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Sustainable Vernacular Architecture

How the Past Can Enrich the Future

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Chapter 4
Vernacular Architecture in Portugal: Regional Variations

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Introduction

The globalization process and technological evolution brought complexity as well as ambiguity to local identities and also a rupture on man's secular relationship with nature. There is still a growing demand for high-tech energy-consuming mechanisms to support artificial indoor environments, resultant from perverted—and unsustainable—comfort expectations.

Vernacular architecture is an essential part of cultural heritage and embodies the knowledge on how to design in harmony with nature, in a durable, healthy, and sustainable way. The local design strategies emerge from centuries of empirical rationality, resulting in comfortable environments that passed the test of time. The knowledge derived from vernacular architecture is at the core of a truly sustainable design.

This chapter aims at providing an overview of the regional differences in vernacular architecture in Portugal. It builds upon a major reference work: the National Survey on Regional architecture, conducted during the 1950s—a document that should always be an inspiration to the present and future generations.

The National Survey on Regional Architecture

The goal of making a national survey of regional architecture during the 1950s was seen as a tool for modernizing Portuguese architecture. One of the main promoters of this idea was the Brazilian architect Lúcio Costa, collaborator of Le Corbusier and

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coauthor of the Brasilia project with his student Oscar Niemeyer. In southern Portugal, the initiative would be led by Keil do Amaral, who was the president of the Portuguese Architects Association (AAP), at the time of the national survey. Fernando Távora would lead the initiative in the northern regions of Portugal (AAP 1961).

Two reasons have prompted the making of such a large survey that would cover all regional architecture across the entire country: the first was proving that vernacular (traditional) architecture presented a variety of differences and a richness that contrasted with the uniform model propagated by the Nationalist regime at the time (the "Estado Novo"), during the 1940s; the second motif had to do with the timing, since the survey coincided with the end of the 1950s, so it provided data on traditional models that were integrated in the recent modern architecture style in Portugal.

The survey was initiated in 1955 with the sponsorship of the Ministry of Building and was led by the Portuguese Architects' Association. The national territory was divided into six zones: (1) Minho, Douro Litoral, and Beira Litoral; (2) Trás-os-Montes and Alto Douro; (3) Beira Alta and Beira Baixa; (4) Estremadura, Ribatejo, and Beira Litoral; (5) inland Alentejo; and (6) Algarve, southern Alentejo, and litoral Alentejo, allocated to six teams. Each team had three architects. Fernando Távora was the coordinator for the northern regions, Francisco Keil do Amaral coordinated the southern regions, and the remaining regions were studied by architects such as José Huertas Lobo, Nuno Teotónio Pereira, Francisco Silva Dias, Frederico George, and Celestino de Castro.

It is current among critics of the survey that the survey was an excuse for the teams to find a clear relationship between the chosen models and the modern architecture. In fact, Leal (2009) argues the survey facilitated a modern look on popular architecture, which is acknowledged even by some architects involved in the survey. Teotónio Pereira wrote that "we were very happy, very satisfied, when we found expressions of popular architecture that had similarities with what we thought modern architecture was. That happened when we discovered houses with a mono pitched roof or walls with blind gables, thus similar to expressions that we tried to use in our architecture. We were really happy when we saw a building that seemed to be modern, which could have been made by one of us" (Pereira et al. 1961 in Leal 2009).

At the end of the 1950s, during the Survey and while preparing the publication in 1961, a new challenge was under discussion. By then there was a clear reaction to some controversial application of the *international style* premises in Portugal, without the necessary adaptation to the national context. This idea is clear in a statement by Nuno Portas in 1958: "Let us remember that if the International Style served us… to rebel against neoclassicism and pseudo-traditionalism, the unconditional and long-term acceptance of this type of architecture is becoming dangerous, because it lacks bonds to our backgrounds (…)". It is this insistent attitude that dictated in part, the making of the National Survey on Regional Architecture as a contribution for the Portuguese Pavilion at the Universal Exhibition in Brussels by Pedro Cid (Ramos 2012). So we can assume that when the teams were in the field, rather than the concern to find a relationship between traditional models and modern architecture, they wanted to discover how to make modern Portuguese architecture.

Regional Variations: Context Considerations

According to Fernandes, Orlando Ribeiro, a geographer by training, was the first researcher looking for a full assessment of patterns across the Portuguese territory, based on its geographical and historical expertise (Fig. 4.1) (Ribeiro 1968).

Orlando Ribeiro describes "a northern civilization made of granite, articulated with rough morphological values, adapted to local climate and to an agro-pastoral livelihood, where settlements could be described as midway between the strong density of Trás-os Montes and the dispersion settlements in Minho." He also describes "the South as a civilization relying on clay, located on flatlands and plateau areas of the meridional region where natural light is plentiful, and which is bonded to soft materials transformed by fire and painted with lime, as a response to a life more open to the outdoors, more grounded on earth, and settled in dense villages which are interlinked."

This description shows two different geological and climatic regions in Portugal: the Atlantic ones (based on granite) and the Mediterranean ones (based on clay). Furthermore it shows the diverse historical and cultural contexts (the Portuguese Celtic, Sueve Christian culture, and the Romanesque and Moorish Portugal) and how its complexity impacted the settlements.

It is later known that there was a third geoclimatic region articulated with the Spanish inland culture, a bigger diversity of building materials (such as schist and wood), and that archeology led to older references.

According to Fernandes (1963), the survey on the regional Portuguese architecture provided knowledge about other subregions of the vernacular architecture. The work has emphasized the links between the cultural and functional context, between northern and inland regions with the neighboring regions of Galicia and Meseta, and reconnects the south of the river Tejo traits with the Andalusian and Spanish Extremadura. As such we can state the inquiry had its own international dimension.

Minho

The region of the Atlantic Northwest is characterized by its temperate climate, cool weather, and high precipitation. It is a region predominantly granitic (despite some vestiges of schist), which is a stone associated with different types of construction. This region is characterized by irrigated agriculture, forming a green landscape with dense and diverse vegetation. It presents diverse crop fields, such as cereals, pasture, vegetables, vineyard, olive trees, as well as maize, a crop introduced during the sixteenth and seventeenth century, with its cultural and social implications, such as an extreme partitioning of the land, which resulted in a characteristic minifundio system.

The Minho landscape mosaic is subdivided in two major areas: the valley—"ribeira" (in the vicinity of the main rivers: Minho, Lima, Cávado, Ave), and the

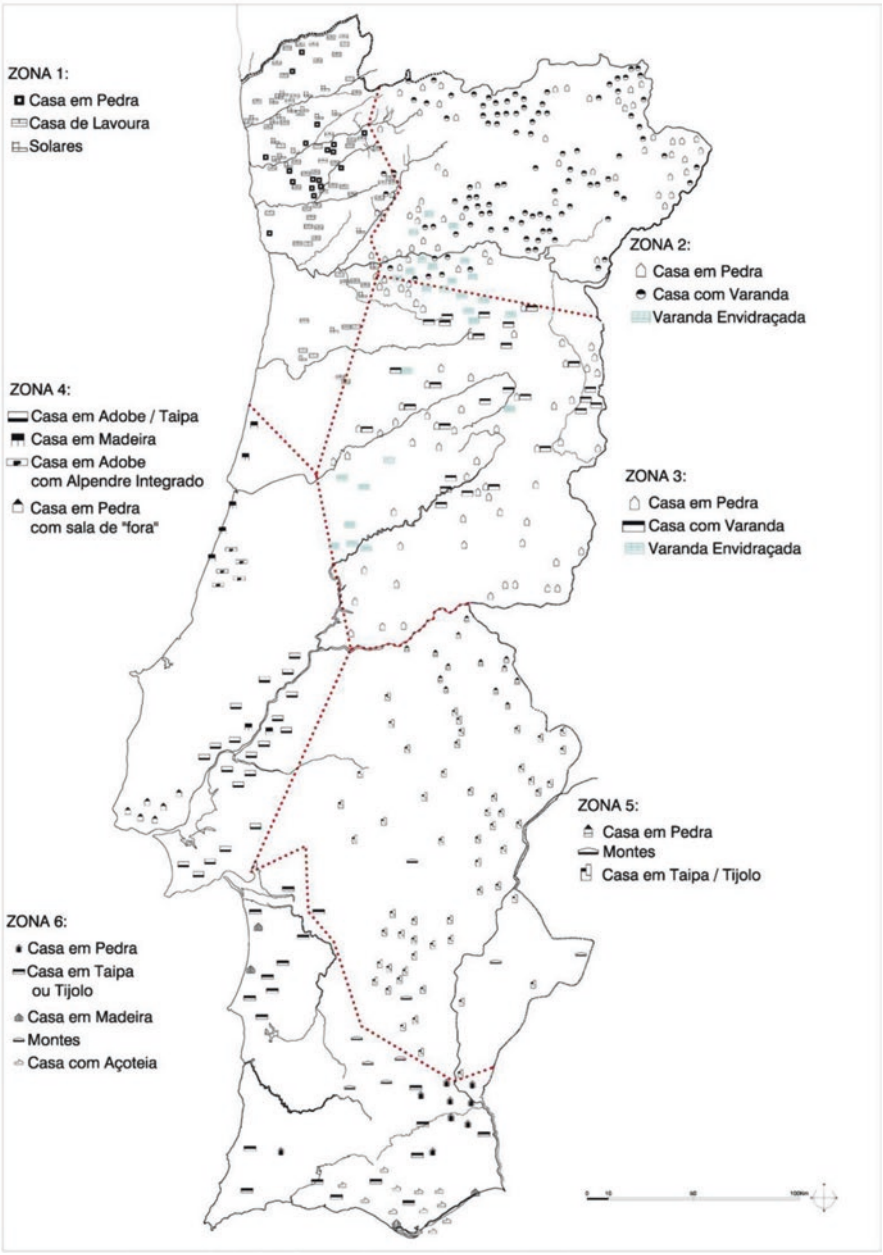

Fig. 4.1 Map with the surveyed regions (1–6) and respective typologies (Maia et al. 2013)

mountain—"serra" (located in the peripheral regions of the river and associated with the main mountain ranges of the region: Arga, Peneda, Amarela, Gerês, Cabreira).

