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Return to the Native Earth: Historical Analysis of Foreign Influences on Traditional Architecture in Burkina Faso

María Lidón de Miguel *, Fernando Vegas, Camilla Mileto and Lidia García-Soriano

Research Centre PEGASO, Universitat Politècnica de València, 46022 Valencia, Spain; fvegas@cpa.upv.es (F.V.); cami2@cpa.upv.es (C.M.); ligarso@upv.es (L.G.-S.)

* Correspondence: malidde@upv.es

Abstract: Learning from the sustainability of traditional architecture, as a solution to the current ecological crisis, seems more challenging in societies where a cultural imposition has occurred. In Burkina Faso, vernacular architecture has experienced a process of transformation, still in course, relying heavily on foreign resources and losing its adaptation to environmental conditions. As in other contexts, the dynamics of transformation are being examined. Joining this line of work, this research aims to explain the causes of the current local perception of traditional building techniques in Burkina Faso in order to consider how a sustainable development of its architecture would be possible. To this end, a historical analysis is conducted by reviewing the literature, consulting historical documents and collecting data during two stays in 2018. The study shows how earth has ceased to be appreciated by progressively becoming associated with "non-definitive constructions"; this perception is due to the narratives put forward by foreign agents since the end of the 19th century. The sustainable development of architecture in Burkina Faso seems to demand a return to the use of earth, local resource par excellence, but this will only be possible if the devaluation of this building material is reversed.

Keywords: vernacular architecture; earth; local materials; colonialism; cooperation; conservation; traditional building techniques; valorization; transformation

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1. Introduction

The present global ecological crisis confronts humanity with a crisis that is environmental, due to the availability of resources; social, due to the rise of inequalities; and economic, due to an exponential growth that has been demonstrated to be unacceptable. This perspective leads to the questioning of the current socioeconomic order and the search for alternatives that allow adaptation to ongoing climate change.

However, the transition towards a culture of sustainability does not necessarily have to be invented. In certain disciplines, as in architecture, it would be enough to look to the past: rather than imagining solutions, it would be possible to relearn them from traditional models [1,2].

Effectively, regarding architecture, it seems that as societies have gained complexity and technical dominance, they have lost a relationship with nature that needs now to be re-established. It has been, in a general way, a misleading idea of development that has progressively distanced architecture from its original adaptation to the environment and the culture in which it is built. A single concept of progress, spread throughout the world especially since the end of the 19th century, explains to a great extent why architecture has lost some of its qualities of environmental, sociocultural and economic sustainability.

The widespread process of transformation that traditional architecture has undergone, and still experiences, in all industrialized contexts, seems to vary in intensity according to the place. The gap between traditional and new building seems to be much wider in territories where industrialization, and the so-called progress, has been accompanied by cultural impositions [3,4]. This is the case in West African territories, where the changes

have taken place in a short historical period and have entailed the devaluation of their own tradition. This rupture with the local generates a dependency that seems incompatible with the idea of sustainability.

At the same time, these are the countries that are currently suffering the greatest consequences of the ecological crisis: desertification, floods and other natural disasters; scarcity of resources and loss of biodiversity; health problems; increasing economic debt; population growth and massive migration to the cities; etc. The return to the past in order to learn from the original adaptation and favour a sustainable development of architecture seems to be urgent, but it must bridge a greater distance in these contexts: the distance of the recovery of identity. It seems necessary to review what has happened in colonized countries in order to restore the value of their natural, social and cultural resources. This idea justifies the present research.

In relation to the acculturation phenomena, the Europeanization of the world as a result of the colonial expansion of the late 19th and early 20th centuries has been recently addressed as an issue to be understood and reviewed [5]. In particular, the Europeanization of architecture, i.e., the general impact of colonization on the constructive cultures of the occupied territories, especially on the African continent, has also been discussed [6,7]. However, the vastness of Africa, with its diverse cultures and wealth of built heritage, constitutes a wide field of research in which what occurred in each territory could be analysed case by case. Studies in this field have been carried out in countries such as Ghana [8], Nigeria [9,10], Liberia [11] and Mali [12]. In each of these studies, the transformations of vernacular architecture and the impact of colonial urban planning and its buildings on the traditional habitat have been tackled.

With over 70% of the population living in traditional earthen constructions in rural areas [13], Burkina Faso appears as a special case to be studied in relation to this line of research. Traditional techniques, specific to each culture in the country, have remained almost unchanged in rural environments. However, this seems to no longer be the case in villages which are becoming increasingly urban and, especially, in the major consolidated towns such as Ouagadougou or Bobo-Dioulasso. The largest migration flows are currently directed towards these two urban centres, where work opportunities and access to basic services seem most likely. In this situation of uncontrolled growth, access to "decent housing", as defined by local authorities, is a problem that successive governments have tried to address. Burkina Faso can therefore be considered as a changing scenario: much of the traditional architecture of the different cultures that inhabit the territory has remained almost unchanged in rural areas; in the increasingly populated and urbanized centres, there is a growing demand for dwellings adapted to official standards. Burkina Faso is therefore studied in relation to the state of its traditional earthen architecture and the possibilities of its sustainable development.

1.1. Specific Background

Burkina Faso is located in the centre of West Africa, between the countries of Mali to the northwest; Niger to the east; and Benin, Togo, Ghana and Ivory Coast to the south (Figure 1). However, it should be remembered that the history of these territories as states has lasted just over a century and that the borders defining them were originally outlined by agents external to the context of the continent.

In the late 19th century Upper Volta (Haute Volta in French) was the name given to the territory located in the high basin of this river and watered by its tributaries: Nakambe (White Volta), Nazinon (Red Volta) and Mouhoun (Black Volta). This territory was inhabited by numerous cultures sharing features in language structure, in social organization systems, in politics or in religious beliefs, while conserving individual peculiarities that shaped their identity as distinct cultural groupings. The similarities and singularities in these cultures could also be seen in their construction: their proximity in the territory meant that the available natural resources and the demands of the climate were similar, but the culture of each society provided the use of materials with distinctive features.

