence of two watermills in the region that, in view of the constant summer droughts, ended up being disused once the water was not sufficient to produce energy. Therefore, at the end of the 19th century, six windmills were constructed, three made of wood and three made of adobe. Nowadays, the only windmills that endured through time were the ones made by the constructive culture of adobe technique.[117]

The mills were the livelihood promoter for the whole community and even for the surrounding villages. The historical characteristics of the presence of mills have an extensive influence on the traditional landscape of Portugal. A symbolic structure seen from north to south, its presence affirms the rural roots of the country, which nowadays accord more emphasis to the role that rural heritage plays in the country's depths.

> *The integrated conservation of this heritage should, in our opinion, be part of planning models that consider the relevance of landscape systems, including, among other topics, the safeguarding of resources and the importance of ecological structure.* [118]

Rural heritage has acquired a place of significance in cultural tourism development. View the necessity of defending and valuing policies and planning strategies that consider the rural dynamics as part of local cultural and economic growth.

117 OPONTO. (2011). *Santo André a minha freguesia*. Available at: *https://issuu.com/jornaloponto/docs/232_o_ponto_-_pag_11_18_-_especial_santo_andr_*

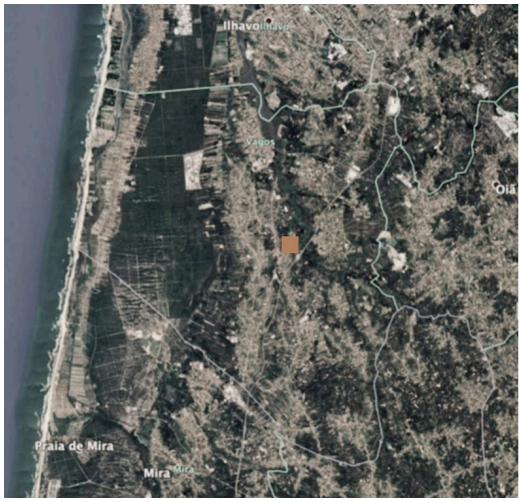
118 BARÃO, M.; VALENTE, T.; REIMÃO COSTA, M. (2014). Watermills and traditional landscape in the hills of the Algarve, Portugal. *In*: *Vernacular Heritage and Earthen Architecture: Contributions for Sustainable Development*. pp. 447-452; Translated by the author

41 The promotion of cultural tourism focusing on a windmills route through the programme "Ria de Aveiro in 80 experiences".

42 From left to right
1. Centrality of Santo André in relation to the municipality of Vagos
2. Traffic flow | A17 and EN109
3. Approximation of the two villages and Interaction within the terrain
Credits: Thaina Araujo











The Aveiro Region Intermunicipal Community (CIRA), integrated to the operation *"Ria de Aveiro – Produto Turístico Integrado"*, has launched a guide that runs through the eleven municipalities that surround Ria de Aveiro, where Vagos is an integral part, called *"A Volta à Ria de Aveiro em 80 Experiências"*. [119] The guide settle multiples experiences associated with the region's most emblematic cultural and tourist interest.

One of these experiences is associated with the mill's presence in the rural area, in which is dedicated a guide called "*Rota dos Moinhos*", [120] valuing the importance of these elements into the landscapes, where the Moinhos de São Romão are an integral part of the itinerary. Although the Mills of São Romão have certain visibility in this context, the local habitants manifest their discontentment claiming the mills have not been properly rehabilitated due to the lack of public investment. The materials used in the rehabilitation were not the original ones, the adobes, but inappropriate materials that could compromise the structure.[121]

Therefore, the current work aims to consider and value the constructive culture of adobe as an enduring tradition that should be estimated not exclusively by its cultural aspects but furthermore, for its technical qualities. And, hence, a strategy of preserving these structures through the implementation of new ones, based on the constructive culture held towards the adobe technique, is a necessary consideration regarding the capacity of adaptability of the technique both to ancient times and contemporary needs.

119 *"Around the Ria de Aveiro in 80 Experiences".*

120 "Windmills Route" Available at: *https://www.cm-albergaria.pt/visitar/rotas-e-percursos/galeria*

121 OPONTO. *op.cit.* p.4















43 View from the terrain to the surrounding area, the old church, and the lake present on the terrain. Credits: Thaina Araujo

44 Levelling, volumetry and vegetation present on the site terrain.

45 The surrounding area, the foothpath and the Boco River.

IV.1.4 - Social catalyst: connecting Santo André to São Romão

The Mills of São Romão is placed on a terrain set in the core of two villages São Romão and Santo André, that is encompassed by an important traffic flow the A17, the highway connecting Lisbon-Porto, and the national route EN109, defining the centrality of the two villages and the terrain.

The terrain as a central point between two villages reveals itself a spot of gathering, given space to several activities, like the monthly local market, interactive tours, and sportive activities. It faces São Romão at North, Santo André at South, the old church and cemetery at West and the highway at East. The terrain described by an irregular relief varies on a scale of 0m to 20m, being the mills placed on the highest part. This difference in altitude allows two perspectives to observe the mills: one to contemplate it as a traditional landscape symbol, and the other one, to examine the volume and its expression in a more intimate perspective.

Although the terrain has a high value for the local inhabitants, in the promotion of activities and serving as a social catalyst, the local authorities have neglected many welfare policies, being Santo André de Vagos the only community without a cultural centre, where many of their traditional values has been lost, including the adobe's constructive culture.

Therefore, the aim to propose a project that settles socio-cultural principles manifests even more relevant in this situation, where not only the adobe's constructive culture is lost but also the community social and cultural expression and engagement. Hence, a project to interconnect both villages and to give cultural value to the community will be presented in the following topics.

46 Minding map/collage of the project most important highlights, summarizing the main ideias of the project
Credits: Thaina Araujo



IV.2 - ARCHITECTURAL STRATEGIES AND PROPOSALS OF INTERVENTION

From the willingness of assembling a constructive culture to a socio-cultural awareness emerges a project that asserts two design dimensions. One based on theoretical regard, where was raised the most relevant issues referring to the decline of a constructive culture, and another one, to situate this theoretical dimension into a practical case. These two perspectives have already been set while the first three chapters were dedicated to reveal and expose the challenges and paradoxes concerning adobe's constructive culture in Aveiro. This last chapter will focus on the applicability of those principles in a case study. As already exposed a brief about the project's prospects, we shall now face the strategies settled to converge theory into practice.

But first, to be able to respond to this concept of "en et sur" [122] architecture is necessary to ascertain the principle that will conduct the project to answer the issues raised during the current work. Throughout this work, the territory has predominantly been employed, referring to its social dimensions, as a space produced socially. Therefore, the conceptual processes of the project have sought to find architectural dynamics. It responds to the social and cultural needs through an interactive and participatory process as an instrument of solidarity and commitment to the common good.

The following topics will propose a reconsideration of the four principles set in chapter two, socio-cultural, socio-economic, technical and environmental interests, relating each one to strategies that will qualify the participatory process of construction. The project will then introduce a perspective of valorisation of adobe's constructive culture, proposing a cultural centre construction through participatory architecture to face the increase of rural exodus in Portugal.

122 "En et sur" "architecture: on one hand, the student is invited to situate his/her action in a theoretical and architectural reference system. On the other hand, he/she activates this referential baggage to develop an architectural project." Available at: https://sites.uclouvain.be/archives-portail/cdc2017/cours--2017-LBARC2231.pdf

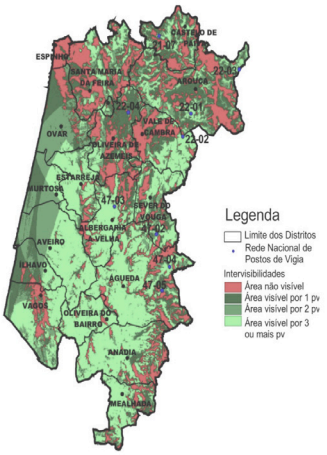
IV.2.1 - Ecology at three scales. The project origins.

The ecologic strategies give the first prospects to the design plan. It was conceived with the purpose of intervening in multiple scales from the regional to the local interest. It starts with the promotion and dynamisation of the Ria de Aveiro through the implantation of signage and pedestrian and cycling paths. The regional scale is reached by creating access and circulation infrastructures along the river connecting both villages, Santo Andé and São Romão. These punctual interventions set in a different range of design allows the inhabitants and local tourists to walk along the length of the Boco River, exploring it from different perspectives. The pathway becomes dynamic by the multiple infrastructures, platforms and public seats that generate passive tourism through a minimal intervention on the natural landscape.

The second scale touches the peripheral area of Vagos' municipality. An intervention to protect and defend the coastal and lagoon areas is envisaged, reducing the significant increase of environmental hazards. According to the Analysis of the National Watchtower Network, this central region of Vagos is not covered by a watchtower [123], as displayed on the map at right, also considered an area of high surveillance priority. Hence as the terrain is located in a high altitude area, the current project focus on establishing a watchtower with a covering diameter of 10 km distance.

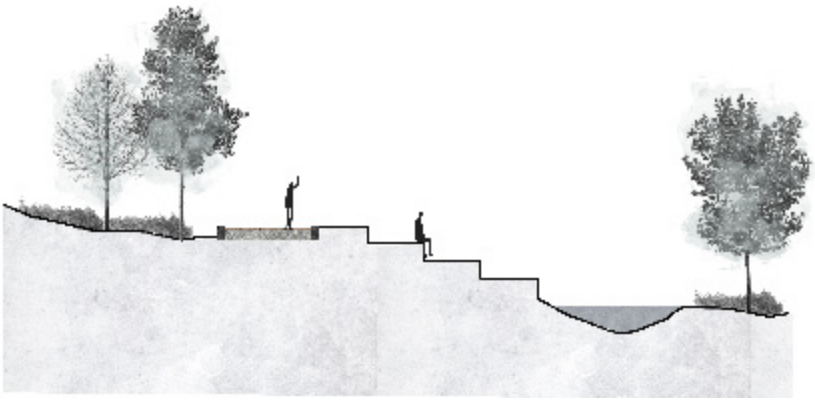
Another intention of the project is to create nature observation points, as required by the Regulation of the Municipal Master Plan. This second watchtower will serve local activities, like the "*Um passeio pelo céu*" event, a guided tour of the night sky in the surroundings of the S. Romão windmills. The last scale is the local one, through the creation of a cultural centre that will value the learning of the local technique. Considering protect and enhance natural, architectural and landscape heritage.

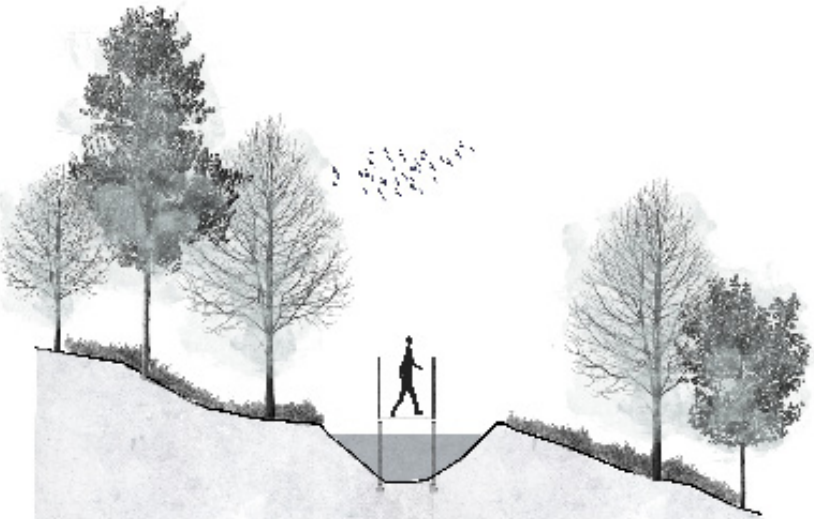
123 Analysis of the National Watchtower Network. Forest Fires Initiative - Project for Forest Surveillance, Detection of Forest Fires and Support to Fighting Systems. Available online: http://www.isa.ulisboa.pt/ceabn/projecto/1/37/an-aacute-lise-da-rede-nacional-de-postos-de-vigia-iniciativa-inc-ecirc-ndios-florestais-projecto-de-vigil-acirc-ncia-florestal-detec-c-cedil-atilde-o-de-inc-ecirc-ndios-florestais-e-apoio-a-sistemas-de-combate



47 Areas of visibility of the national network of watch towers







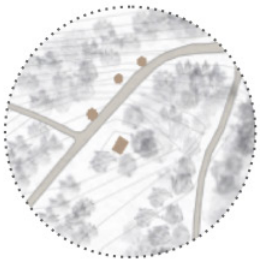
48First intervention - adaptable foothpath and cycle lane.
49Second intervention - foothpath, cycle lane and ponctual interventions of public equipement.
50Third intervention - footbridge, will allow a closer contact with the sourrounding nature, and explore in depth the River Boco.
Credits: Thaina Araujo



1. REGIONAL SCALE

RIA DE AVEIRO

Promotion and dynamization.
Through: observation and mobility



2. PERIPHERAL SCALE

VAGOS

Protection and defense of coastal areas to prevent risks
By: observation and passive tourism

