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From Precariousness to Sustainability: A Participatory and Ecological Housing Project for the Elig Effa Neighborhood

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Abstract:- This article examines the precarious housing conditions in the Elig Effa neighborhood. It begins with an analysis of the existing housing in this area, highlighting the main characteristics of the neighborhood as well as the materials and construction techniques commonly used. The study identifies the strengths and weaknesses of these materials, emphasizing their impact on the durability and resilience of the housing. The article then proposes a list of alternative materials better suited to local constraints and environmental requirements. This list is developed considering the ecological properties, availability, and cost of the materials. Finally, the article proposes a participatory and ecological housing model specifically designed for Elig Effa. This model incorporates sustainable construction practices, ecological materials, and promotes the involvement of local communities in the construction process. The proposed model is thus both sustainable and affordable, tailored to the residents' needs, and contributes to the positive transformation of the neighborhood.

Keywords:- *Affordable Housing, Slums, Participatory Approach, Sustainable Architecture, Yaoundé, Cameroun.*

I. INTRODUCTION

By 2030, urban land will account for more than 200,000 slums inhabited by about 2 billion people, or a quarter of the world's population [1]. As architect Francis Kere stated, "Architecture can improve the quality of life of people in the poorest neighborhoods. We must design affordable and sustainable homes that meet the real needs of local communities."[2] This statement highlights the idea that we must provide an innovative solution to the housing problem in the precarious neighborhoods of our cities. In the context of the city of Yaoundé, which currently has 70% of its built-up area occupied by precarious housing, this reflection is all the more relevant.

The social housing proposed by the state, in addition to being insufficient, remains out of reach of the average Cameroonian's budget (between 17,000,000 and 22,000,000 CFA francs to acquire a T1, T2, T3, T4 or T5 type housing) [3]. People with modest incomes are therefore unable to housing properly due to the high cost of construction and materials. As a result, they turn to informal housing. In the precarious neighborhoods of Yaoundé, a large proportion of the inhabitants (34.38%) are informal sector traders, and only 24.83% of households have cumulative incomes exceeding 100,000 CFA francs [4].

It emerges that these informal neighborhoods are faced with a major housing problem, particularly due to the socio-economic status of their residents: How can we design comfortable housing adapted to the problems of the precarious neighborhoods of Yaoundé while keeping it affordable for its population with sometimes very low incomes?

This article proposes to highlight the different characteristics of the precarious housing in Elig Effa 1, to identify the techniques and materials used for the construction of housing in the area, and finally to propose a model of ecological, affordable and participatory housing for the neighborhood.