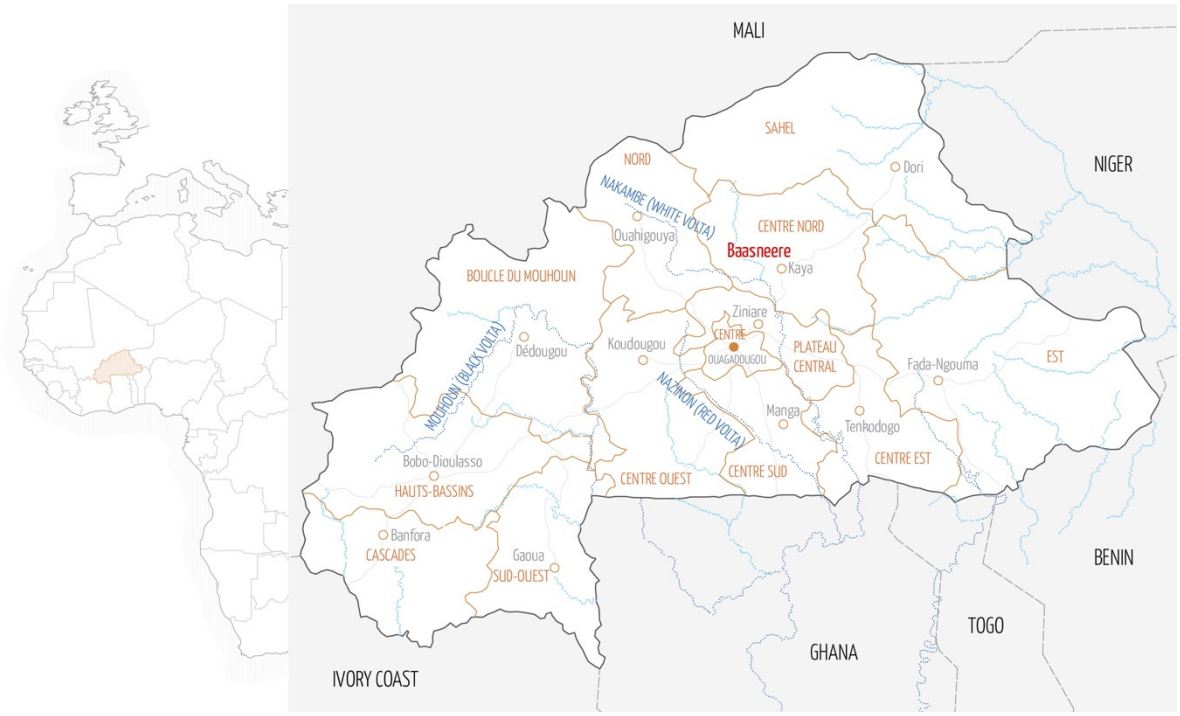


Figure 1. Administrative plan of present-day Burkina Faso.

The characteristics of the different cultures that inhabited the territory were the main topics of research during and after the colonial period [14–22]. An initial study of vernacular architecture compiled the construction techniques, building typologies and social grouping systems of the main cultures in the country [23]. This study showed how, effectively, the same natural resources in a similar climate had been used by different cultural groups to form a unique identitarian architecture. The main material used in traditional architecture was argillaceous earth, employed in all these cultures to build walls, roofs and coverings of buildings. In an area with torrential seasonal rains, earthen constructions had to be maintained in an almost annual cycle, in perfect harmony with the work cycles in the fields. Earth, which was cultivated and used for construction, represented an essential element of major significance for these cultures [24].

Later studies also analysed the general characteristics of vernacular architecture [25] or focused on particular cases such as the traditional dwellings in villages of Gurunsi culture [26]. More recent research has attempted to identify the transformations taking place in the vernacular habitat [27–32]. Closely linked to urbanism, other studies have focused on the development of the two capitals of the country [33]. The impact of foreign influences on the architecture of these cities has also become a topic of research [34]. In particular, one such study carried out in 2002 looked at the relationship between society and the spaces it inhabits, considering the contexts of Bobo-Dioulasso and Ouagadougou from colonial times to independence as case studies [35].

Finally, useful surveys have recently analyzed the challenges of the construction sector in Burkina Faso and the possibilities of using local resources in new building techniques [36–38]. The impact of foreign influences on the building traditions of Burkina Faso and the possibilities for the conservation of this vernacular heritage remains to be addressed.

1.2. Motivation, Objectives and Main Results

From this background, the current situation that motivates the investigation is presented. As already mentioned, while a few urban centres are becoming increasingly populated, traditional earthen architecture has remained almost unchanged in rural areas.

This type of self-constructed architecture uses local resources and expresses the distinctive features of the cultures of the country, thus showing environmental, sociocultural and economic values of sustainability. Its adaptation to the current needs of the population could represent a solution to the sustainable development of architecture and to the growing demand for housing. However, conflict seems to arise when traditional earthen constructions have to adapt to the land availability, to the orderly planning and to the urban regulations on housing in the new towns, becoming informal settlements without the necessary services.

There seems to be, therefore, a physical and conceptual transformation in the use of earth as a building material from the traditional architecture still being built in rural areas to its official conversion into "precarious housing" when integrated into the urban fabric of cities. This current situation leads to the following questions that define the objectives of the research:

- What is the perception that the local population has about its traditional architecture? Objective: To identify the current changes in traditional earthen architecture and trace the reasons and the extent of these changes.
- How has this appreciation changed throughout the history of the country and why? Objective: To analyse, throughout the recent history of Burkina Faso from its occupation to the present day, the different attitudes towards the use of earth as a building material.
- What role can traditional earthen architecture play in the future of the country? Objective: To consider the possibilities for the conservation and protection of traditional earthen architecture through its sustainable development.

The French colonization of the territory, the subsequent European tutelage and even the actions of international cooperation are external factors to the cultural framework of the country that have inspired different attitudes to earthen construction among the local population. This research addresses the impact of these factors to provide a historical overview of the meaning of earth as a building material in Burkina Faso that explains the current situation and the possibilities for the future.

The study shows how the outright official rejection of traditional architecture by the foreign occupants, first, and by the consecutive administrations, later, has led to the gradual assimilation of imported materials by the local population. At the same time, the dependence on foreign resources is untenable, and the agents involved in the building sector are now proposing a return to the use of local materials. Earth and stone used in new technologies are beginning to be considered as an alternative for new architecture. However, despite the use of these new techniques in non-residential buildings such as schools or health centres, there is still a long way to go before they are used in self-construction traditional housing. The perception of the population is now confronted with an incipient variation in official discourses, in accordance with international documents on sustainable development, and with the need to adapt, once again, their concept of the use of earth as a building material.

2. Materials and Methods

The aim of this article is to show how the consideration of earth has changed in the architecture of Burkina Faso in order to have a measure of the extent of the transformations undergone and an overview of the possibilities for the sustainable development of earthen architecture in Burkina Faso. A historical analysis of the country aims to reflect how foreign influences have contributed to creating the current perception and use of this material by the local population.

The methodology followed in this analysis consisted of both consulting documentary sources and collecting data on the state of construction in the country in two stages in 2018 (Table 1).

Table 1. Diagram of the data sources and its corresponding purpose.

Documentary Sources			
Type of source	Description	Provenance	Purpose
Administrative documents	Urban planning decrees implemented in the Kaya region in 1950 from the Kaya District Colonial Archives [39]	*Centre National des Archives* (CNA) in Ouagadougou. Digital copies available in the British Library thanks to the Endangered Archives Project (EAP462/1).	To understand the housing arrangements during the colonial period.
	Reports from the census of the population in Burkina Faso [13]	*Institut National de la Statistique et de la Démographie* (INSD) of Burkina Faso	To know the current trends of growth and transformation collected by the census of the population at a national level.
Historical images	Series of photographs by the Swiss pilot Walter Mittelholzer [40]	Digital collections of the image archive of the *ETH-Bibliothek Zürich*	To verify the impact of colonization on traditional architecture
Reports from international institutions	*Document de Programme-Pays 2008–2009 Burkina Faso* [41]	The United Nations Human Settlements Programme (UN-HABITAT)	To confirm the international position about the development of the country and contrast the findings of the research with this global panorama.
	World Heritage for Sustainable Development in Africa [42]	United Nations Educational, Scientific and Cultural Organization (UNESCO)	
	New Urban Agenda [43]	United Nations (UN)	
	Sustainable Development Goals [44]	United Nations (UN)	
	Agenda 2063 [45]	African Union (AU)	
	Charter for African Culture Renaissance [46]	African Union (AU)	
Previous literature	On the context of Burkina Faso	Academic community and Non-Governmental Organizations (NGO) working in Burkina Faso.	To set the background of the research, to trace the changes in the appreciation of earthen architecture by the population through history, and to consider the possibilities of a sustainable development of traditional earthen architecture in Burkina Faso.
	On the effects of colonization in the development of architecture	Academic community	
	On the features of sustainability in vernacular architecture	Academic community	
Direct Sources			
Method of research	Description	Purpose	
Cataloguing of architecture (Quantitative research)	Detailed analysis of the architecture and urbanism in the village of Baasneere in the North Centre Region of the country.	To learn about the traditional architecture of the Mossi culture and the most widespread transformations in this type of architecture.	
	Photographs and general data on the vernacular architecture of the country.	To register the traditional architecture that is still built by the Gourounsi, Dagara, Lobi, Bobo and Gouin cultures.	
Open interviews and participant observation (Qualitative research)	Conversations with the neighbours of the village of Baasneere and coexistence in their daily life in two different stays (February and September, 2018).	To know the opinion of the inhabitants of the village about their traditional techniques and about the new materials, as well as the changes that are taking place in the families.	