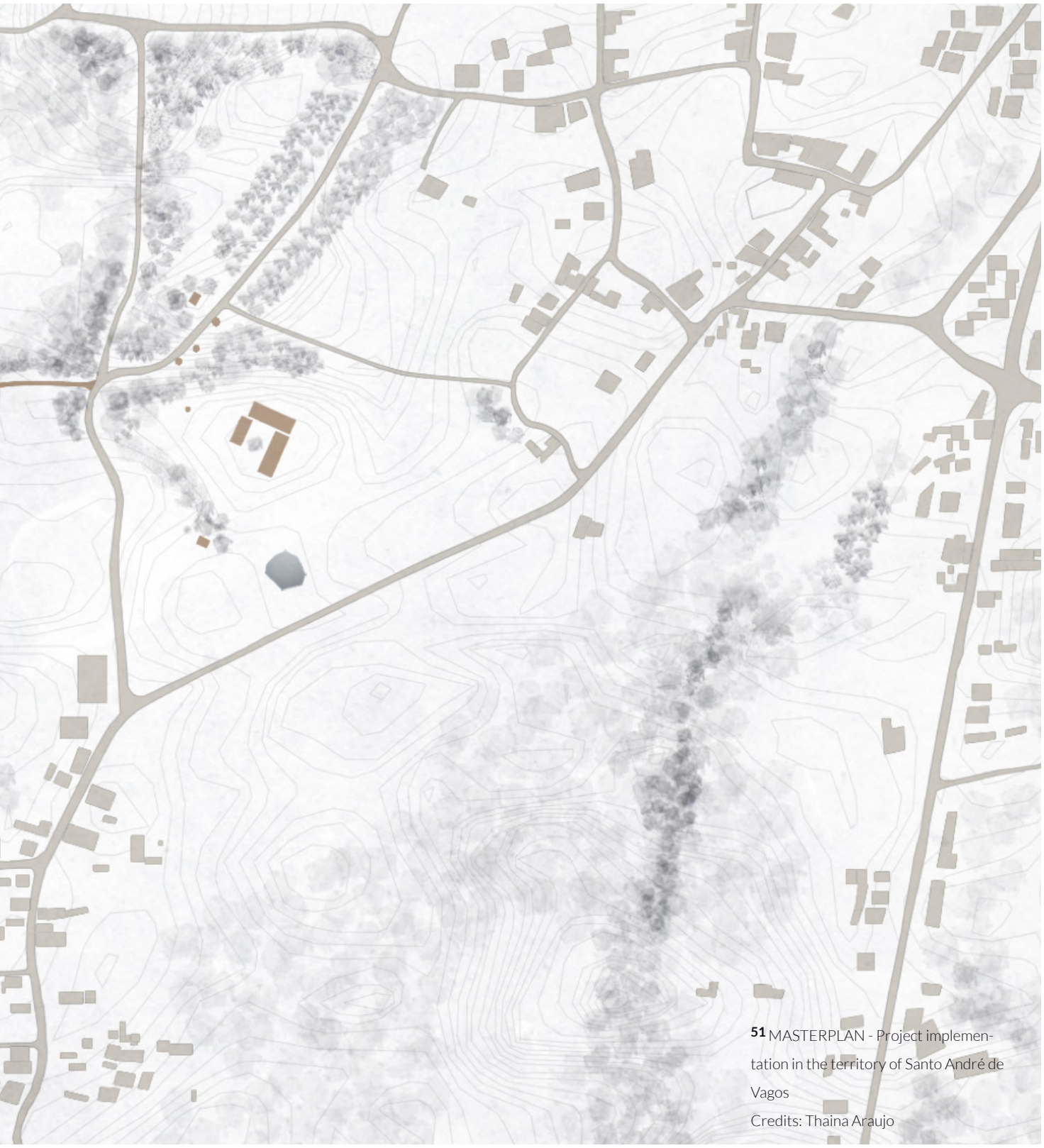


3. LOCAL SCALE

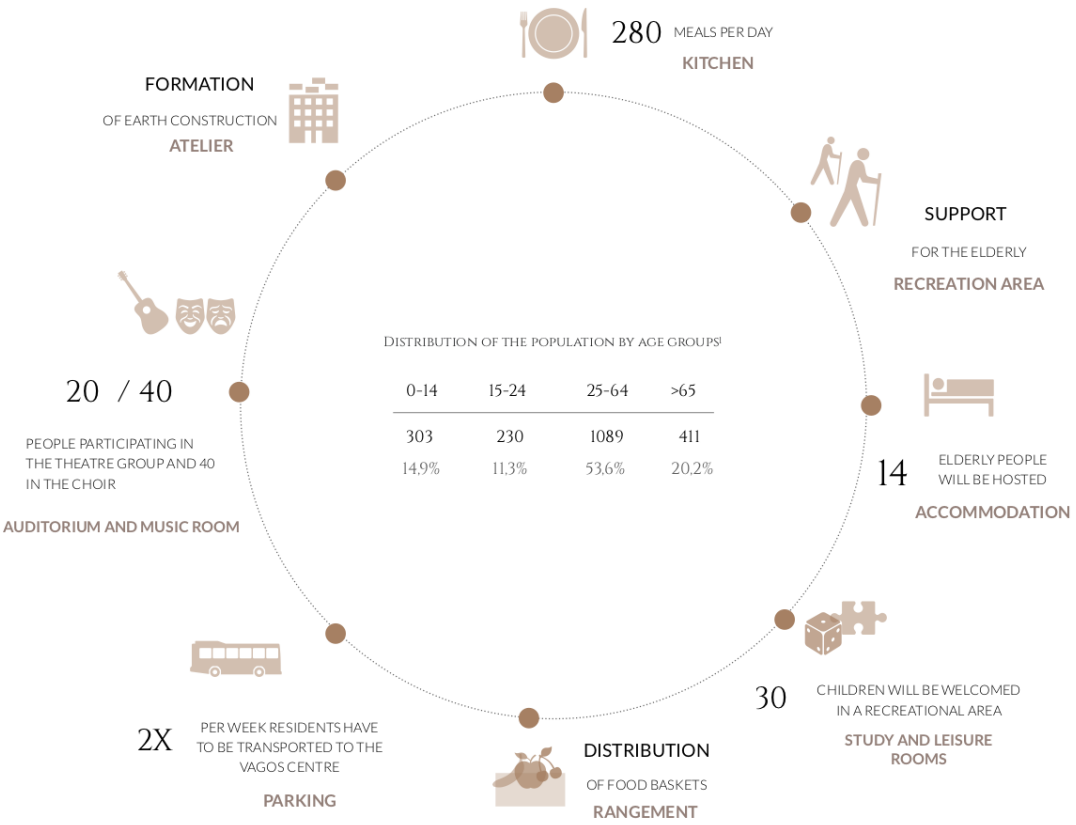
SANTO ANDRÉ ET SÃO ROMÃO

Protection and enhancement of natural, architectural and landscape heritage
Through: learning and preservation





51 MASTERPLAN - Project implementation in the territory of Santo André de Vagos
Credits: Thaina Araujo


280 MEALS PER DAY
KITCHEN
SUPPORT
FOR THE ELDERLY
RECREATION AREA
14 ELDERLY PEOPLE WILL BE HOSTED
ACCOMMODATION
30 CHILDREN WILL BE WELCOMED IN A RECREATIONAL AREA
STUDY AND LEISURE ROOMS
DISTRIBUTION
OF FOOD BASKETS
RANGEMENT
2X PER WEEK RESIDENTS HAVE TO BE TRANSPORTED TO THE VAGOS CENTRE
PARKING
20 / 40
PEOPLE PARTICIPATING IN THE THEATRE GROUP AND 40 IN THE CHOIR
AUDITORIUM AND MUSIC ROOM
FORMATION
OF EARTH CONSTRUCTION
ATELIER
Distribution of the population by age groups[1]
0-14 15-24 25-64 >65
303 230 1089 411
14,9% 11,3% 53,6% 20,2%

IV.2.2 - A VILLAGE WORKING FOR A COMMUNITY CENTRE.

The socio-cultural strategy by the actors involved and in their participation in the construction process. As already stated, Santo André de Vagos is the only village not to have a social centre. However, even without financial support, the community in a solidarity act manifests its interest for the common good. In an interview with the local magazine *O Ponto*[124], Madam Mayor declared this interest of the community when stated:

> *The cultural centre would be the engine of development for everything: economically, in terms of employment, in terms of society. People need it. It doesn't have its own headquarters, but it is supported by 30 employees, which, without any funding, has been built since 2003 with the support of the people of Santo André.* [125]

In an attempt to construct their cultural centre, the inhabitants have started to build it themselves, but due to the lack of social, economic and environmental strategies. Therefore this initiative demonstrates already the collective commitment and the communal roots in the habitants' origins.

The designing process started by considering the participatory construction aspect where the intergenerational engagement, into the entire process from design to maintenance, pointed to most of the constructive and technical solutions suggested in the project. The programme was based on the current necessities of the local inhabitants. In this same magazine, O Ponto was mentioned and identified the main actors that actively attempts to dynamize the community with regular cultural activities.

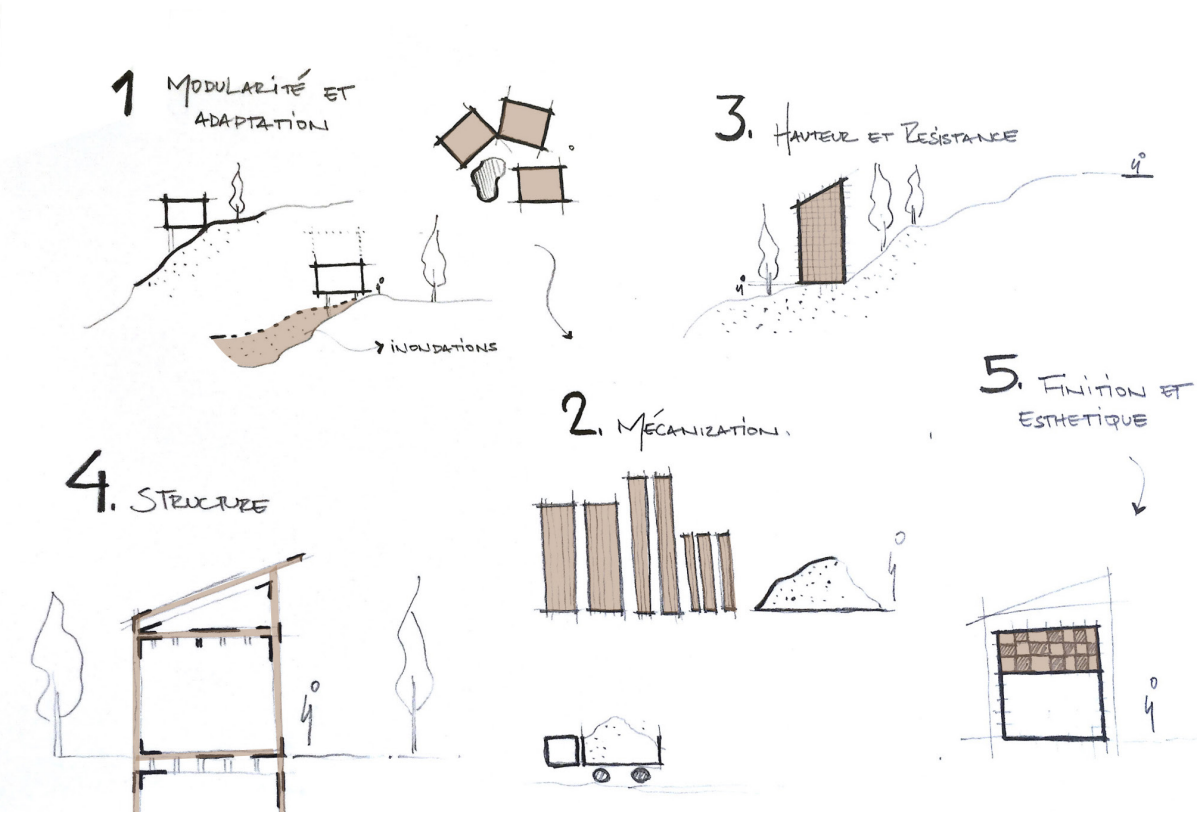
Ms Sereno responsible for the IPSS, a social solidarity group stated, "*we work without financial support and every day we serve 280 meals,*

124 *Jornal O ponto*. O PONTO is a bimonthly newspaper of general information, directed to the councils of Vagos, Ílhavo and Mira. The newspaper considers grounded and free information, in order to potentiate a public and active opinion. Available online: http://www.oponto.net

125 O ponto. *ibidem*. p.2

52 Picture at left - Diagram showing the main needs expressed by the inhabitants of Santo André de Vagos.
Credits: Thaina Araujo

53 Diagram of 5 principles of technology application
Credits: Thaina Araujo



we support the family, the elderly and the children". [126] Besides her, Ms Grasiosa Santos is responsible for the theatre and folklore group of Santo André de Vagos. She says it is challenging bringing the group together and carrying out social events. "*The social centre will be able to reactivate the theatre group*," [127] where she specified that twenty people participate actively in the theatre group and forty in the choral.

The interview with the two ladies and other residents have identified some additional requirements to the cultural centre, like accommodation to host some elders inhabitants and a recreative space to welcome the children. Construction is an important economic activity which justifies once again the opportunity and importance of establishing an earth construction learning centre dedicated to teaching the technique of adobe for the younger generation. [128]

IV.2.3 - Technique meets needs.

Most of the practices that come from adobe's constructive culture has been lost essentially due to technical inconstancies. The reasons have root essentially in the lack of political initiatives, as already indicated. But part of it is also related to the necessity of improving the constructive technicity to keep up with the contemporary demands.

In Aveiro, with the introduction of new construction methods, the inhabitants involved in the constructive culture did not question themselves on improving adobe technique. This action had the consequence of discontinuity of the traditional know-how.

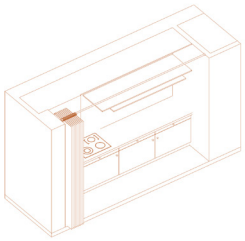
The project attempts to reestablish the technical principles to match the social needs identified. If a practice of intergenerational process is needed, then the manufacturing of adobe and the construction of the community centre has to adequate for different ages and

126 SANTOS, G. *Jornal O ponto*. Available online: http://www.oponto.net

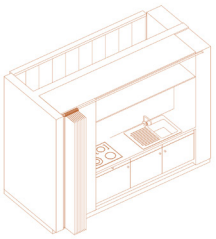
126 SERENO, D. *Jornal O ponto*. Available online: http://www.oponto.net

128 Unfortunately, due to the sanitary condition that was current during the development of the actual work, it was not possible to establish direct contact with the actors just mentioned. Therefore the information just shared is based on the ranges of interviews produced by the O Ponto magazine. Those pieces of information were later confirmed by Ferreira's family members, which were the only community's members I was allowed to meet; Assuming I was not able to collect other information neither to talk to other inhabitants.

KITCHEN/STORAGE MODULE

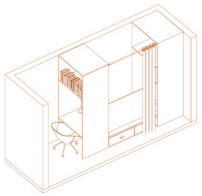


Single-side kitchen + side storage • 4,20m x 1,40m

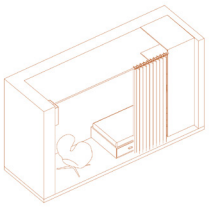


Double-side kitchen/storage • 3,20m x 1,40m

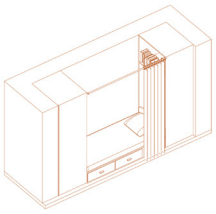
BEDROOM/STUDY PLACE MODULE



Single-side bedroom + study place • 4,20m x 1,40m

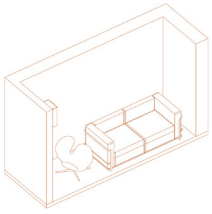


Single-side bedroom + reading place • 4,20m x 1,40m

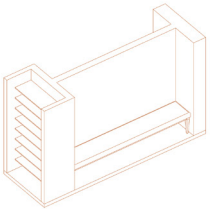


Single-side bedroom + storage place • 4,20m x 1,40m

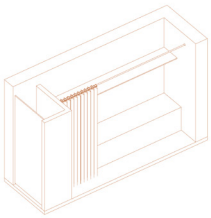
LIVING ROOM/STORAGE MODULE



Single-side living room • 4,20m x 1,40m



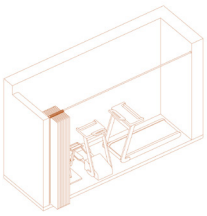
Double-side resting place + side storage • 4,20m x 1,40m



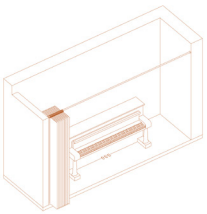
Single-side shelf + side storage • 4,20m x 1,40m

Single-side storage • 4,20m x 1,40m

ACTIVITY ROOM MODULE

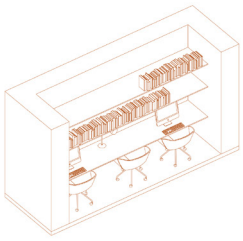


Single-side gymnastic room • 4,20m x 1,40m

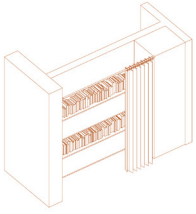


Single-side music room • 4,20m x 1,40m

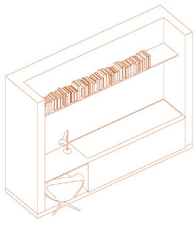
STUDY PLACE/ LIBRARY MODULE



Single-side study place • 4,20m x 1,40m



Double-side library + shelf • 3,20m x 1,40m



Single-side library + study + resting place • 3,20m x 0,90m

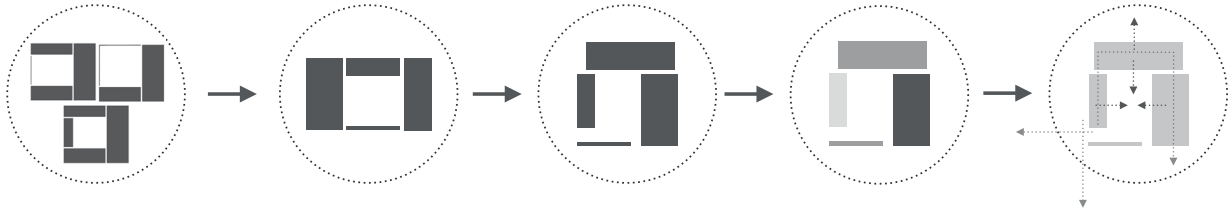
purposes of construction. Therefore, the project envisages a constructive method adapted to the physics and economic conditions of the inhabitants, where five principles were raised to respond to the most relevant technicals issues related to the construction site.

54 Picture at left - Diagram showing the modulees compositions present in the project
Credits: Thaina Araujo

The first one considers a system based on principles of modularity that will allow the participants to adjust the construction to the environmental needs and design the building complex according to their capacities. This process calls for simple structural details, providing a mechanical assembling method that facilitates the construction process. The structural system also explores the possibilities of height in adobe construction and seeks potentialities of finishing, corresponding structure to aesthetics.

The principle of modularity has been much explored nowadays, attempting to respond to many issues in the construction domain. One of its best features is the adaptability of a simple, preset structure to several distinct conditions and circumstances. In the current project, this principle is used in two purposes, first to settle a line of reference with the local typology, traditionally composed in a modular logic, where the dimensions, materials, spaces were preset, and later each family would do it on their own way. And secondly, to suggest a system that would adapt to the technical, financial and social contingencies of the inhabitants of Santo André de Vagos.

The modules have a simple arrangement that allows the adobe to operate as a loadbearing structural material. Once it has fixed dimensions, the modules are easily adapted into the project, considering the participatory process of composition and manufacturing. The modules were drawn to be the 'serving sections' of the project, accommodating all furnishing and storage for each space, which opens up to a more dynamic, unobstructed interior space. It can be one-sided, serving a unique room or two-sided, serving either two



55 Picture at above - Diagram showing the conceptual process
Credits: Thaina Araujo

different rooms, either interior/exterior.