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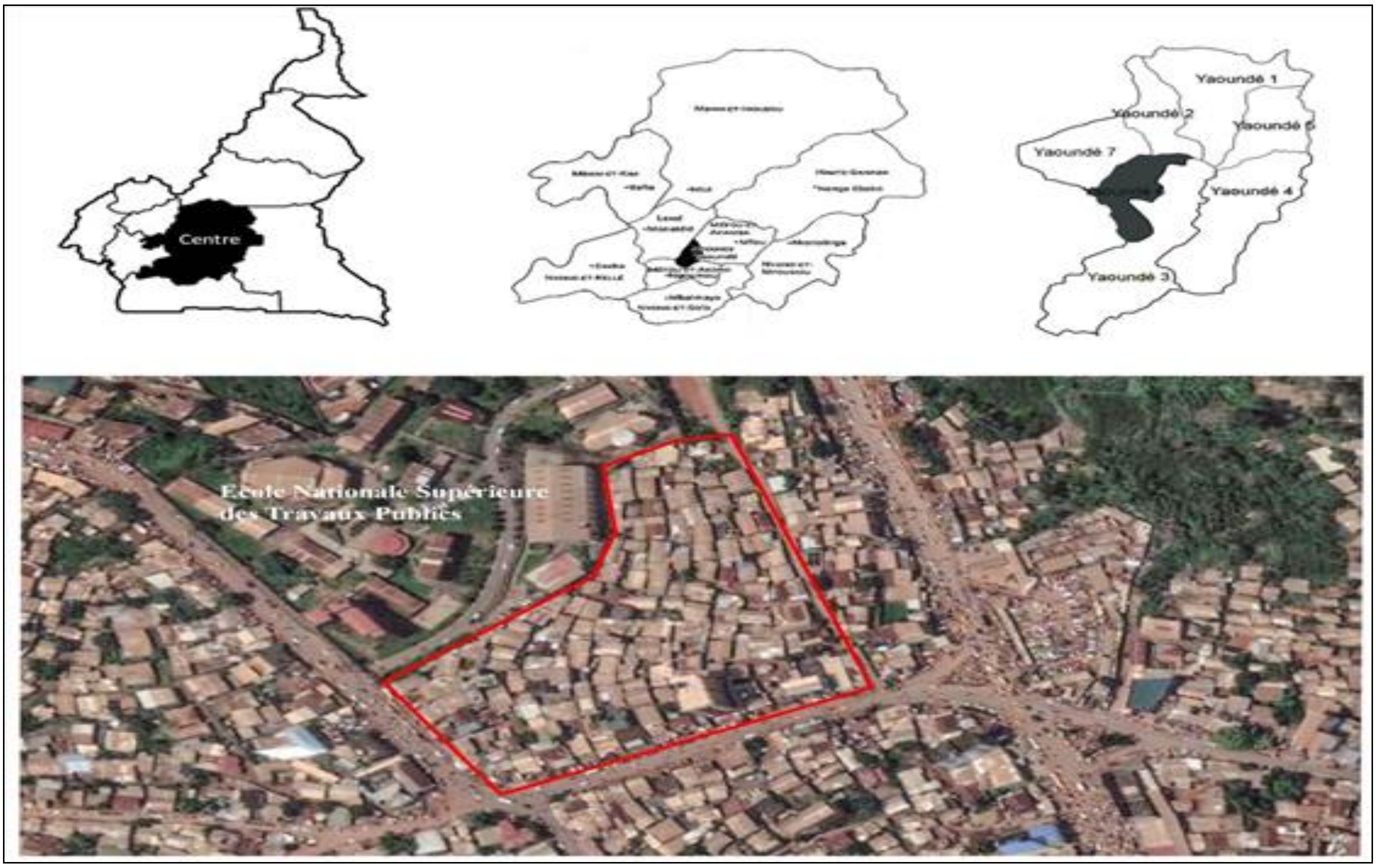

Fig 1: Location and Delimitation of the Study Area

II. SITE STUDY

A. *Location*

The chosen study area is the informal and irregular Elig Effa I precarious neighborhood. It is located in the Yaoundé VI arrondissement near the National Advanced School of Public Works (Figure 1).

B. *Climatic Data*

The city of Yaoundé has an average annual temperature of 24°C, with two distinct seasons:

- Rainy season from April to November: cool and humid with an average temperature of 19°C to 24°C and an average relative humidity between 65% and 75%.
- Dry season from December to March: warm and humid with an average temperature of 23°C to 27°C and an average relative humidity between 55% and 70%.

Precipitation is frequent and distributed throughout the year, reaching 1,000 to 1,700 mm per year (Figure 2).

The global solar radiation on a horizontal surface in the area is between 5.0 and 6.4 kWh/m2/day, except on rainy days (Figure 3).

The wind in the city of Yaoundé has an average speed between 0.3 and 2.2 m/s, and it mainly comes from the southwest (Figure 4).

C. *Urban Composition*

The Elig Effa neighborhood presents an old urban fabric that has densified in an anarchic manner over the years, becoming a precarious district. The precarious neighborhood is not located in a risk zone, such as flood-prone areas, steep slopes prone to landslides, or areas near cliffs or ravines that could collapse. This situation therefore offers the possibility of considering direct on-site interventions to address the issues of precarious housing and informal settlements that characterize this neighborhood. Housing improvement operations, rehabilitation, or even partial reconstruction can be considered without having to relocate the entire population.