The field data collection was conducted within the framework of the *ConBurkina* research project, designed to provide technical support and research on the construction of vaults for a school in the village of Baasneere, in the North-Centre region of the country, using the Compressed Earth Block (CEB) tile vault technique. This research project included a preliminary study and data collection phase in various regions of the country and a phase of practical construction workshops held in Baasneere and in Ouagadougou in February 2018.

The data collected in the village of Baasneere, extended during a second stay in September and October 2018, allowed a detailed analysis of the transformations that were taking place in traditional housing, in this case, in the Mossi culture. A study on this scale made it possible to establish direct contact with the population and to carry out quantitative and qualitative research on the changes that were taking place in the way of life and forms of construction of a rural community in Burkina Faso. The results of that first study were used as the starting point for this research.

3. Results

As already mentioned in the introduction, with the arrival of the Europeans, interest arose in studying the populations that inhabited the territories in the upper basin of the Volta river. The so-called "voltaic populations" were initially classified according to their languages. This began a wide academic discussion since there was no unanimity on the criteria to be used to systematize the variants of the local languages into groups and subgroups. Moreover, there was also a risk of shifting from classifying languages to classifying cultures, although the linguistic universe did not necessarily have to coincide with the cultural one. This could result in classifying cultures as the same when further research could demonstrate features justifying their being considered as independent cultural groups [20].

On the basis of this discussion and subsequent research, the historian Joseph Ki-Zerbo compiled four different population groups [21]:

- The "natives": Gurunsi, Senufo, Dongo, Bwa, Kurumba, etc.
- The peoples of "Mandé" culture: Bissa, Samo, Bobo-fing, Yarsé, etc.
- The Fula or Peuhl, a semi-sedentary people.
- The Mossi.

Throughout history, of these groups, only the Mossi seemed to have created a recognizable state formed by the grouping of kingdoms (Yatenga, Ouagadougou, Koudougou, Tenkodogo and Kaya) exercising their authority over other peoples. This, however, is a subjective observation because the exact extent of the 'local authority' and the complexity of political relations between groups was unknown [16].

To sum up, at the end of the 19th century, the territory of the Volta was mostly occupied by the Mossi, who inhabited the Nakambe basin as far as the Nazinon. Next to them were the Peuhl and Gourmantche to the north and east; the Bisa and Gurunsi to the south; the Lela, Ko and Samo to the west; and even further south, the Lobi, Bobo and Birifor, among others (Figure 2), each of which had its own traditional architecture that used earth, in almost all cases, as its main material (Figures 3 and 4). These groups would have settled in the territory as a result of migrations, conflicts and alliances, but little was known at the time due to the absence of written historical sources and the Europeans' unawareness of traditional oral sources.

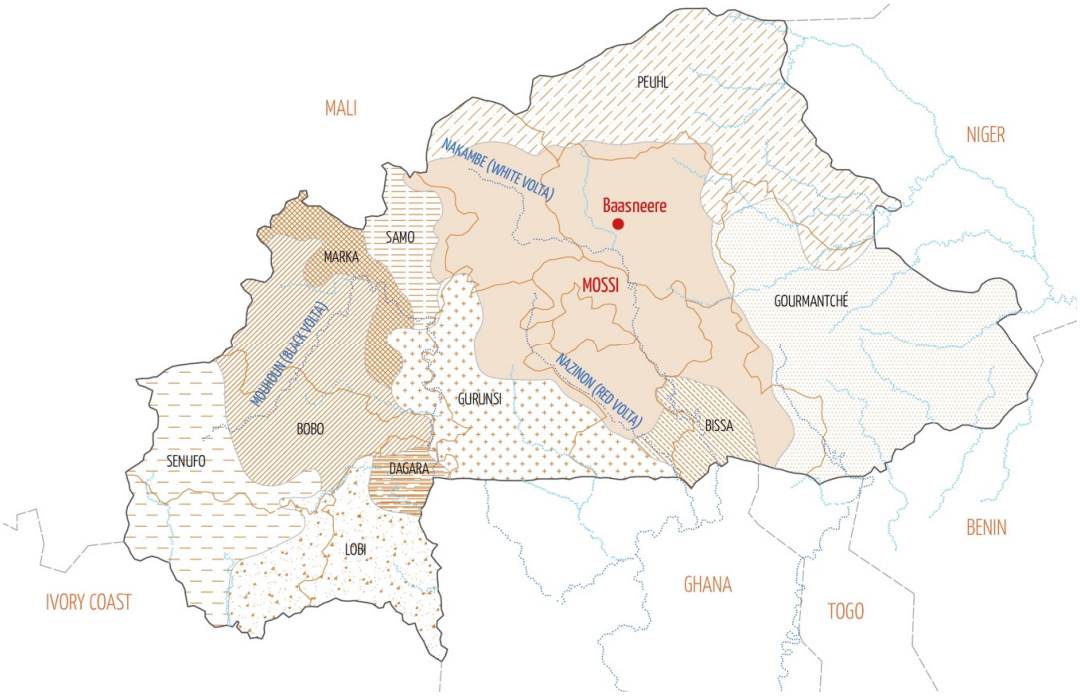


Figure 2. Plan of the current Burkina Faso and of the different cultures in the territory.

(**a**) (**b**)

(**c**) (**d**)

Figure 3. Photographs of different variants of traditional architecture: (**a**) house in the village of Tangasoko, of Gurunsi culture; (**b**) house in the village of Baasneere, of Mossi culture; (**c**) house in the village of Tiébélé, of Gurunsi culture; (**d**) group of housing in the rout between Diébougou and Gaua, of Dagara culture.

(**a**) (**b**) (**c**)

Figure 4. Photographs of different variants of traditional earthen techniques: (**a**) *Mur en bauge*, common in the Dagara and Lobi culture; (**b**) Adobe or *banco*, used by the Mossi and Gurunsi among others; (**c**) decorations on the earthen cladding of the adobe walls, typical of the Gurunsi ethnic group.

3.1. Upper Volta Colony (1919–1932)

It is, therefore, within this multicultural and unknown backdrop that the representatives of the European countries arrived to start what was later known as the "Partition of Africa" or the "Scramble for Africa" [21]. In 1919, the territory called Upper Volta officially appeared as a colony of French West Africa together with Ivory Coast, Dahomey (present-day Benin), French Guinea, Mauritania, Senegal, the French Sudan (present-day Mali) and French Togo.