The programme is organised into three main buildings in order to dedicate each function to a different part of the project. The distribution of the programme is another representation of the Gândaresa house typology, where, as seen in the picture above, the leisure function was separated by a central courtyard from the work function. The patio was then in an intermediary position serving both work and leisure. In the current project, the plan design layout is no different. Basing on the "U" shape typology, the most found in the municipality of Vagos, it is composed of three buildings in which two were usually assigned for working and one for resting. Hence, from this same structure, the three buildings were divided and arranged to provide a dynamic circulation flow.

The first building is dedicated to cultural and communal activities, entitled "living together", is also divided into three different activities, the first section is the living space where is situated the collective kitchen and living room, displayed in an open-plan space. Followed by a courtyard, the second section is a multi-functional space dedicated mainly to the theatre and choral group, but it can also serve as a gymnastic or a meeting room, as will be detailed in the following pages. The third section, equally separated by a courtyard and arranged in an open-plan space, is dedicated to the children's learning and entertainment. These three segments intersect them-

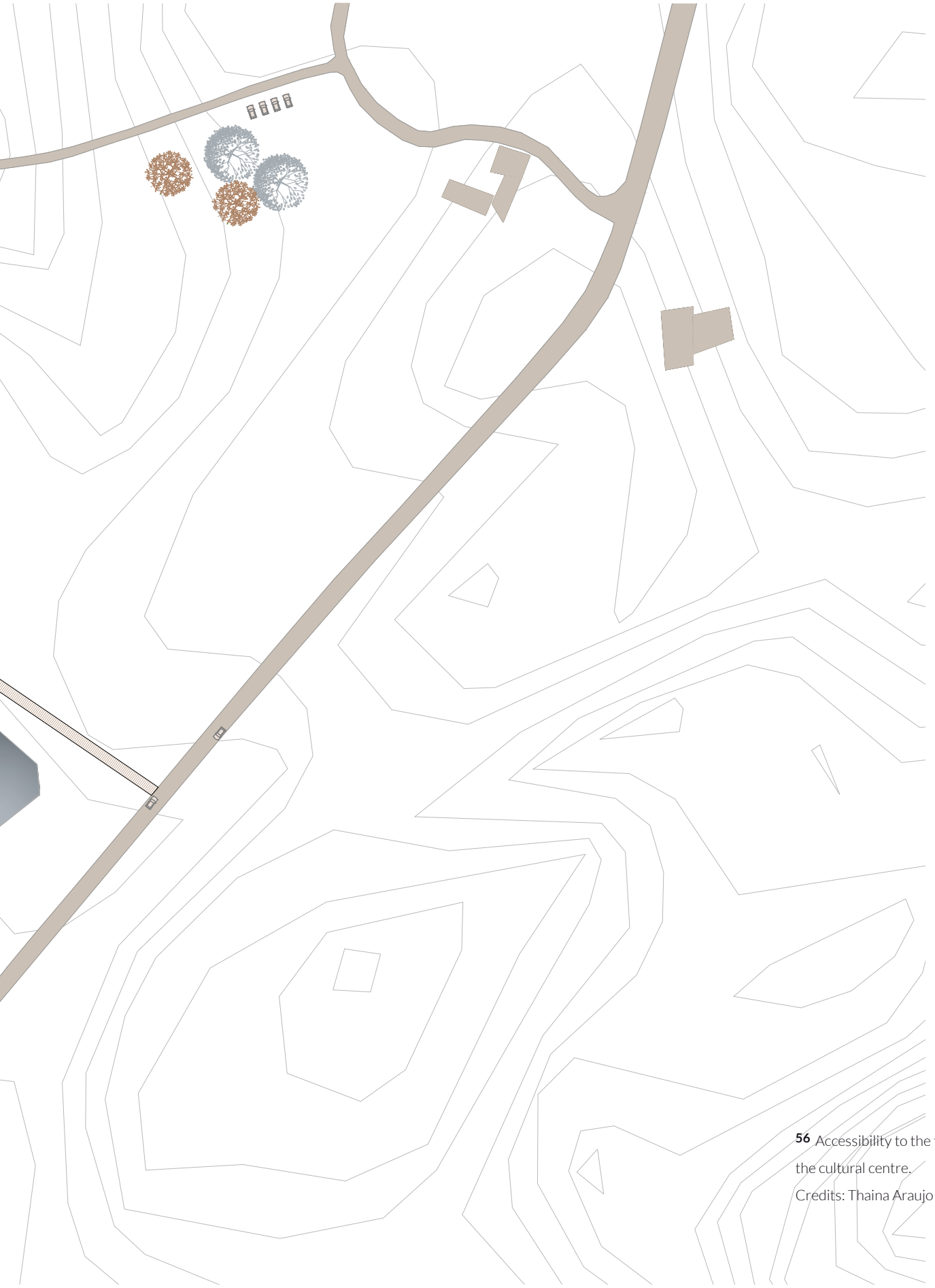
selves in a corresponding alignment that goes from one edge to the other, providing an extended view from north to south.

The second building is designated the "to do space", dedicated to all activities associated with the learning and the continuity of the adobe's constructive culture. It is composed of an atelier/laboratory, where is made the first tests to examine the raw material, which is stored in the adjacent room, in an airy open space. A central patio comes subsequently, providing an ideal area for the manufacturing of the adobes, that once completed, are placed in a storage room.

The third and final building designated the "dwell", is composed of two accommodation parts connected by a central collective open--air living space. Each of the accommodations is made of five different bedroom typology. A private single-bedroom, with a study and reading place furniture. The three following typology are placed in an open-space bedroom. Once most of those accommodations are intended for the elder, it was necessary to design interconnected spaces that could either open up to create living areas subspaces or closed up to create an individual sleeping room. One of the typologies is adapted to people with reduced mobility, as well as the bathroom. The building is also provided with a common living space that opens up to the central patio.

Finally, the central patio is an open-air living space that connects the three buildings and accommodates a variety of activities, a multi--functional space that can serve to a local party, a concert, the local market, sportive activities and so on.

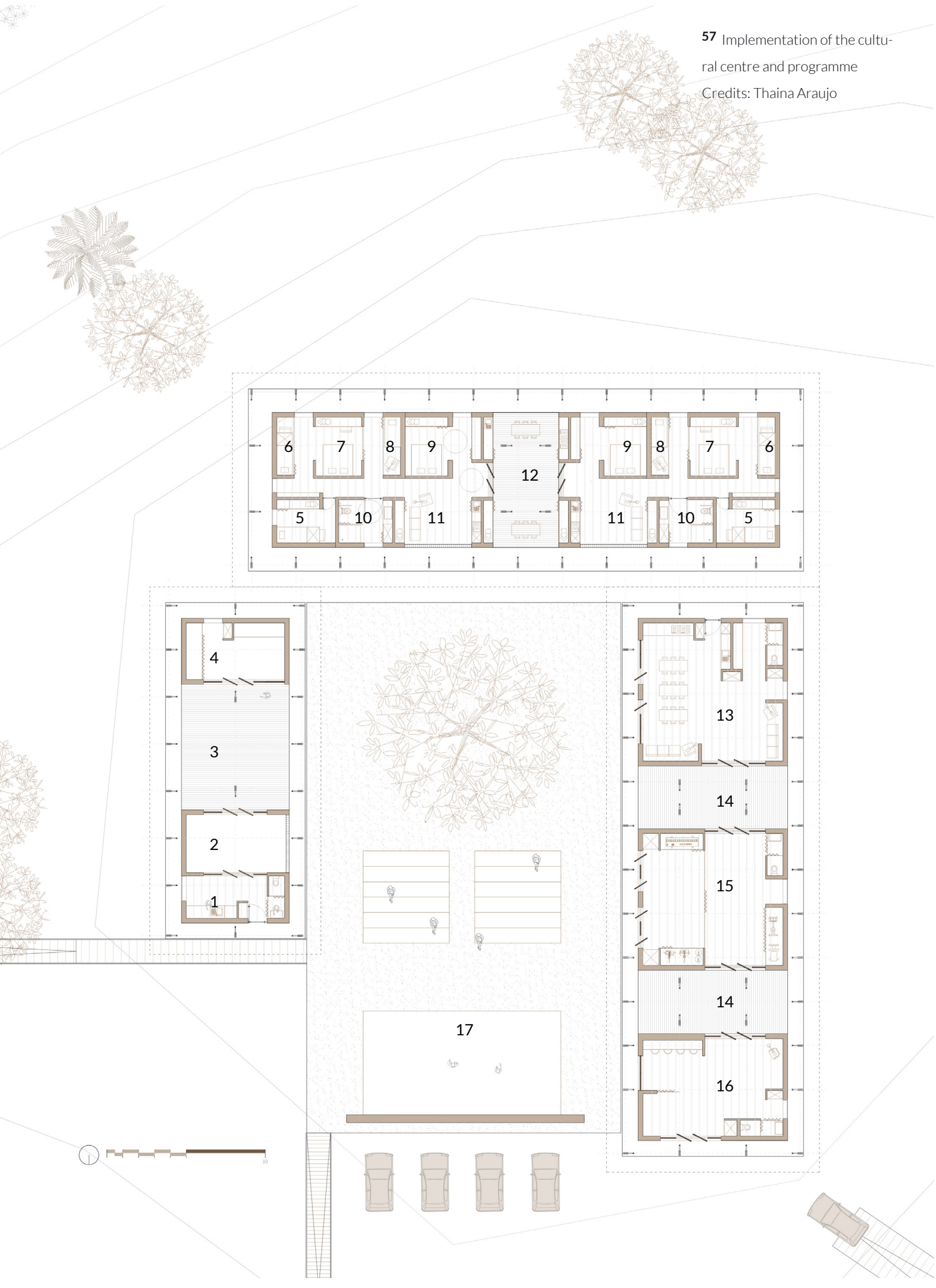




56 Accessibility to the terrain and the cultural centre.
Credits: Thaina Araujo



1. Laboratory
2. Storage room - for raw materials
3. Central courtyard - manufacture of adobe
4. Adobe storage room
5. Bedroom 1 - private
6. Bedroom 2 - bed + study area
7. Bedroom 3 - Double bed + work space
8. Bedroom 4 - Bed + resting area
9. Bedroom 5 - Double or PMR bedroom - private
10. Bathroom PMR
11. Living room and kitchen
12. Central patio - shared leisure area
13. Sitting-room and shared kitchen
14. Shared courtyard
15. Multi-purpose room - Sports, music, theatre and meeting room
16. Children's room - child care
17. Central patio - open air auditorium



57 Implementation of the cultural centre and programme
Credits: Thaina Araujo



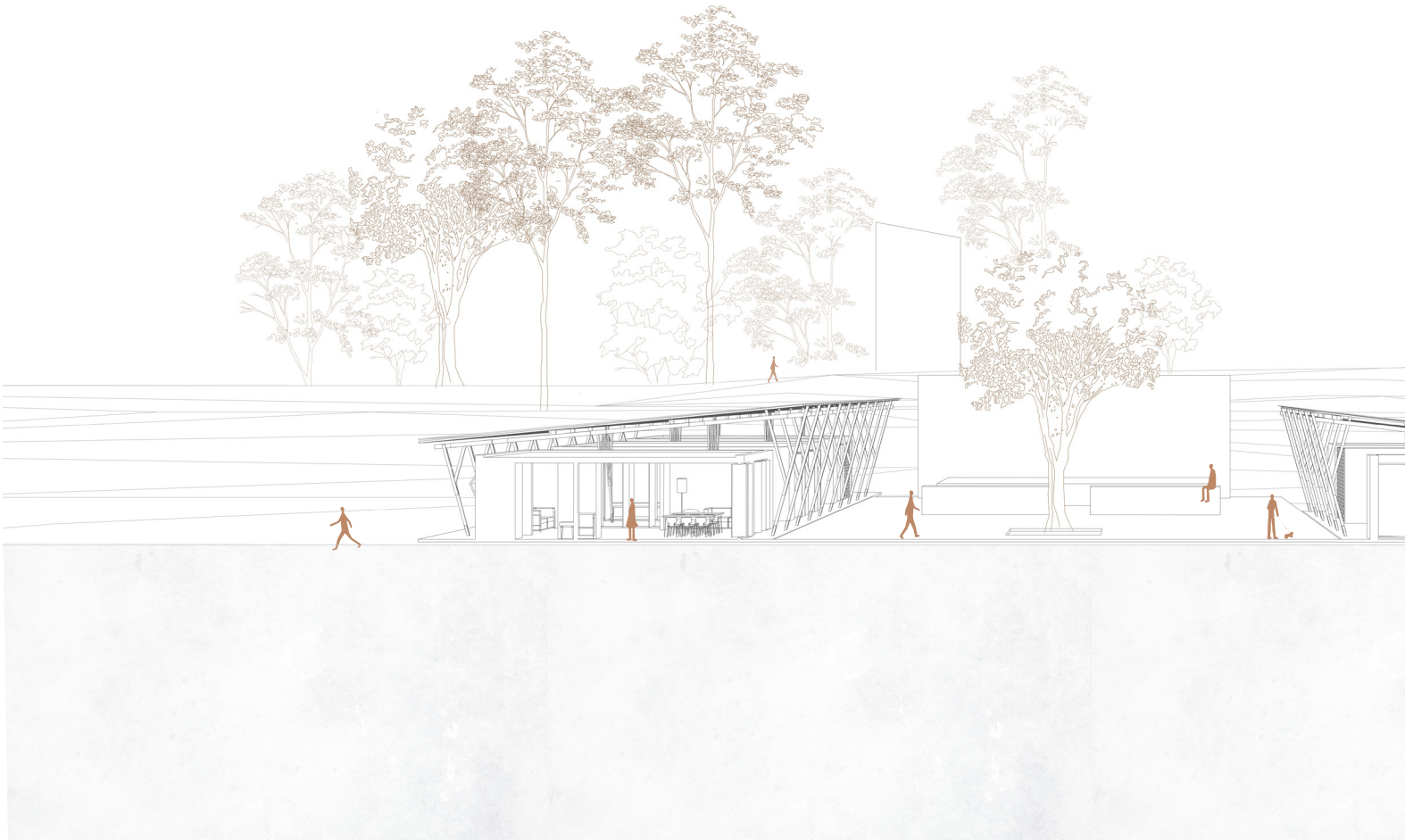
57 Ecological Influence - from the Ria de Aveiro to the Wind mills of São Romão
Credits: Thaina Araujo

The project is placed in the lowest part of the terrain, aiming to permeate and anchor to the soil. This aspect, besides allowing a most effective technical design and participatory construction process, also enables interaction in the core of the terrain, connecting both villages São Romão and Santo André.

The project is accessible from three different locations. The first one connects the East façade to the street 14 de Setembro, the windmills' street. This pedestrian access is also the one that leads to the River Boco pathway. Another access is the one already existent, a footpath marked by the inhabitants of Santo André de Vagos to access the mills. It is placed in the south, starting at the street called Rua dos Moinhos. The third one is vehicle access that links the street from where comes most traffic flow, Rua do Cabeço, directly to the North façade of the project. And the final access joins the project to the observation tower, through a pedestrian pathway, also accessed from the Cabeço street.

Hence, the project establishes four principal means of communication with the terrain and the nearby villages. When observing the longitudinal section below, it is notable the way it intercommunicates with the windmills, allowing this landscape symbol to speak up for the traditional adobe construction, whereas setting a point of reference to the cultural centre that in contrast marks the contemporary adobe construction.

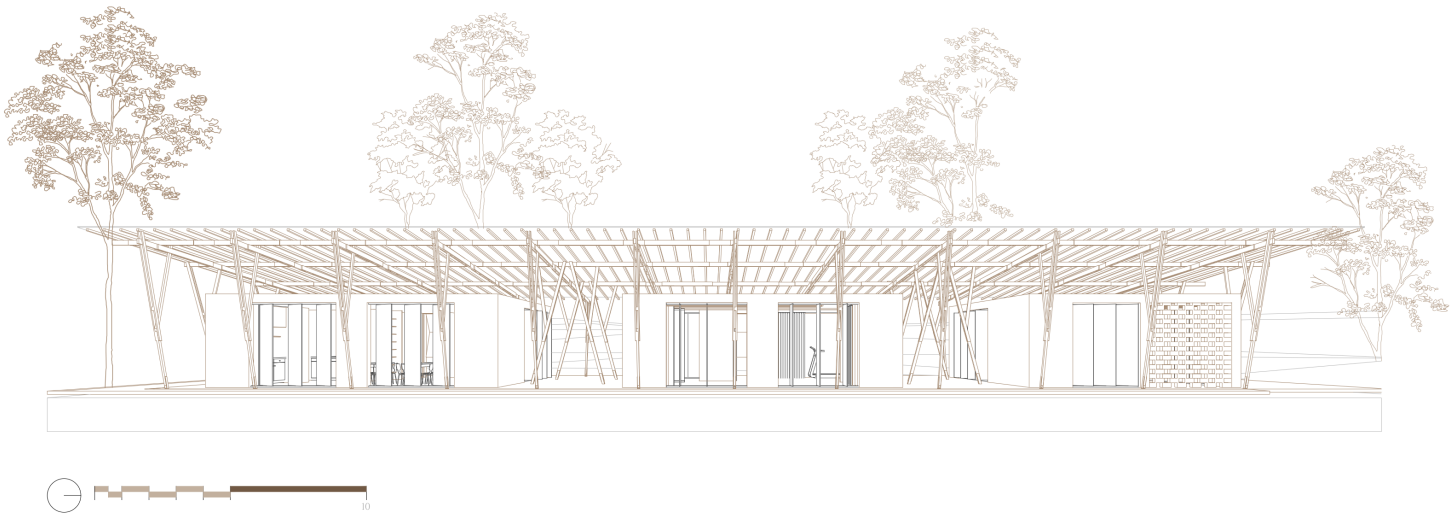
Zooming in that same section is noticeable the influence of ecological diversity that can be seen in a 25 km section as in a 500m section, like the one displayed at left. The richness of the fauna and flora provided constructive details, including the earth construction response to the micro-climate and ecological possibilities.

