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Importance of Self-built Temporary Spaces, Between Traditional and Transitory Architecture: The Saharawi Wilāyāt in the Algerian Desert

La importancia de los espacios temporales autoconstruidos entre la arquitectura tradicional y efímera: El Wilāyāt saharawi del desierto argelino

Importância dos espaços temporários auto-construídos, entre a arquitetura tradicional e a transitória: O Wilāyāt saharawi no deserto argelino

Keywords | Palabras clave | Palavras chave

Migrants, Refugee camps, Temporary settlements, Vernacular architecture, Algeria

Migrantes, Campos de refugiados, Asentamientos temporales, Arquitectura vernácula, Argelia

Migrantes, Campos de refugiados, Povoações temporárias, Arquitetura vernácula, Argélia

Abstract | Resumen | Resumo

In an increasingly complex world of climate-related crises, migrations, and forced displacements, the study of spontaneous and temporary self-built settlements in harsh habitats may be of value to the architectural debate. The analysis of the Saharawi camps in the Algerian desert presented here identifies recurrent typological patterns in both domestic and common spaces. The aim of this paper is to analyze these settlements as a structural form of habitation, framing them within the discourse of traditional architecture, while recognizing aspects of ephemerality and emergency provision. The method used was a spatial classification of housing units and settlements in order to identify recurring typological patterns. Our results demonstrate the presence of such patterns and show that, even in precarious and developing situations, principles of traditional architecture apply. By encouraging these practices, we may improve the living conditions of those inhabiting temporary contexts, while also favoring practices that are more sustainable for the environment.

En un mundo cada vez más complejo de crisis climáticas, migraciones y desplazamientos forzosos, el estudio de los asentamientos autoconstruidos, espontáneos y temporales en hábitats hostiles puede ser valioso para el debate arquitectónico. El análisis de los campamentos saharauis del desierto argelino presentado aquí identifica los modelos tipológicos recurrentes, tanto en los espacios domésticos como en los comunes. La finalidad de este artículo es analizar estos asentamientos como forma de alojamiento estructural, enmarcada en el discurso de la arquitectura tradicional, al tiempo

que se reconocen los aspectos efímeros y de solución de emergencia. El método utilizado fue el de la clasificación espacial de las unidades habitacionales y los asentamientos para identificar los modelos tipológicos recurrentes. Los resultados demuestran la presencia de dichos modelos y cómo, incluso en situaciones precarias y cambiantes, se aplican en ellos los principios de la arquitectura tradicional. Al fomentar estas prácticas, quizás podamos mejorar las condiciones de vida de quienes habitan asentamientos temporales, al tiempo que favorecer actividades más sostenibles para el medio ambiente.

Num mundo cada vez mais complexo de crises climáticas, migrações e deslocações forçadas, o estudo de povoações auto-construídas espontâneas e temporárias em ambientes hostis pode ser valioso para o debate arquitetónico. A análise dos acampamentos Saharais, no deserto Argelino aqui apresentado, identifica padrões tipológicos recorrentes tanto nos espaços domésticos como nos espaços comuns. O objetivo deste artigo é analisar estas povoações como uma forma estrutural de habitação, enquadrando-as no discurso da arquitetura tradicional, ao mesmo tempo que se reconhecem aspetos de efemeridade e de provisão de emergência. O método utilizado foi a classificação espacial das unidades habitacionais e das povoações, de modo a identificar padrões tipológicos recorrentes. Os nossos resultados demonstram a presença de tais padrões e mostram que, mesmo em situações precárias e de desenvolvimento, os princípios da arquitetura tradicional se aplicam. Ao encorajar estas práticas, podemos melhorar as condições de vida das pessoas que habitam contextos temporários, favorecendo ao mesmo tempo práticas mais sustentáveis para o ambiente.

Introduction

With the current perception of acceleration due to the rapidity with which information travels, human displacements and migrations have taken on more significance for those concerned with “organizing and shaping space” (De Carlo 2002). These displacements consist of stops and passages which leave marks on territories, transforming the landscape. Migrating populations adapt the landscape to their journeys, creating temporary migratory infrastructures: spontaneous settlements, planned refugee camps, or else walls and thoroughfares as enduring signs of these journeys. In this context, phenomena of self-building for temporary

habitation are so widespread that they take on significant dimensions, especially in Africa.

This paper seeks to address temporary constructions linked to displacement as a structural form of habitation rather than an emergency one, and to reflect on the phenomenon from a morphological, territorial, and architectural point of view. These settlements show complex, non-unique patterns of development in which traditional instances are combined with responses to new needs. Typological constants recurring in the construction of family and common spaces



Figure 1: *Wilāyah* of Smara, *hammada* of Tindouf, in the Algerian desert (2022)

may be seen as being generated by a wise use of the scarce resources available (Fig. 1).

Our aim is to consider settlements in the context of migration and displacement not only as sites of desperate improvisation but as places where one may encounter significant ancient architectural and settlement traditions, suited to harsh environments and a resource-poor existence. These embodiments can offer valuable lessons to architects and urban planners working in today's complex world.

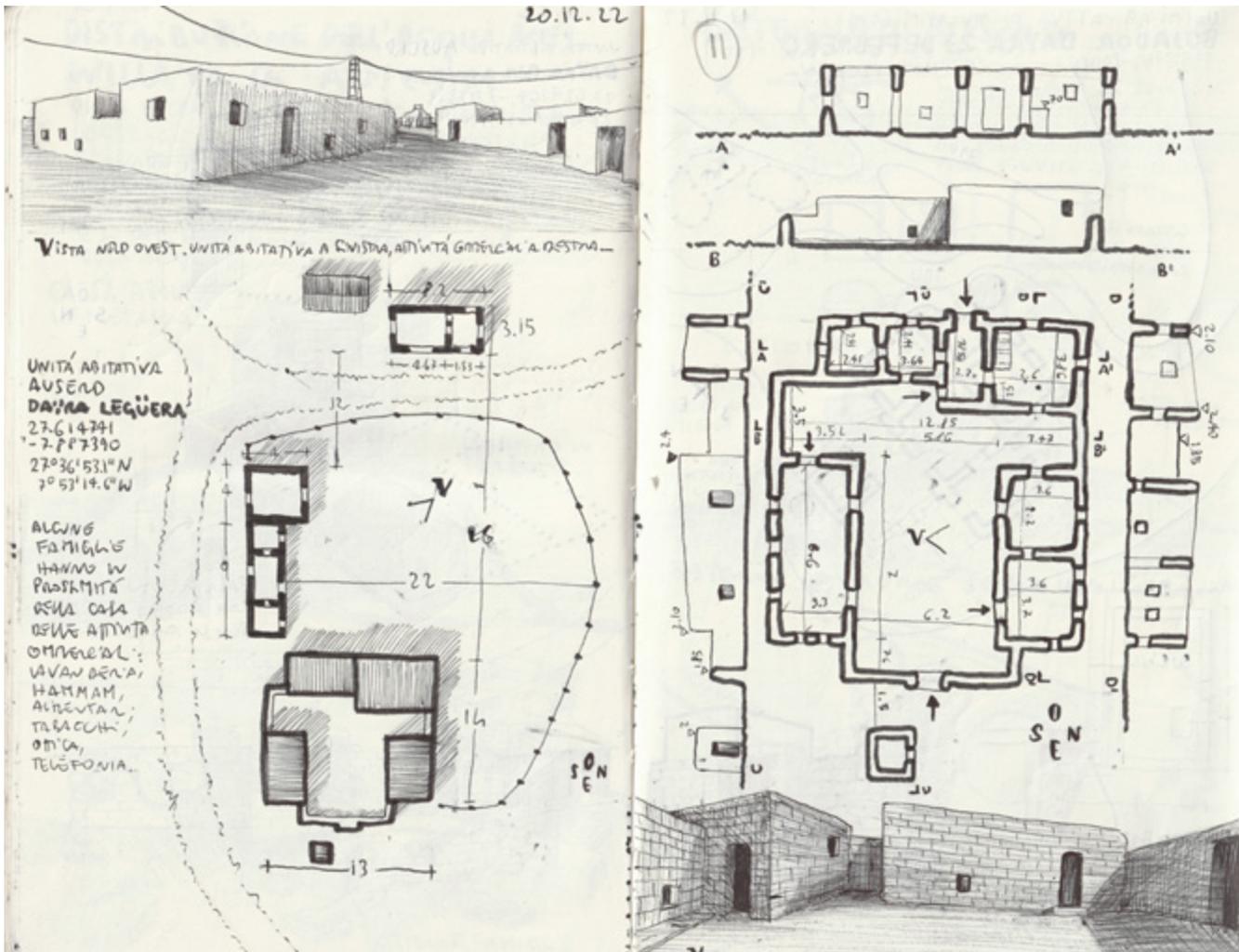
A case study of the experience of the Saharawi refugee camps in the *hammada* desert flatlands of Tindouf in the Algerian Sahara will be taken as an example. Since 1976, due to unresolved geopolitical conflict, these people have had to move away from their homeland, adjusting their nomadic or semi-nomadic way of life as they have been driven into refugee status. They have built their own temporary settlements, creating a remarkable model of self-management and participation in civic and political life, while applying the traditional spatial development processes of their desert-dwelling culture.

Methodology and Objectives

These places are significant from an architectural and planning perspective in that temporary settlement is a necessary form of adaptation to circumstances, such as climatic, economic, and political factors. Our hypothesis is that in them we may find traditional spatial solutions linked to the scarcity and simplicity of the materials used. These solutions respond effectively to the needs they address, and with economy of means they show an ability to adapt to a harsh environment.