The attitude of the settlers towards the earthen architecture built by the native population could be summarized as a mixture of fascination and rejection. According to Gwendolyn Wright, for many Europeans, the colonial environment revealed two sides of a cultural dichotomy: the earthen temples with their forms and decorations, together with the earthen habitat, which they considered to be "primitive", evoked a world that was unknown and alien and therefore fascinating. At the same time, the straight tree-lined streets and the new buildings that were beginning to rise in European districts were, for them, an example of the benefits of civilization [47]. Effectively, the new occupants of the territory clustered together in what the local population knew as "white neighbourhoods" and built their houses following their own cultural patterns, albeit adapting somewhat to the surrounding climatic conditions.

The first colonial houses in Upper Volta were large buildings, as there was no limitation on the land available at the time. The layout was that of European houses, but the interior rooms were protected from the high temperatures and the intense sun by wide verandas and shutter systems. The materials used were imported, as Europeans considered the local materials to be of poor quality: timber was in short supply, stone quarries were not yet in operation and earth was rejected because of its vulnerability to rain. The new buildings, covered with undulated sheet metal and designed with modern systems of lighting, ventilation and insulation, were made to last and to become a sign of social progress in architecture [48]. Two opposing cultural conceptions concerning the duration of buildings thus came into conflict. Repair and reconstruction had different meanings for the native inhabitants and for the newcomers. Thus, the concept of "definitive construction", as opposed to the family tradition of maintaining buildings damaged by seasonal rain, was to become the most influential factor in the devaluation of traditional earthen architecture.

In terms of urban planning, the two cultural worlds also clashed due to their completely opposing approaches. The classic European order, designed and based on the grid as an urban design tool, was diametrically opposed to the spontaneous and organic order of local groupings. The current great city of Ouagadougou, which was then composed of clusters of houses and the first facilities, was already beginning to adapt to this new foreign planning. The impressive photographs taken by Swiss pilot Walter Mittelholzer during his flight over the city in 1930 left valuable evidence of the time when the two orders coexisted

(Figures 5 and 6). However, this coexistence was not to last long since, as can be seen in the images, it was to be the fabric of the new French planning that would finally prevail in city development.

Figure 5. Ouagadougou, the capital of the Mossi kings (Upper Volta). Mittelholzer, W.: Tschadseeflug, 1932, Abb. 78. Source: ETH-Bibliothek Zürich.

Figure 6. Ouagadougou from an altitude of 100 metres. This Mossi city, in wide streets, built according to modern and hygienic principles, is the product of French colonization. Mittelholzer, W.: Tschadseeflug, 1932, Abb. 79. Source: ETH-Bibliothek Zürich.

3.2. Dissolution of the Upper Volta Colony (1932–1954)

In 1932, two years after Mittelholzer flew over the city of Ouagadougou, France decided to dissolve the Upper Volta colony, a territory with no access to the sea and unproductive in comparison with the other colonies. The territory was divided between French Sudan, Niger and Ivory Coast, and part of the population was forced to emigrate to work on the plantations in the neighbouring colonies. The largest concentration of workers, especially those of Mossi culture, was found in the Ivory Coast, and these population flows were maintained and became the norm [49].

During this period, contacts between Europeans and the local elites were beginning to take place. The local leaders were invited to the French districts, where they became familiar with the new architecture, which they would later inhabit [48].

The global shock of World War II also had repercussions in the colonial territories, especially in the current Burkina Faso. The decade following 1945 was a time of growth for the emerging cities due to the migration of population to the two increasingly urban centres of Ouagadougou and Bobo-Dioulasso [48]. In this context, the new architecture underwent some changes, which can be summarized as follows:

- Available land was becoming increasingly limited in the urban setting.
- The workforce had been reduced by migration to the Ivory Coast and by the consequences of World War II.
- Local building materials were still scarce and of poor quality for European inhabitants. Although the French administration could have developed sawmills, quarries or brick factories, the fact is that no technical advances had been made in the construction industry and all materials were still imported [48].

It was essential to address the growing demand for housing and new facilities and to do so in a cost-effective manner. This led to the abandonment of the first colonial style of large buildings somewhat adapted to the environment [48]. In addition, at this time, Europe had already experienced the rise of the Modern Movement, intended to be international and characterized by mass culture, serial production and machinery [6], ideas which were also reaching the territories occupied by the European countries.

Although some attempts were made to reduce construction costs by importing completely prefabricated buildings, delays in transport and difficulties in assembly for an unskilled local population resulted in the failure of these initial trials. From then on, the accepted and permanent solution was to import industrialized materials and components.

Along with this process of new town planning and building, there was a parallel process of conservation of traditional architecture in rural areas, where most of the local population lived. Although this could be understood as a desire to maintain their identitarian features, it is also true that the new building materials were entirely inaccessible to the vast majority. The local population continued to maintain their traditional earthen houses, regardless of the evolution of architecture in the cities.

The dissolution of the colony, the massive migration of the population to other colonies, the regime of forced labour there and the compulsory participation of men as a corps of the French army in the war did not prevent the traditional chiefs from trying to preserve the identity and autonomy of their peoples. After World War II, a group of chiefs from the former Mossi kingdom of Yatenga began a campaign to convince the National Assembly in Paris to re-establish Upper Volta. The French government eventually decided to send a representative to determine whether the population really wanted this to be restored [18].

Whether because of the favourable outcome of this report or to halt the anti-colonialist advance of Houphouët-Boigny and the *Ressemblement Démocratique Africain* (RDA), which was increasingly represented in Ivory Coast, Upper Volta regained its status as a French colony in 1947 and held its first elections two years later, in 1949.

With these elections, a slow process began by which power was no longer exercised by the traditional chiefs but by the politicians from the newly established parties. However, it is true that these parties had emerged to represent the different cultural groups and that their leaders were those who could economically and socially meet the conditions required

to form a party, i.e., the members of the former ruling families. Moreover, rural populations were reluctant to accept the changes, and even today, the figure of the traditional chief maintains its authority in rural areas. For the majority, the re-establishment of the colony and the holding of elections did not mean so much the gain of civil rights but rather, and most importantly, the end of forced labour outside their territory [18].

There is evidence from this decade of the first administrative actions related to land property. These regulations could be considered the origin of the concept of "definitive construction", contrasting with the building traditions of the country, and the one that has most influenced how they are currently perceived. A 1951 decree concerning the government of the Kaya region, for example, established the requirements that buildings had to meet for their owners to receive the *Permise d'Habiter* [39]:

(a) The buildings must be built on a solid (*en dur,* in the original document in French) foundation. The walls should be solid up to at least 30 centimetres above the foundation.
(b) The pillars of the verandas, the corners of the buildings and the supporting pillars should be made of solid material.
(c) Roofs should be made of non-combustible materials such as fibrocement plates, tiles, cement terraces or similar materials, with the exception of clay terraces and straw roofs; the use of asphalted cardboard for sheds and rooms will be tolerated.
(d) For the purposes of these specifications, the following materials are considered solid masonry materials: stone, bricks, artificial stone bound with lime or cement mortar or bound with clay, provided that the walls are carefully coated with hydraulic lime or cement mortar.

This regulation affected only the urban areas. The rural areas, which still maintained the authority of their traditional chiefs, retained their native land administration and were therefore still exempt from these directives. However, the fact that solid construction (*en dur*), which excluded traditional building materials, was the guarantee for the habitation permit and inevitably influenced the local conception of earthen architecture.

On the 5th of August 1960, the colony became independent from France. During the ten years following the first democratic elections, anti-colonialist ideas had spread to the various political parties in the country, as they had to all the other French colonies in West Africa. Finally, a set of circumstances, both inside and outside the country, led Maurice Yameogo to become the first president of the Republic of Upper Volta.