➢ *Neighborhood Density*

The average land occupancy coefficient in the area can be estimated at 0.85. According to the document "Charter for Sustainable Building, Neighborhood Design and Urban Mobility in Tropical Countries", this coefficient indicates a high density. Because this coefficient should be maintained at 0.5 to allow space for circulation, public spaces and green spaces.

➢ *Mix of land uses*

At the periphery of the neighborhood, there are mainly small shops. The interior fabric, on the other hand, is mainly made up of residential blocks and shared toilet/shower blocks for homes without internal toilets. (Figure 2)

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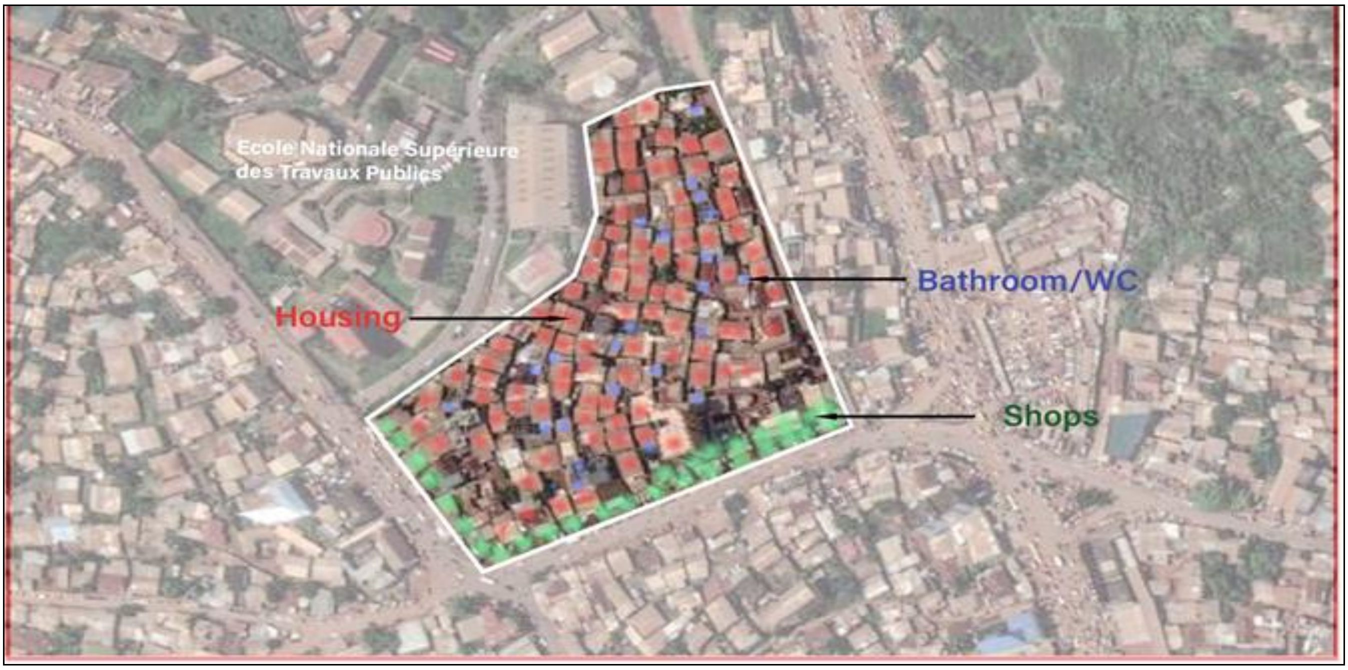

Fig 2: Zonage du Quartier

➢ *Connectivity*

The houses are arranged longitudinally on both sides of the pedestrian alleys with widths between 0.6 and 1.8 m. The network formed by these alleys does not have any particular organization, as they are created spontaneously by the inhabitants themselves and undergo modifications over time. These alleys are used by the population for daily activities (cooking, laundry, drying clothes, washing dishes) and also serve for the evacuation of rainwater (Figure 3). The Shower/Toilet blocks are built randomly at the ends of the alleys, in the courtyards and at the back of the houses.