In these transitory settlements generated in emergency conditions, recurring characteristics may be identified in housing solutions, and their development processes and strategies reconstructed. Our method is based on the study of architectural typology and urban morphology, and can also be applied to analyzing temporary settlements with discernible permanent cultural aspects. These manifest themselves in spatial solutions which can be studied regardless of the precarious conditions.

Figure 2: Notes, drawings and architectural surveys made during a visit to the Saharawi refugee camps in the Algerian desert (2022)



Methodologically, a spatial classification of the housing units and settlement model can be used to reconstruct the logical process that generated them with an interdisciplinary approach also allowing us to apprehend the intrinsic relationships between the environment and habitational strategies. Our case study reflects significant factors in the context of migrations and the climate crisis in Africa, which is to face major social, economic, and environmental challenges in the coming years (Fig. 2).

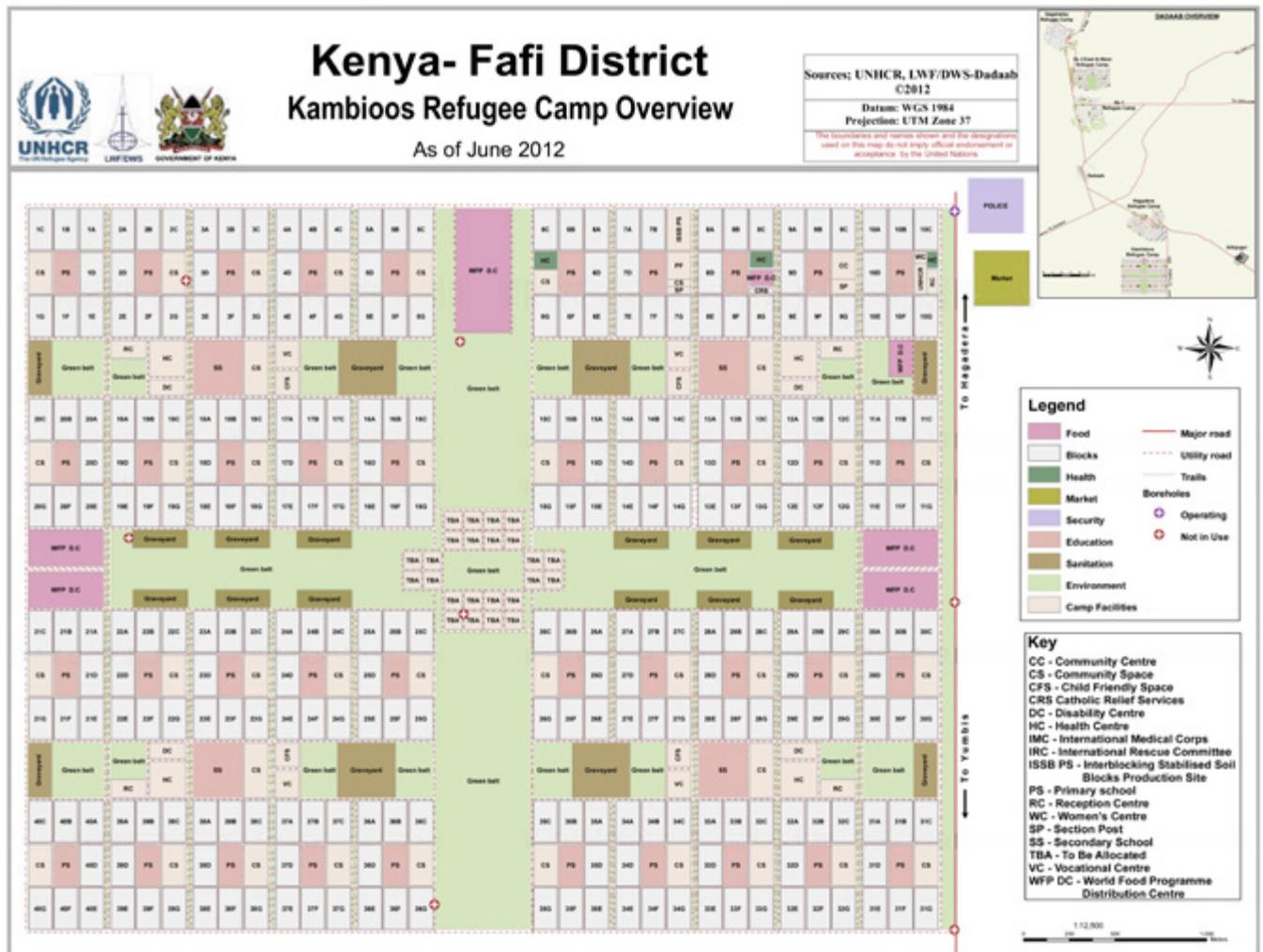
This contribution, part of a doctorate in progress on architectural composition, is the product of research in libraries and archives supported by interviews and visits to the Drâa valley (September 2022) and the *hammada* of Tindouf (December 2022). Many drawings and surveys were produced, some of which are included. Drawing buildings and urban spaces allows us to better describe such sites and to understand their transformations, thereby tracing their logical construction process.

Migration, Planned Camps and Self-Built Habitats

Migration has always offered opportunities to humans leaving their place of origin to settle, albeit temporarily, in other places with better living conditions. Today, for many migrants¹ the journey is so long that migration often lasts for years, with perpetual displacements and temporary sojourns in a constant search for favorable, or at least bearable, living conditions.

In the past decade the number of people forced to leave their homes has increased greatly due to protracted conflicts, climate change, and environmental degradation, and many are forced to move again and again (UNHCR 2020). The UN Department of Economic and Social Affairs has estimated that, between now and 2050, half of the global population increase will be due to nine countries alone: in descending order of growth, India, Nigeria, Pakistan, Democratic Republic of Congo, Ethiopia, Tanzania, Indonesia, Egypt, and the USA (UN 2019). In particular, the 1.4 billion Africans are likely to double in number by

Figure 3: Functional plan of Kambioos Refugee Camp, Fafi District, Kenya, June 2012 (UNHCR)



2050, and more than 80% of this increase will occur in cities, particularly slums (Muggah and Hill 2018). Africa will face enormous challenges, with unprecedented climate stress². These trends across Africa will result in increased migration from rural areas to cities, from one country to another³, and from that continent to others, mainly Europe.

These movements and the large-scale constructions resulting directly or indirectly therefrom have changed, albeit temporarily, the topography of landscapes at regional level. Unplanned buildings, shelters, fences, and camps occupy and leave their mark on the land in a state of constant ongoing emergency. As mentioned, our aim is to address the phenomenon of self-built temporary habitation, so planned camps will be discussed only briefly.

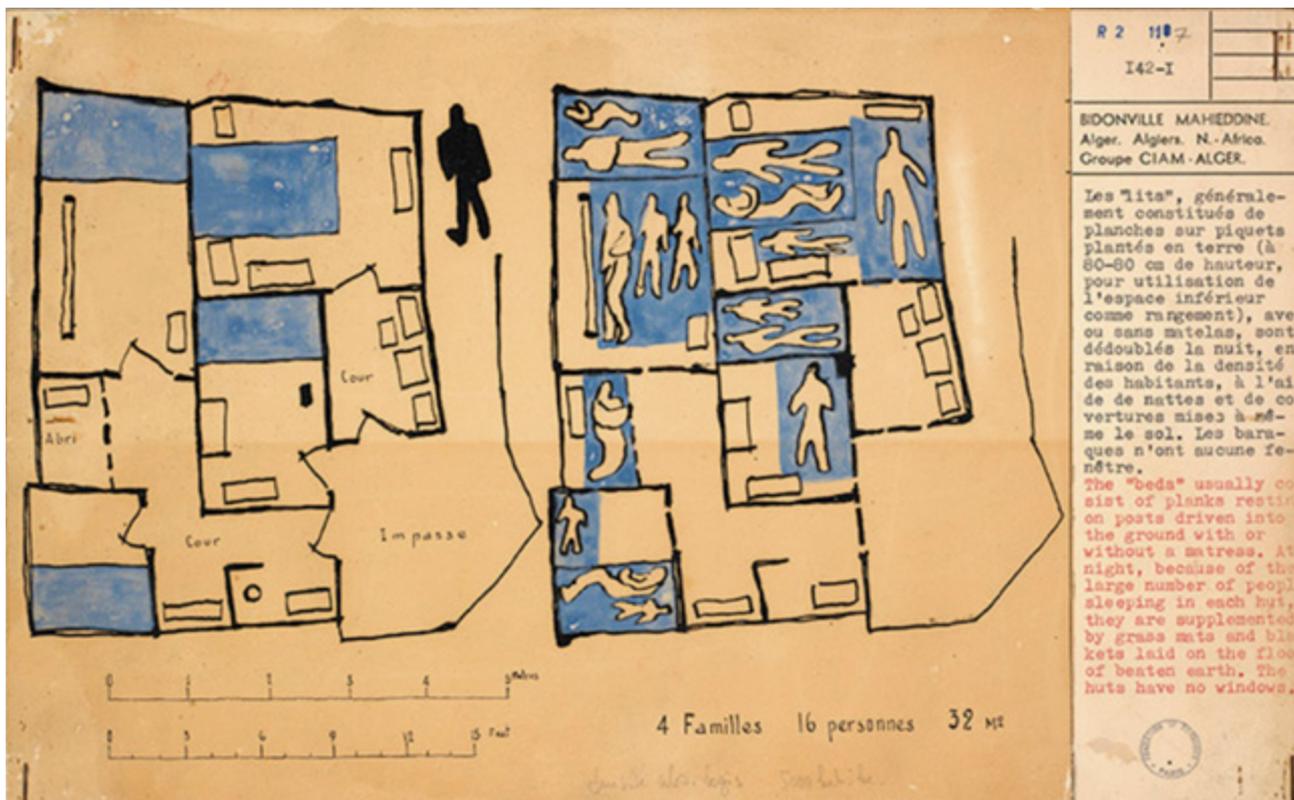
No one knows exactly how many displaced-person camps there are in Africa and around the world. In 2012, 700 were officially identified, but there are hundreds more that escape counting (Rufini 2015). Most refugees are from the African Great Lakes region and the Horn of Africa and live in camps in the DRC, Sudan, Uganda, Somalia and, to a lesser extent, Algeria, the Ivory Coast, Chad, Kenya, Ethiopia, and South Africa. African migration destinations are mainly South Africa and the Maghreb.