3.3. Republic of Upper Volta (1960–1984)

This political change and the adoption of the administrative structures of the colony can be seen as analogous to what also happened in the field of architecture. According to Whyte, overall, the debate on colonial architecture cannot be reduced to a mere conflict between the opposing European and native styles. The debate became more complex as the local population, and especially their elites, chose to adopt the foreign architecture. This was seen as a symbol of status and a sign of the capacity to obtain foreign products that were much more expensive than local ones [6]. For most of the population, concrete, in particular, began to be associated with the concepts of well-being and health as opposed to traditional materials. Cement cladding imitating concrete constructions on earthen walls was increasingly used, especially in urban environments [50]. This was also favoured by building regulations, as mentioned above. The European-style buildings and imported industrial materials were distinctive and began to be valued as something remarkable.

This gradual adoption process, common to all the colonies, also took place in the new Republic of Upper Volta. Cement, in this territory, remained unaffordable for the majority of the population, and at this time, the first transformations of vernacular architecture affected, above all, the earth and straw roofs, which began to be replaced by those of corrugated sheet metal. Although the price of these new materials delayed the extent of these changes, the devaluation of traditional earthen architecture as "non-definitive construction" was beginning to spread not only among local leaders but also among a

large part of the population. This could be explained by the high value that many African cultures, including the Mossi, had historically attached to the newcomer from abroad, foreign and exotic. In fact, some authors have recorded how many West African cultures attributed their foundation to a foreign warrior who helped the native population and thus became their ruler [16,20–22]. Leaving aside the serious consequences of colonialism, this cultural factor might explain the rapid adoption of European systems.

Following independence, West African countries were left without the infrastructure, experience and industrial base needed to build the large facilities, administrative centres and factories that modern life and the general international context seemed to demand of them. The former colonies resorted to European-trained architects and European-based construction companies to design and build the new nations [6]. At the time, the only way African nations could maintain the modern architecture built in colonial times was to depend on European countries for the supply of industrial building materials and skilled labour [51].

Thus, for instance, in stark contrast with the traditional dwelling of the Mossi kings, in 1965 the French architect Foblé designed the residence for the first president of the republic, Maurice Yaméogo, in the city of Koudougou (Figure 7). The Yaméogo Palace, now an abandoned ruin, was an imposing building, approximately 1200 m^2 in size, which once hosted the meetings of the president with important African dignitaries such as Houphouët-Boigny, the precursor of the first independences. The project, adapted to the hot and dry climate of this part of the country with its large, well-ventilated open areas, was built using imported materials and technology and reflecting the architectural trends in Europe.

Figure 7. Current condition of the *Palais Yameogo* in the city of Koudougou.

Simultaneously, another building designed by the same architect was inaugurated in Ouagadougou. This was the current *Maison du Peuple*, an emblem of the city originally built to house the *Union Démocratique Voltaïque* (UDV), the party of the then-president. Within three years and following the successive military uprisings, the former *Maison du Parti* became a public establishment independently managed. This building came to be iconic, with a capacity of 3000 people, an assembly hall, courts, pavilions, a radio broadcasting cabin, bars and restaurants and, despite its advanced state of deterioration, is still used for the organisation of concerts and festivals. Most see the large lanterns that illuminate the interior of the building as a metaphor for the traditional conical roofs of Mossi architecture. However, again, despite a certain adaptation to the context, the style and materials were those of imported European architectural trends (Figure 8). In developing cities, construction had become a discipline that required technicians, in this case French technicians, to introduce the structural systems of large spans into the country.

Figure 8. Current condition of the *Maison du Peuple* in the city of Ouagadougou.

The construction of these buildings in the 1960s coincided with a new period of migrations towards the urban centres of cities such as Koudougou, Bobo-Dioulasso or Ouagadougou [33,48]. These centres needed new facilities—schools, hospitals, town halls and administrative offices, markets, malls, cinemas, etc.—which were new typologies of large-scale buildings.

Thus, although Europe was increasingly losing political control over Africa, its cultural influence on the continent did not decline but rather seemed to increase with respect to architecture [52]. A transfer of ideas, styles and forms of construction from Europe to Africa had occurred based on an intercontinental relationship, which was initially imposed and later maintained. This happened despite the fact that cultural adoption implied an economic dependence on other countries.

3.4. Burkina Faso from 1970 Onwards

Parallel to the arrival of the independence and the formation of the new state, international cooperation, officially established after the World War II, can be considered another external agent exerting influence on the territory. The concept of "development" itself and the way to achieve it had changed and so had the approach to international cooperation for development.

Whereas in its early stages cooperation was understood as a unidirectional transfer of technological improvements and large-scale infrastructure construction, in the 1970s, this model was questioned in order to shift towards smaller-scale projects, with a more local character based on the joint work with counterpart associations. Schumacher's ideas on the need to rethink economics and technology, restoring them to the service of human beings, resulted in the appropriate intermediate technologies theory. The final lines of his most famous essay seem to call for the necessary learning from local traditions [53].

Following this line of thinking, the international association of architects ADAUA (*Atelier pour le Développement naturel d'une Architecture et d'un Urbanisme Africain*) was created in 1975 and was active in Burkina Faso from 1978 to 1990 [37]. This association was the first to use stabilized earth blocks in major projects, the *Pan Logements APP* in Fada N'Gourma, the *Centre Matériaux* or the *Panafrican Institut for Development* in Ouagadougou [34,37]. However, these new buildings were not entirely accepted by the population. The necessary maintenance was not carried out, and they quickly deteriorated. Some authors hold that this lack of adaptation was due to two aspects [37,48]:

- Earth used in the stabilized blocks, later known as Compressed Earth Block (CEB), was still associated with the negative image of poor, non-definitive old material.
- Earth was used in walls and vaults with a foreign technology dependent on a specific training and organization that was not accessible to the local population and, therefore, not easily affordable.

Ultimately, the solution of stabilized earth blocks or CEB was seen as an ambiguous technique that was neither entirely local nor entirely foreign. This, added to the lack of promotion of the qualities of earth as a building material, led to the abandonment or deterioration of these buildings.

In addition to the contributions of international cooperation, interest in local materials began to emerge in official spheres after the claim for a local economy by President Thomas Sankara in 1984. Unfortunately, however, this government did not have enough time to implement its measures, and it was not until the 1990s that the political option for the local began to materialize (Table 2).

Table 2. Summary of the main products that use local materials such as earth [1].

	BLT	CEB	SBF	TMV	GRANITO
Full name	*Block Latéritique Taillé*	*Compressed Earth Blocks*	Bricks of the *Société de Briqueterie du Faso*	*Tuiles en Mortier Vibré*	*Les granito*
Composition	Carved stone	Compression of a clayey earth blend stabilized with a low proportion of cement	Fired clay bricks Earth bricks stabilized with cement	Tiles made from a mixture of sand, gravel and cement	Fragments of limestone blend with cement for floor construction
Start	-	1994	1990	1994	-
Promotion	Their use is encouraged among local civil engineers.	Technical support in training and promotion of LOCOMAT	Public company from 1998	Technical support in training and promotion of LOCOMAT	-
Main site of production	Quarries in the western and south-western regions of the country	Ouagadougou (or construction site in case of nearby resources)	Ouagadougou	Ouagadougou	Bobo-Dioulasso
Production	Handmade production	Handmade production	Industrial production	Handmade production	Industrial production
Drawbacks	Unregulated physical and mechanical characteristics	Production and distribution	Scarcity of wood for fired pieces	Production and distribution	Production only under demand
Average price	90–100 CFA [2]	90–125 CFA [2]	175–325 CFA [2]	200–240 CFA	-

[1] Based on the study made by Amadou Traore in 2003 [36] and the report of the *Direction du Développement et de la Coopération* (DDC) in 2005 [37]. [2] This cost must be increased by the cost of transport and installation, which makes these products more expensive than cement blocks (150 CFA).