In the valley, settlements are dispersed, with land being cultivated between forest patches (called soutos), including on hills, predominantly "matos" (mainly gorse), that once provided the bed for the animals and constitutes the main fertilizer. The houses are scattered, or in small clusters, located between these cultivated lands, and so the notion of agglomerations or dense "villages" does not really exist. In the small valleys, among the scattered dwellings, there is a predominance of small private properties, which stand out as larger farms belonging to wealthy farmers, some of them members of the local nobility, living in manor houses. In addition to these, the church stands out with its tower, churchyard, and cross, where the cemetery and the parish house are usually implanted, thus marking the core of each parish. However, the dispersion of houses is such that in many cases, "the last houses of one place are confused with the first ones of the next one" (Oliveira and Galhano 2003), and it is therefore difficult to perceive the territorial limits of these small units of colonization of the Minhoto territory.

The cultural and economic aspects of the mountain range areas present some aspects that are similar to the valley areas (such as the importance of maize). Both societies share the importance of pastoralism in the mountainous and high mountain areas, which in some cases depend on communal pastoral systems (vigias or vezeiras) practiced in some cases in a transhumant regime (Peneda, Amarela, and Gerês mountain ranges). This mountain settlement is similar to that of the adjacent Trás-os-Montes region, thus concentrated: houses clustered in a compact and dense way, contiguous to each other and sometimes sharing walls, forming small, irregular and narrow streets. The concept of "village" prevails in the mountain areas, which is surrounded by crop fields, forest areas, brushwoods, and common lands (and in some cases, include complementary settlements for seasonal use—corrals or summer villages, called brandas).

In this region prevails the house of 2 stories, where the ground floor holds stables, corrals, cellars, and warehouses, and in the upper floor all the spaces are used by people: kitchen, living room, bed rooms, and the balcony. The floors have independent access (second floor is accessed by an external staircase, in many cases with a covered porch or balcony). The most common building material is stone (granite or schist, depending on local availability, and economic reasons), usually also having some parts built of wood. The walls are commonly made of exposed stone (especially in the mountainous zone), and in some cases painted with lime or plaster (when it is, usually the skirtings, wedges, and sill trimmings appear in gray or other dark color).

The balconies, which in many cases constitute additions to the original constructions, are made of wood, or in large blocks of granite (perpianho), and are often protected by a roof eave. These structures are used as a corridor or as storage room, often working as indoor/outdoor space (or transitional), connected to a staircase. Their height and opening size are often interlinked with local climate conditions (being higher and open in the valley zones, and lower and closed in the mountain range). Usually, there are divisions at the end of these balconies (rooms, or partition

for loom). This balcony-corridor, common in rainfed farm regimes, could be the origin of other construction types of the Entre-Douro-e-Minho, such as the great verandas (varandões) and sun drying flooring (sequeiros), characteristic of the region of Baixo Minho.

In Entre-Douro-e-Minho region the kitchen is the core of the house, given the importance of the fireplace, and the multifunctionality associated with this space. The living room (which in many cases works as a bedroom) was the most elaborated division, and it has an important ceremonial function (hosting the pascal compass, weddings, funerals, etc.). The bedrooms are often functional, and small in size, and in many cases lack windows (alcoves). When the house is small, all divisions are located in the same space. However, in the case of more affluent houses (and therefore of larger size and care in their distribution), certain dependencies (especially those associated with animals and agricultural work) are located in independent divisions and buildings, which in many of the cases are arranged around a courtyard.

In the mountainous areas the houses are typologically similar to those of the valley zone, although of smaller dimensions and use rustic features. Given the characteristics of the clustered mountain settlement, in many cases these houses do not have any external space of their own, communicating the stairway directly to the public space. When they present this space, it is generally a small courtyard (or quinteiro) that works as a transitional space between the public and the private ones, allocated for agricultural and pastoral activities of the family. In the steepest areas the house is implemented in a dialogue with the slope, and in many cases there is no external staircase, since it can be accessed directly on the upper floor by the highest part of the terrain. Unlike valley areas, where roof tile prevails (on roofs of 3 or 4 surfaces), in the mountainous zones it is usual for the roof to be a pitched roof (having persisted in the most remote villages until recent times, the use of thatched roofs).

The importance of the introduction of maize crop in the region has manifested itself in the structuring of the territory, through the partitioning of land, irrigation structures, and from the architectural point of view, the proliferation of storage elements such as dry flooring, haylofts, and granaries. These are indeed a highly developed and perfected element, which had great prominence in Arquitectura Popular em Portugal (AAP 1961). In the valley areas, the granaries are built mainly in wood (or mixed granite-wood structure), being located in the vicinity of the dwellings, or agricultural annexes of their own, dry flooring or threshing floor, etc. As for the mountainous areas, the granaries become more robust, and sometimes are built exclusively in granite (Soajo), implemented around communitarian spaces, as communal threshing floors, in large groups of three, four, or five dozens (Soajo, Lindoso, etc.).

At the northern end of the municipality of *Arcos de Valdevez*, nested in the initial section of the valley of the river Vez, and the abrupt slopes of the northwest slope of the mountain of Peneda, is located the parish of Sistelo, marked by strong contrasts between the humanized landscape of the valley of Vez and a more open landscape with wide horizons looking at the plateau of Peneda (Fig. 4.2). The variances in steepness gave rise to distinct microclimates within the parish, which are directly associated with the different elevations and the availability of water and insolation,

Fig. 4.2 Sistelo: valley landscape with terraces to the maize, and mountain landscape in a summer village (credit: Barros 2013)

Fig. 4.3 Cachena cattle in a summer village, and buildings in Branda da Gêmea at 1000 m (credit: Barros 2015)

which clearly distinguish the deep areas of the valley of Vez and adjacent streams (corgas), and areas of mountain and high mountain, that approach the plateau of Peneda.

The breeding and grazing of Cachena cattle has been one of the most important pillars of the family economy of all the mountain communities of Peneda, associated with the smallness of the fertile valley spaces, and the strong availability of high mountain pastures, which could be exploited (especially in the summer season), was punctuating the saw of corrals (Fig. 4.3) and "brandas" (summer villages), laying the foundations for the structuring of a transhumant and seasonal use of space, between the low valley areas—used throughout the year (and where the villages are located)—and high mountain areas—where livestock goes up, between March and April, and where they remain until September or October.

Another key point to understand the settlement was the introduction since sixteenth century of the maize. The need for irrigation moulded the slopes of the valley into monumental terraces, thus creating horizontal levels that hold the water and allow irrigation. These are associated with the granaries (canastros), intended for

Fig. 4.4 Terraces in Valley of Vez between Padrão and Porta Cova, and Granaries of Padrão (credit: Barros et al. 2016)

Fig. 4.5 Granite houses in Padrão's village, and houses and pastoral shelters constructed in corbelled dome structure at Gêmea's summer village (credit: Fernando Cerqueira Barros)

the storage and drying of corn, built in granite and wood, elevated in order to avoid soil moisture, and protected from climbing rodents. Within dense villages, which characterize the concentrated settlement of the mountain, the granaries are clustered, oriented for maximizing exposure to sun and winds, to better conserve the cereal (Fig. 4.4).

As granite is a primordial material, villages contain robust buildings, with few openings, defending themselves against the harshness of the climate, in some cases enclosed around private courtyards, which are associated with haylofts, made out of wood. These granaries were added and clustered and implemented in communitarian lands. Alongside the rivers one can find the mills as well as interesting bridges, which allowed the passage of the waterways, in important territorial connections (Fig. 4.5).

The mountain region of Peneda is located within the National Park where landscape features granite mountains alternating with oak forest and rivers in the valley.

Fig. 4.6 A house and a street in the winter village of Pontes (credit: Cabral and Chalfoun 1998)

Until recently *Castro Laboreiro* settlements depended on a transhumant livelihood. In this region shepherds spent their summertime in higher grounds (above 1000 m), while in Winter they were forced to move the cattle to lower grounds (under 800 m) to avoid the long snowy season. Therefore the Castro people built houses in both sites. This type of settlement has created three different types of villages: the summer village or Branda, the winter village or Inverneira, and permanently inhabited village or "lugar fixo" such as the town of Castro Laboreiro (Cabral 2009).

Most villages had less than 30 houses, a common oven and a common water tank. The houses were often located in the least productive land, sometimes on the rockbed mingling with it. Surrounding the village there was a communal land used for grazing and where some oak trees and birch trees were harvested for building the houses. Small vegetable gardens were close to the houses. Due to the uneven precipitation regime, water was scarce in the summertime and demanded the construction of levees that in some cases were also used during wintertime to prevent the fields from freezing (Campos de Lima) (Fig. 4.6).

The traditional Castro house is characterized by a unique typology with small variants. According to Viana (1999) the castro house has two stories, where the ground floor is used for sheltering animals (cows, sheep, and goats) and the first floor is residential. The outer walls are commonly assembled with crossed over granite stones, stabilizing the shell. Wood walls confine the divisions of the living area. The stones are usually of irregular shape for houses built before 1960. The pitched roof structure is made of local oak wood; once thatched it is now covered with ceramic tile. In both cases there was no chimney over the fireplace. The floor slab around the fireplace is made out of stone and it is called "lar." In the bedrooms the floor is replaced by oak wood (Fig. 4.7). The exterior walls can be as thick as 80 cm on the ground floor and 60 cm on the first floor. This high thermal inertia of these walls provides comfort in summertime but not in wintertime, since openings are very small, reducing solar gains. The small openings for windows avoid the harsh winter weather but it is also due to the stone's low resistance to horizontal loads (Cabral et al. 2013)