Fig 3: Pedestrian Alleys and Activities Carried Out (01/2024)

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D. Proximity to Public Services

Table I presents an assessment of the distances of access to basic public services for the inhabitants of the neighborhood.

Table 1: Assessment of Distances to Access Basic Public Services

Public services	**Access distance**	**Regulations**
Healthcare facility	< 3 km	< 5 km according to WHO
Primary school	< 2 km	< 3 km according to UNDP
Security services	< 2km	< 2 km according to the World Bank
Administrative services	< 4 km	< 5 km according to the World Bank

We can therefore conclude that the populations of the neighborhood have good accessibility to basic public services. This proximity of public services greatly facilitates the daily lives of the populations.

E. State of Basic Services

➢ *Sanitation*

The toilet blocks are not supplied with water. They are built in the open air with recovered materials such as sheet metal, tarpaulin, plastic and wood (Figure 4). The toilets use a pit latrine system with a platform covering the top, but these latrines are often poorly constructed. There is therefore no sanitation and these latrines are also used for washing.

Fig 4: Photo of the Shower/Toilet Blocks (01/2024)

➢ *Drinking Water Source*

On the site, we notice the presence of a few taps, most of the owners of these taps sell drinking water to the other residents. There are also free water sources in the neighborhood. Figure 5 presents these different sources.

Fig 5: Drinking Water Source (01/2024)

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➢ *Electricity*

On the site, we note the presence of some ENEO meters, but electricity is present in the houses mainly in the form of general-purpose current. The electrical wiring circuits are installed in an anarchic manner by the populations themselves and run overhead the pedestrian alleys as shown in Figure 6.

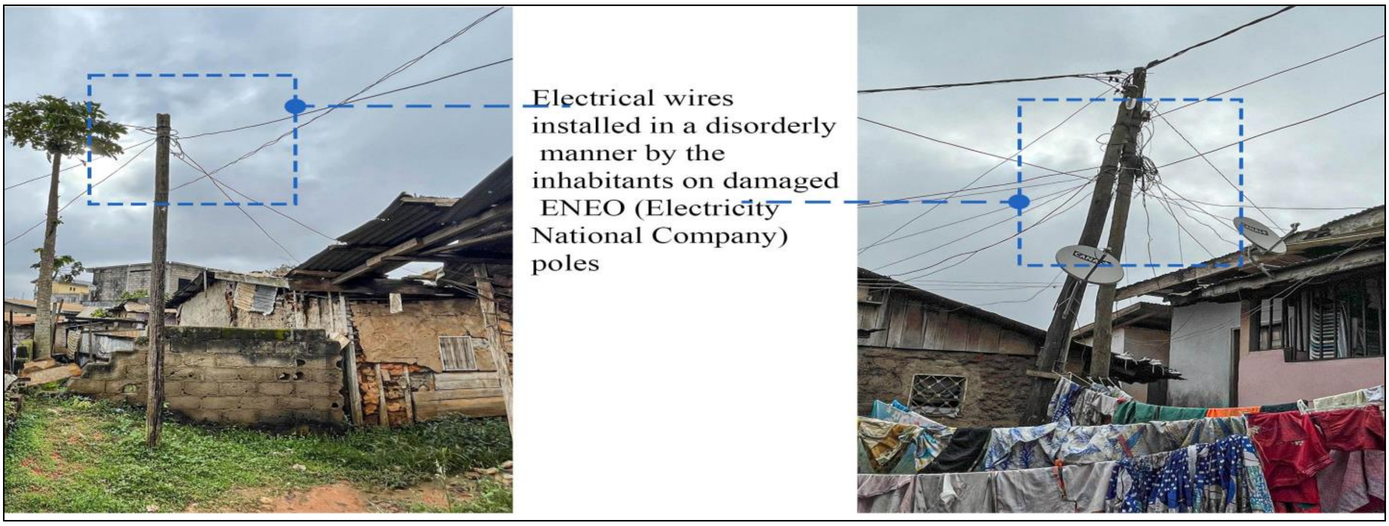

Fig 6: Photos of the Electrical Installations in the Neighborhood (01/2024)

III. PRESENTATION OF PRECARIOUS HOUSING

We mainly distinguish 2 typologies of construction of the precarious dwelling in the neighborhood; the poto poto plastered dwelling with 58% and the cement block dwelling with 35%.