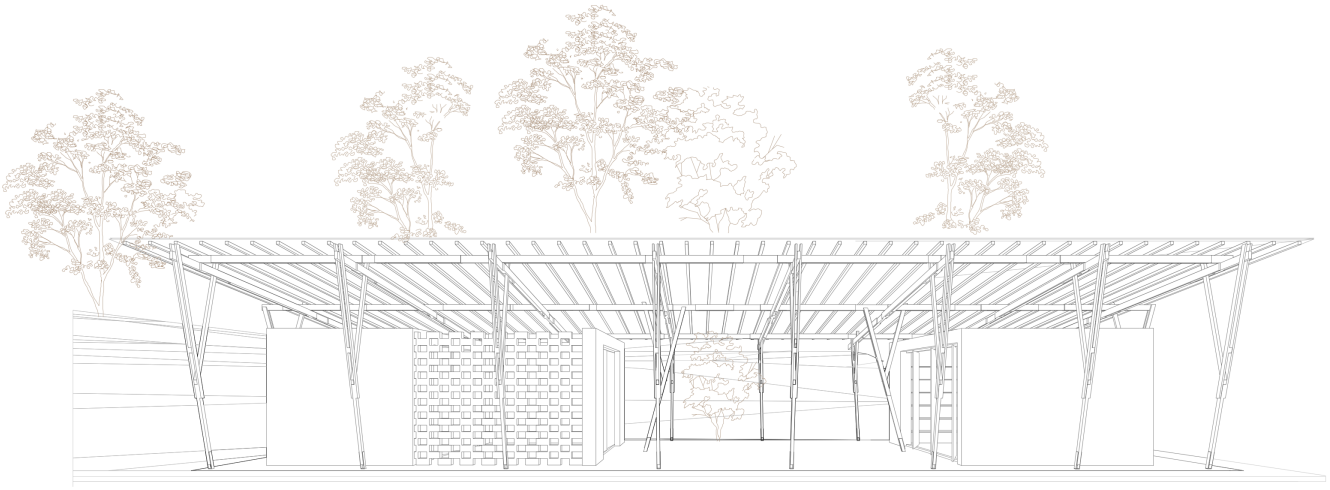


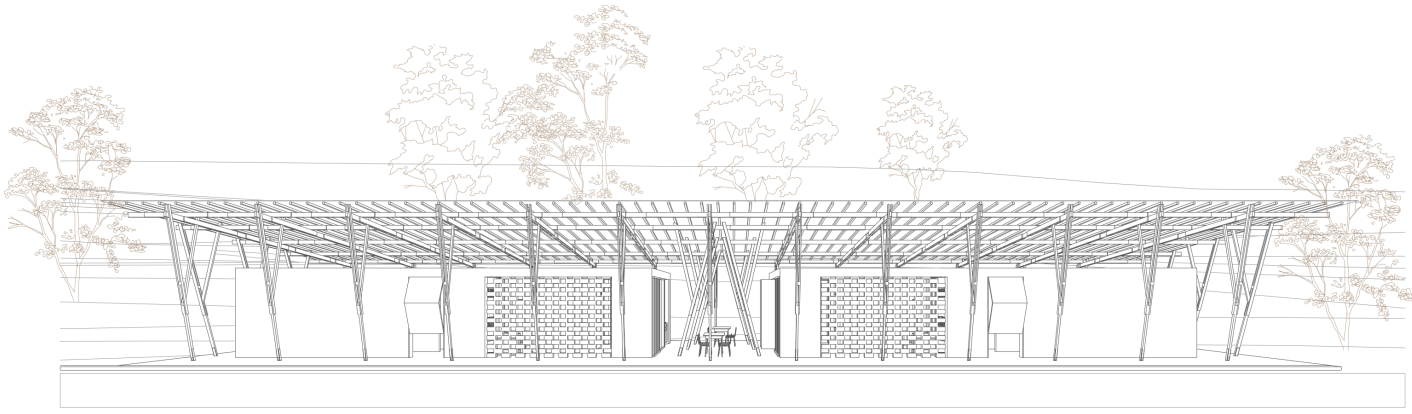


58 Longitudinal section
Implementation of the project in relation to the windmills.
Scale - 1.200
Credits: Thaina Araujo

59 Earth construction learning centre building - East façade
Scale - 1.100
60 Accommodation building - North façade
Scale - 1.100
61 Living space building - West façade
Scale - 1.100
Credits: Thaina Araujo







IV.2.4 - Economy meets society. The reinvented construction site

From the master plan to the constructive details, every component was thought to deal with their current social issues. The insertion of the building in the landscape, the spaces layout, the structural details of assembling, enables multiple solutions that shall be taken collaboratively. This method bases on contemporary initiatives that deal with the same concerns, realising in participatory performances the strength to face challenges. The ConstructLab is one of them,

> *The community builds up around convivial situations. Through their daily activities mixing, living and working, without prioritizing one or the other, the members of the community of designer-builders progressively becomes local residents of the context they are in for the time of the project.*[129]

Due to the modular system, spaces are efficiently displayed and can be configurated following the daily routine of the residents and inhabitants of Santo André. The multi-use theatre room is in the morning a gymnastic room, in the afternoon a theatre/music room, and at night a meeting room. This possibility of transforming each space into many other subspaces is also a response to economical needs.

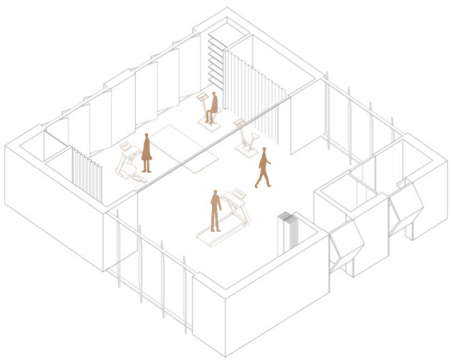
Hence, the financial strategy set for the current project accords to the mechanism of modular construction. Once the community may have to construct by its means, it is necessary to consider a construction method that will enable the participants to intervene whenever they have the financial possibility. That will allow them to settle the hierarchy of construction, which means, at first instance, if a communal kitchen and living room is the space most needed, then it will be the priority of building. This process may continue in a local economical-cycle system until the entire community centre is built.

129 CONSTRUCTLAB *et al.* (2019). *The convivial grounds. In: How together.* pp. 14-22

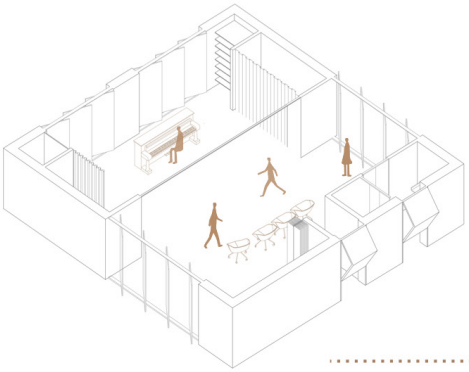
MULTIFUNCTIONAL ROOMS

DAILY CONFIGURATION

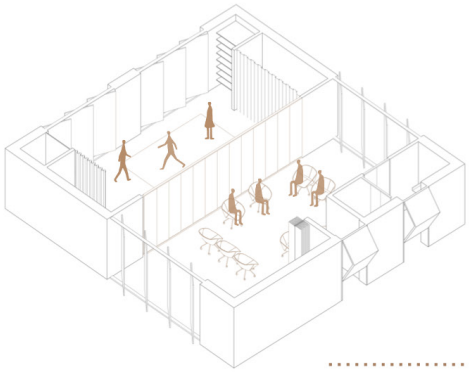
FROM 9 A.M. TO 8 P.M



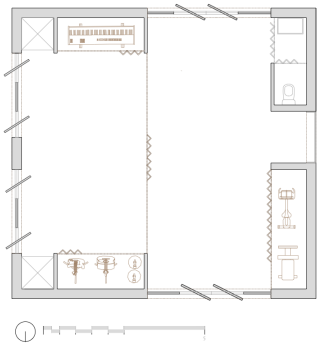
1ST USE - 9 a.m - 12 a.m
GYMNASTICS ROOM



2ND USE - 1 p.m - 4 p.m
CHORAL GROUP - MUSIC ROOM

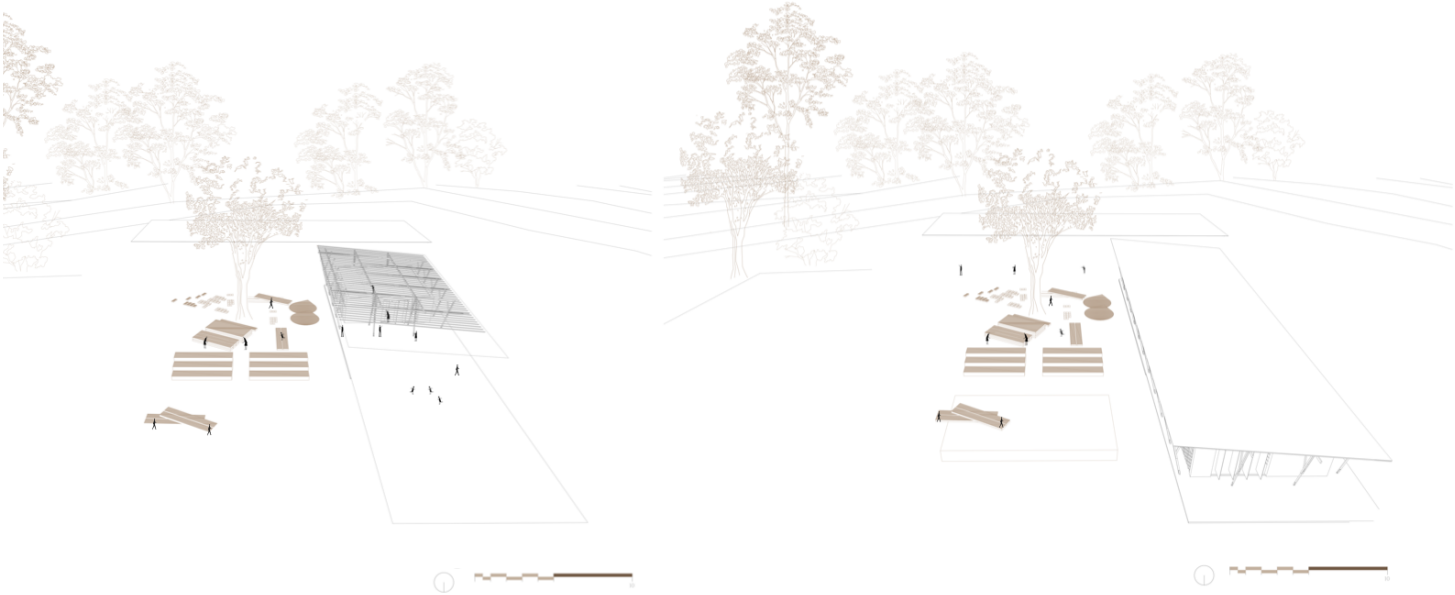


3RD USE - 6 p.m - 8p.m
THEATER GROUP - MEETING ROOM



62 Initial room setup.
Credits: Thaina Araujo

The phases of construction were thought to consider the following perspectives. It should start with the promotion of intergenerational relation into the entire process from design to maintenance, relating the transmission of the constructive known-how to the younger generation. Enhance the community's engagement and participation to, therefore, promoting technical system solutions diversity in a building. And finally, articulate these social dynamics to the production of activities that will lead to a circular economy.



1ST YEAR

1ST PHASE OF CONSTRUCTION

The first phase of construction will be dedicated to the construction of the shared living area, the kitchen and living room. The construction process begins with the implementation of the roof structure, thus allowing a covered space for the center's activities.

2ND PHASE OF CONSTRUCTION

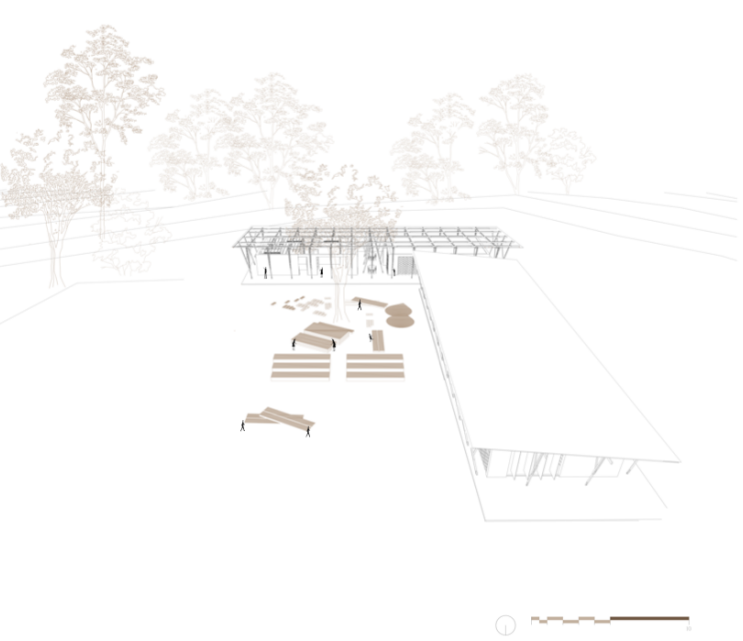
The second construction phase will be dedicated to completing the "living together" building. This process can have an indefinite duration of time, thus enabling a evolutive building process.

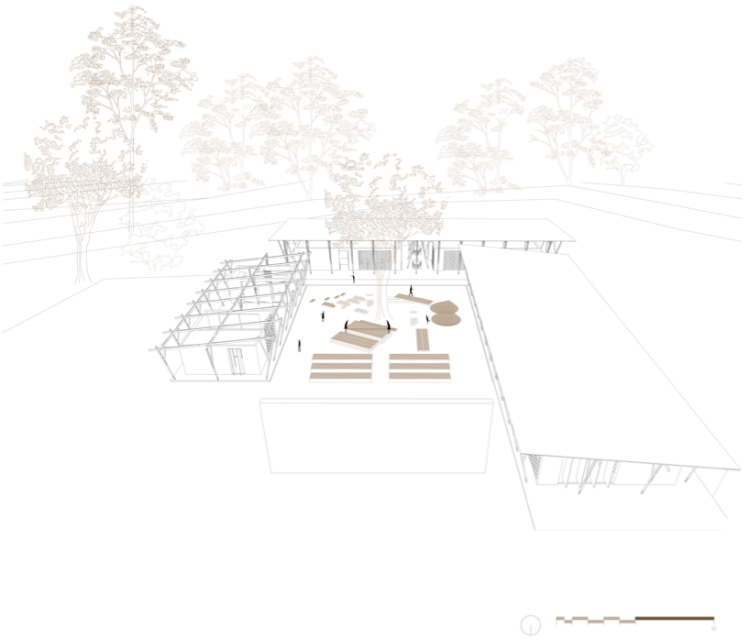
Parfois, cela [the earth construction process] prenait plusieurs années car pour des raisons d'accessibilité économique, les constructions étaient souvent évolutives, à partit d'une première configuration assurant un logement de base. [130]

Therefore the following schema explains how the construction of the community centre can take place considering this same financial affordability on the construction process over the years, giving possibilities to the participants to evolve according to their means.