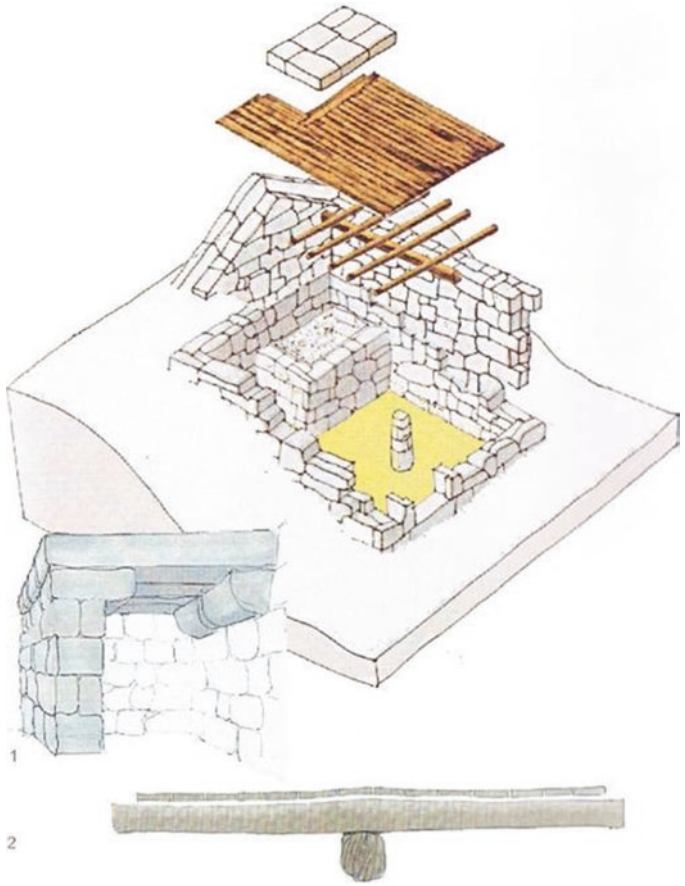

Fig. 4.7 Typical building system in Castro (Credit: Viana 1999)

Trás-os-Montes and Alto Douro

The region of Trás-os-Montes and Alto Douro is separated from the Northwest Atlantic coastal region by a sequence of mountains (Gerês, Cabreira, Barroso, Alvão, and Marão). These mountains determine the climate in the Transmontana eastern inland region, which is mostly continental as opposed to the western Atlantic coastal climate. The landscape includes several plateaus, and extensive cereal crop fields in the highlands (rye and wheat, sometimes fallow), as opposed to the deep valleys carved by the river Douro and its main tributaries (where vines and olive plantations are traditional, as well as almond trees).

Predominantly a schistous area (although large granitic areas are also present), this region is commonly divided into two subregions due to its subclimates: the "Terra Quente" (associated with the river Douro valley and its main tributaries) has

Mediterranean geographical features, and the "Terra Fria" (associated with the extensive plateaus located along a west-east axis) has a more continental climate. Climate in both cases is harsh, with its cold winters and abundant rainfall, snow and frost, alternated by scorching, dry summers and high temperatures: the so-called "Iberia Seca" (Oliveira et al. 1969). The vegetated groves are scarce, and fragmented in patches of chestnut or oak forests, whereas in the "Terra Quente" the olive and the cork oak forest is more common.

The economy depends on two separate activities: the pastoral and communal livelihood of the plateaus of "Terra Fria" (with its common pastures and meadows, where livestock herding is shared by the community in a vezeira regime; and ovens, mills, and communitarian mills are also shared, under a system of self-governance—such as the "Concelho" of Rio de Onor) and a family-owned activity, particularly in the large vineyards of Port Wine, typical of "Terra Quente."

The population density of the region is lower than in the coastal area, and settlement is mostly concentrated. The communities are located near water springs, in sheltered and sometimes rocky areas, allocating most of the surrounding productive land for both extensive cereal crops and livestock grazing. The concentrated settlement system is related to the historical origins of the settlement in this region, and to a communal management of the territory (commons and communitarian livelihoods), which until recently governed these societies (Sampaio 2009).

The villages are compact and dense consisting of rustic aligned houses forming streets. In the center, the Parish Church (or Chapel) stands out among the buildings. Besides this massive built area, there was usually a large central area where a communal threshing floor was located. Surrounding the village, in the nearest plots, and especially in those best irrigated, one can find the vegetable gardens, and further away the areas of extensive cultivation, one can find grazing fields. It was verified that the houses are mostly (especially in the Terra Fria) built in raw stone, without lime plaster, with prevailing thatched roofs or roofs in slate.

The popular house, which generally does not differ much from other northern regions (stone house, two floors with different functions, and outside staircase and balcony), presents in Trás-os-Montes a singularity, especially in the larger houses: the patio (or curralada). This large compartment, located in the central areas, or adjacent to the dwelling, has important functions in the family economy, and is associated with farming activities.

It is around this patio that all divisions are distributed and accessed. The access to the patio is generally made by a large carriage door (porta carral), which opens to the street, and that door is usually covered by a porch, sometimes becoming a division for haystack (designated in some areas as "theater of hay"—"teatro do feno").

The smaller houses, which are surrounded by streets, sometimes have thick walls, shared with adjacent houses, have no patio, and alternatively a small yard in the back, where they tanned manures. Sometimes these smaller houses may not have any outdoor space, and the manure would be tanned in the corrals of the ground floor, or alternatively stacked in the street, immediately in front of the house.

The most used construction material in the whole region is stone (schist or granite, according to local resources), complemented by wood (balconies, pavement,

roofing structures). The roof varies between the thatched roof, the slate roof, or ceramic tile (the latter clearly a more recent solution, not available in most remote areas until the middle of the twentieth century).

A primordial element in the Transmontana housing is the balcony, which, having no place properly defined, presents itself in different typologies and functions, according to the type of house in which it was installed. In the streetfront houses, it is located in many cases in the main façade, towards the street, functioning as an extension of the stairs landing. In the courtyard houses, it usually appears along the various sides, varying between a balcony with one front (when the patio is on one side of the house), or a balcony on three or four sides (when the patio is in the center). It should also be noted that, in some cases, the balcony can be installed in the rear façade of the house, especially if it has a backyard, or in cases where the rear façade reveals better sun exposure (since the balcony was also a place to dry the cereals).

From a functional point of view, the balcony can present similarities, for example, with the balcony of the Minho region, since it is also an auxiliary space for family activities, agricultural activities, also for sun drying cereals, storage, as well as meeting or eating space.

Alongside the rural cases, the balcony is also present in Trás-os-Montes urban dwellings. In the house of Tras-os-Montes, the kitchen is the essential division of the house, as it is located close to the fireplace, used for hosting visitors, and where the owners perform the most important tasks of the family life. Contrary to other regions, in many cases, the kitchen had no oven, since, due to the persistence of communal customs in this region, the communal oven was shared by the villagers.

In many cases these communal ovens present singular and important architectural forms. These are solid constructions of reinforced materials, built with large blocks of granite, linked to its inside space, exterior covered spaces or porch (such as the one of Santo André, which appears in prominence in "Arquitectura Popular em Portugal" (AAP 1961)), and that besides meant for baking, were also used as a place for dating and meeting, and sometimes even for an overnight stay for travelers and beggars.

Tourém and *Pitões das Júnias* are two villages located in the municipality of Montalegre, in the most northwestern region of Trás-os-Montes, and close to the border with Galicia (Spain). These villages are located in the Mourela plateau, bordered by the mountain of Gerês (on the west side), Barroso (south side), and Larouco (east side), and the valleys of the rivers Cávado and Rabagão (south side) and Salas (north side). This region, generally called Barroso, was one among the case studies in the Regional Architecture survey within zone 2 (see Fig. 4.8).

Looking westward one can find the mountain range of Gerês (vastly depopulated) and the northern area of Galicia, where most villages from Barroso show similarities with the west regions, i.e., the mountainous areas of inland Alto-Minho with some Atlantic characteristics that have penetrated this region through the valleys of the rivers Cávado and Rabagão. The area where Pitões and Tourém are located corresponds to a granite zone (its constructive tradition may be included in what Orlando Ribeiro called "The Granitic Civilization of Northern Portugal" (Ribeiro 1961)).

Fig. 4.8 Pitões das Júnias—aspects of the village (Source: AAP 1961)

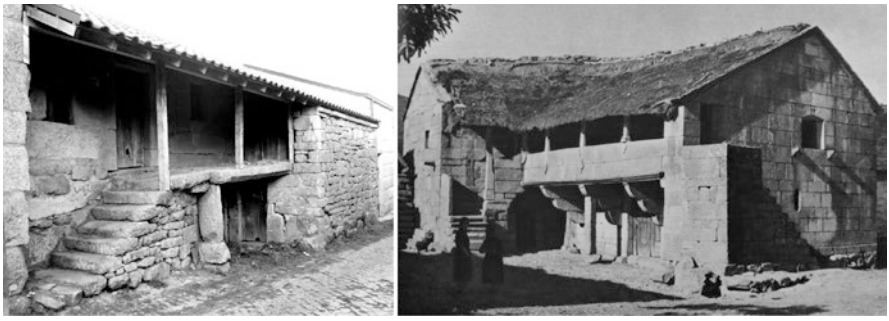

Fig. 4.9 Tourém's houses (source: Barros 2013 and AAP 1961)

From the economic point of view, the population relied on a typical mountain livelihood, where cattle grazing prevails, as the "Community's Ox" ("Boi do Povo") became a symbol of fertility and reason for pride for each community. The main crops are rye, which is associated with livestock, and more recently also potato (maize is an exception in the Barroso area). The best land is for cattle grazing and grain growing. The poorest lands and common lands were meant for small livestock (goats and sheep).

The two villages are built along irregular paths and alleys, intersected by crosswalks (canelhas), and their dwelling houses are clustered like small neighborhoods in a rustic urban space. This matrix opens in small common spaces, where one can find a fountain or a community oven, the chapel, or the church and its churchyard.

The traditional house can be described as three different main types: (a) the elementary house only has one division per floor; (b) the intermediate type has a central block in granite where a staircase is carved, has a balcony and/or outdoors division in with wooden pavements; (c) the third type is the most affluent houses of larger dimensions, corresponding to the house-patio typology (Fig. 4.9).

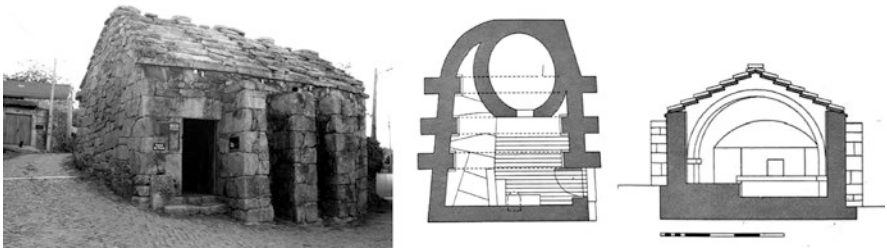

Fig. 4.10 Tourém—Community oven (source: Barros 2013)

At the time of the survey, there was a clear predominance of thatched roofs in most buildings (similar to the Alto-Minho mountain areas). The use of this roofing and its binding (windbreaker stones, wooden sleepers, etc.) is explained in Arquitectura Popular em Portugal (AAP 1961), which was disappeared in part due to a fire hazard.