Furthermore, the beginning of this development also coincided with a 50% devaluation of the franc of the *Communauté Financière Africaine* (CFA), the currency in Burkina Faso, from its initial value in 1994, which made imported products increasingly inaccessible. At the same time, the growth of urban centres continued to increase the demand for accommodation (Table 3). The official shift towards local materials as a cheaper alternative to meet the housing needs of cities can be seen in the LOCOMAT initiative, a project intended to promote the use of CEB and TMV with actions that include technical training for producers.

The creation of the association *La Voûte Nubienne* in 2000 could be highlighted as another action in this line. This association specialised in the construction of coverings with the ancient technique of the Nubian earth vault as a sustainable and ecological alternative to the desertification and deforestation in the Sahelian countries.

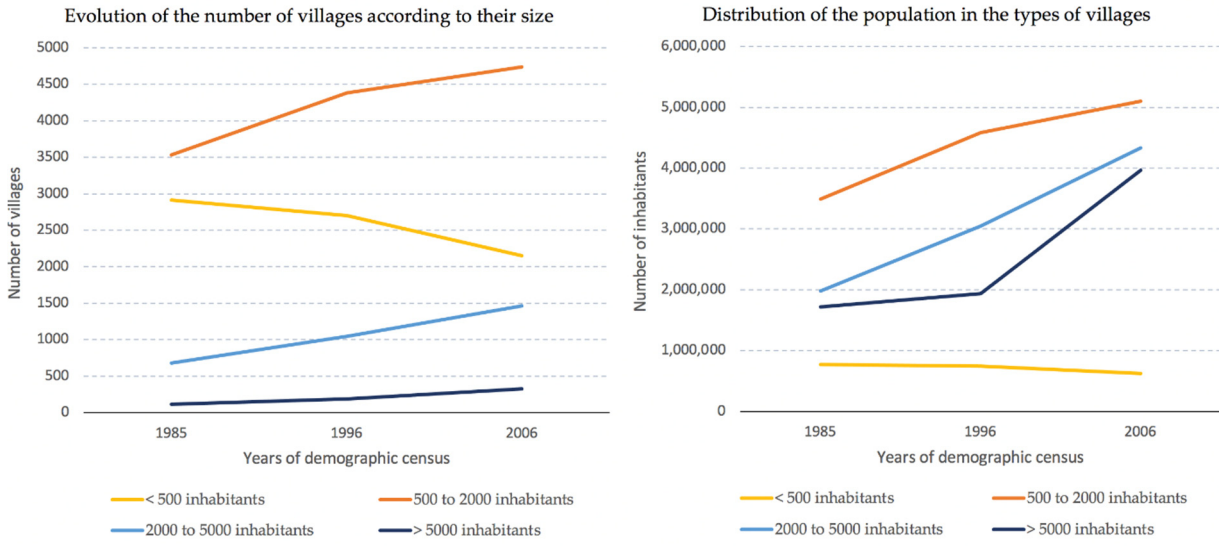
Table 3. Population growth and population distribution in urban and rural areas in 1985, 1996 and 2006 [1].

	1985	1996	2006
Total population (inhabitants)	7,964,705	10,312,609	14,017,262
Urban areas (%)	14	16	23
Rural areas (%)	86	84	77

[1] Based on the data data from the Institut National de la Statistique et de la Démographie (INSD) [13].

However, the concepts of "definitive" and "non-definitive" materials were still present in Burkina Faso, and the population remained sceptical about the use of earth. In fact, the requirements for access to property in 2005 were reminiscent of the 1950s decrees on housing: in order to obtain the *Permise Urbaine d'Habiter* (PUH), residents had 5 years to add value to their land by building a house covered with at least 16 corrugated sheet metal modules and an outdoor toilet area. As a provisional solution, adobe walls construction was allowed. However, before permission was granted, such buildings could be destroyed by order of the authorities or by the action of rain and wind on a roof and walls that had been quickly and economically built. The insecurity and the fear of not gaining permission were associated with the use of earth, so it was understandable that people wanted to replace these constructions, considered provisional, as quickly as possible by other more durable ones of cement block [37].

Although this situation mainly occurred in the cities, conflicts were beginning to arise in the transition areas that were becoming progressively more urban and less traditional (Figure 9).



(**a**) (**b**)

Figure 9. Growth of population settlements: (**a**) evolution of the number of villages according to their size; (**b**) distribution of the population in the types of villages. Based on the data from the *Institut National de la Statistique et de la Démographie* (INSD) [13].

According to a report by the *Institut National de la Statistique et de la Démographie* (INSD) on the 1996 general population census in Burkina Faso, most of the population lived in "precarious housing". This report also stated that only 12.2% of the houses were *en dur*, i.e., made of durable, permanent or so-called "definitive" materials, and that about 60% of the dwellings were built with a precarious roof of earth or straw. *En dur* construction, i.e., solid construction, referred to the use of concrete, cement block, stone or bricks, and

semi-dur referred to the construction of earth walls enhanced with a cement cladding. The association of earth with the concepts of precarious, backward or poor, could therefore still be seen, despite the government's or associations' initiatives to develop building products or techniques based on the use of local resources [37].

In this regard, it is worth noting the work that some international agencies have done promoting local materials. For instance, in 2004, a United Nations Development Programme (UNDP) report on habitat in Burkina Faso mentioned the need for housing plans to be built with local alternatives such as CEBs or BLT [41]. In spite of this, the official concept of "decent housing", built with "definitive" materials, continued to exclude the traditional techniques still used by most of the population (Table 4) (Figure 10).

Table 4. Use of "non-definitive materials" in walls, roofs, floors and entire houses in 2014 [1].

	Houses with Walls from Non-Definitive Material (%)	Houses with a Roof in Non-Definitive Materials (%)	Houses with Earth Floors (%)	Houses from Non-Definitive Materials
Burkina Faso	76.5	34.8	42.5	77.0
Urban areas	38.6	5.0	7.7	39.5
Rural areas	91.5	46.5	56.2	91.9

[1] Based on the data from the Institut National de la Statistique et de la Démographie (INSD) [13].