130 GUILLAUD, GRAZ, CORREIRA, MECCA, MILETO, *et al.* (2009). *op. cit.* p.86

63 The diagram below represents the principle of the reinvented evolutive construction site. It reveals the phases of construction throughout the years, adapting to the communities' socio-economic conditions.
Credits: Thaina Araujo





3RD PHASE OF CONSTRUCTION

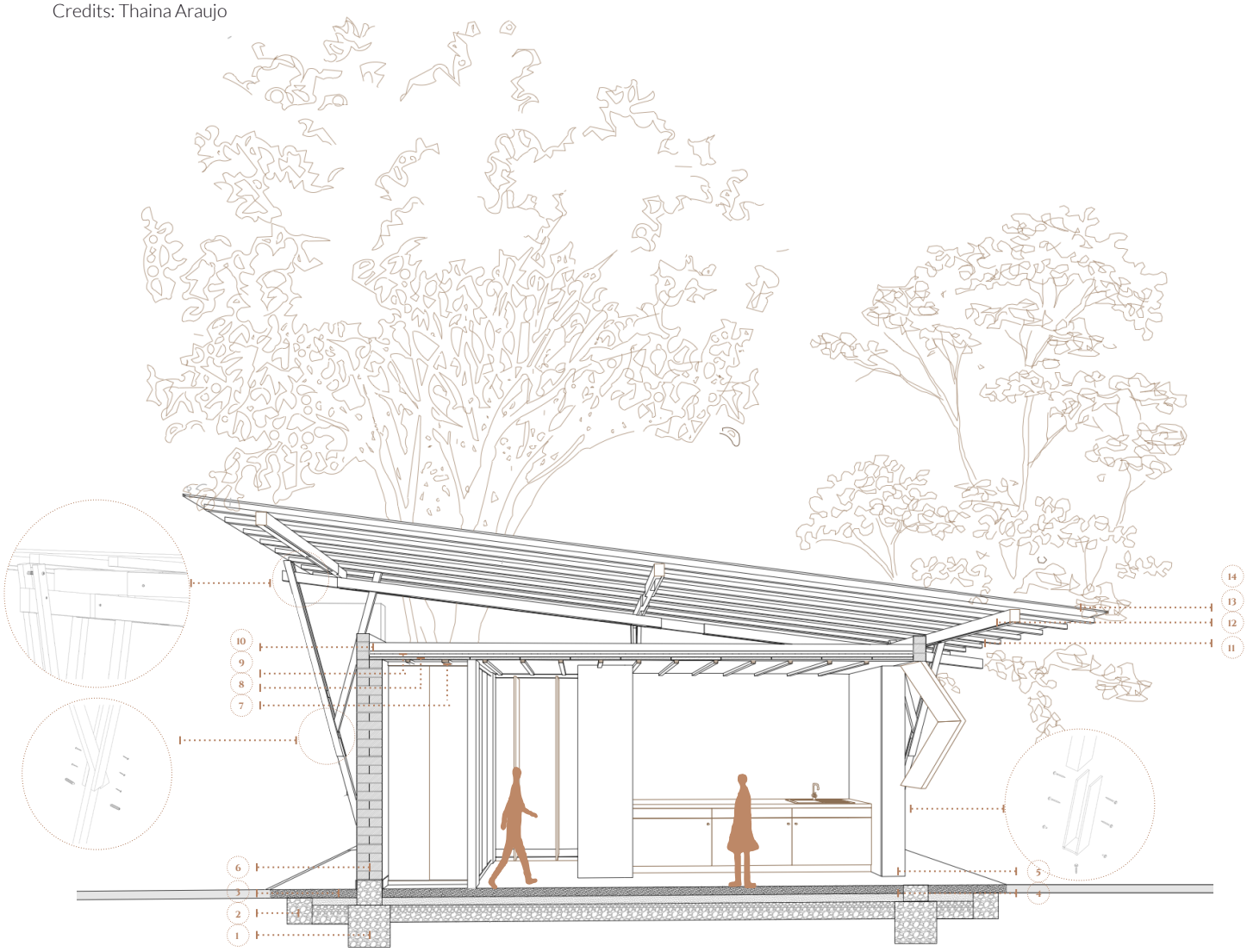
The third part of the construction is dedicated to develop the "dwell" building. And so the space will be able to house an even more present and convivial daily dynamic.

4TH PHASE OF CONSTRUCTION

The fourth and last construction phase will be dedicated to develop the "to do space" building, where the community centre will gain a new learning function, perpetuating the earth construction technique in Aveiro.

64 Detailed construction section

Credits: Thaina Araujo

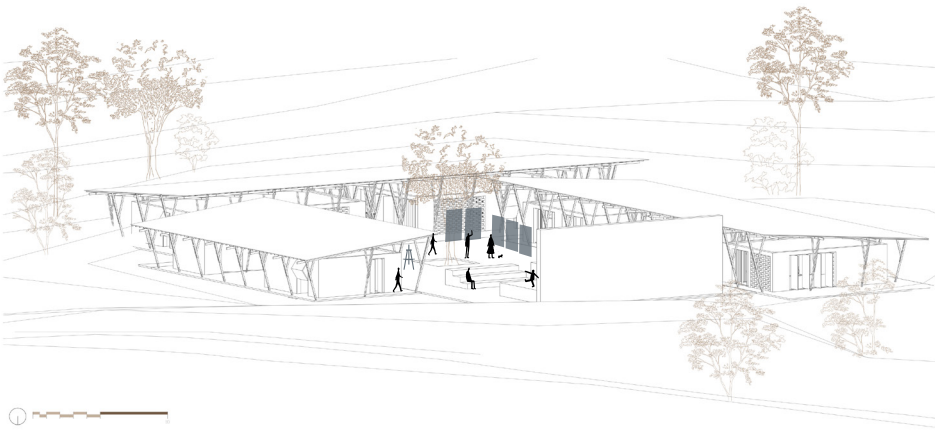


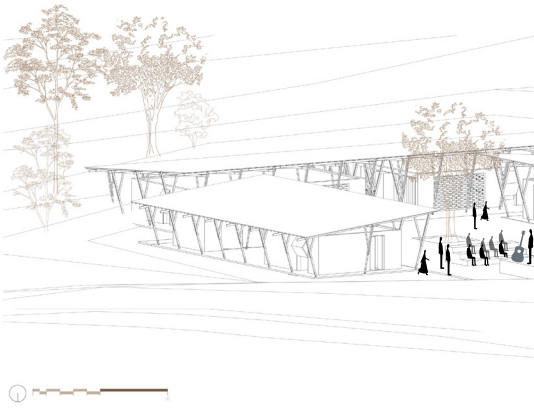
1 Cyclopean concrete foundation 50x50 (bottom) 20x20 (top) . **2** Cyclopean concrete foundation structure 20x20 . **3** Compacted backfilling of selected soils . **4** Waterproof sheeting . **5** Terrazzo clay flooring . **6** Adobes 9x15x30 . **7** wooden beam 40mmx40mm . **8** entarimado of wood, anti-termite treatment . **9** Waterproof sheeting . **10** expanded clay pebbles backfilling . **11** wooden beam 60mmx60mm . **12** wooden beam 120mmx60mm . **13** galvanised steel grating plate . **14** Reed coverture

The constructive details will reveal every component mentioned throughout the description of the project. From the economic to technical and social scene, all combined to provide a holistic approach to the construction site. Consequently, the roof was thought to be an independent structure, the first established element, giving versatility during the entire project execution. The buildings are then placed independently under the protection of the roof structure, emphasizing the saying earth building calls out for a good "hat and boots". The entire infrastructure is made with local materials, like the cyclopean concrete for the foundation, layers of earth soil as an insulator and reused wood panels for covering. The modular system contributes to count the exact quantity of raw material needed, which provides another convenience to the economic requirements, and evidently to environmental issues.

The interior and exterior wall has esthetical distinction by the apparent earth masonry, a slightly pinkish colour balanced with the natural colours of the local materials and landscape. The interior spaces are valued by the thermo-acoustic properties of earth walls. The opening elements, doors, windows and panels are made with woven reed by the local craftsmen, also communicating esthetically with the other materials. The most predominant façades are directed to the West and East, taking advantage of diffused and adjusted lighting and ventilation, that given the intersection of the buildings creates a continuous flow.

The following schema reveals how the social interactions between the subspaces are converted to the central patio and used to produce different communal activities during the entire year. This final image converges all the scenarios and studies made during the current work. The best image to conclude and characterize the communal life and cultural value that can be generated through a constructive practice, in the core of a community.





1. ART EXHIBITION

The central patio will be designed to host multiple activities in the centre of the community. The first of these is related to the importance of artistic and craft work in the region, and events linked to artistic exhibitions will be promoted.

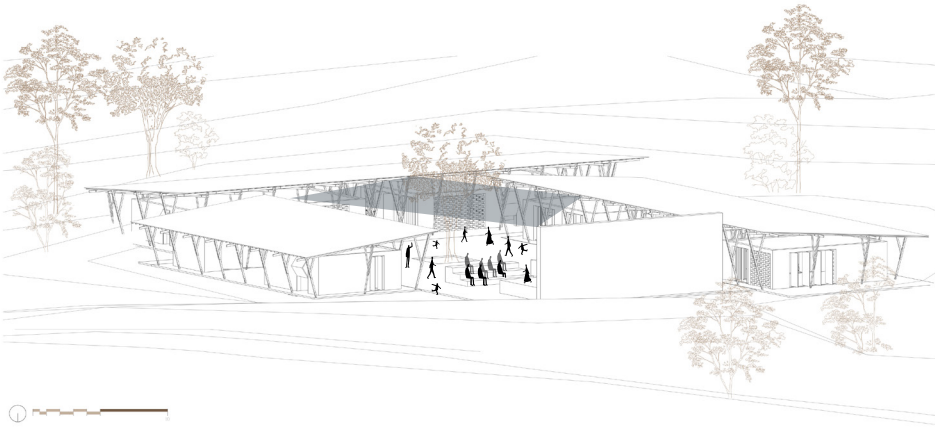
2. MUSIC CONCERT

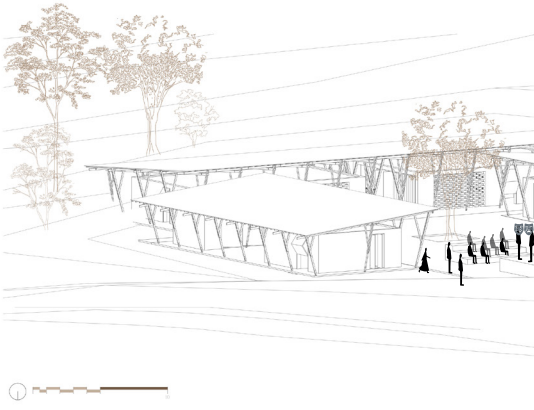
The space will also be used for musical performances, as the community centre will house an active music and choir group.

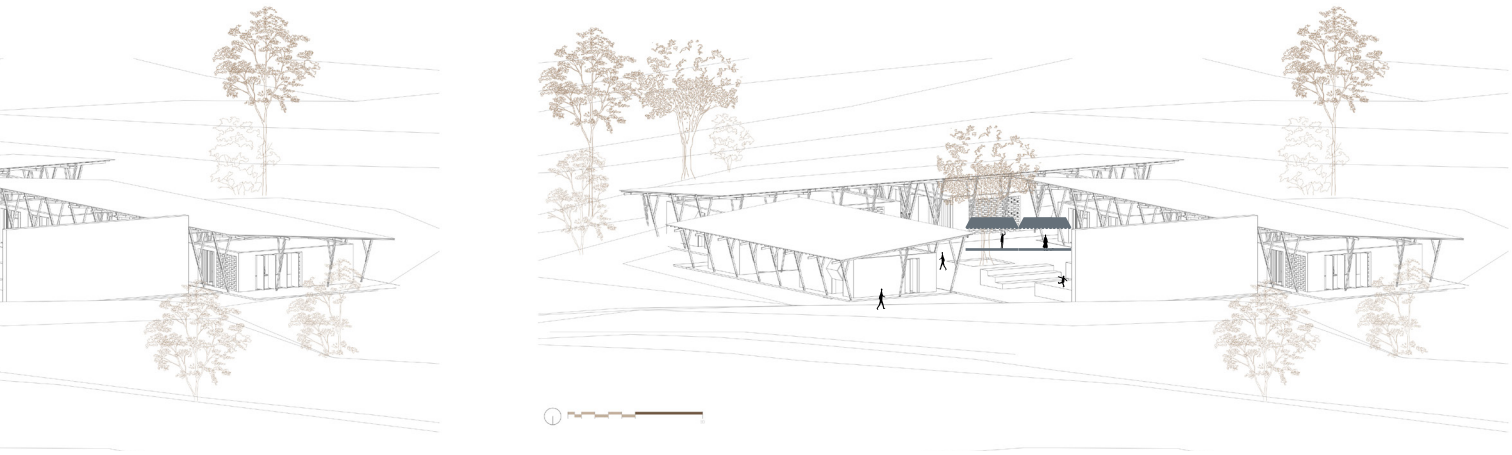
3. THE LOCAL FAIR - FEIRA DE SÃO ROMÃO

Nowadays, every 25th of the month, the "São Romão" fair is held on the site of the mills, being a socio-economic factor of great importance for the local inhabitants.

4. PARTIES AND FESTIVAL - FESTA DE SÃO JOÃO







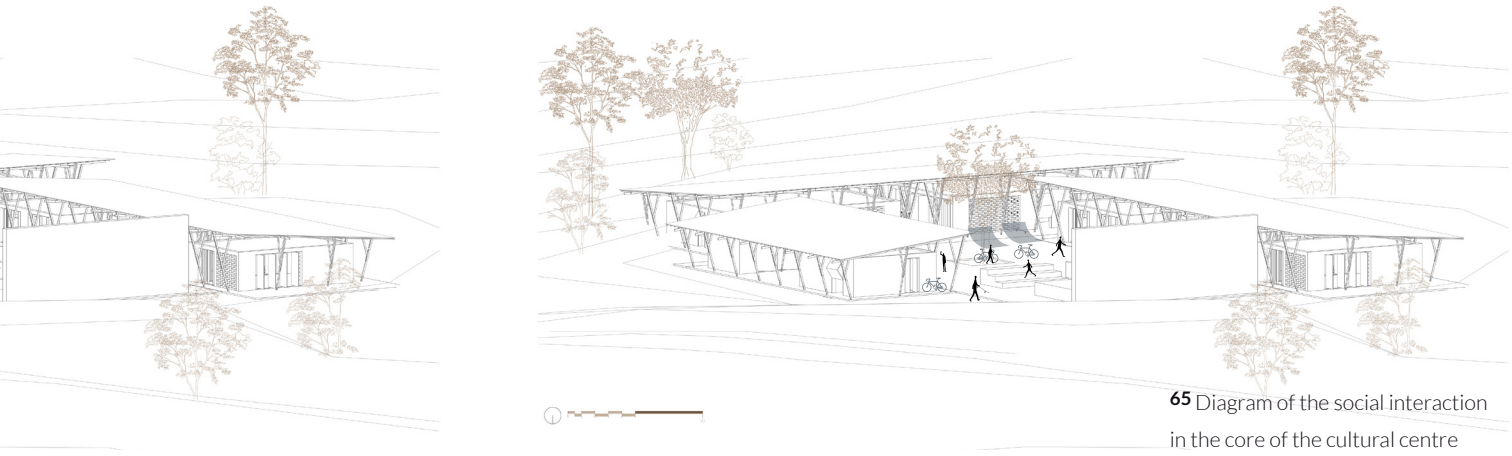
Festive events have great value for the local inhabitants. The Festa de São Romão is one of them, which takes place at the Moinhos site, as well as other religious festivals that are very important for the convivial spirit among the inhabitants.

5. OPEN-AIR THEATRE OR CINEMA

Events aimed at theatre and cinema will also be planned at the centre, since as well as the musical group, the centre will also have infrastructure for the theatre group, which is currently active.

6. SPORTS ACTIVITY - SKATEBOARDING, BIKING

Sporting activities are also another current function given to the terrain. Because the terrain is level, it is interesting for sports such as skateboarding and biking.



65 Diagram of the social interaction in the core of the cultural centre project
Credits: Thaina Araujo



65 Integration of the project into the landscape
Credits: Thaina Araujo



66 Earth construction learning centre building
Credits: Thaina Araujo



67 Communication between indoor and outdoor spaces
Credits: Thaina Araujo



67 Communication between the earth material and environmental dynamics
Credits: Thaina Araujo



68 Multi-purpose area, children's playground and study room
Credits: Thaina Araujo



CONCLUSION

REFLECTIONS AND FINAL CONSIDERATIONS

Faced progressively with the decline of technical and specific knowledge resulting from popular traditions, we have lived the unconscious behaviour of consumption and waste. We have replaced hand-crafted work, a reflection of local culture, produced over many generations, by a unitary industrial methodology, bearers of a foreign culture, that simplifies the identity expression of local culture.

The discussion raised during this work reveals the fine line between tradition and culture. Presuming there are still societies that rely on local cultures to develop their techniques and protect their heritage. The interest in keeping alive a local tradition of constructive culture is due to the importance of sustaining a holistic approach to architecture in socio-cultural, socio-economic, bioclimatic and technical development.