Some camps are a temporary home to more than 100,000 people. Among the largest is the Dadaab complex in Kenya, which hosts over 400,000 Somali refugees (rising

to almost 600,000 during the 2011 drought). Other large camps are Dollo Ado in Ethiopia, with 200,000 Somalis, Kakuma, also in Kenya, with over 120,000 refugees from Sudan and Somalia, and Breidjing in Chad, with 250,000 refugees from Darfur.

The planned emergency settlement is conceived, through functionalist aggregations, as an integration of systems including layout, circulation, administration, sanitation, housing, water, lighting, recreation, organization of people, food distribution, waste disposal, storage, and camp access⁴. In these places in which multiple individualities coexist without stability, the quantitative and functional logic is evident (Fig. 3). It is applied to build camps according to a calculation of the minimum daily requirements of each displaced person. As De Carlo says of the *Existenzminimum* concept, "people want the maximum and not the minimum" (De Carlo 1970). However, when migrants remain in a camp initially designed as a temporary settlement and organized by external entities⁵ for a prolonged period, spatial transformations take place leading to the use of interstitial spaces and the formation of common or family spaces recalling displaced persons' former living habits. These transformations occur as a result of the need for self-organization. In these separate and often fenced-off places, life is suspended in the present, and inhabitants are forced into survival individualism, into a spatial container for those who "have no right to have rights" (Arendt 1951).

Figure 4: CIAM-Algiers Architects, La Mahieddine shantytown (day/night plan), c. 1953, Algeri (Fondation Le Corbusier/ARS)



In 1968 John Turner, referring to the shacks he had seen on the outskirts of Lima, Istanbul, or Kinshasa, commented that “these small, tottering structures changed from season to season and from year to year, adapting to different circumstances and expressing the lives and livelihoods of the residents within” (Turner 1968). Such settlements are hard to control but highly resourceful, and their self-building processes, in addition to meeting immediate needs, reveal striking cultural aspects.

Between Vernacular and Transitory Settlements

Worldwide, according to estimates by Amos Rapoport in 1995, vernacular architecture constitutes 95% of the built environment. Even today, self-built settlements and “architecture without architects” remain dominant, serving immediate, local needs and constrained by the materials available nearby. Such architectures reflecting local traditions and cultural practices are integrated into their environment. These aspects appear even in ephemeral contexts, such as camps for displaced people. J. B. Jackson in his 1984 book *Discovering the Vernacular Landscape* referred to what he called a “third landscape”, an ever-changing, temporary landscape responding to specific needs.

During the CIAM IX conference in 1953 in Aix-en-Provence, Le Corbusier’s grid, which had been presented in 1946 as a matrix of categories for the design of the future – of standardized universal cities – was reinterpreted by the ATBAT-Africa⁶ and GAMMA⁷ groups, who believed that only by starting from the everyday customs of rural populations could a new habitat be conceived. Attention was thus focused on a completely different urban environment from those considered hitherto, namely *bidonville* shantytowns, with case studies such as the *Carrières Centrales*⁸ slum in the Hay Mohammadi in Casablanca and *La Mahieddine*⁹ in Algiers (Fig. 4).

This approach was a new departure in which the slum was considered not only as a site of symbolic social struggles but also spatially, and as a meeting point between the traditional culture embodied by the customs of those moving to the growing cities and modernity. Notable examples were the reflections of Candilis and Woods on Moroccan slums. In this context, the architects recognized the traditional courtyard typology of villages in the Atlas mountains, integrated with the dense urban fabric of the new cities. These reflections also constituted a great step forward in overcoming the orientalist approach of many European and North American architects, with worthy exceptions¹⁰, who looked to traditional African architecture in the hope of finding solutions to modern problems.

The Western viewpoint also prevailed when Le Corbusier worked from 1931 to 1942 on the Algiers Plan, as he attempted to find a universal urbanistic solution through connections

between the European and other worlds. Although he was enthusiastic about the spatial relations and urban plots of the *kasbah* and its relationship with the landscape and the coast, he imagined that the future urbanism was possible only through a grafting of Western Modern architecture onto the Algerian reality. These reflections raise questions about architectural practice and its disciplinary roots, and lead us to consider the transfer of traditional cultural practices to spontaneous and transitory habitats.

Who are the Saharawi? Exile, Social Structure, and Their Manifestation in Desert Dwelling

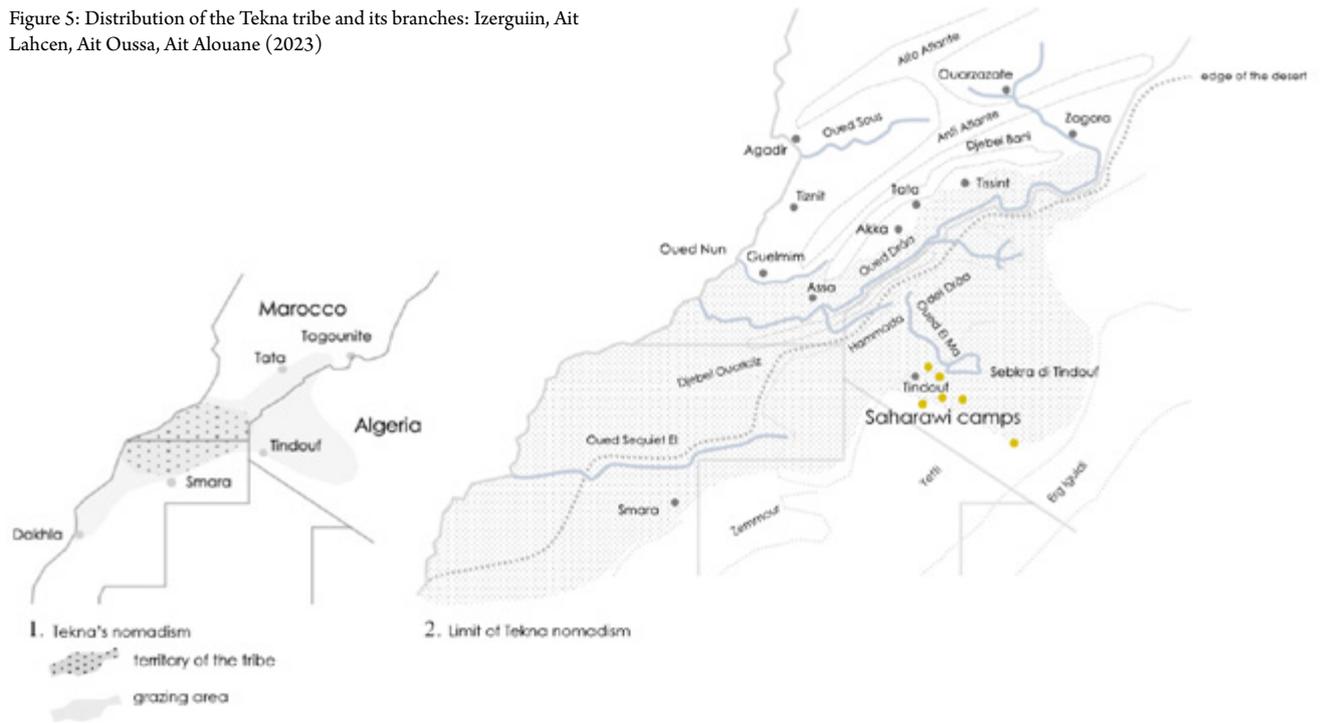
In this setting of climate crisis, migration, and emergency settlements created as temporary habitats, there is the specific case of exile in Algeria and the camps of the Saharawi, which, as noted by the anthropologist Alice Wilson, are somewhere between refugee camps and nomadic encampments (2014).

Among the last acts of Europe’s decolonization of Africa, in late 1975, Spain withdrew from its Western Sahara territory, allowing its takeover by Morocco¹¹ and Mauritania. To escape the invasion, thousands converged on the Oum Dreyga, Tifariti, and other camps in the central Spanish Sahara before heading for the Tindouf region of Algeria after the Moroccan air force bombardment of February 1976¹² (Martín Beristain 2016: 17-28). Near the town of Tindouf in one of the most inhospitable parts of the Sahara, on the *hammada* plateau (about 500 m asl), the Algerian government has since 1976 allowed the fleeing Saharawi to establish, build, and self-manage the camps where most of them still live today (Loewenberg 2005). The Saharawi, accustomed to the desert, organized the building process and founded self-administered proto-urban spaces.