Community ovens are considered evolved architectural forms (AAP 1961). Unlike most dwellings, the furnace is covered by granite slabs, for structural reasons and to prevent fires. In Tourém these are supported by three granite arches, reinforced by buttresses (Fig. 4.8). In some cases we can see the resemblance with a temple, both as a space for making bread and as a community building, a space open to all villagers. The ovens were used in turns, as various families had different roles (e.g., supplying wood to light the fire) (Fig. 4.10).

At the moment these villages are less isolated and remote than in former times, but very much affected by migration. In 1971 these settlements became part of the National Park of Peneda-Gerês, and later also part of the World Biosphere Reserve of UNESCO. The material and immaterial heritage of this region has been preserved and managed by the Barroso Ecomuseum.

Beira Interior

The green hills of Gardunha and the extensive plains of Idanha and the Natural Park of the International Tagus are the main features of this region. In the county of Fundão, at the foothills of the Gardunha mountain and belonging to the so-called Cova da Beira, is located the largest producer of cherry. But other products such as cheese and olive are also an important part of the local economy.

In terms of historical heritage, one can find well-preserved villages, part of the Historic Villages Network, such as the villages of Castelo Novo (in Fundão), and Idanha-a-Velha and Monsanto (Idanha-a-Nova). More recently, the network of Schist villages covers villages like Baroque and Janeiro de Cima and Foz do Cobrão.

Regional architecture in Beira Interior is characterized by compact houses made of exposed stone walls and small windows. Buildings are two stories high with storage

Fig. 4.11 The traditional glazed porch in Cova da Beira (source: AAP 1961)

rooms in the ground floor and porches with exterior staircases sometimes glazed in order to protect from the strong winds (see Fig. 4.11). Chimneys are omitted in these houses so heat is not lost during cold winters. Often there is a patio in front of the house for some agricultural works (see Fig. 4.8). Locally available materials like granite, schist, and clay are largely used for walls and roofs. Thatched roofs were also common. Pine and oak wood are the most common materials used in structure and partitioning.

The *Quinta da França* is located on the foothills of Serra da Estrela (Continental Portugal's highest mountain) and close to Covilhã. It has about 500 ha and has diverse activities like agriculture, animal husbandry, and forestry. The territory is limited by the river Zêzere on west boundary where you can find three small dams (Cabral and Chalfoun 1998).

There are about 24 rural houses covering a total area of 4800 square meters. The houses are very diverse in size and are scattered over the farm due to their historical occupation and different types of farming, forming 12 clusters.

The Casa dos Eucaliptos (Fig. 4.12) is located on the top of a small hill, facing SE and protected from winds by a dense tree line of eucalyptus. There are also deciduous trees on the south side shading the patio. The house is close to a levee along which there are several trees. Farther south there is an irrigation pond. The house geometry is a 30 m long rectangle rotated 43° towards the east side.

There is also a small construction on the east side that is slightly below ground where there used to be three pigsties (Fig. 4.10). The house is bermed from the north side. It is settled in a rocky basement. This allowed the nonexistence of foundations and also permitted the use of a sloped piece of land less favorable for agricultural use. This earth berm is also a way of diminishing the shadow cast by the house on its north side. The berm maintains the wall at constant temperature, its inertia reducing seasonal seasonal weather changes and daily temperature swings.

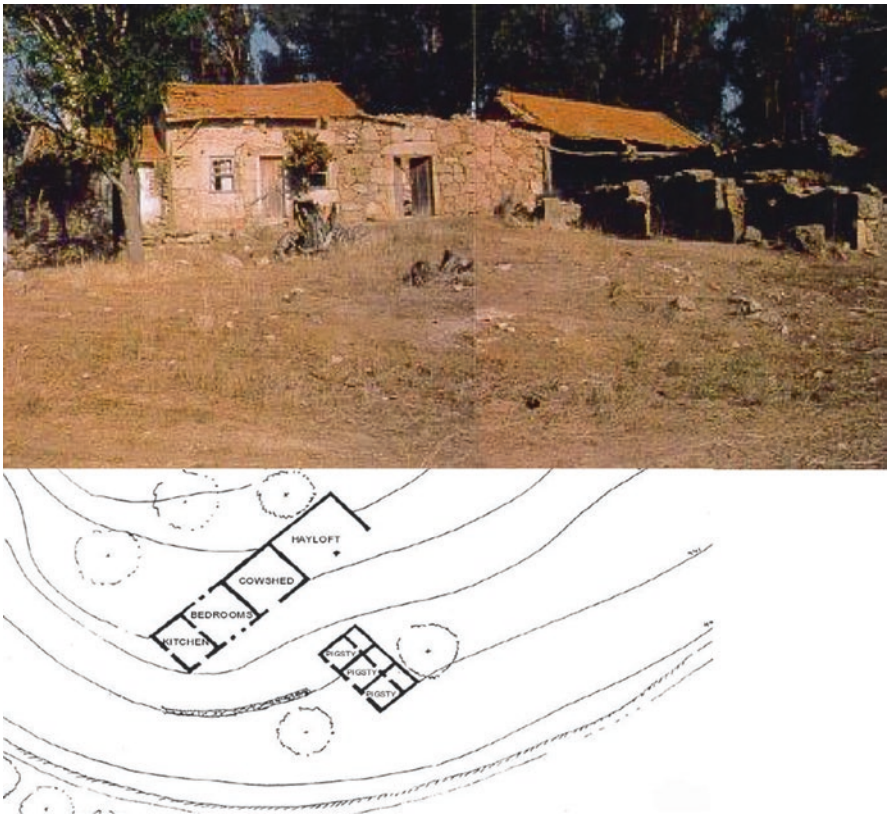

Fig. 4.12 The House of Eucaliptos in Quinta da França with three pigsties and a patio (credit: Ines Cabral)

Estremadura and Ribatejo

The so-called region 4 was defined as transitional and contrasting, as the team realized the region combined feature from north and south vernacular architecture. However we can say that in the area there are mostly white washed homes, stone or adobe and rammed earth in South, but some exceptions stand out. And these exceptions are many and diverse and also well mapped in the survey. From the chapel to the seashore to wells and cisterns, wineries and windmills and watermills, they all show how important the production and storage of items were for the supply of the city of Lisbon.

Also in the exemplification of housing types, the survey team choose a few cases that are strict to same confined areas. These are the "avieiros," wooden constructions on the riverbanks of the river Tagus or the houses with front porches "casas alpendradas" near Leiria, both endangered.

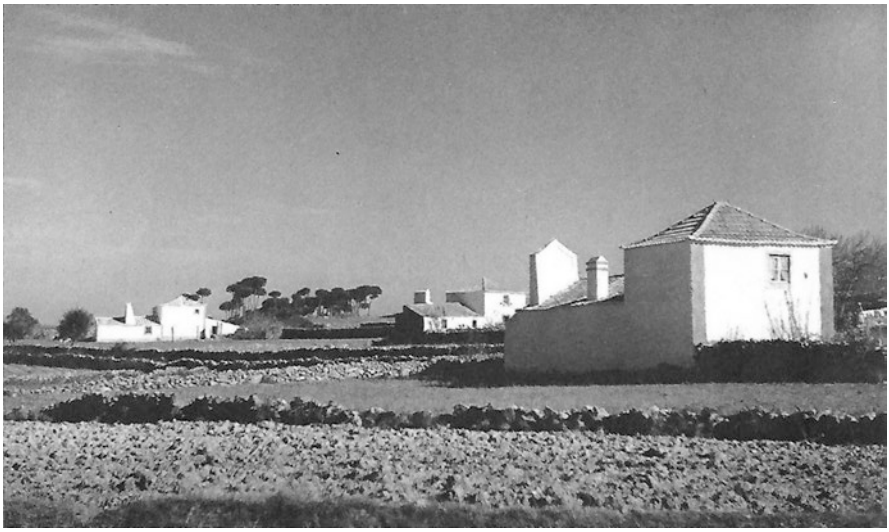

Fig. 4.13 Group of "saloio" houses, Ar, Sintra" (AAP 1961)

Another example of housing in the outskirts of Lisbon is the "Saloia" *House* (Figs. 4.13 and 4.14), which stands out in the landscape for being one of the few two-story cottages in this region. This type of housing unlike the aforementioned types still has a few examples in good condition and has been the investigated post-survey.

It is today consensual that the regional type of housing does not stop just in the northern riverbank of the river Tagus, as shown in the survey, but there is also part of the south riverbank. João Vieira Caldas in his study called "rural houses in Lisbon suburban areas" refers to the evolution of the definition of zoning, and states that it is the very architecture that bears witness to the presence of the "Saloio" people also on the South riverbank of the Tagus, pointing examples that show this. Fernandes and de Lurdes Janeiro already in their work on the "architecture of the Saloia region" defined this region to be located between two places of pilgrimage: "Nossa senhora da Nazaré" and "Nossa Senhora do Cabo" in Espichel, two places quite symbolically as there are two chapels with cubic shape (Caldas and Correia 1999).