Therefore, the architectural principle set for the current work attempted to manifest the beauty of vulnerability and irregularity of an architecture made with local resources by the local people. Consequently, it was necessary to reaffirm the principles of participatory construction to generate a socialised, appropriated and symbolised architecture.

The current work aimed to enrich and value earth as an accessible material by re-integrating it into contemporary society, generating socio-cultural awareness through the development of a cultural project in the district of Aveiro in Portugal.

It is before these motivations that address the subject deepened during the present work: **How to reappropriate adobe's constructive culture in Aveiro.**

Portugal, among many other countries, calls our attention to an

enormous heritage in earth architecture. This heritage has been for many decades unrecognized in the core of local cultures. Earthen construction in Portugal has an original and authentic constructive heritage that forms the Popular Portuguese Architecture, enriched by the local traditions that need to be preserved. As is the case of Aveiro, in the centre of Portugal, a city estimated by a significant constructive culture of adobe. This culture has been gradually weakened and lost by locals due to new construction regulations and the difficulty of keeping the knowledge alive and passing it along to other generations.

The current work is the progression of a set of experiences that resulted from a continuous effort of investigation and reflections, based on the development of both analytical and personal artistic intervention. Throughout it, the adobe technique was studied in the Portuguese context from two perspectives.

One based on theoretical consideration, where the first three chapters were dedicated to revealing the most relevant issues, challenges and paradoxes, referring to the decline of the adobe's constructive culture in Aveiro, and another one, focus on the applicability of those principles in a case study. This duality theory/practice is a response from the "en et sur" methodology, which was the principle that conducted the project to answer the issues raised during the current work.

Throughout this work, the territory has predominantly been employed, referring to its social dimensions, as a space produced socially. Therefore, the conceptual processes of the project have sought to find architectural dynamics, in response to social and cultural needs through an interactive and participatory process as an instrument of solidarity and commitment to the common good.

The last chapter was, then, dedicated to proposing a reconsideration of the four principles socio-cultural, socio-economic, technical and environmental interests, set on the theoretical part, where each one was related to strategies of participatory construction.

In search of reappropriating adobe's constructive culture in Aveiro, and generating socio-cultural awareness, a cultural centre project was intended. The project has focused on valuing adobe's constructive culture, through a participatory construction process, facing the increase of rural exodus in Portugal. Therefore, it was designed to generate social interaction in the core of the cultural centre and the villages of Santo André de Vagos and São Romão, based on the promotion of intergenerational relation, envisaging the transmission of the constructive known-how to the younger generation. Enhance the community's engagement and participation to promote technical system solutions diversity in a building. And articulate these social dynamics to the production of activities that will lead to a circular economy.

From the master plan to the constructive details, every component was thought to deal with the communities' current social issues. The insertion of the building in the landscape, the spaces layout and the modularity principle, the structural details of assembling, enables multiple solutions that shall be taken collaboratively.

Different scenarios were suggested to respond to the economic, socio-cultural, environmental and technical needs. However, as a work that reflects on the importance of the interactive and participatory process, I shall now open this reflection and extend it to the reader. I propose that he/she puts himself/herself in a critical position about the decisions made, hoping that this work was able to enrich the discussion on the matters of earth construction and the reappropriation of a constructive culture as a means of cultural value.

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ANNEXES

INTERVIEW WITH MRS ODILE VANDERMEEREN 12TH OCTOBER 2021. TOURNAI, BELGIUM.

Question 1 : Thaina : J'ai vu dans votre parcours que votre philosophie, c'est de créer des synergies etallier les savoir-faires. Vous faites ça dans 3 continents, en Afrique, en Asie, et en Europe.
Je voulais savoir quelle était l'identité visuelle de la terre (que pensent les gens de la terre ?) dans ces trois continents.

Réponse 1 : Odile : C'est très différent dans chaque pays. La terre est très présente en Afrique, là où j'ai habité. Elle est très présente au Vietnam aussi (mais pas en ville).

En fait, c'est comme si il y avait deux mondes différents. Quand vous êtes en ville ou à la campagne.

Et je peux parler plus de l'Afrique parce que j'y ai passé plus de temps. Ca fait partie de tous les jours. La terre fait partie du quotidien. Mais ce n'est pas pour ça que c'est bien vu.

Ca reste totalement ancestral. C'est un matériau du pauvre. C'est très peu valorisant. Les gens qui parviennent à subvenir à leur besoin, à s'élever un petit peu financièrement, ils iront systématiquement vers le béton parce que c'est signe de richesse, de puissance et de réussite.

Par contre, quand on lance des actions comme les expositions, les concours, il y a quand même cette partie d'ancestralité qui vient et qui rend fier aussi. C'est un peu « je t'aime mais je ne t'aime pas ». Donc on a envie d'y revenir. Mais pour le moment, ça a une connotation de pauvreté.

Mais quand on y revient et qu'on lui redonne ce titre de noblesse, tout le monde est partant pour se parler des modes ancestraux parce que l'ancêtre ancien est encore très important en Afrique.

Ce lien aux ancêtres, à ce qui est plus ancien, à la culture est très puissant. Donc, ça permet de remettre ça au goût du jour assez facilement.

Thaina : Et en Europe ?

Odile : En Europe, c'est méconnu. Les gens sont très surpris quand on dit qu'on peut construire en terre. En Belgique, c'est le cas. Par contre, dans certaines régions de France, c'est différent. Et au Portugal, ça doit être différent aussi.

Thaina : Vous pensiez que les gens acceptent plus la terre (par exemple construction d'une maison en terre)

Odile : ca reste encore très surprenant. C'est une option qui reste encore très marginal dans l'esprit de la plupart des gens.

Thaina : Est-ce que les gens ont également ce rapport de pauvreté à la terre en Asie ?

Odile : La question ne s'est même plus posée là-bas. C'est quelque chose qui appartient à la ruralité. Après, ils ont un musée d'éthnologie et d'architecture avec des techniques bien développées.

Et donc, ils n'ont même plus ce questionnement là.

>< En Afrique, ça pourrait être honteux.

Au Vietnam, ça ne les concerne plus vraiment quand on est en ville. A la campagne, ça fait encore partie de tous les jours.

En Afrique, il y a une part de spiritualité qui est très importante. Quand on parle de la terre, on a la préface de Oussouby Sacko (« nous venons de la terre et nous retournerons à la terre »). Il est malien, prof à KYOTO au JAPON et parle beaucoup de cette spritualité là .

En termes d'identité, quand on parle de la terre, il y a tout ça qui resurgit et qui est très important, ce qui permet du coup une acceptation de la construction en terre, peut-être plus forte ou plus facile qu'ici.

Question 2 : Thaina : Comment la terre s'adapte aux différents aspects sociaux et culturels, économiques et techniques dans les trois continents. En gros, quelles sont les similarités et les différences ?

Réponse 2 : Odile : C'est très large comme question.

En Afrique, il y a cette part d'artisanat et le fait de trouver la matière sur place qui est très présente. Un petit peu de pré-fabrication mais très peu. Il y a une relation à la construction en terre qui est vraiment très artisanal.

En Belgique, c'est quand même de plus en plus normalisé. Dans un atelier d'Elie, ils ont déjà un grand sac de terre mélangée prêt à l'emploi. Il y a déjà ce côté de la semi-industrialité. Au Vietnam, on est un peu entre les deux.

Question 3 : Thaina : Vous parlez beaucoup de construire ensemble. Comment implémenter ce terme dans la pratique, dans la vie quotidienne ? Comment introduire l'architecture participative dans la pratique, dans la vie quotidienne ?

Réponse 3 : Odile : Ce qui est bien avec l'architecture en terre, et quand je suis en Belgique, ça englobe la paille et les autres matériaux.
En Afrique, la terre est le matériau le plus commun, en abondance.

Mais je pense qu'ici, ce genre de pratique là, en Belgique, c'est avec d'autres matériaux aussi. Le bois, la paille, la terre. Ca implique d'office pour moi cette façon de travailler avec les artisans. En faisant ce type de chantiers, on est d'office dans la pratique et le dialogue avec l'artisan et son savoir-faire sur la construction.

Thaina : De votre expérience en Afrique, je voudrais savoir comment intégrer la communauté dans le processus constructif ? Est-ce quelque chose de culturel ?

Odile : C'est culturel. Cette pratique de se mettre ensemble pour construire et participer à l'effort existe déjà. Elle se perd un petit peu avec la mondialisation. Néanmoins, ce sont des choses qui se font déjà.

Thaina : A votre avis, est-ce que ça crée un vrai sens de communauté et surtout un changement de mentalité. Par exemple ici en Europe, avez-vous eu l'opportunité de travailler dans un mode participatif de construction ? Est-ce que ça crée un changement de mentalité ?

Odile : Oui, j'y crois. Après, ce n'est peut-être pas à grande échelle. Tout dépend de l'échelle à laquelle on travaille.

Je crois que dans certaines localités, c'est un moyen de ressouder les gens autour de ce monde là de la construction. Rencontrer les artisans, travailler ensemble et être en contact au niveau local permet de redonner un sens à tout ce qu'on fait, de prendre soin des choses, de prendre soin de celui qui a fait les choses, de prendre conscience que la source qu'on utilise est là et n'est pas en quantité infinie.

Ce sont toutes ces notions là qui ont un but dans la façon de faire.

Bien sûr, ce n'est pas la même chose d'être dans un bureau d'archi et de dessiner uniquement les fenêtres. Tout est cloisonné. Parfois, on a une grande échelle pour répondre à une forte demande, un projet. Mais c'est sûr que lorsque tout est cloisoné, chacun est dans son monde et ne s'y retrouve peut-être pas facilement.

Thaina : Est-ce que vous comme architecte dans une construction participative, est-ce que les gens ont les principes de construction ? Est-ce qu'ils peuvent correspondre avec le processus de construction de la terre sans formation spécifique ? Dans ce contexte, est-ce que c'est difficile pour vous d'intégrer les gens dans le processus de construction ?

Odile : La différence en tout cas entre l'Afrique et ici, c'est que là bas, ça fait vraiment partie du quotidien.

En ville, ça se perd un petit peu. Mais dans les villages, chaque enfant a déjà participé à la construction d'un grenier, à faire des briques.

C'est commun. C'est comme un peu la situation où les enfants ont déjà pu faire un gâteau avec les parents. Ca fait partie de la vie de tous les jours.

C'est l'avantage des matériaux peu transformés et naturels pour permettre à tous de s'y mettre. Ce qui est magnifique aussi, c'est que ça ne demande pas une spécialisation.

Après, il y a des maîtres-maçons qui ont un savoir-faire magnifique et vont sublimer le travail. Mais chacun peut venir et participer à la tâche. C'est abordable.

Thaina : C'est ça qui répond à la question et qui crée un vrai sentiment de communauté, d'être ensemble et de faire ensemble.

Odile : Et pour l'enseignement, je trouve que c'est vraiment intéressant ce matériau parce qu'on peut vraiment s'y mettre. C'est sûr qu'on ne va pas pouvoir faire ça avec du béton. Il y a vraiment ce côté accessible et agréable au toucher. Ça ne passe pas que par la tête. Il y a des choses qui viennent avec la main.

Question 4 : Thaina : je vais parler de la continuité constructive. Quand vous intervenez dans un pays, dans une communauté, comment faites-vous pour garder ce concept de continuité constructive ? Est-ce que naturellement les gens gardent la pratique de continuer à construire en terre en communauté ?

Réponse 4 : Odile : On a la chance en Afrique d'avoir encore un savoir-faire. En Afrique de l'Ouest en tout cas (ce qui n'est pas le cas en Afrique de l'Est où c'est plus difficile de trouver des artisans).

Il y a encore cette base là qui existe encore mais ça se perd de plus en plus. Il est grand temps de remettre au goût du jour avant que ça soit totalement perdu.

Thaina : nous, comme architectes, on peut garder la continuité de cette construction quand on intervient dans une communauté ?

Odile : Oui, mais c'est compliqué comme question. Pour le moment, quand on veut utiliser ce type de matériau là , ça reste encore assez « outsider ».

Soit, on fait un mélange et on est dans un bureau d'architecture qui fait un peu de tout et de temps en temps on a des projets comme ça.

Soit, on réinvente un petit peu notre profession. Et moi c'est ça qui m'intéresse beaucoup avec tout le mouvement de la « frugalité heureuse » en France avec cette idée de réinventer nos modes de construction.

C'est ce que j'ai appris en voyageant, parce que j'ai du sortir de ma zone de confort et réinventer parce que j'étais dans différents pays et je ne pouvais pas prendre mon CV et aller le déposer dans un bureau d'architecture. Je ne pouvais pas être engagée et faire le job qu'on me demandait de faire.

Non, il fallait réinventer le métier d'architecte.

Ça a impliqué que je me retrouve dans d'autres pays, de sortir de ma zone de confort pour réinventer mon métier de constructeur.

Avec ce type de matériau là, on en est encore à ce stade là même si il y a pleins de choses qui se passent. Par exemple en Belgique, ça devient accessible et les gens vont connaître petit à petit.

Il faut se réinventer, être bâtisseur sois-même. Quand on est dans ces matériaux là, on ne peut pas être juste architecte. On doit mettre la main à la patte. Ca devient un mix en fait et on revient un peu à la définition de l'architecte-ingénieur comme c'était au tout début du métier. Ce n'est pas uniquement celui qui fait les plans et les cahiers des charges et qui prescrit. On est plus dedans. Il faut y aller vraiment à corps perdu. C'est un mix avec l'entrepreneur d'aujourd'hui.

Chaque matériau a ses performances. Il faut se poser les bonnes questions.

J'ai découvert l'architecture en terre parce que c'était dans un contexte où la matière première de la terre était disponible.

Donc tout est une question de contexte aussi.

En Belgique, c'est sûr qu'il faut se poser les questions différemment. Quelles sont les ressources que je veux ? Quels liens sociaux et culturels je veux avec les gens ? Ce n'est pas juste une histoire de matériau. C'est la circularité aussi, l'énergie qu'on consomme. Terre, pailles ou autre chose.

Par exemple, si la ville doit construire un pont, elle utilisera d'autres matériaux. Tout est complémentaire mais c'est une question d'échelle et d'affinité .

Il n'y a pas une solution. Il y a plusieurs domaines et chacun s'interpose, se connecte pour répondre à des besoins. Et chacun trouve sa place là ou il a le plus d'affinités.

Thaina : Dans l'atelier d'écologie, on a tous étudiés que le béton est horrible et on construit pour construire et Elie nous dit à chaque fois : « chaque chose a sa place ».

Odile : Dans une classe d'étudiants, d'élèves, chacun aura ses affinités. Il y en a qui préfèreront les calculs de structure, d'autres préfèreront le côté administratif, logistique. Chacun trouvera sa place dans la société. Et c'est ça que je veux dire. On est ensemble et l'artisanat, ce n'est pas forcément construire en terre absolument. Chacun doit trouver sa place dans le sens où il apporte quelque chose à la société avec ses capacités. « Je suis bon là-dedans, et c'est là-dedans que je fais bien les choses ».

Selon moi, c'est la terre ou d'autres matériaux naturels, le fait que ça m'a permis de faire avec les gens parce qu'il y a d'autres domaines où je suis plus malheureuse et ça ne me convient pas.

Question 5: Thaina : Vous considérez que la continuité constructive, c'est un terme parallèle à l'architecture durable ? Pour vous, l'architecture durable, c'est la continuité constructive, le fait de construi-

re ensemble ?

Réponse 5: Odile : Si j'ai noté architecture durable dans mes textes, il faudra que j'aille modifier mes textes.

Le durable est la croisée de trois thématiques économique, culturel et écologique et il faut pouvoir atteindre ces trois objectifs.

Les choses évoluent. Et le durable englobe un peu de tout. Je ne sais pas si il faudrait encore utiliser ce terme là. Mine de rien, la définition de l'architecture durable me parle.

Cette notion prête à confusion quand on est en Afrique. Parce que pour le durable, les gens vont penser que ça va durer pendant 15 ans sans que je doive m'en occuper.

Mais par contre, cette notion d'y répondre à la fois culturellement, économiquement. Et ce contact qu'on a par rapport à l'environnement.

Pour moi, c'est plutôt un rapport, un respect à l'environnement, à la nature que je dois autant à l'homme qui a fait qu'on a réglé nos relations par rapport à l'environnement. Et on arrive à des problèmes qui sont d'ordre climatique et qui sont des problèmes pour nous et la terre.

C'est un peu ce rapport que j'ai trouvé dans l'architecture en terre.

Selon moi, ce n'est pas suffisant de faire ensemble parce que c'est juste un aspect.

Il y a faire ensemble et après il y a ces notions. Il faut qu'il y ait une efficacité économique et structurelle et une relation avec l'environnement et la nature.