There is now a vast literature on the Saharawi struggles against Moroccan occupation in political terms (Mundy 2007) and from a counter-historical perspective (see, among others, Gimeno Martín and Robles Picón 2015). Several anthropologists have studied the identity and cultural transformation of Saharawi society through exile and revolution (see, among others, Caratini 2003; Gimeno Martín 2007; and Isidoros 2018), and there are meticulous urban and spatial analyses of camp settlement (Herz 2013).

These forms of habitation may be basic and akin to others elsewhere, but with their peculiar conditions of temporariness, climatic harshness, and physical isolation, they show a connection to an ancestral worldview, allowing us to identify what Aldo van Eyck, traveling through North Africa in 1951-52, recognized as the primary elements of architectural language (Strauven 1998). Below we discuss the permanent features of these desert dwellings.

Figure 5: Distribution of the Tekna tribe and its branches: Izerguini, Ait Lahcen, Ait Oussa, Ait Alouane (2023)



The Saharawi society was born of the clash between Berber tribes, black tribes, and colonizing Arab tribes (Bendoni 2000). Accordingly it consists of Arab-Berber groups with a strong cultural identity, living traditionally in the Western Sahara¹³ (Ramondino 1997), gravitating towards the *Sāqiyat al-hamrā'* (Saguia el Hamra in Spanish) and the *Wādī al-dhahab* (Río de Oro). Their territory, spanning more permanently inhabited areas and grazing grounds that were only periodically inhabited, had no specific topography. All these parts of the Western Sahara, with varying terrains, microclimates, and hydrology (almost always subterranean), sustained livestock transhumance (Fig. 5).

Sedentary and nomadic communities here are interdependent through complex relationships, developing on each other's fringes. The dark tent of camel or goat hair fabric called *khaima* was the dismantlable habitation, an effective response to the desert climate allowing continuous movement in search of pasture and water. The often fortified permanent settlements called *ksour*, by contrast, were fixed points in the landscape, to be used periodically and shared with other tribes, where grain and other resources, such as water, could be stored (Fig. 6).

Traditional Saharawi encampments are known as *firgān* (sing. *frig*), whose spatial formalization reflects the

Figure 6: Forms of inhabiting the desert: the *khaima* tent of camel or goat hair, and the *ksour* Berber fortified village, evolving into complex spaces from the *ghorfa* room module (2022)

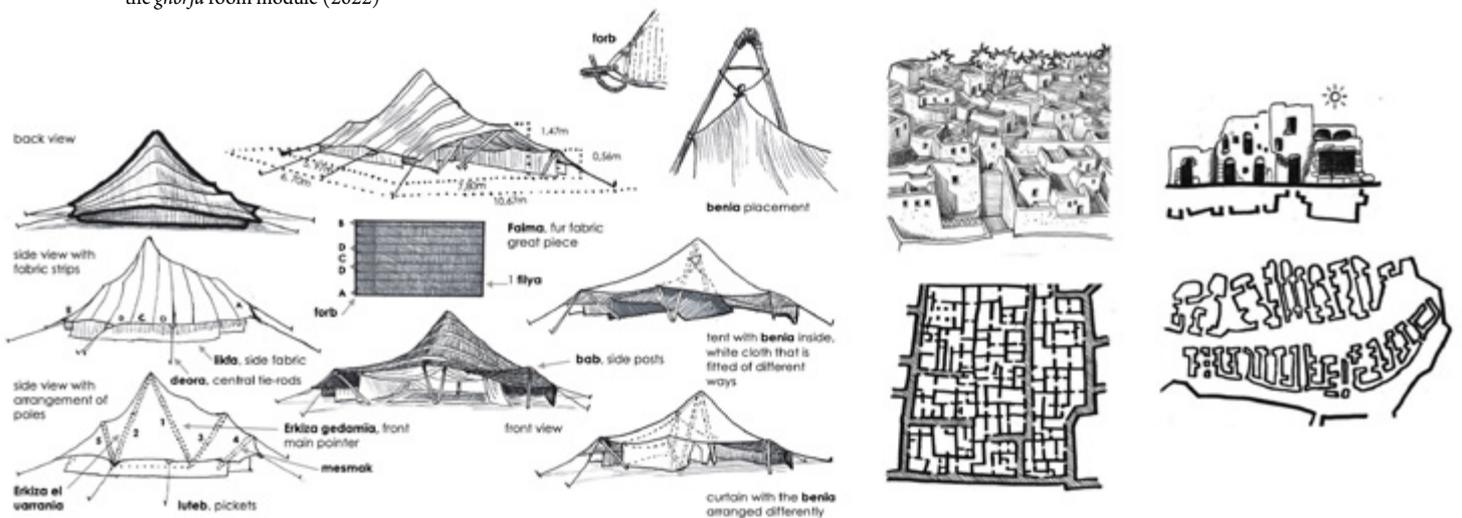
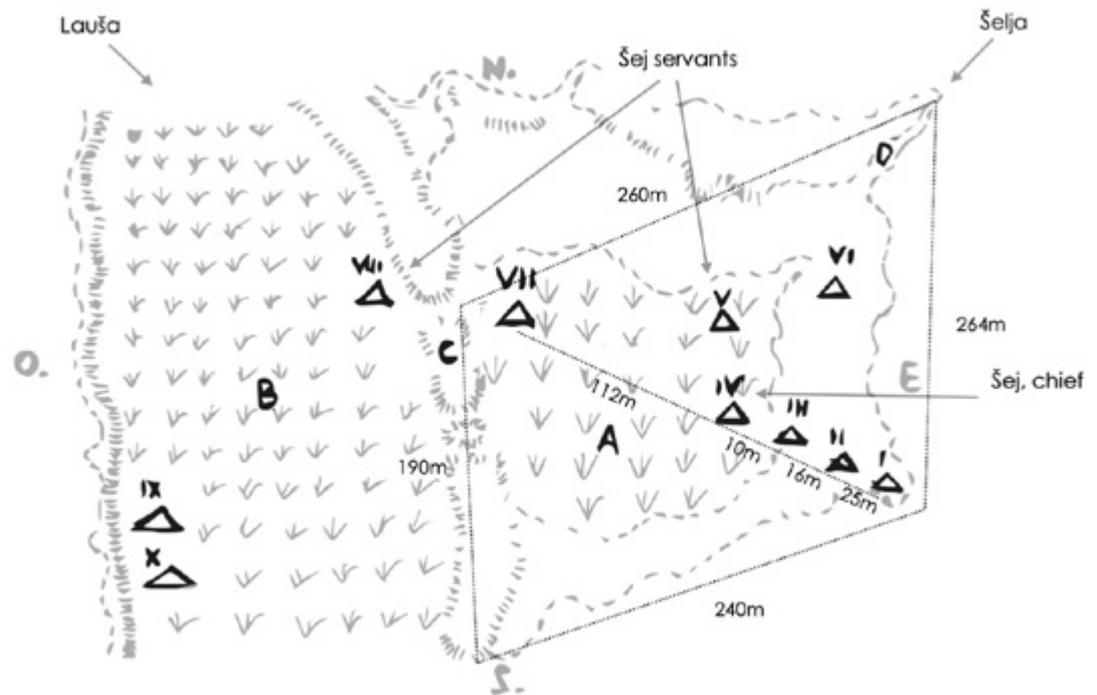


Figure 7: Diagram of a *Firg*. Arrangement of tents in the camp of Grara Del Teseiagt, with two inhabited parts: one with less vegetation, where the Sej (A) lives, and one with trees and shrubs (B), where the shepherds (IX, X) live. In the middle, a gate called Taug (C). The entrance is called Šelja (D) (Author, after J. Caro Baroja (1955), *Estudios saharianos*)



relationships between families and their properties. The chief's tent is in the middle, along an east-west axis. The distance between tents is proportional to the degree of kinship. In some specific cases the camp may be arranged in a circle, called *anawāl*. In extraordinary periods, several *firgān* are gathered around the chief's tent and arranged in parallel: this arrangement is called *mahsar* (pl. *mhasir*). Thus structured, the tribes have inhabited the desert for centuries (Fig. 7).

From Nomadic Settlements to Refugee Camps

In 1976 the flight from the Western Sahara was sudden, allowing families no time to take anything but the essentials. Even the heavy *khaima* was left behind, though not the lighter white canvas *benia*. The early encampments were made by arranging tents in the circular *anawāl*, typical of wartime. Only later did international organizations begin to provide aid and new larger, stronger tents. According to international protocols, these were arranged in a checkerboard pattern. Over the next few years, families reorganized their spaces. Near the tent an earthen oven would be made for baking bread, using materials available locally, and the first adobe structures were built to divide the private and community spheres. A courtyard was generated from an enclosure, functioning as an open-air room for family life (Fig. 8). As the enclosures rose up next to each other and spread across the land, these solutions were articulated into more complex systems, making this desert dwelling pattern a resilient¹⁴ proto-urban experience which can be observed today (Herz 2017).

While many of their features belong to “traditional” refugee camps, Wilson observes, after Caratini, that the camps' arrangement can be interpreted as that of *firgān*, between the square forms of a *maḥsar*, in response to the war situation, and the circular form of the *anawāl*, signaling equality among the tribespeople. We may also draw a parallel with the organization of the garrison cities founded at the time of the Arab conquests¹⁵. All these settlements were laid out according to kinship, with a distribution in tribal neighborhoods around a core. The plot assigned to an individual tribal group in the garrison towns is called *Khitta*, or “piece of land marked out for building”. The fusion of these forms and land occupation processes led to the grid-like arrangement of each *dā'ira* (borough), with camps arranged in a circle around administrative buildings. The camps were therefore organized according to the typical settlement pattern of this community of Berber origin, namely the *wilāyah* (province), divided into *dā'iras*, each subdivided into four *hay* (neighborhoods).