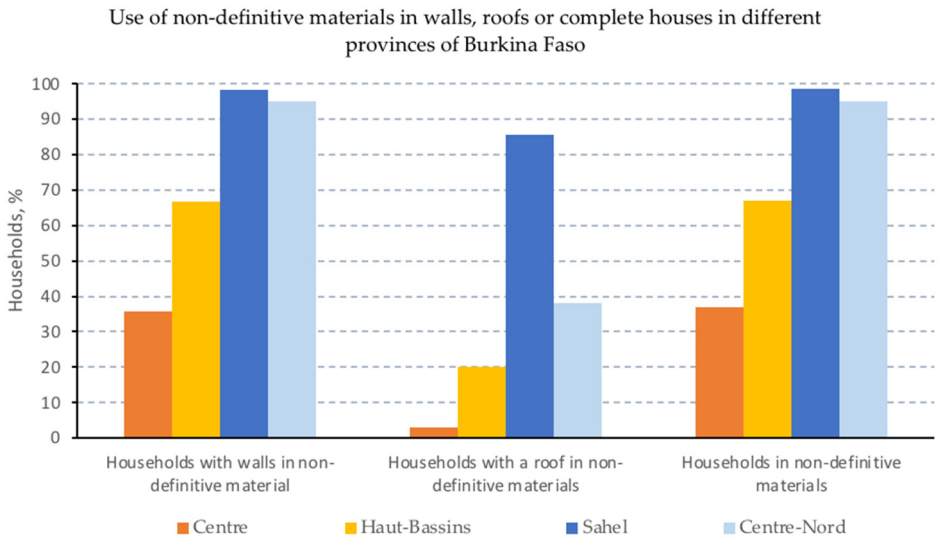


Figure 10. Use of non-definitive materials in walls, roofs and entire houses in four different regions of Burkina Faso: centre (region of the capital Ouagadougou), Haut-Bassin (region of Bobo-Dioulasso) and the two more rural regions of Sahel and Centre-Nord. The very use of the terms "non-definitive" by this official organism is indicative of the concept of the natural materials. Based on the data from the *Institut National de la Statistique et de la Démographie* (INSD) [13].

The transformations of vernacular architecture in rural areas continued this trend towards the use of definitive materials, albeit at a slower rate than in urban areas. Due to the high price that cement had, the changes continued to affect, especially, the earth and straw roofs that were being replaced by undulating sheet metal roofs (Tables 5 and 6).

Table 5. Distribution of households according to the materials used in the walls in 2003, 2005, 2007 [1] and 2009 [2].

	Households (%)			
Wall Materials	**2003**	**2005**	**2007**	**2009 [2]**
Earth	83.0	80.6	80.6	79.1
Brick [2]	-	-	-	1.1
Improved adobe [2]	-	-	-	12.4
Adobe [2]	-	-	-	65.6
Stone	0.9	0.4	0.9	1.2
Cement	11.4	14.6	14.9	17.0
Straw	3.5	2.3	2.1	2.5
Others	1.1	2.1	1.4	0.2

[1] Based on the data from the *Institut National de la Statistique et de la Démographie* (INSD) of Burkina Faso [13]. [2] Data from the *Enquete Integrale sur les Conditions de Vie des Menages* 2009–2010 (EICVM), where the distinction is made between bricks, improved adobe and adobe [13].

Table 6. Distribution of households according to the materials used in the roof in 2003, 2005, 2007 [1] and 2009 [2].

	Households (%)			
Roof Material	**2003**	**2005**	**2007**	**2009 [2]**
Straw	30.2	26.5	27.1	23.6
Tôle	41.1	45.7	48.6	56.5
Earth	27.8	26.9	22.6	18.5
Others	0.9	0.9	1.6	1.4
Dale	-	-	-	1.2
Tuile	-	-	-	0.1
Others	-	-	-	0.1

[1] Based on the data data from the Institut National de la Statistique et de la Démographie (INSD) [13]. [2] Data from the Enquete Integrale sur les Conditions de Vie des Menages 2009–2010 (EICVM) [13].

This represented not just a change in building materials, as this transformation also affected the very configuration of the typical dwelling. The characteristic curved shapes of the Mossi round hut were incompatible with the rectangular sheet metal modules, and this led to the disappearance of this type of building. In addition, the flat earthen roofs of orthogonal buildings, also common in the building tradition of some of the Burkina Faso cultures, were disappearing. The dimensions of these buildings were then determined by the number of sheet metal modules that were used.

In the 2018 survey on the transformations of traditional Mossi architecture conducted in the village of Baasneere [29–31], only 64 of the 500 cases of buildings analysed were traditional round huts. Only 11 of the total of cases of rectangular constructions maintained a traditional flat roof of earth. When questioned about their reasons for using the sheet metal, the inhabitants of the village replied that, although it did not provide good protection from cold or heat, the traditional roof was a thing of the past and needed much more maintenance.

Moreover, natural materials which were formerly available for free then had to be bought; in particular high-quality timber, which was becoming increasingly scarce in the country, was even more expensive than corrugated sheet metal in some areas [37] (Figure 11).

Figure 11. Transformations of the traditional earth roofs in Tiébéle, with the consequent change in the form of the construction.

As the studies in Baasneere showed [29–31], despite the desire for durability, it was precisely the installation of the metal sheet on traditional adobe walls that resulted in precarious constructions given the discontinuity and incompatibility between both materials (Figure 12).

Figure 12. Material discontinuity generated by the installation of the metal sheet on the adobe wall. The change in the material used in the roof is not accompanied by a change in the construction technique, which causes the rapid deterioration of buildings.

In these surveys, it was observed that the elders of the community were mainly the ones who continued to build and inhabit the traditional types of housing. According to some older people, for example, the roar of torrential rain on the sheet metal gave them an uneasy feeling of insecurity. For them, the traditional roof solution of wood, straw and earth was much more suitable even if it needed to be repaired annually. Some of the courtyards visited during the stay preserved remains of traditional constructions with flat earthen roofs that had been built by the grandparents of the current inhabitants. With the passing of time and the absence of their original occupants, these buildings had been left without repair. The ephemeral nature of these constructions and the close link that exists in the culture of this village between the dwelling and its inhabitant explain why the housing unit that has belonged to an individual is not occupied when the person dies. The building is abandoned and deteriorates over time.

Due to the high price of cement, the adobe walls were generally still being built and maintained. The custom of preparing the adobes for repairs once the rains had passed continued, although two factors began to have an impact on this tradition in the village:

- The migration of young people in search of work opportunities to urban centres, mainly Kaya, the capital of the region, or Ouagadougou. Their assimilation of the habits and rhythms of city life means a logical change in their aspirations and a distancing from traditional knowledge.
- The transition from self-construction to the professionalization of construction. In the village of Baasneere, in 2018, new houses began to be commissioned to masons. Since the construction project is ordered and has a price, it is understood that it must be durable and definitive, which explains why these new buildings had been made with cement blocks and corrugated iron sheets. These housing projects required a previous design whose definitive character was opposite to the spontaneity and adaptability of traditional housing. The incipient professionalization of the construction in the village would have also contributed to settling the idea of the definitive construction, being an analogy, on a small scale, of what happened in the cities.

4. Discussion

The historical approach to the perception of vernacular earthen architecture in Burkina Faso has provided some answers to the questions formulated in the introduction.

At present, the local population's concept of their traditional architecture is deeply conditioned by the idea of duration. The expressions "definitive material" and "non-definitive/ephemeral material" have settled in the collective consciousness. As a result, when compared to the architecture in the cities, traditional earthen architecture is associated with the old and undeveloped, in spite of it not depending on foreign resources for its construction. The studies conducted between 2003 and 2005 by Amadou Traore [36] and the *Direction du Développement et de la Coopération* (DDC) [37] pointed out that most of the population aspired to inhabit a dwelling made of cement blocks and undulated sheet metal. This was confirmed by the own inquiries made in 2018 in the village of Baasneere.

A review of the evolution of architecture in the different stages of the history of Burkina Faso has attempted to analyse the reasons for these preferences. Based on this analysis, the origin of the current appreciation of traditional earthen architecture can be traced back to the great cultural change that began in 1919 with the European occupation.