Le faire-ensemble, c'est plutôt la relation entre êtres humains. Et après, il y a les autres aspects qui doivent être pris en compte.

C'est une forme de déclinaison, un effet de l'architecture durable comme on a pu le définir.

La notion de « frugalité heureuse » me parle bien. Je définis ceci avec « archisanat ».

Les choses sont complexes. Il y a tout qui s'interconnecte. Et les études d'archi nous donnent des outils pour appréhender, mettre tout ensemble et essayer d'additionner toutes ces couches pour arriver à construire ensemble.

Il y a quand même cette attention aux choses qui est une part féminine (que les hommes peuvent avoir aussi). Mais il y a ce côté attentif à tout (à la communauté, à chacun, à chaque chose). J'ai l'impression d'absorber pleins de choses et ensuite d'essayer de faire un mélange et ça sort comme ça. Je me laisse imprégner, et puis quelque chose sort. C'est une part de féminité.

INTERVIEW WITH MR ADÉRITO DE FERRIRA 21ST FEBRURARY OF 2021. *ON-LINE.*

Thaina: Qual foi a sua primeira experiência com o adobe? O que o ligou ao abobe?

Quando eu era pequeno, desde criança. Não se casava sem que tive casa, era tradicional. Primeiro faziam as casas e depois casavam-se.

Thaina: E somente as pessoas ligadas as famílias que se juntavam para fazer os adobes?

Adérito: Amigos e vizinhos, juntavam-se todos para fazer a casa. O custo era pouco porque não se pagava o trabalho de ninguém, o único custo que tinham era a cal. Cal viva.

Thaina: O senhor comprava a cal viva pronta ou o senhor a fazia?

Adérito: Compravam a cal ja queimada. A cal é feita da pedra calcário, e vai para um forno e é queimada em alta temperatura e ela mantém-se até que levem água ou muito vento. Faz reação com a água e queima. Se fores a cal morta, também serve mas já não é tão resistente

Thaina: E quando vocês se reuniam para fazer o adobe? Era durante a semana ou aos finais de semana?

Adérito: Sabes que antigamente as pessoas viviam do campo, não havia fabricas, ou haviam, mas poucas pessoas trabalhavam nelas, eram mais fabricas de conservas e coisas de peixe, salinas, também havia as salinas, mas era mais a classe masculina, era um trabalho pesado.

Então cada vez que se juntavam era, por exemplo, trabalhavam hoje e amanha venho eu, e depois vem o outro. Ou seja, sempre existia uma equipe de dez ou quinze pessoas todos os dias. E faziam rápido. A menina depois já podia se casar.

Thaina: E qual era o processo? Primeiro se fazia a extração da terra…

Adérito: Sim, se fazia um morro de terra, terra que tivesse alguma pedra era melhor. Também havia quem fizesse de barro. Mas o adobe de barro era menos resistente. Porque com a humidade desmorona-se porque não era cozido, pera barro cru, aquilo depois acaba por se estragar com a humidade.

O adobe de areia procuravam sempre uma areia com mais pedra, pedra miúda, uma pedra que não fosse muito graúda, para ter mais aderência, e consumir menos cal, que é igual ao cimento, o sistema era o mesmo. Juntava-se a cal com a areia misturavam bem o processo muito idêntico ao do cimento, ao cimento atual, e juntavam água, e mexiam, faziam umas formas de madeira, com aquela medida que queriam a espessura da parede. Não podia ser muito grosso, no máximo ai com uns dez centímetros de espessura que era para poder coê-los porque senão as pessoas não conseguiam coê-los. É parede pesada.

Thaina: Sim, e não eram do tamanho de um tijolo normal, como atualmente, eram grandes. Havia uma proporção a se seguir não?

Adérito: A proporção dos blocos era praí quarenta de comprimento, dez de espessura, sempre dez, e depois a largura andava entre uns vinte e uns trinta, normalmente era assim.

Thaina: Qual era o ambiante quando se faziam os adobes?

Adérito: Alegre. Um ambiante alegre. Olha o pagamento era uma refeição normalmente de batatas e bacalhau e vinho. Era um ambiente de amizade. Vinho e broa, a broa sempre acompanhava, e azeito-

nas, porque normalmente era quase sempre o que produzíamos.

Por que o azeite muita gente tinha oliveiras e quase toda gente fabricava azeite e tinham azeitonas. Vinho também a maioria das pessoas tinham vinhas, era agradável. Era um convívio, e era muito alegre.

Não era só nisso, mas por exemplo para agricultura se juntavam igual porque não existia dinheiro, mas isso era diferente, as casas eram gratuito, quando era na agricultura, ias para mim um dia, eu ia para ti no outro, pronto, pera troca de tempo. Era igual para as casa, porque depois vinha outro e casava-se e também vinham ajudar e o outro também, vinham ajudar. Faziam uma troca. E era uma modalidade muito boa.

Toda gente tinha casa, não se casavam sem ter casa. Isso fazia parte da tradição "quem casa, quer casa". Depois também havia, as pessoas iam fazer a casa onde tinha terra. As pessoas primeiro faziam a casa e depois é que iam as finanças dar um valor a casa. Mas era depois da casa estar feita. Por que, nesta zona onde eu vivo há setenta anos atras ainda não existia eletricidade.

Thaina: Entendi. E as casas eram como? Haviam muitas casas Gândaresas…

Adérito: A casa se fazia a volta do pátio. Um patio central, em que a casa se faz a volta de um patio. O L fica virado para a estrada e depois o resto fica para trás. E a parte aberta e a parte onde tomava sol. Para depois usar a eira, a feira pera um patio onde se secavam o trigo, o arroz, o feijão, eram onde faziam as secas.

Thaina: E as casas Gândaresas tinham a mesma tipologia?

Adérito: Quem tinham mais poder punham pedra a volta das janelas e das portas, as cantarias. Tipologia, eles falavam em divisões, normalmente era dois ou três quartos, o banho, não havia banhos. Por acaso na casa da minha mãe ja existiam banho, mas isso não era sempre que se conseguia. E existia água canalizada que era retirada do poço através de uma bomba de pressão manual. Mas isso não tinha em todos os lados, a maioria fazia uma latrine. Sabes o que é uma latrine?

Thaina: Não.

Adérito: Nunca vistes? Eles usavam, junto aos estábulos das vacas, havia um compartimento que tinha uma tábua de madeira com um buraco, as pessoas faziam depois iam por trás e puxavam, era assim. Sim, um banheiro seco.

Thaina: Uma outra pergunta que eu gostaria de fazer, é as mulheres e crianças participavam na construção das casas?

Adérito: Toda gente. Olha crianças a brincar trabalhavam. Trabalhavam, divertiam-se brincando mas à trabalhar.

Thaina: O senhor acredita que as pessoas poderiam voltar a usar o adobe, ou é uma técnica que ficou para trás e ninguém mas usa?!

Adérito: É difícil porque hoje é tão fácil existem produtos tão práticos de fazer. Hoje o que funciona é a rapidez. Tempo é dinheiro, la está. Hoje me dia tu pagas mão de obra, antigamente tu não pagavas mão de obra e quanto mais tempo tiveres uma pessoa a trabalhar pra ti mais tu pagas. Pra voltar ao adobe, tu tens que ver que as pessoas demoravam mais tempo para fazer a casa, e que se paga e as vezes a mão de obra é mais cara que os proprios materiais.

Thaina: E culturalmente o senhor acha que se perdeu muito com o esquecimento da técnica?

Adérito: Sim, sim, perdeu-se bastante. Vamos começar pelo convívio, perdeu-se o quem casa, quer casa, perdeu-se hábitos alimentares, foram coisas que se foram perdendo, assim como as casas, porque as pessoas começaram a trabalhar em outras áreas para terem dinheiro e não bens, porque era tudo troca por troca, pera batatas por batatas, e hoje em dia não tens isso.

E perdeu-se muita coisa, porque as pessoas da terra juntavam-se muito mais do que se juntam hoje em dia. Os amigos eram amigos de verdade. Hoje não são, a maioria não.

Hoje existem conhecimentos, são pessoas conhecidas, a palavra amiga é muito cara. Tu se calhar na aldeia da tua avó tens noção disto, das pessoas se juntarem e ir ajudar o outro vizinho.

As casas perderam-se, mas também se perdeu isto. Porque aquilo que era o momento em que toda a gente se juntava e uniam-se para ajudar já não existe.

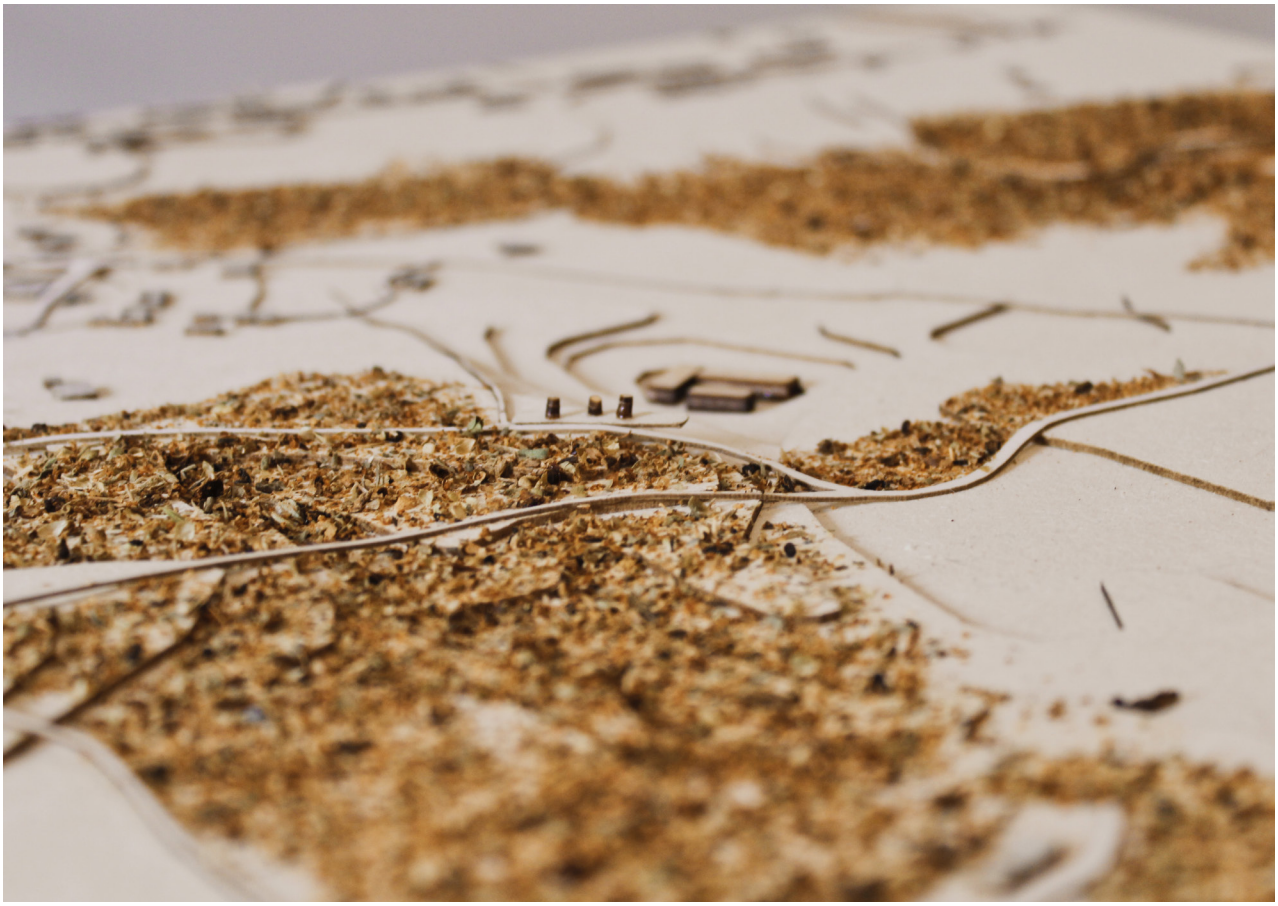
Tudo o que a tecnologia veio a favor, elas são muito boas, por exemplo, nós estamos a conversar nesse momento a milhares de quilómetros de distancia, facilitou.

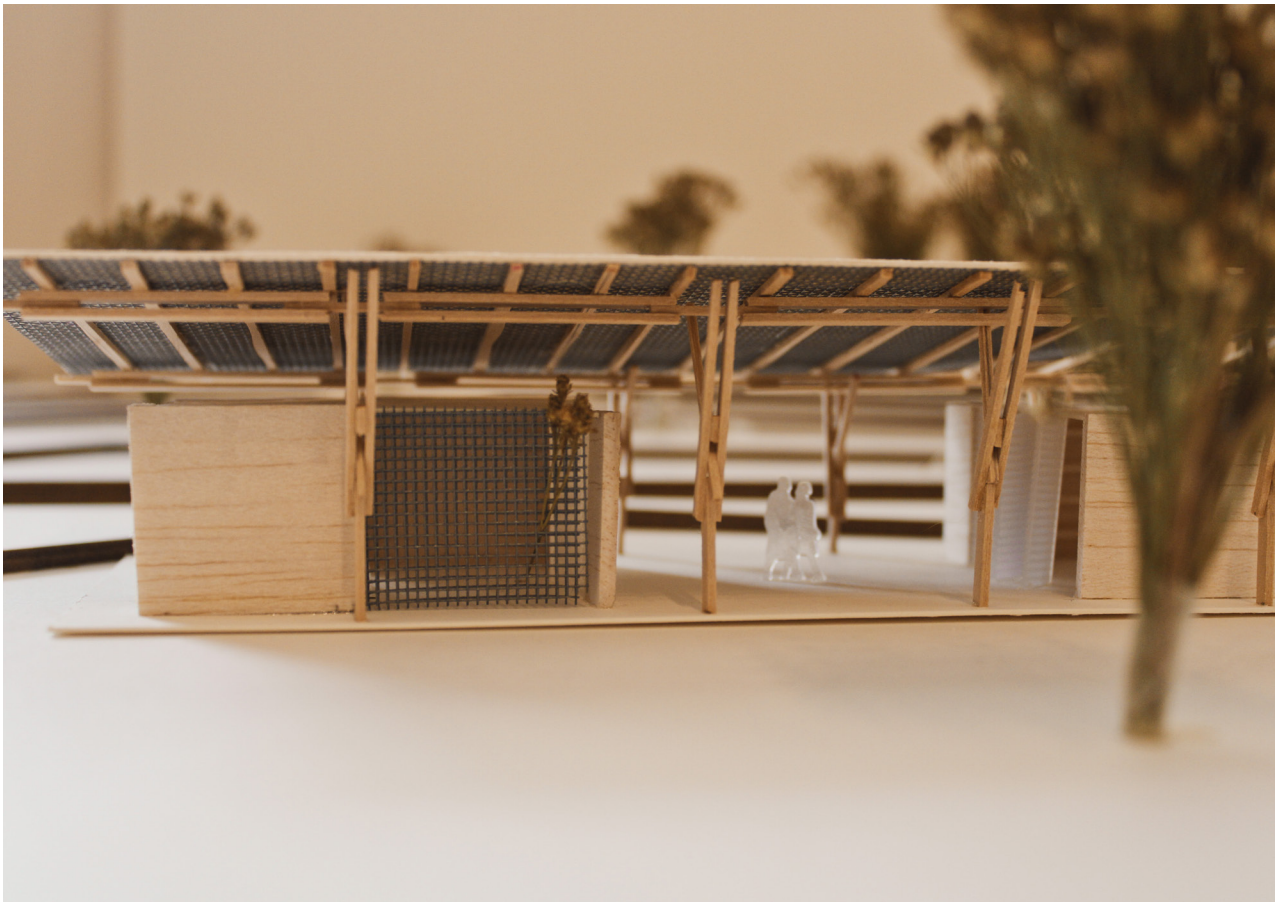
Mas ao mesmo tempo, perde-se a presença. Nós estamos aqui a quilómetros de distancia, mas o meu vizinho está aqui à cem metros e eu, ou ela lamentavelmente ao invés de vir ter comigo, telefona. Quando o relacionamento por telefone nunca é o mesmo. As novas tecnologias são boas por um lado e por outro perde-se muito.