This organization is recognizable in the camps of El Aaiún, Smara, and Dakhla, all of which are organized into seven *dā'iras*, in addition to Auserd (six *dā'iras*), and Boujdour (three *dā'iras*). Rabouni is the only camp not divided into *dā'iras* because it serves as the administrative capital of the Sahrawi nation in exile, with dedicated spaces, such as ministries, a hospital, a national museum, and historical archives, housing the Sahrawi Arab Democratic Republic administration (Fig. 9).

The relationship between settlement principles and typological choices promotes social interaction within the

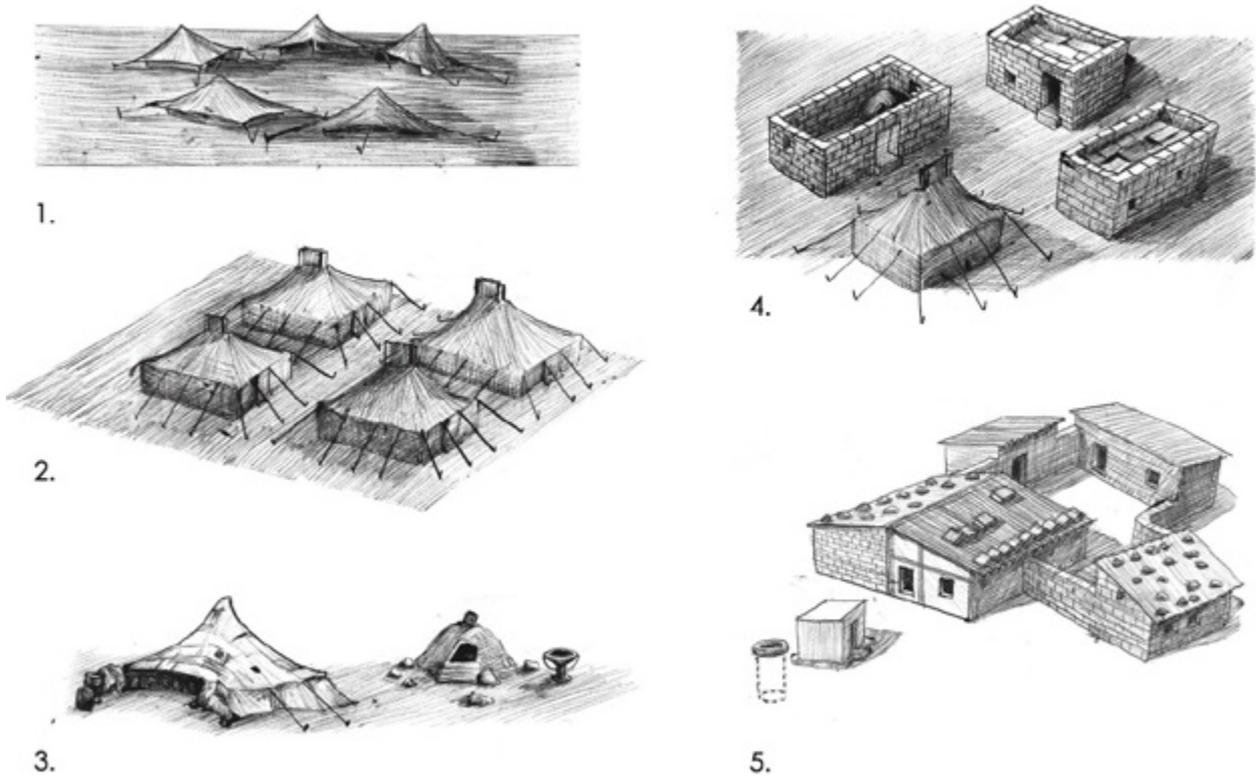


Figure 8: Five stages of camp evolution: 1. The early camps were made by arranging tents in the circular *anawāl* form. 2. Checkerboard arrangement of new tents provided by international organizations. 3. Reorganization of spaces and erection of an earthen oven. 4. Construction of the first adobe buildings with fabric roofs. 5. Finally after the 2015 flood, concrete houses

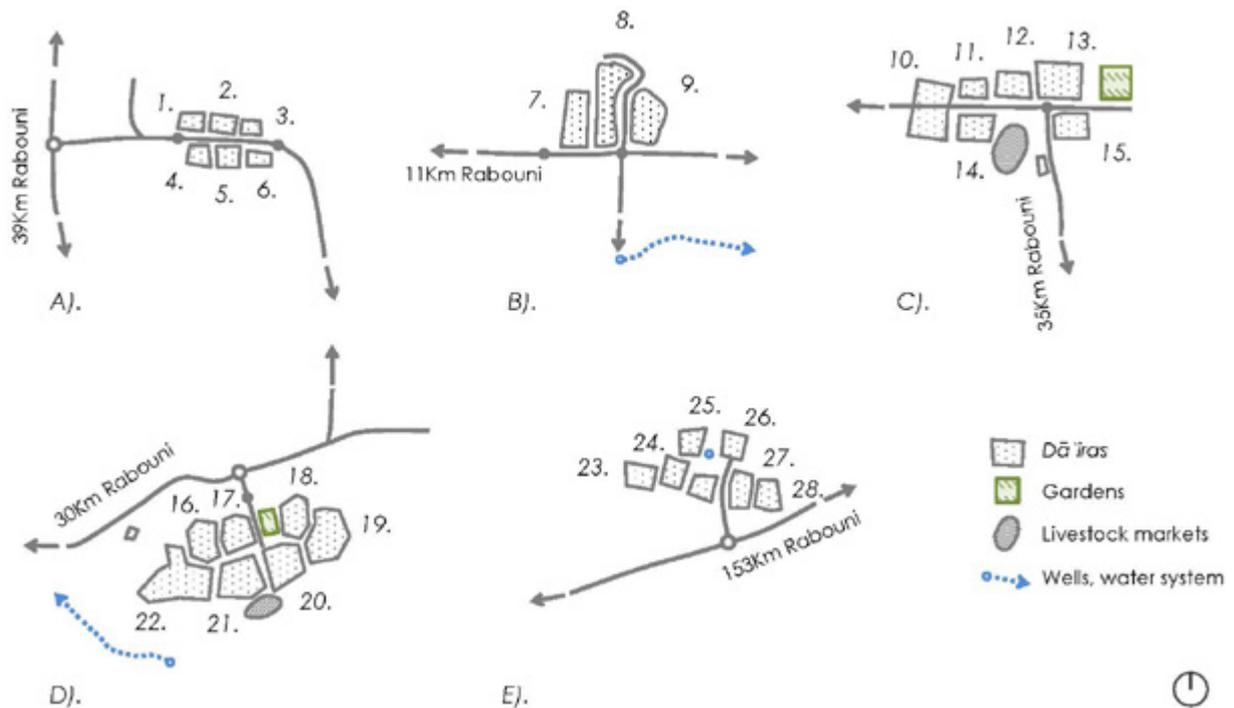


Figure 9: Diagrams of the *wilāyat* with their *dā'iras*. A). Auserd: 1. Bir Ganduz, 2. Miyek, 3. Zug, 4. Legüera, 5. Tishla, 6. Agüeinuit. B). Bojador: 7. Akti, 8. 27 de febrero, 9. Lemsid. C). El Aaiún: 10. Gelta, 11. Hagunia, 12. Dora, 13. Dcheira, 14. Bukraa, 15. Amgala. D). Smara: 16. Tifariti, 17. Bir Lehlu, 18. Mahbes, 19. Farsia, 20. Jederia, 21. Hauza; 22. Emheriz. E). Dakhla: 23. Bir Enzaran, 24. Tiniguir, 25. Ain-El-Beida, 26. Madreiga, 27. Argub, 28. Giraifia (2023)



Figure 10: Organization of the *wilayah* of Smara: in red the 7 *dā`iras* and their centers. The middle part is devoted to common areas. Around the inhabited areas, corrals for livestock (2023)

Sahrawi camps, and the population is encouraged to use the camps as sites for political experimentation, anticipating the nation-state of Western Sahara (Herz 2017). The Saharawi have established schools and created spaces for community gatherings, which choices reveal an intent to provide community facilities beyond the bare minimum for survival. Thus a full social life is fostered with markets, schools, mosques, *corral* pens for cattle, etc., all arranged with recognizable criteria, with an expectation of a gradual increase in services.

For example, at Smara (416 m asl), the largest of the camps to date with nearly 60,000 inhabitants as estimated

by UNHCR (2018) and a populated area of 9 km², a clear spatial organization is discernible (Fig. 10). The *wilayah*, when it was established in 1976 (for this is the second oldest camp), consisted of four *dā`iras*, but was later expanded to six *dā`iras*: Tifariti, Bir Lehlu, Mahbes, Farsia, Jederia, Hauza, to which a seventh, Emheriz, was recently added. Except for the latter's more extensive *dā`ira*, they are clearly divided into four *hay*. The two main thoroughfares are roughly perpendicular and meet in the middle of the *hay*, where services, municipal administrative centers, and a primary school are located (Fig. 11).