As Burkina Faso has evolved since colonization, technological innovation in the construction sector has always been imported even if, in recent years, the resources used in the production of building materials have been local. This means that the evolution of architecture in the country has been completely alien to a building tradition that, for nearly a century, has remained on the margins of development. At the same time, the high cost of imported materials has led to the maintenance of traditional building techniques. This conservation has been subject to a slow process of transformation motivated by the willingness of the population to assimilate traditional buildings into what has officially and historically been considered "decent housing". In other words, the preservation of the vernacular architectural heritage in Burkina Faso did not come about so much because of its qualities and values, denied by the various administrations, but rather due to the economic inaccessibility, for a large part of the population, to the new modes of construction.

The current situation of precarious adobe housing in the urban milieu and of the transformations of traditional architecture in the rural areas is the consequence of the negative opinion towards earthen construction which has long been held. Another cause may be found in the lack of investment in a construction industry, which could have led to the development of traditional architecture.

This brings to the last question: How could a sustainable development of traditional earthen architecture be brought about in the context of Burkina Faso as a solution to the present ecological crisis? The new materials based on the use of local natural resources, such as the CEB or BLT, could represent a sustainable and adaptable advance to some traditional techniques such as the adobe. However, the studies on the use of these materials [36,37] show how these new products are not yet a real alternative for the majority of the population. In the village of Baasneere, for example, the CEB, which had been used

in the construction of a school by an NGO, aroused curiosity and appreciation among the population, although, precisely because it had been used in an international cooperation project, it was seen as a foreign and inaccessible material.

It seems that the use of local materials in new building products is not yet sufficiently significant to link recent constructions and traditional dwellings, becoming a way of preserving vernacular architecture in a sustainable development. There may be two main reasons for this rejection: firstly, the lack of promotion to counter people's concept of natural materials and, in particular, of earth; secondly, the continuing high cost of the production, distribution and implementation of these new products.

The return to the use of earth and other local natural resources is in accordance with the international documents for sustainable development. The New Urban Agenda, which contributes to the implementation of Goal 11 (to achieve inclusive, safe, resilient and sustainable human settlements), focuses, precisely, on the efficiency of resources and prioritizes the use of local materials [43].

The same document also recognizes the importance of cultural diversity as a source of enrichment for humanity. Culture is presented as an indispensable element for the inclusion of the population in the initiatives of sustainable development, strengthening social participation and the exercise of citizenship in these initiatives. Furthermore, according to the New Urban Agenda, culture should be taken into account in the promotion and implementation of new patterns of production and consumption that ensure the responsible use of resources and counteract the adverse effects of climate change [43].

The importance of the use of local resources is also reflected in the African Union Agenda 2063, a document arising from the need to address the priorities of Africa in the achievement of real independence. Within this strategic framework, the aspiration to maintain a strong cultural identity and common heritage, values and ethics can be highlighted [45]. The intention is to achieve the African Cultural Renaissance against the alienation and acculturation promoted by colonialism. The two actions considered in this regard are the Great African Museum and the Encyclopedia Africana. Following the African Charter for African Cultural Renaissance, these measures aim to promote the cultural wealth of the continent as a tool to mobilise and unite the population in countering the cultural diaspora [46]. It would also be a means to learn from traditional models, as mentioned in the introduction to this article, and to maintain the values and identity traits of African societies in the development of the continent.

An internationally accepted position can be observed, therefore, that understands the importance of maintaining cultural heritage in the process of sustainable development. The New Urban Agenda mentions, in addition to the restoration and adaptation of architectural monuments, the protection of all kinds of traditional expression and the support for plans for self-construction and the gradual construction of housing [43].

However, this recognition contrasts with the very devaluation of vernacular architecture among the locals. It could be stated that while the international panorama seems to expect from the population the maintenance of their traditional modes of construction, locally, these are still considered precarious because of the use of "non-definitive" materials.

The problem seems to be due to the excessive emphasis placed on the durability of constructions as a guarantee of "decent housing". This "decent" attribute in housing could be considered, instead, to go beyond the question of materiality, depending rather on the existence of a basic network of services: efficient and clean energy, water supply, sanitation, sustainable waste management, sewerage and rainwater management to mitigate the effects of flooding. Once this infrastructure is established, the material question would no longer be so decisive. The mode of construction could continue to be the traditional one of each culture in the country with slight adaptations to these basic services. This should be complemented by measures to contain uncontrolled urban growth and revitalise the rural areas to prevent massive migration. In addition, investment in recovering local resources, such as wood, could in turn reverse the consequences of desertification.

The cultural richness of traditional architecture referred to in the above-mentioned documents [43,45] also goes beyond the material issue. The vernacular dwelling constitutes a complex fabric of customs, habits, aspirations and ideals that result in specific forms and configurations that generally vary over time to suit the lifestyles of its inhabitants. The building of these types of dwellings depends, to a great extent, on its inhabitants. Therefore, a sustainable development of earthen architecture will not be possible if the population does not recover its appreciation for its traditional heritage.

5. Conclusions

As anticipated in the introduction and developed throughout the text, there has been a conceptual shift in the use of earth as a building material that has led to considering traditional self-construction as precarious housing. This current perception prevents earthen architecture from being considered an alternative for sustainable development. The results of the research can be summarised as follows:

- The local population has a negative concept of earth as a building material and, therefore, of traditional building techniques. These are mainly just valued by community elders in rural environments. The aspiration of the young population is to replace natural materials with imported ones, such as cement or corrugated sheet steel, which otherwise have a price that most families find difficult to assume. This conflict is combined with the shortage of some raw materials, such as wood, due to the desertification and the massive use of the soil for crops. This makes it almost impossible to maintain or recover traditional roof configurations. The use of new materials, such as corrugated sheet steel, not only generates an economic dependence but also means a modification of the characteristic features of vernacular architecture or even the disappearance of traditional typologies.
- The current situation has its origins in the cultural change that began with the colonisation of the territory. The use of foreign resources and European models has been favoured for nearly a century. These influences have mainly concerned the construction sector that has developed since then, but they have also had a great impact on the perception of traditional self-construction.
- Although the government and the agents involved in construction, aware of the problem of dependency, have been trying to develop building materials based on the use of local resources since the 1990s, these do not yet represent a real alternative. The lack of promotion and their still high cost explain why they have not yet been accepted by the majority of the population.
- The international scene highlights the importance of preserving cultural diversity as a tool for including people in the development process and promoting their participation. Feelings of empowerment, identity and belonging are recognized as enriching for human beings and are supposed to arise, especially, from the maintenance of cultural features.

From these conclusions, it is possible to distinguish two different views: the local one, which distrusts its traditional techniques because of the use of non-durable materials and the abandonment of the habit of maintenance, and the international one, which is aware of the great cultural value of vernacular architecture as an indispensable tool for sustainable development. Added to this second view is the academic vision, which, as indicated in the introduction, has demonstrated the environmental, sociocultural and economic sustainability features of vernacular architecture and propose it as a solution to counteract the three sides of the current ecological crisis. It seems necessary, first, to bridge the gap between these two opposing views.

As already mentioned, one possible solution would be to redefine the concept of "decent housing" assuming that, beyond materiality or construction processes, this essential right includes access to basic services (energy, water, sanitation, waste management). Traditional configurations could be, then, adapted to this basic structure without losing their characteristic cultural features. However, all this requires that the population recovers

the appreciation for its constructive traditions and, specifically, for the use of earth. In other words, the value of its own natural, social and cultural resources must be restored. How to accomplish this without causing new cultural negative interference is a complex issue that requires further research.

What this paper has attempted, so far, is to show how the sustainable development of traditional earthen architecture will seem unattainable as long as the concept of "development", which has marked the evolution of Burkina Faso over the last century, is not sustained by historical, cultural and local building traditions.

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