The origin of the people who inhabit this region is not easy to track because they "should never have been a distinct population group, physically individualized or differentiated from the Portuguese". However most of the authors assign its origin to Arab ancestors and Christians who have left Lisbon during the "Reconquista" (term defining the conquest of Portugal to the Moors by Afonso Henriques), to occupy the surrounding lands and living off agriculture. Fernandes and Janeiro (2008) date the origin of the Saloio as far back as the invasion of the Iberian Peninsula by the Arab peoples, accompanied by people from the Berbers tribe, who stay from the start in these border regions, while the Arabs occupied the town. The

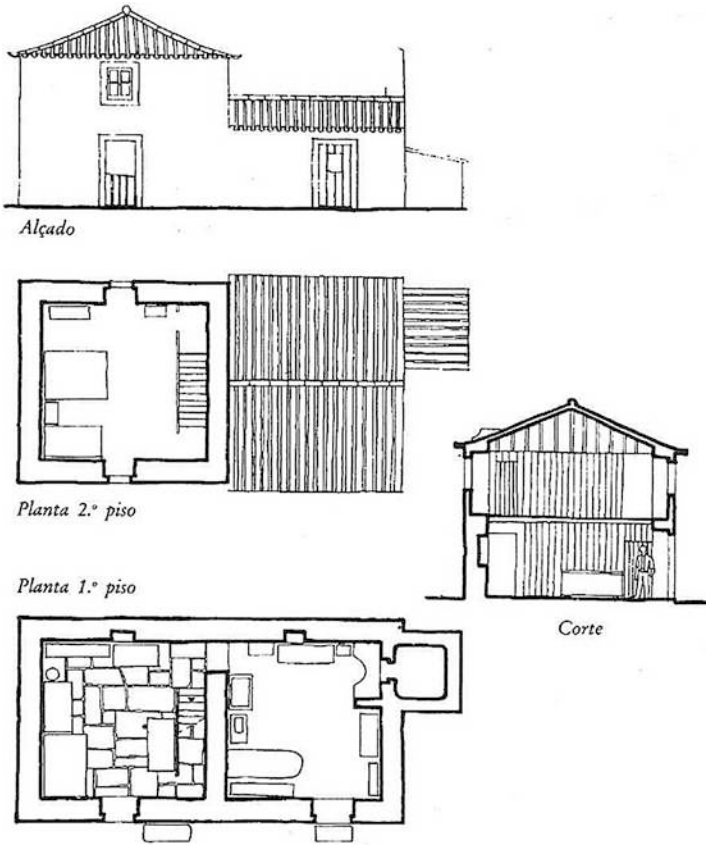

Fig. 4.14 "Saloio" house—plans, elevation, and section (AAP 1961)

miscegenation of race that occurred then is hard to distinguish these populations along with its manners.

Unlike the people, the house "saloia" is perfectly detectable, because its characteristics are easily recognizable among numerous dwellings of this region, as far as its dimensions which are repeated in various cases even though they are far from each other. The "saloio" House is part of the generic model of the South, Mediterranean architecture, plastered, whitewashed, and tiled. However the existence of two floors in most cases suggests influences from Northern Portugal which according to Vieira Caldas (…) should become a transitional group. Were single houses of rural character initially isolated from surrounding farmland (Fig. 4.15) which later given way to other buildings, so building an urban structure as a "hard process given its rustic and simple expression of single House"?. These two authors agree on the characterization of the types of the "saloio" home:

Fig. 4.15 "Saloio" house, Assafora, Sintra (AAP 1961)

Type 1—house with two or more divisions and four-pitched roof.
Type 2—identical to type 1, but with a cubic volume of two stories at the end. This volume has a four-pitched roof and a lower roof with two or three pitches. The second floor of the cubic body was the bedroom, and in the first floor is the living room "quarto de fora" that communicates with the existing kitchen in the body only with a story.
Type 3—two-story house resulting from duplication of cubic volume with plant similar to the previous but with two bedrooms upstairs.

The use of geometry in the volume of these houses and especially the presence of the cube refer to an Islamic influence. J.M. Fernandes and M.L. Janeiro suggest a proportional ratio of 1 to 2 is used in the dimensions of these volumes. This proportion can be found in some "saloio" rural houses and curiously in the "Kaaba", in Mecca, Islam's sacred building. Not being a perfect cube the relation between the width, depth, and height is the same as those of the "saloio" home. Other factors are the small size of the living spaces and the openings J. Vieira Caldas also commented that houses with windows seats, with shutters or crates, have similarities with typologies from the Islamic culture.

However it is the roof that has more interpretations. The characteristic design of the four-pitched roof, and the curvature along the cornice "saqueado" ending with the almost horizontal tiles, is very particular and it appears to be a singular feature of Portuguese architecture. However this type of roof is not restricted even to vernacular architecture or to the region of Lisbon and can be found in some areas of the Algarve, as in Tavira for example. According to J. Vieira Caldas, it appears mainly in mansions outside the region of Lisbon and the Algarve, not being frequent in the vernacular architecture of other regions.

It must be pointed out that these two studies that we've been referencing not confined only to the popular models of the local region. In the case of J. Vieira

Caldas is made a complete survey and characterization of erudite rural housing in this region and the relationship with vernacular models. In the study of J.M. Fernandes and M.L. Janeiro is treated in depth the spread of the "Saloio" house in other regions, refer: Azores, mainly on the island of St. Mary, Madeira Island, and the Canary Islands.

Finally, the survey refers to the two most well-known examples of a dwelling group, based on the "saloio" house: The row house for rural workers in the "Picanceira" near "Mafra" known by the name "bairro dos Ilhéus" dated at the end of the nineteenth century, and the dwellings from pilgrims in the Sanctuary of "Nossa Senhora do Cabo" in Espichel from eighteenth century.

The "Bairro dos ilheus," in the island of S. Miguel, Azores, is the repetition of a very simple module that, taking advantage of the slope, has two-story dwellings with entries in two levels. The module has a cylindrical volume on the ground floor accessing the oven (Fig. 4.16). Downstairs would be the kitchen with a patio and upstairs the living room (casa de forra) with street entrance and a room where the stairs are.

The sanctuary of "Nossa Senhora do cabo" in *Cabo Espichel* consists of a set of buildings: the church dated at the beginning of the eighteenth century and the two long buildings of dwellings supported in a simple arcade, which defines a gallery, space of transition between the square and the interior spaces. In the center develops a vast space of a rectangular square open to the east (Fig. 4.17). The housings for pilgrims in "Saloio" architecture, of great interest and monumentality, were built in the first half of the eighteenth century, by a group of pilgrims "sirios" from the "saloio" region, as indicates a plaque at the site.

Each module has a square plan and consists of a ground floor with part of the gallery and a shop, and the second floor comprises the hostel room where pilgrims could stay overnight. The main facades have a very interesting fenestration scheme - missing a window in the space of the stairs and causing an interruption in the row of windows.

Fig. 4.16 "Bairro dos Ilheus", Picanceira, Mafra (AAP 1961)

Fig. 4.17 "Nossa Senhora do Cabo," Espichel, Setúbal (Ordem dos Arquitetos)

This relates to the presence of the geometric square. The asymmetry caused by the different lengths of the two sets of rooms creates a very interesting tension in the square. This group of buildings was classified as heritage in 1950.

The fishermen called *Avieiros*, as they were originally from Praia de Vieira (in Leiria), used to migrate to the riverbanks looking for less strenuous fishing conditions in the coastal areas during the winter months. As river fishing was similar to their traditional livelihood, this community moved to the banks of Tagus and Sado rivers (Moreira 1987). During the migration period, the Avieiros generally lived in very poor conditions, either in their boats or in precarious constructions made out of the local available material, such as reeds and branches (Palla and Gaspar 2015).

This population settled in the banks of the Tagus river, from Alhandra to Santarém, organized in stable communities that lived on fishing shad (fish that, like the salmon, used to migrate to rivers to spawn).

Initially the Avieiros lived in their boats on the riverbanks. Later looking for better conditions, the Avieiros built permanent palaphytic villages (Fig. 4.18), mostly in the higher sites of the riverbanks, protected from the regular floods of the Tagus river (Fig. 4.19). These spaces served as a storage place for fishing gear as well as improved shelter for the family than the boats (sometimes only the children lived there).

Today these palaphitic constructions and settlements are threatened by abandonment as younger generations tend to migrate looking for jobs in nearby cities, as the fishing activity is declining due to depleted fish stocks. Moreover the wood buildings do not provide living conditions according to modern standards.

Fig. 4.18 House in Avieira's village of Palhota

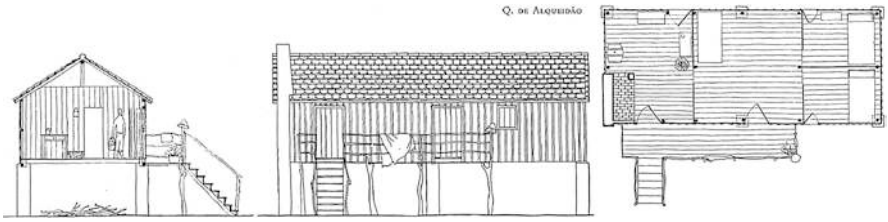

Fig. 4.19 Typical palaphitic house in the Tejo river (source: AAP 1961)

Inland Alentejo

Although the Alentejo region is usually addressed as having a very homogeneous building culture, a more thorough look can expose a rich and diverse architectural heritage.

The inland Alentejo is usually classified as a southern Mediterranean region, with hot and dry climate half a year. Despite the cold winter and mild autumn, the low precipitation is a strong feature, contrasting with the littoral region where the influence of the Atlantic Ocean attenuates the temperature swing. The relief presents a distinctive smooth and undulating configuration, in a dynamic combination of wide valleys and low plateaus. The traditional forest called Montado includes three species: cork trees, holm oaks, and olive trees. Silviculture provides complementary income for both farmers and shepherds.

The settlements of Alentejo are the most disperse and less dense of the country, and its population is decreasing and aging. The economy of the region is based on extensive cultures of cereal, a legacy historically attributed to the roman presence in the Iberian Peninsula. The twentieth century national policies accentuated the monoculture regime, forcing the optimization of the dry-land farming and establishing

Alentejo as the "granary of Portugal." Therefore, the landscape is divided in large properties, speckled with dispersed small settlements and isolated rural units, called Montes, also known as "Inland meridional" settlements (Ribeiro 1963). A high percentage of land has thin, poor, and rocky soil, thus not productive. The Alentejo inland subsoil is mainly composed of no crystalline schist, with specific areas where marbles, granites, and limestone can be found.

Despite the availability of many materials, until the middle of the twentieth century, the dominant building technique was rammed earth (Correia 2007). The vast use of this technique by the communities with less economic resources helps us understand its strong presence in rural houses conditioning most of the vernacular typologies of Alentejo's inland.

The architecture is based on structural façades of load bearing earth walls. The material determines a rectangular shape of the floor plan and limits the height of the walls as well as the number and size of its openings. Due to the structural limitations of the material and the historical record of seismic occurrences (of low intensity) it is rather usual the integration of several structural reinforcement elements like buttresses, relieving arches, stone benches, and tie rods in the traditional solutions (Correia and Carlos 2015). The Alentejo traditional architecture can also resort to adobe, fired brick, or stone masonry (usually schist or granite), but all of these techniques are commonly used as complementary to the rammed earth construction system or applied as principal material in rather particular places and circumstances.