Figure 11: *Dā`ira* Bir Lehlu, *wilayah* of Smara, consisting of 4 *hay*, in the middle of which are meeting places or facilities: the town hall, the kindergarten, the medical center. Valencia primary school (a.) and mosque (b.) The *corrals* for livestock are on the periphery of the *dā`ira* (2022)



Figure 12: Morphological analysis of the common spaces of the *da'ira* of Bir Lehlu (521,000 m²). 1. Main road, 2. Secondary routes, 3. Interstitial spaces (2022)

Apart from the two main streets, the common sphere is composed of interstitial spaces that expand and contract between compounds, creating an intricate system of secondary thoroughfares and widenings which, as well as serving as buffers between households, are places of community interaction. If we take the spatial characteristics of the *da'ira* of Bir Lehlu, we see that most of the space – 79% – is occupied by housing units, with 5% devoted to main and secondary streets. No less than 16% is occupied by this system of interstitial spaces (Fig. 12), and these proportions are to be found in most of the *da'ira* of the five *wilayah*.

In the studies on the social structure of Arab-Berber communities and the arrangement of tents in their encampments conducted in the Western Saharan by Julio Caro Baroja (1955), it is easy to recognize principles in the formation of these settlements, with spatial propositions and anticipation of environmental, social, and cultural needs. And, despite the refugee camps' makeshift character, these reflections of housing habits and community needs continue to be recognizable.



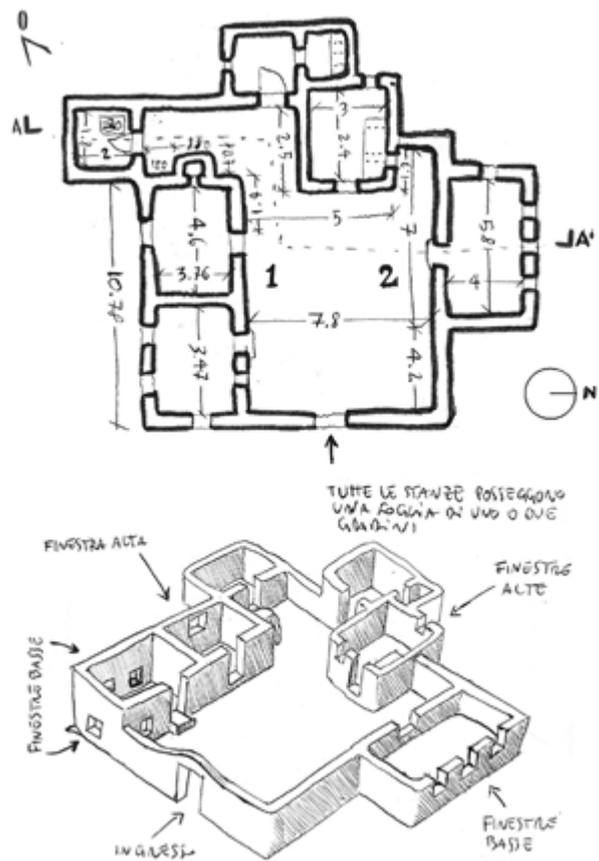
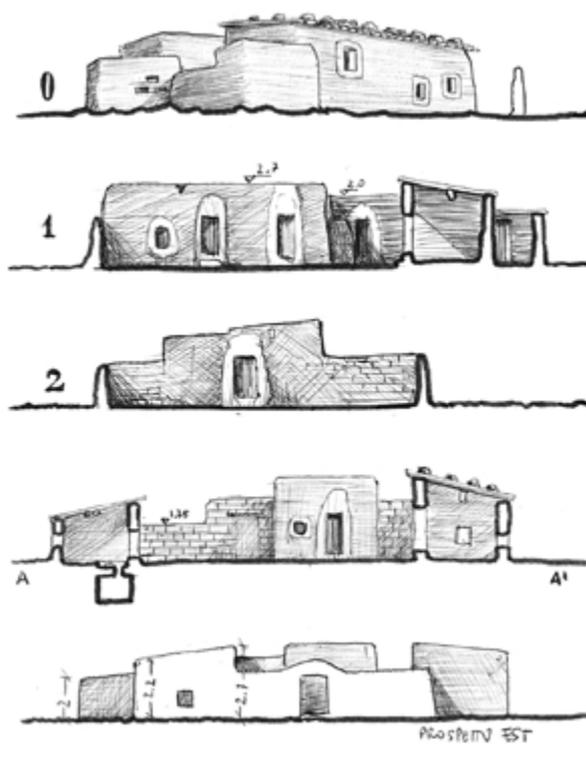
Figure 13: Dwelling unit in the *da'ira* of Mahbes, *wilayah* of Smara, *hammada* of Tindouf, in the Algerian desert (2022)

Morphological Analysis of Living Spaces

In the traditional social system of the Saharawi, kinship is essential. Baroja (1955) found that the *qorabai* (sing. *qarib*), or kin in the general sense, gathered in a larger permanent social unit, the *gabilé* (pl. *gabail*), which were divided into *fracciones*, or *fajad*, (pl. *efjad*). While evolving and outgrowing tribal organization, present-day Saharawi society still follows kinship patterns in its spatial organization. Over the years, each Saharawi family has created its own home, organized around a central courtyard, on the perimeter of which are various single-story housing units, with average dimensions of 6x4m (Moretti 2016: 9), built of adobe, i.e. raw-earth brick, and typically monofunctional: for cooking, sleeping, drinking tea or receiving guests (Fig. 13). Nearby one finds one or more *corral* pens for livestock and a tent, which on average measures 6x6m (Fig. 14).

From a typological point of view, Saharawi domestic architecture may be said to be much more complex and articulated than that of other peoples of this arid region, as they have elaborated the courtyard house type in various ways (Moretti 2016: 6). The roughly rectangular courtyard serves as a distributive space for the covered rooms, as well as for an open room for warmer nights. This living unit with a courtyard is a spatial manifestation of the routines of the Arab-Berber household, which remains the basic unit of Saharawi society today. Depending on the size and finances of each family, these complexes may consist of one or two structures or grow so as to include seven or eight buildings. Such temporary architectures, a product of cultural knowledge, are highly functional for desert life and symbolically represent the ephemerality associated with a nomadic past and a present in exile (Fig. 15).

Figure 14: Drawings and architectural surveys of a housing unit in the *dā'ira* of Hauza, *wilāyah* of Smara (2022)



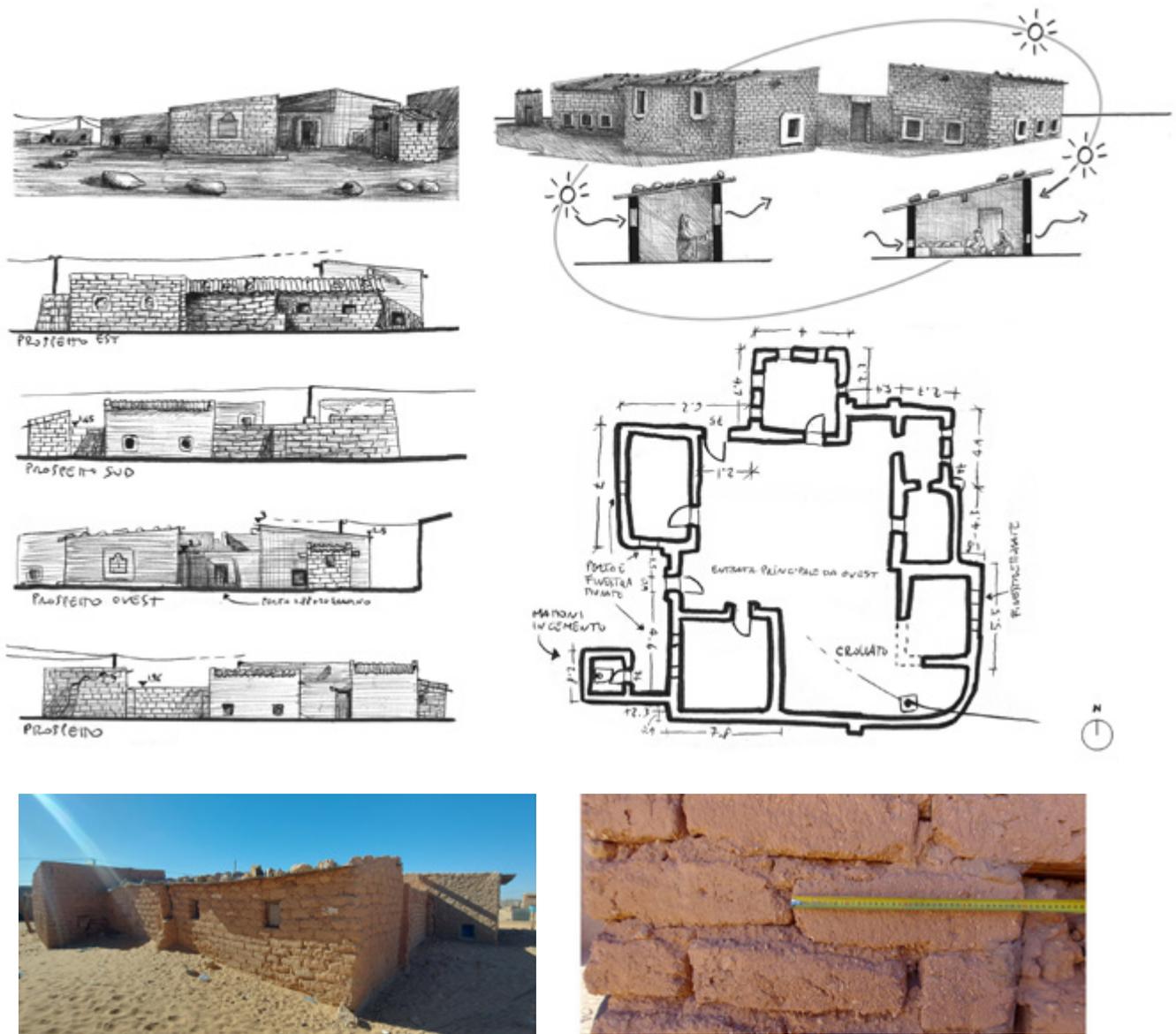


Figure 15: Drawings and architectural surveys of a housing unit in the *dā'ira* of Bir Lehlu, *wilāyah* of Smara. Windows are positioned according to room function, favoring cross-ventilation. Adobe walls offer good thermal insulation (2022)

Openings in facades are few and those that do exist are small (max. 50x45 cm). On the *hammada* of Tindouf, the prevailing wind is from the northwest. As a result, doors and windows are placed so as to prevent sand from entering the interior and to maximize cross-ventilation for thermal comfort. It is notable that, in some buildings, the windows are located close to the ground, while in others they are about one meter up, to allow cross-ventilation. The position reveals the room's function: in kitchens the windows are high up, while in rooms used in the afternoon or for sleeping the windows are 20 cm above ground (Fig. 16).