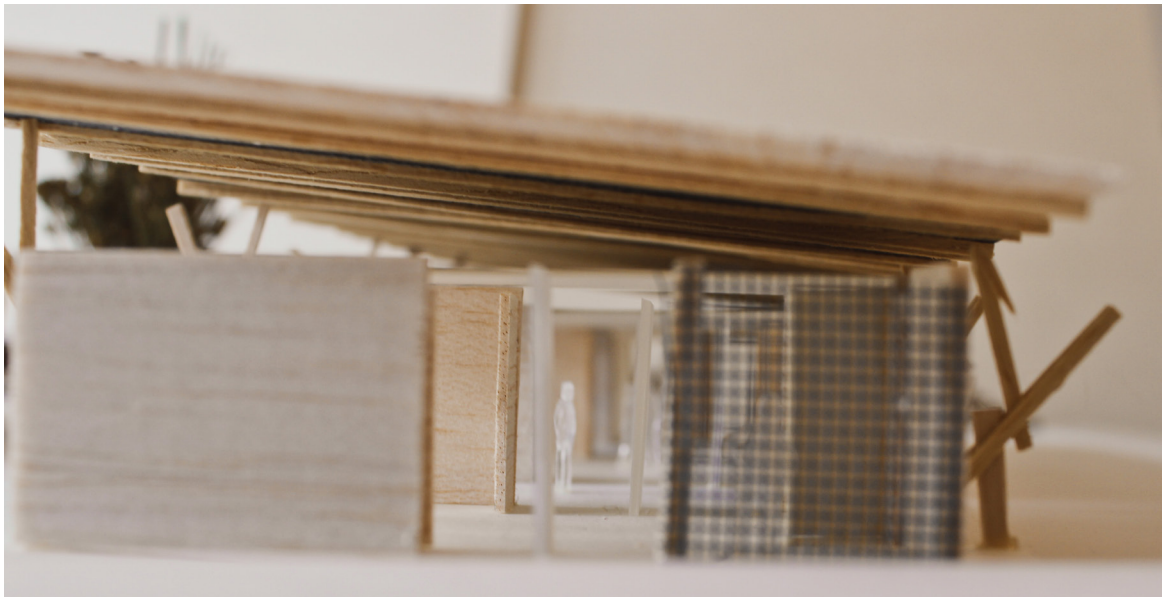
Thaina: Se eventualmente ocorresse uma oportunidade de se construir em adobe, o senhor acha que as pessoas participariam, nem que fosse aos finais de semana? E o senhor acha que elas teriam esse espirito de comunidade?

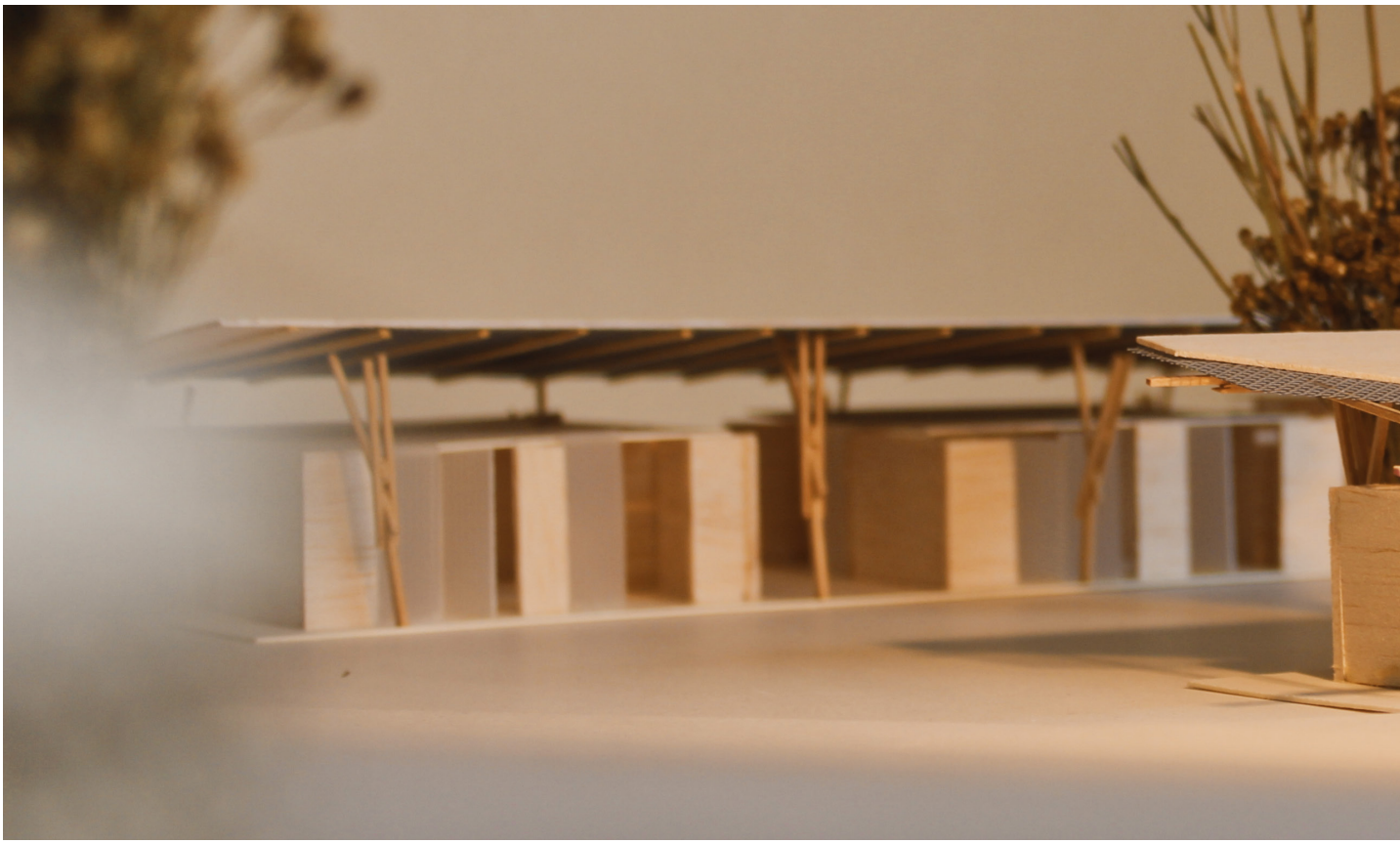
Adérito: Sim, sim, por exemplo a nossa zona ainda é uma zona muito pacata onde as pessoas ainda vão bastante à igreja, a maioria são católicos, também existem outras religiões, mas onde se juntam…, se numa das igrejas for-se dito: olha fulano vai fazer uma casa a moda antiga e agradecem à todas as pessoas que queiram participar e ajudarem, eles agradecem que apareçam. Olha aparece a freguesia completa.

MODELS PICTURES











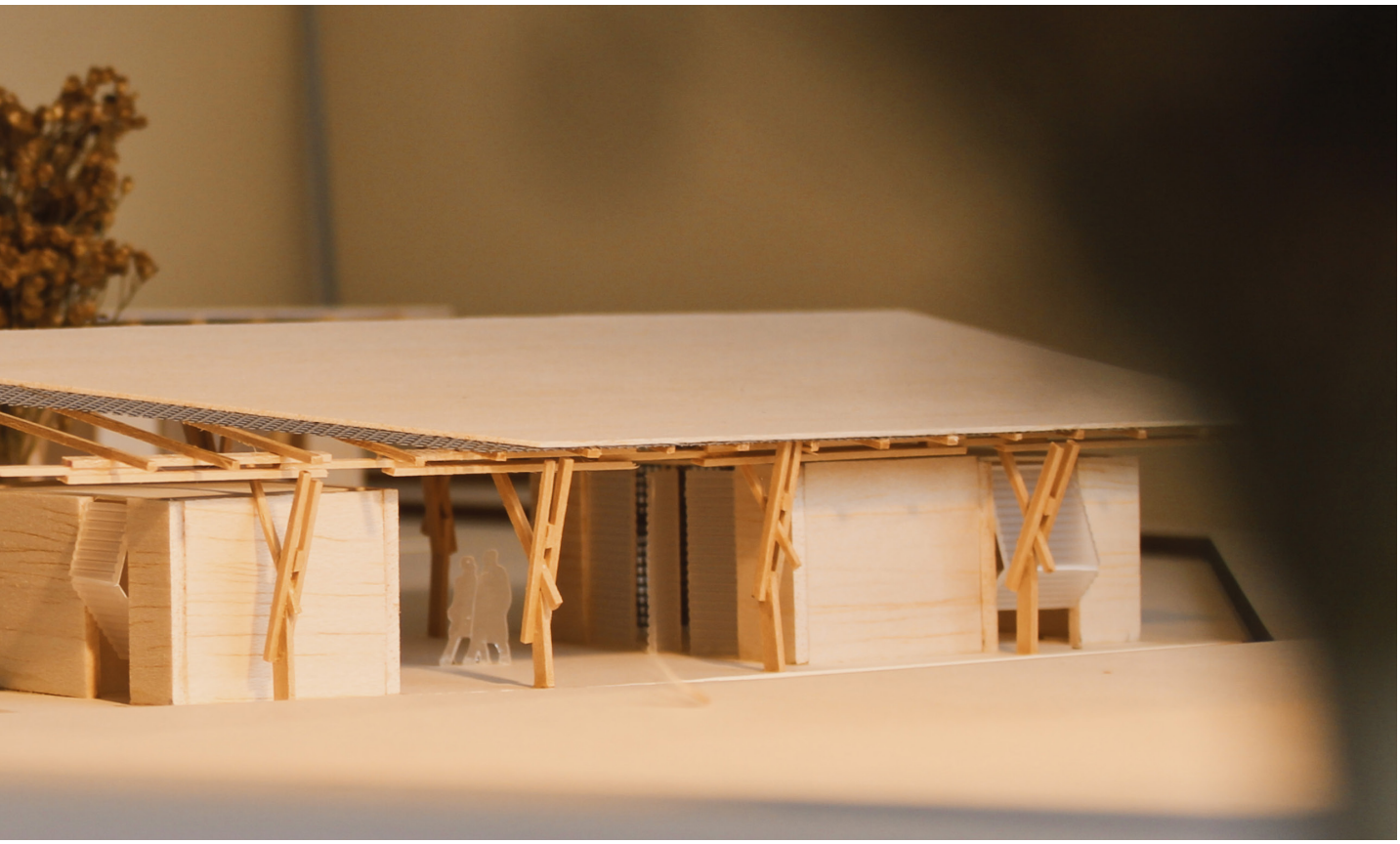
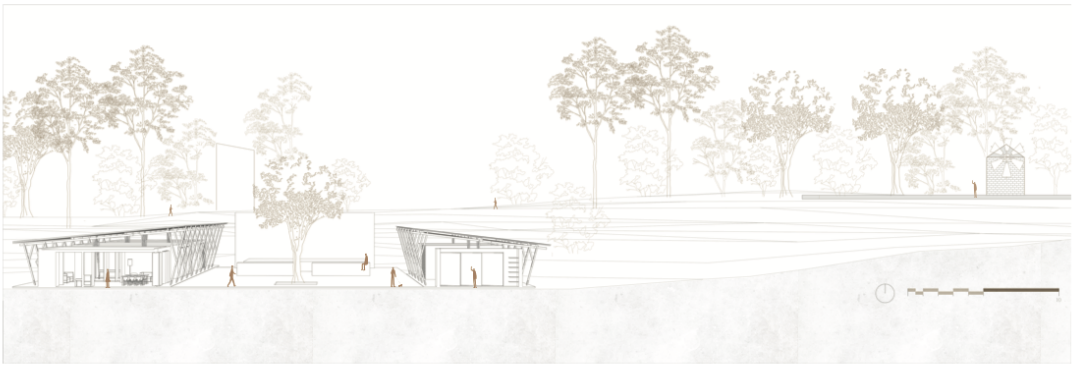




Fig. 1 - Project implementation in the territory of Santo André at three scales.

Fig. 2 - Longitudinal section. Implementation of the project in relation to the windmills.



Faced progressively with the decline of technical and specific knowledge resulting from popular traditions, we have lived the unconscious behaviour of consumption and waste. We have replaced hand-crafted work, a reflection of local culture, produced over many generations, by a unitary industrial methodology, bearers of a foreign culture, that simplifies the identity expression of local culture.

Therefore, the architectural principle set for the current work attempted to manifest the beauty of vulnerability and irregularity of an architecture made with local resources by the local people. The conceptual processes of the project have sought to find architectural dynamics, in response to socio-cultural, socio-economic, environmental and technical needs through an interactive and participatory process as an instrument of solidarity. Aiming to enrich and value earth as an accessible material by re-integrating it into contemporary society through the development of a cultural project in the district of Aveiro in Portugal.

The project was designed to generate social interaction in the core of the cultural centre and the villages of Santo André de Vagos and São Romão, based on the promotion of intergenerational relation, envisaging the transmission of the constructive known-how to the younger generation. Enhance the community's engagement and participation to promote technical system solutions diversity in a building. And articulate these social dynamics to the production of activities that will lead to a circular economy.

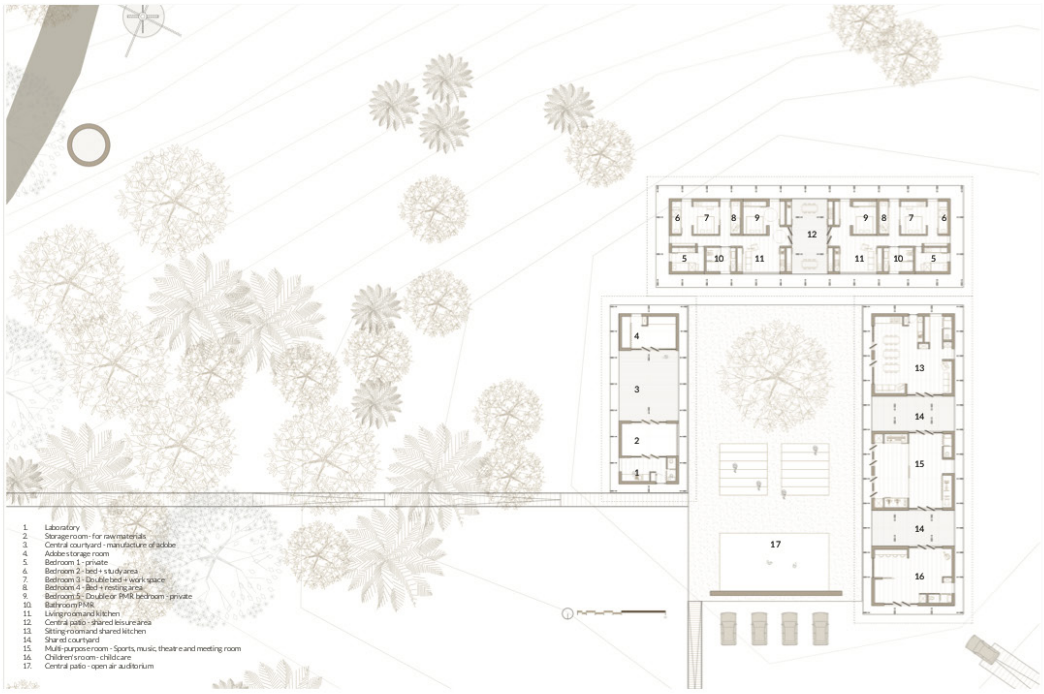
As a work that reflects on the importance of the interactive and participatory process, different scenarios were suggested to allow the participants to adjust the construction to respond to their social issues. Leaving open the opportunity of reflecting on other possibilities to enrich the discussion on how to reappropriate a constructive culture as a means of cultural value.

Earth construction as cultural value

Reappropriation of adobe's constructive culture in Aveiro

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THAINA ARAUJO



Img. 3 - Implementation of the cultural centre and programme

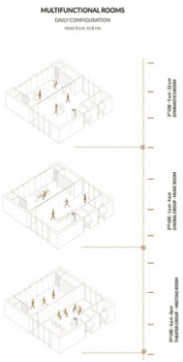
Img. 4 - Earth construction learning centre building - East façade

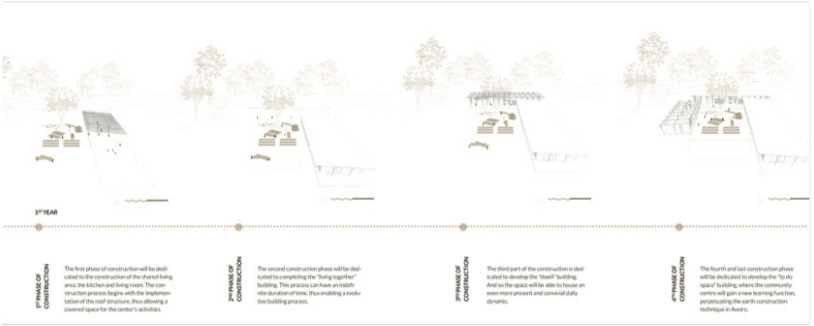
Img. 5 - diagram - principles of the reinvented evolutive construction site. The phases of construction throughout the years. Adaptation to the communities' socio-economic conditions.

Img. 6 - diagram multifunctional daily rooms configuration + social interaction in the core of the project









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