Lime, wood, reed, and woodwaxen constitute the most common transversal elements of the vernacular typologies applied in cladding and finishing solutions. These materials provided a protective coating and coverage against weathering, for indoor spaces and for the main building components, constituting a rather light solution that does not compromise the building structural performance. The external lime wash painting, made of several layers, constitutes another distinctive aspect of the region's traditional architecture. This solution is not only fundamental for protection of the rammed earth walls, from natural erosion, but also contributed to minimize the thermal inertia of the exposed facades in summertime. The most simple, and therefore common, roofing system relies on the transversal support of wood beams, of circle section, placed directly under the pitched roof. Additionally one can find the vaulted ceiling, considered one of the most interesting solutions of the Alentejo traditional construction. It is made of bricks (abobadilha) and according to the national survey, this solution expresses the high expertise of the Alentejo's masons as these low vaults were made without using a cymbal, relying entirely on the quality of the used lime mortar and the technical skill of the worker.

As easily inferred, most of the identified vernacular typologies of the Alentejo inland are related to farming activities. The rural complex, the "Monte," constitutes the most common example, where one can find both the residential building, and agricultural and/or livestock-related constructions. The more elaborated Montes present a central enclosed space. This space called patio usually results from the placing of linear sections of walls, connecting the different buildings of the complex. Besides the one-story house, there is a barn, a cow shelter, and a pig shelter as the most common complementing buildings. The collective bread oven was an

Fig. 4.20 Monte da Boleja (credit: Gilberto Carlos)

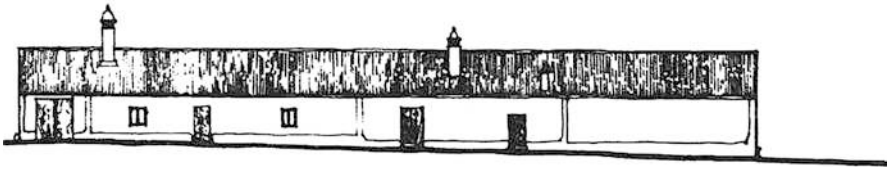

Fig. 4.21 Monte da Boleja front elevation (credit: AAP 1961)

important addition to the domestic life. It is very frequent to find this element attached to the end of the main building or even detached but close by, covered by a dome. Besides the different types of openings, all of the aforementioned complementary buildings used the building technology of the main construction.

As it can be observed in the following example (Figs. 4.20 and 4.21), located in the Baleizão, the rural traditional house is usually structured with a single volume of low and horizontal expression. The kitchen constitutes the central space, where the entrance is placed, and also functions as a living room. The small bedrooms, the "alcovas," are directly connected to this space. In the lower inner land area, rammed earth is combined with schist elements, namely in the execution of the buttresses, reinforced corners, and in the framing elements of the openings.

The *house of Monte da Boleja*, located in Baleizão, is composed of a single ground floor. It has 60 cm deep rammed walls, on the top of a shallow foundation of schist. It integrates several and different big buttresses, made of schist masonry, except in the front façade, where most of the openings are located. The front façade is exposed to north-east in order to avoid the most aggressive sun exposure. The plastered facades are carefully lime washed, contrasting with the traditional blue color of the wainscot of the wall, the soco, and the openings shutters, the postigos. The application of strong colors like green and yellow on this region, circumscribed to the mentioned transition elements, is usually related with the original intention to repel the insects. The inside partitions are executed in fire brick masonry. The pitched roof, with a slight inclination, is directly supported by simple round wood

Fig. 4.22 Reguengos de Monsaraz (credit: Gilberto Carlos)

beams and is covered by traditional "canal" tiles. In this case the pavement is covered with thin square mosaic brick, the local "baldosa," but in many buildings the floor could be simply made of compacted earth and the areas of more intense use could resort to river pebbles. The tall and thick chimney, intersecting the roof, acquires a significant expression, reflecting the importance of the kitchen, but not as much as in the houses located inside the compact settlements.

The second example represents the Alentejo's townhouse in *Monsaraz* (Fig. 4.22), typically urban defined by more compact structures. In this particular dwelling the construction is developed in two floors, although one-story houses are also common. The building is more compact, and the inside partition presents a less regular matrix. Although plastered and lime washed rammed earth continues to be the prevailing construction system, in these examples, granite, schist, and fired brick masonry are also common. In all the examples studied, the lime mortar is a determinant element (Fig. 4.23).

The coverage system resembles very much the previous example, but here the channeling of the rain water plays an important role. Here some of the pitched roofs combined the gutters and eaves conducting rainwater to an underground cistern, shared by the locals. The support of the higher level floor is provided by simple wood beams, but in most of these cases, they are combined with stone arches (or vaulted ceilings), centrally placed in the lower divisions, thus helping bearing the added weight. The lower floor usually contains two divisions of collective use. The entrance leads directly to the kitchen. The upper stairs divide the kitchen from the rear living room from which one can usually access a small patio with some small

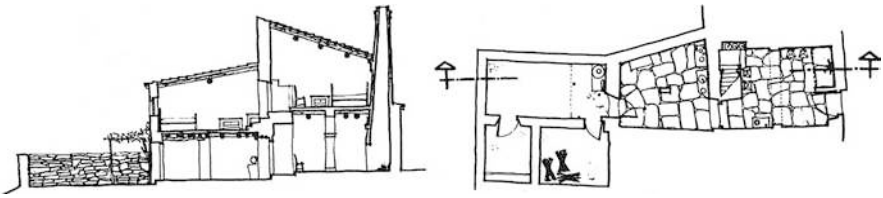

Fig. 4.23 Reguengos de Monsaraz: floor plan and section (AAP 1961)

storage or animal shelter. The upper floor contains bedrooms on opposite sides, articulated through the stairs, with openings to the street and to the rear patio, respectively. It is frequent to use vineyard trellis as a coverage solution for the transition areas with the exterior. Due to its abundance in the region, most of the ground pavements are covered with schist slabs. The chimney acquires a relevant position, tall and thick, emerging as an outgoing element, extending from the street facade over the roof lines.

Coastal Alentejo, Lower Alentejo, and Algarve

The so-called zone 6 which is larger than the others (cf. Fig. 4.1) is comprised of the entire region of the Algarve, Alentejo coastside (from the river Sado to the Algarve), and a portion of Lower Alentejo that borders the Algarve. Furthermore the national survey team divided the province of the Algarve into three distinct zones because they understood that these had characteristics of settlement, and economy differentiated in addition to differences in the building materials.

These 3 zones are the lower Algarve, the Barrocal or Algarve (where limestone is abundant), and the Higher Algarve with its mountain area. This natural division also results from topography and geology in three zones which are still easily identifiable today by the different types of settlement, geographical, and architectural features, and more recently by different economic development levels.

The south of Portugal presents unitary characteristics in traditional construction, linked to clay and lime, possibly as a result of its Roman past when it was integrated in Lusitânia and Moçárabe land as part of the Al-garb Andaluz kingdom, with small variations in each region.

The Alentejo coast and the southern zone of the lower Alentejo present an architecture close to the one existing inland, which is characterized mostly by buildings in simple construction with earth walls not very high, may have buttresses, and pitched roofs with reduced slope covered with tiles. This configuration and the construction materials used resulted in an architecture inserted in the landscape that often stands out only for the high and generally large chimney in the Alentejo.

The simple spatial division was mostly characterized by a large central space with fire where all the functions of domestic life—eating, living, and sleeping—were performed, according to Ramos (2010); this characteristic was quite common

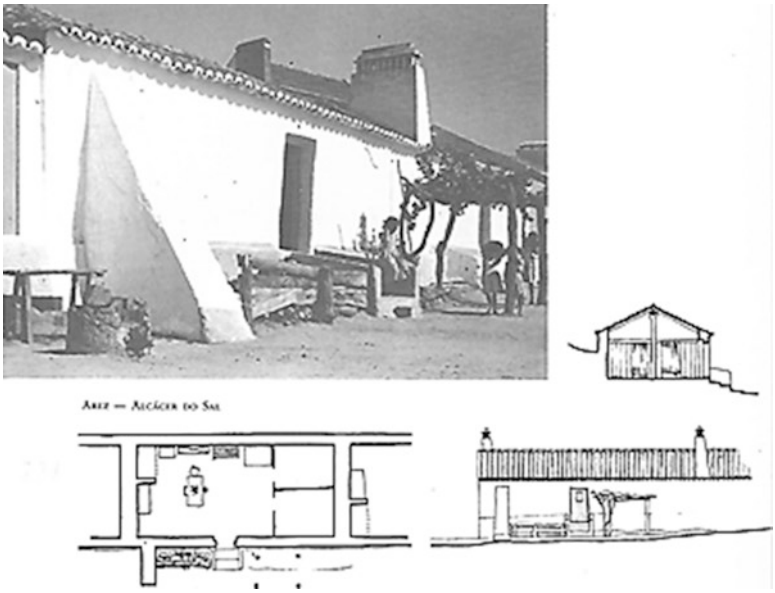

Fig. 4.24 House in Arez, Alcaçer do Sal (AAP 1961)

in the oldest rural dwellings: "The rural house of popular origin can present a simple organization, usually based on a single compartment, and may have light partitions that protect the sleeping place" (Ramos 2010).

The town houses, in the rice fields of the Sado Valley for example, are referred to in the survey as single room dwellings with a fireplace, with wood partition walls in sleeping zones that appear to be of later construction (Fig. 4.24).

These low-wall dwellings with buttresses are also notable for their large chimneys perpendicular to the façade and the fact that there is no other type of opening beyond the entrance door. This open door and high chimney ensured the necessary cross-ventilation for the single central space. In the survey that Mariana Correia made on the "taipa" dwellings in Alentejo, these were located in the same zone of *Alcácer do Sal*, and with the same characteristics (inquiry 35 and 37): houses with a central rectangular space, with fireplaces, and few windows. Some of these windows according to direct testimony were later opened. This simplicity in the typology of housing in the river Sado valley is referred to in the survey as "a synthesis of man's minimum needs" (AAP 1961) (Fig. 4.25).