Another characteristic element is that there is no defined use for each space. The house is lived in dynamically: each space is used according to the family's needs, the time of day, and the time of year. This could be described as nomadism within the home and is a typical feature of vernacular architecture in Islamic countries. For example, after cooking, the family gathers in the tent erected near the

compound for the tea ritual. Here the various fabric layers and the arrangement with respect to the prevailing wind allow for consistent cross-ventilation assuring thermal comfort even in the heat of the day. (Fig. 17). Toward evening the family moves to the rooms that receive less direct sunlight and have low windows, to settle on the mats and cushions.

In place of flooring, mats and rugs are laid directly over the sand. As Carlo Carretto recounts in his *Letters from the Desert* (1964): "mats in the desert are everything: [...] dining room, bedroom, reception room" (Carretto 1964: 13). A threshold of about 20 cm marks the entrance to each covered space and prevents sand from entering (Fig. 18).

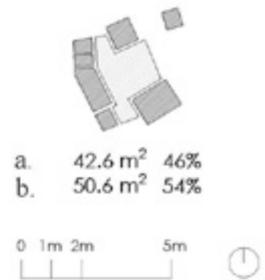
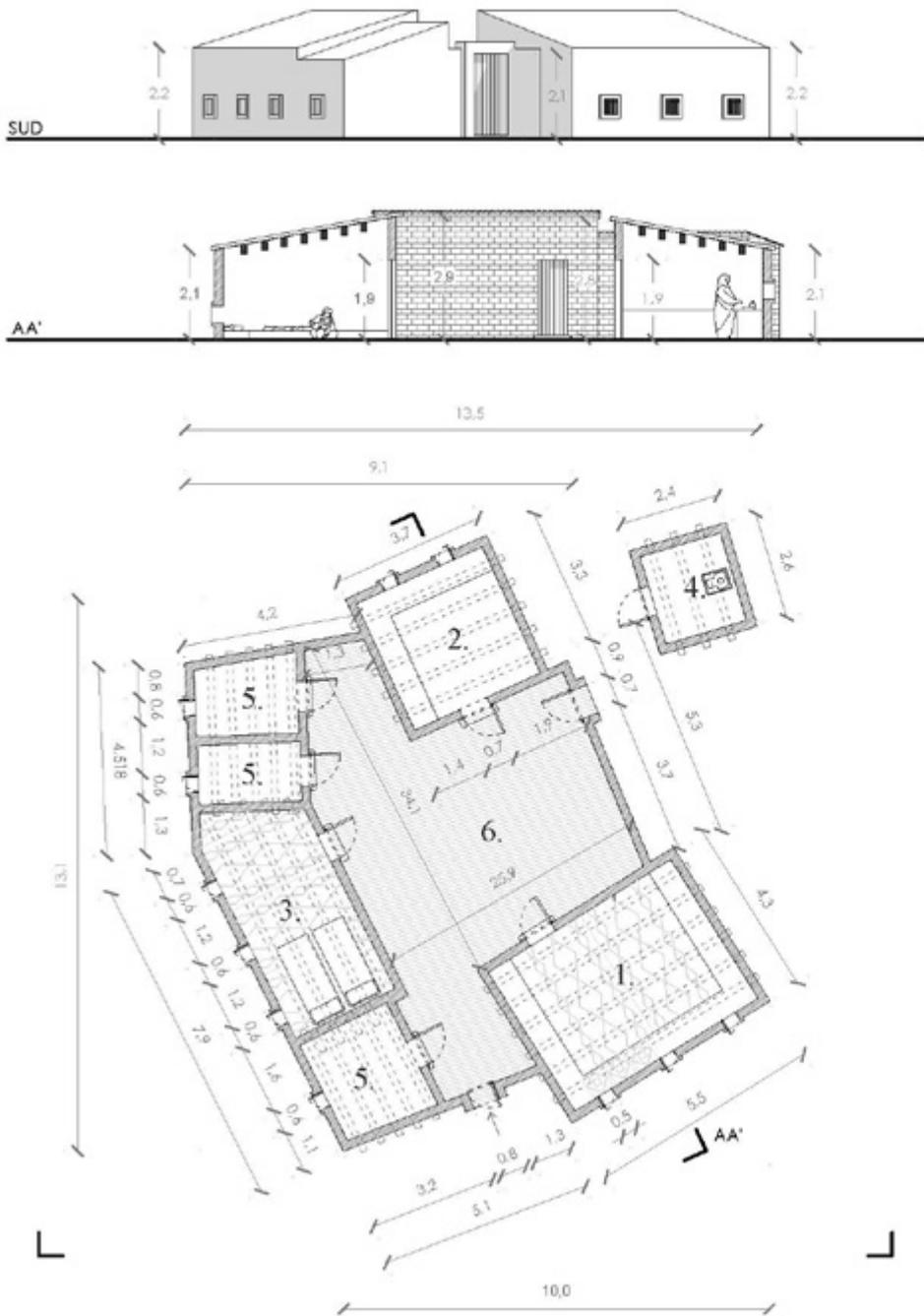
In analysis and classification conducted through field surveys, constant ratios of proportion were found between the outer courtyard space, occupying around 60% of the total, and the covered rooms, occupying about 40%.



Figure 16: Facade of a housing unit in the wilāyah of Smara. Openings at different heights, reflecting the use of interiors and facilitating cross-ventilation (2022)



Figure 17: Interior of a tent in the *dā'ira* of Dcheira, wilāyah of El Aaiún. The tent structure consists of metal poles in the sides and two bamboo posts about 4 m high. There are four layers of textiles: a strong dark cotton fabric as the exterior, a second layer of light cotton, a third one of old fabrics such as veils and rags, and finally the fabrics of the interior furnishings. These layers along with the tent's shape and orientation make it comfortable even in the hottest hours



1.	tearoom	1	15.8 m ²
2.	kitchen	1	8 m ²
3.	room	1	12.3 m ²
4.	toilet	1	4 m ²
5.	storage	3	10.5 m ²
6.	courtyard	1	42.6 m ²

Figure 18: Typological analysis: Saharawi housing unit. Use of spaces and ratio between uncovered (a.) and covered (b.) space (2022)

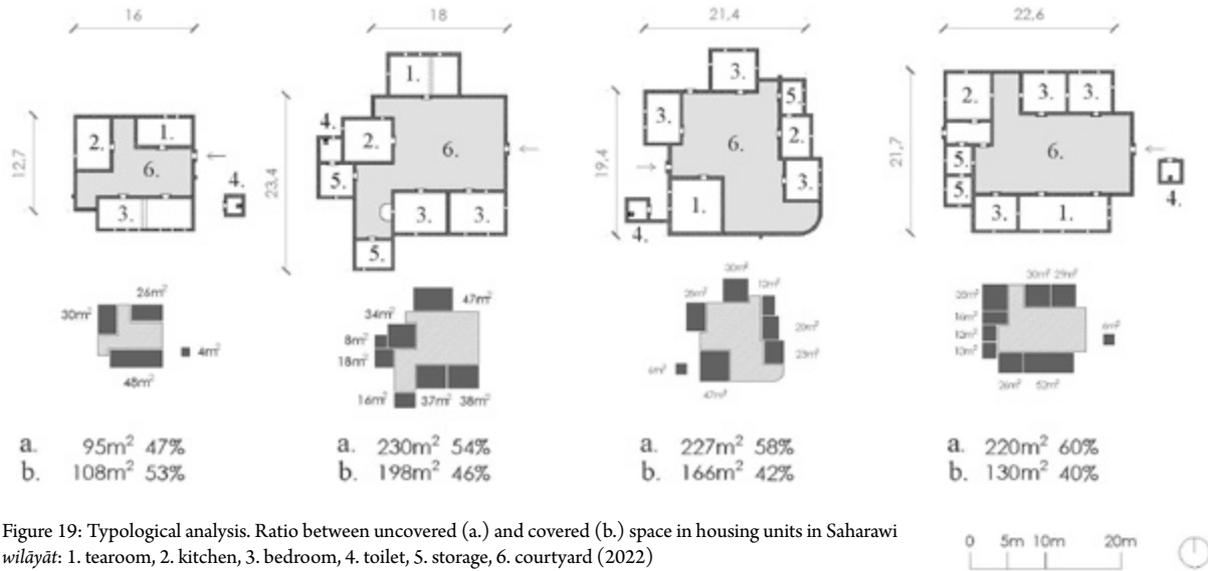


Figure 19: Typological analysis. Ratio between uncovered (a.) and covered (b.) space in housing units in Saharawi wilāyāt: 1. tearoom, 2. kitchen, 3. bedroom, 4. toilet, 5. storage, 6. courtyard (2022)

This courtyard organization is recurrent throughout the Western Sahara, and the yard may be said to be the core of the dwelling. Adalberto Libera, in 1951, after visiting the ancient cities of Morocco, defined the courtyard as the “first room of the house” (Fig. 19). If one compares the lowland and mountain dwellings of Morocco to compound housing in the Sahel belt, the ratio of covered to uncovered space is clearly similar to that of Saharawi homes (Fig. 20). The typological choices reflected by these dwellings can therefore be framed within cultural processes and environmental adaptation throughout the region.

Certain typological features are constantly repeated in these architectures, as the product of desert-dwelling knowledge handed down over time and adaptation to refugees’ needs. On the one hand, the persistence of this status has allowed these people to experiment and evolve their way of living,

both typologically and in construction techniques, and on the other, it has involved great challenges. A large flood in October 2015 damaged and destroyed many structures, not only houses but also schools and public buildings, especially in camps in flatlands such as the *wilāyah* of Smara.

Conclusions

Through the above reflections, time emerges as a structural material of architecture, on a par with space, location, and use (Gregotti 2020: 9), and so the condition of enduring ephemerality needs to be addressed. Studying these lives in motion and their impermanent architectures may help guarantee better living conditions, albeit temporary, and promote a more sustainable approach according to social, economic, and environmental conditions.

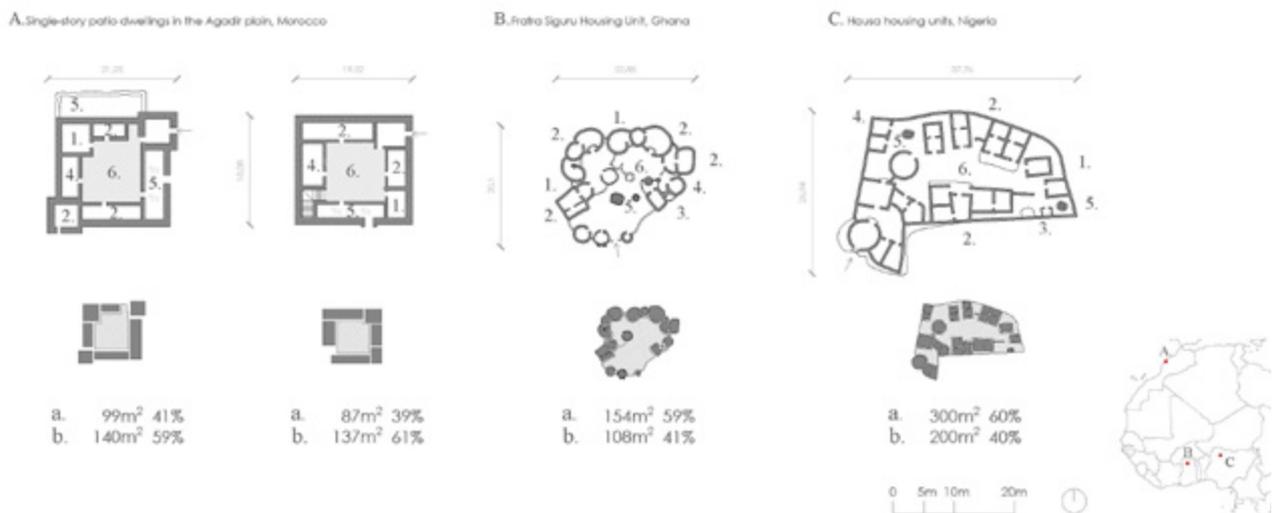


Figure 20: 1: Typological analysis. Ratio between uncovered (a.) and covered (b.) space in family housing units in Morocco, Ghana, and Nigeria: 1. kitchen, 2. bedroom, 3. toilet, 4. storage, 5. stable or barn, 6. courtyard (2022)

An analysis of these experiences could highlight the most sustainable possible strategies at all levels. Paul Oliver in his *Encyclopedia of Vernacular Architecture of the World* (1997), argued that, given the insights it provides into issues of environmental adaptation, vernacular architecture will be needed in the future to “ensure sustainability in both cultural and economic terms beyond the short term”.

The plight of the Saharawi may be seen not just as a phenomenon in the global landscape of migrations, displacements, and refugee camps but also as a paradigm that could be a model for other settlements. Some vernacular practices of living in extreme environments such as this one present recurring typological models of space aggregation which, combined with traditional technological solutions, should be encouraged. These historic habitational practices, which for centuries have allowed a more balanced coexistence with the planet, may be passed on to future generations and used to tackle present and future environmental, political, and social challenges worldwide.

¹ Within the macro-category of migrants, we find national and transnational migrants, and we may further distinguish with reference to regularity status and the reasons for leaving the country of origin: refugees, displaced persons, economic migrants, etc.

² Climate change is leading to increasingly frequent events with catastrophic effects, widespread freshwater shortages and the consequent loss of arable land, and accelerating desertification.

³ Only rarely do we hear about migration within Africa, yet it constitutes the greater part of African movements, along “endo-continental” routes. In many cases migrants move from the country to cities, or between states (Alice for Children 2021).

⁴ These support systems involve a holistic approach according to the research of Fred Cuny and his group, in the INTERTECT Relief and Reconstruction Corporation, which in the 1960s and '70s developed guidelines for the design and management of refugee camps and for displaced populations in general (Cuny 1977).

⁵ A refugee and displaced-person camp is conceived as a temporary settlement, usually planned and set up by the UN Refugee Agency (UNHCR), which negotiates with local government or private landowners to secure land on which crisis refugees may be housed for short periods. But their stay often lasts for years, although many may prefer to think and act as if it will be over in weeks. Strategies for planning a camp today are formulated in the UNHCR Emergency Manual, designed for UN use, setting out general planning principles and the services to be provided.

⁶ ATBAT-Afrique was the African branch of ATBAT, Atelier des bâtisseurs, founded in 1947 by Le Corbusier, Vladimir Bodiansky, André Wogensky, and Marcel Py, with Jacques Lefèbvre. It was conceived as a research center where architects, engineers, and technicians could work across disciplines, originally for the construction of the *Unité d'Habitation* in Marseille. In 1951 Georges Candilis, Shadrach Woods, and the engineer Henri Piot took over ATBAT-Afrique in Tangiers, Morocco, up to late 1952. Later Candilis and Woods led its expanded headquarters in Casablanca, though the political atmosphere had changed by then and ATBAT-Afrique was soon wound up.

⁷ GAMMA (Groupe des Architectes Modernes Marocains), formed by Georges Candilis, Michel Écochard, Vladimir Bodiansky, Henri Piot, and Shadrach Woods.

⁸ For the redevelopment of Casablanca's *bidonvilles*, Écochard drew up a settlement plan based on an 8x8m grid consisting of a low fabric of courtyard houses, aggregated into units of four dwellings each. The recurring basic unit was the neighborhood, with services (such as

hamams and souks) and places of worship in keeping with Muslim ways of life and cultures.

⁹ Regarding *La Mahieddine* in Algiers the studies carried out, presented at CIAM IX in Aix-en-Provence (1953), on the theme of emergencies and social habitats, were materialized in the *Cité de transit* (1956-1958) and in various habitats for Muslims and Europeans: neighborhoods with a low horizontal fabric and collective buildings (Atzeni and Mocci 2018: 74).

¹⁰ In some cases this interest in African vernacular architecture with its symbolic, cultural, and temporal stratifications led to significant connections being drawn between European architectural thinking and African architectural realities, one example being Aldo van Eyck's profound reflections regarding Saharan settlements and Dogon culture.

¹¹ On November 6, 1975, there was a “peaceful” invasion of the Western Sahara by 350,000 Moroccan civilians and 25,000 military personnel, called the Green March by King Hassan II, meeting with timid condemnation from the UN (Ardesi 2004). Hassan II thereby established a “Greater Morocco” and began exploiting the Sahara's natural resources (fisheries, phosphates, gas, iron, and oil).

¹² Although the Saharawi declared the Western Sahara independent on February 27, 1976, they still lack control over the country, whose sovereignty remains unresolved.

¹³ The abstract entity of the Western Sahara was formed with the borders that Europeans had drawn for themselves in their colonies in the Maghreb, Sahara, and Sahel. After decolonization, the newly independent nations reestablished ancient territorial subdivisions. Today the territory is divided between Morocco, Algeria, Mauritania, and Mali, and claimed by the Sahrawi Arab Democratic Republic. Here we refer to the Western Sahara as a geographical area historically inhabited by desert peoples.

¹⁴ Resilience involves not only building structures and settlements suited to these climes, with the scarce resources available and an extreme environment, but also the ability to respond to cultural and social survival challenges.

¹⁵ As Nezar Alsayyad explains in *Cities and Caliphs: On the Genesis of Arab Muslim Urbanism*, the garrison towns, created as military camps by the early Arab conquerors, were a model for later Arab cities, with recognizable elements of urban form including residential districts.

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Biography | Biografia | Biografia

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