Also near Alcácer do Sal but in the sandy areas near the *Comporta* beach, we can find the houses of fishermen with completely different constructive characteristics. These are constructions with a wooden structure of reduced section, as much in the walls as in the finishings that are filled by two layers of stem and topped in the walls by horizontal boards generally covered with clay (Fig. 4.26). The floors are made of rammed earth. The rectangular plants sometimes had two or more bedrooms with a living room in the center that might have a fireplace. In some cases, a dwelling

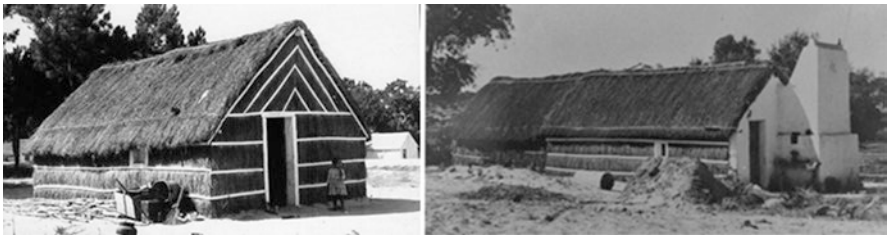

Fig. 4.25 Houses in Carrasqueira, Alcaçer do Sal (source: AAP 1961)

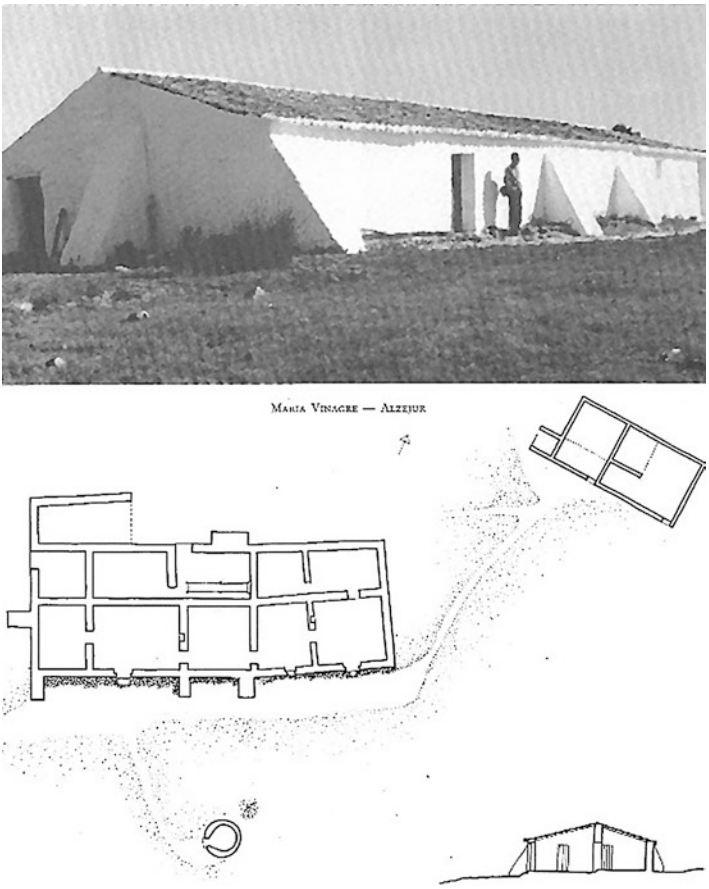

Fig. 4.26 House in Arez, Alcaçer do Sal (AAP 1961)

consisting of two huts may be found, one with a fire hut, in order to isolate the flammable fireplace from the rest of the house.

Algarve—Team 6 has conducted in a very detailed study of the area of the Algarve: addressed the urban structure, housing types, and construction materials used, and, unlike other chapters, also the relationship between climate and architecture. The natural division of the Algarve into three regions, as already mentioned, also corresponds to different types of architectures and construction materials. While in the lower Algarve the use of clay is the most frequent, in the mountainous areas it is the stone masonry, varying according to the region. In the barrocal or limestone Algarve, the stone masonry of the region is the most used building material.

The dwellings of the lower Algarve have characteristics close to the Alentejo houses: low walls with two-story roofs, but usually have a more quadrangular plan and are less extensive than most Alentejo houses. Another distinguishing characteristic is the small chimneys if we compare with the Alentejo and with a network with decorative elements for the extraction of the fumes. The plants of the interior, more subdivided than in the Alentejo dwellings, have the kitchen separated from the reception area outside. Compartments dedicated to animals or agricultural stowage appear next to the dwelling or in the same set.

In the dwellings of the places closer to the Alentejo such as in the *house of Maria Vinagre* in the Aljezur area, these differences are diluted. This house was one of the models raised in the survey, as it is an interesting rare example in the Algarve architecture. Its plant has a master wall in the longitudinal direction, which divides the zone of the residential space in the south of the space for animals and storage in the north (Fig. 4.26). This example is also notable for containing "Moirões" (buttresses) rare in the region of the Algarve as in (Fernandes and Janeiro 2008), who also refers this house in his work on popular Algarve architecture: "it would be very important to safeguard what remains of this authentic relic of Portuguese vernacular architecture—a rare and beautiful vestige of the use of the "moirão" in the construction of rural Algarve.

In the housing of "*quarto estradas*" for example, also referenced in the survey, enclosures for animals are located next to the house hidden by the terrain slope (Fig. 4.27). This house is a very interesting example of this type of architecture because it has three volumes of different finishes but with a common layout which suggests different times of construction. Outside the building in front of it, a living space spreads a terrace flanked by benches and small whitewashed walls topped by a grapevine that allows the shade in summer days. These walls, which extend the ground floor creating terraces next to the houses as a form of appropriation of the landscape, sometimes include a cistern or a tank, a popular feature in the Algarve, though conversational benches along the exterior walls are typical in different regions of Alentejo.

In central Algarve, the most remarkable example and also the most known is one that articulates a volume with a slanted coverage of one single roof with another covered by a roof terrace (açoteia). This one, which generally is oriented to the street, is topped by a parapet, almost always with decoration, serving as a balcony on the roof, very characteristic in this region. These houses may be isolated or

Fig. 4.27 House in Quatro estradas, Lagos (AAP 1961)

clustered. The survey finds this type of housing in settlements between Porches and Tavira, but mainly in the "barrocal" area. In his thesis "Algarve Buildings" Agarez (2013) disassembles the possibility of this type of parament (Fig. 4.28) being genuinely vernacular, dating back to the nineteenth century. Existing originally only in terraces for users' protection, it began to be used in all types of roofs from 1872, when a law enforced drainage in pitched roofs to avoid run off in public spaces. The spatial organization of these houses is very similar to the lower Algarve, with a square plan in rural houses and while urban homes feature a deep rectangular shape with the smaller side towards the street (Fig. 4.29).

We should also refer to the urban housing group of *Olhão and Fuzeta*. These are town houses of fishermen with long rectangular plants with "patios" in the back. In the case of Fuzeta these "patios" are the ceiling of a lower floor, possibly due to the topography of the terrain. In Olhão the typical building is usually a story high. In both cases the dwellings have flat roofs or açoteias, accessible by a ladder outside.

The origin of these terraced houses is questioned by zone 6 authors in the survey, citing António Sérgio, as he claims it to be the result of a recent Northern Morocco influence (nineteenth century), due to permanent contacts between the populations of these two regions and across the Atlantic. Another hypothesis would be this type of roof deriving from the weather, as local climate differs from others with clear distinguishable architectural patterns. Also Ricardo Agarez raises the issue of the origin of açoteias in Olhão and its relationship with Morocco, citing Leite de Vasconcelos. This author presents another reason besides the direct relationship between the population of these towns and the north of Morocco but adds up that examples of these styles in other locations in the Central Algarve, like Estoi, Moncarapacho, or Tavira, would justify this theory itself.

Finally, the houses of the *"Caldeirão" mountain and the "Guadiana" valley*, both with very simple volume and plant with a single-pitch tiled roof. This roof that accompanies the slope of the terrain is sometimes creating gaps inside the housing, in cases where they are implanted in accentuated slopes. With very simplified plant and sometimes just with the door as the only opening, these stone

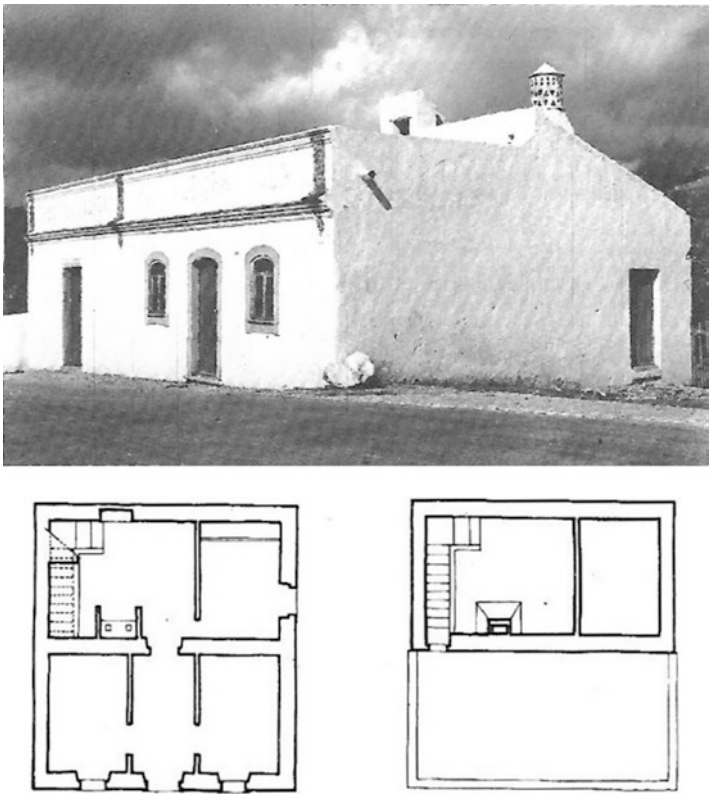

Fig. 4.28 House in Fonte do Bispo, Tavira (AAP 1961)

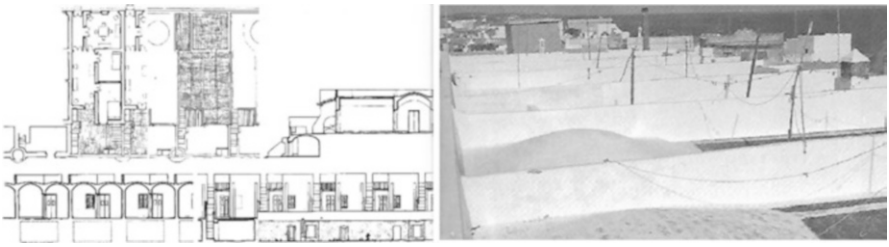

Fig. 4.29 Row houses in Fuzeta, Olhão—plans, sections, elevation, and "Açoteias" (AAP 1961)

houses feature an outdoor fireplace to cook in the summer and for heating the interior of the houses during winter. Smoke naturally through flows through the tiles in these constructions with no chimney (Fig. 4.30). In the national survey of regional architecture several examples portray this type of rural house but always isolated dwellings. However in a thorough study about mountain houses of these two regions, conducted by Costa (2014), most of the cases studied are clusters of

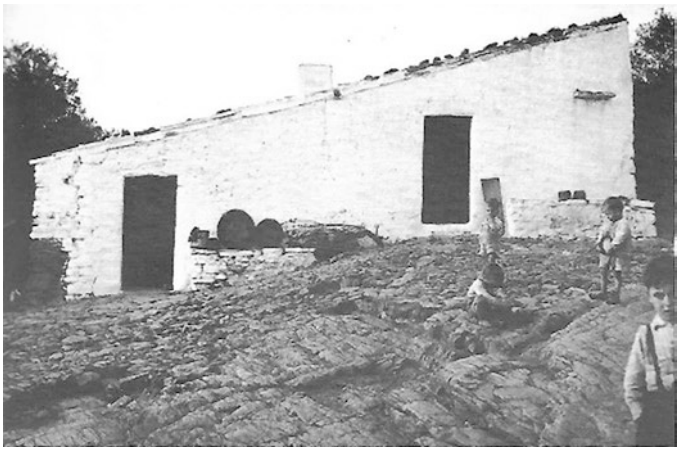

Fig. 4.30 Houses in Alcoutim—plan and section (AAP 1961)

dwellings or dwellings grouped with facilities for animals and agricultural support. Some of these provided a community life (Milheiro 2012).

In the area of the river "Guadiana" the "montes" were a cell junction, some are housing, some with farm use, and some with dual function. The system of these villages was a living system that was going to engage new cells when it was necessary, creating an organic system quite adapted to the terrain. In "Beliche de Cima" (Fig. 4.31) for example there are several single clusters of houses, but every construction of these can have one or more cells for homes, and in some cases a family could dwell in a cell of a building, but having the agricultural compartments in another building.

Architecture and Climate To conclude this reflection about the Algarve, it must be stated that the zone 6 team—coast and far southern Alentejo and Algarve—have a section dedicated to the climate and its interaction with the Architecture, relating design with thermal performance in Summer and Winter.

In this chapter the architects of the Team 6 made a geographic characterization of the region, with large areas of south-oriented slopes favoring both the settlement of villages as single housing. Maps of the region's temperature variations and precipitation are presented.

Various architectural aspects are pointed in the studied cases to improve the climate-comfort issues: the privileged South orientation; the protection from the Atlantic winds; the fixed shading (balconies, porches, terraces, etc.). As says João Santa-Rita "In Algarve, preferring the southern Quadrant for their house and creating heat transition spaces: courtyards, Porches, trellised vines, etc."

To the end, the team no. 6 shows several detailed examples of water collection systems, through the sloped roofing and guttering systems that guide the water to cisterns or tanks – a way of storing rainwater in regions where it is rare in Summer. "In the short terms one can say, like the Algarve team, that the entire elements put all together set—the most perfect conditions of living and using" (Santa Rita 2012).

Vernacular Revival

The vernacular legacy has been largely forgotten since the dawn of the "Mechanical Era." To many, it was associated with poverty, lack of living conditions, and rural environments; instead, modern building techniques represented greater value and efficiency. Local references have become subdued by a mass culture, turning architecture into a "fast consumption" product (Sampaio 2009).

The need for a sustainable architecture arrived in Portugal in the last two decades. Teaching and research on bioclimatic design began in the turn to the twenty-first century—bringing with them a new interest on vernacular design.

Today, new generations of architects start (or restart) to perceive vernacular as a fundamental source of knowledge, bringing about a shift in architectural paradigms. Vernacular is no longer viewed as poor and inefficient—instead, it is a rich source of renewed inspiration, and vernacular buildings are very efficient. Efficiency is no longer a mere attempt to mimic mechanized uniform environments such as those

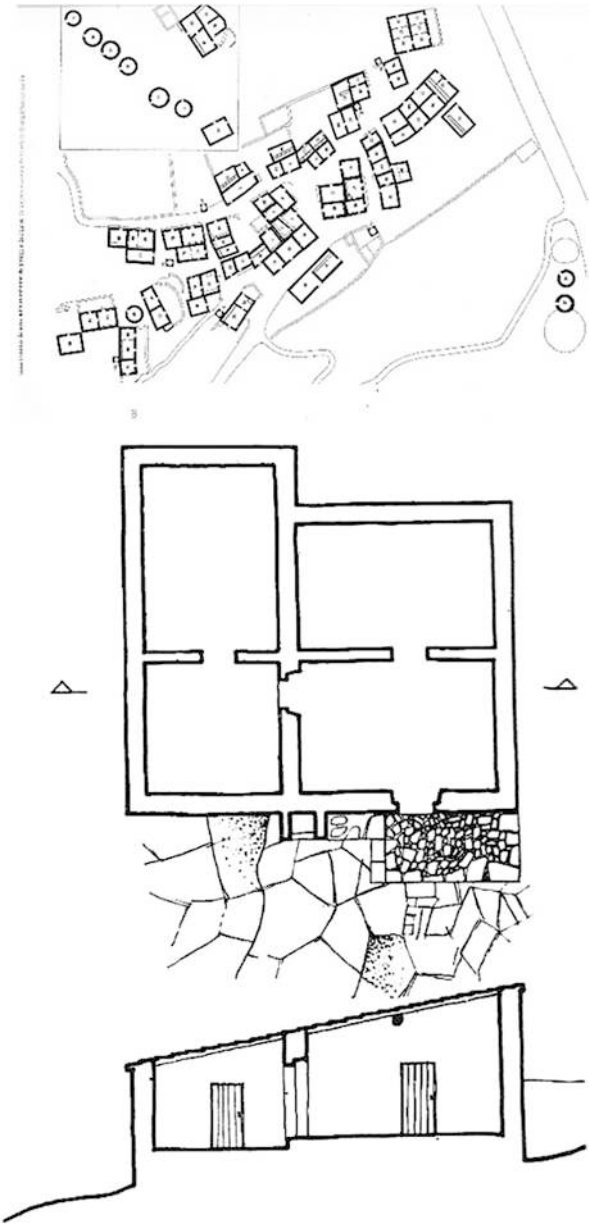

Fig. 4.31 Beliche de Cima, Tavira—plan (Migue Reimão Costa)

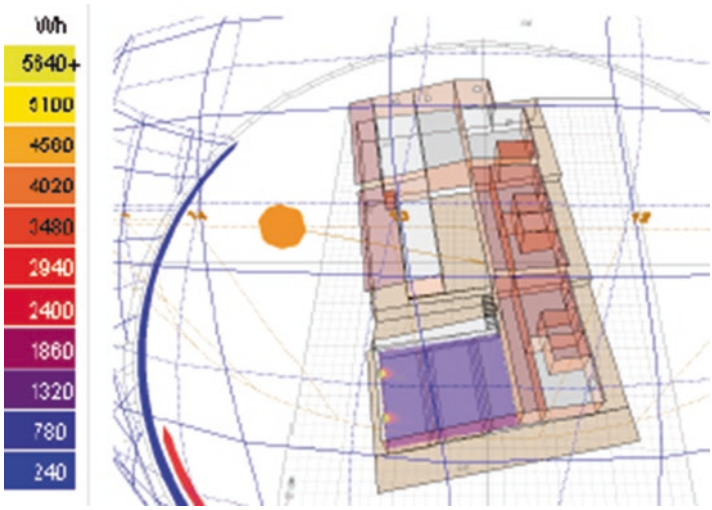

Fig. 4.32 The use of software to assess the environmental performance on a vernacular building in Alentejo (Serpa)

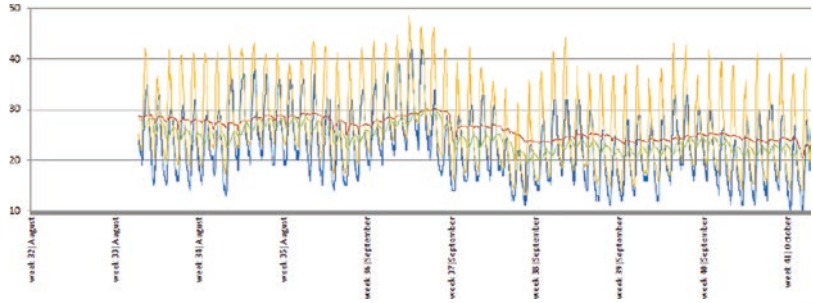

Fig. 4.33 Thermal performance of a vernacular building in Serpa (Alentejo), during the summer heatwave of 2016. Internal temperatures (brown line) are stable, within comfort limits and well below external temperatures (Távora 1947; Viana 1999)

produced by HVAC systems; instead it is the ability to provide natural, variable environments, such as in traditional buildings.

New software tools used by students of architecture show the ability of vernacular to produce comfortable thermal and lighting natural environments through its appropriate bioclimatic design (Fig. 4.32). Figure 4.33 shows the result of measurements made on a vernacular building in Alentejo, during a particularly hot heat wave in 2016: internal temperatures are stable and well below external temperatures, essentially due to thermal inertia.

Furthermore, rural villages across the country that have long been deserted due to migrations to urban areas are now being re-occupied by families that chose

eco-friendly, alternative, ways of life. New concepts, such as biological agriculture, are slowly contributing to the revival of the rural space, bringing about a new life to vernacular buildings. Contradicting centralization in mega cities, this movement is a step towards global sustainability and greater quality of life.

Conclusions

This chapter has provided an overview of the regional variations of vernacular architecture in Portugal, resultant from man's dialogue with the local natural context. Vernacular architecture is today slowly being perceived as a core reference for sustainable design and an essential part of Portugal's cultural heritage.

In a world challenged by social conflicts, global warming, and lack of harmony, vernacular stands as a beacon of hope and possibilities. There are clear signs of a renewed interest in rural space and vernacular revival; let us hope that this trend is here to stay.

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