A. Presentation of the Main Typologies of the Precarious Housing

➢ *The Plastered Poto Poto Housing*

This type of construction is the legacy from the traditional local construction cultures, it is made of local materials such as earth, wood and bamboo. Figures 7 and 8 present in more detail the different characteristics of the plastered poto poto construction in the precarious neighborhood.

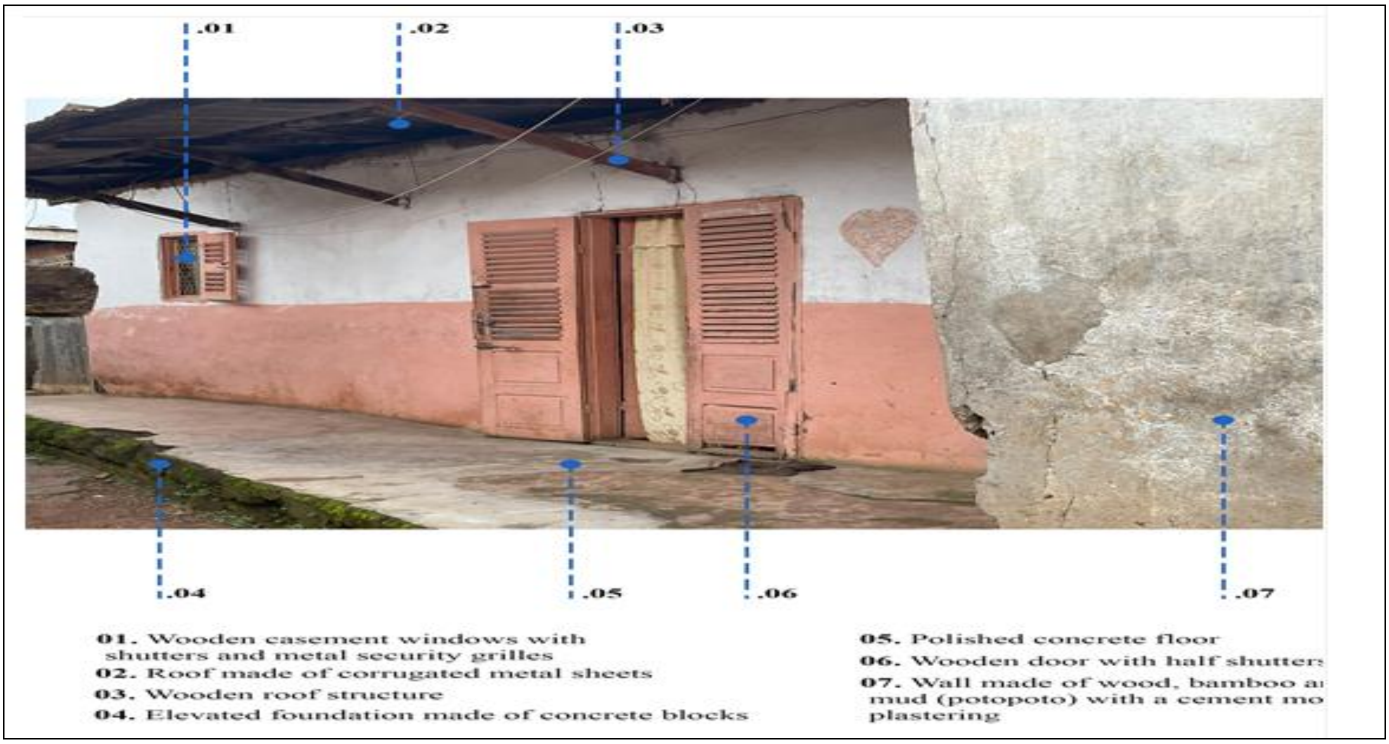

Fig 7: The plastered Poto Poto Housing (01/2024)

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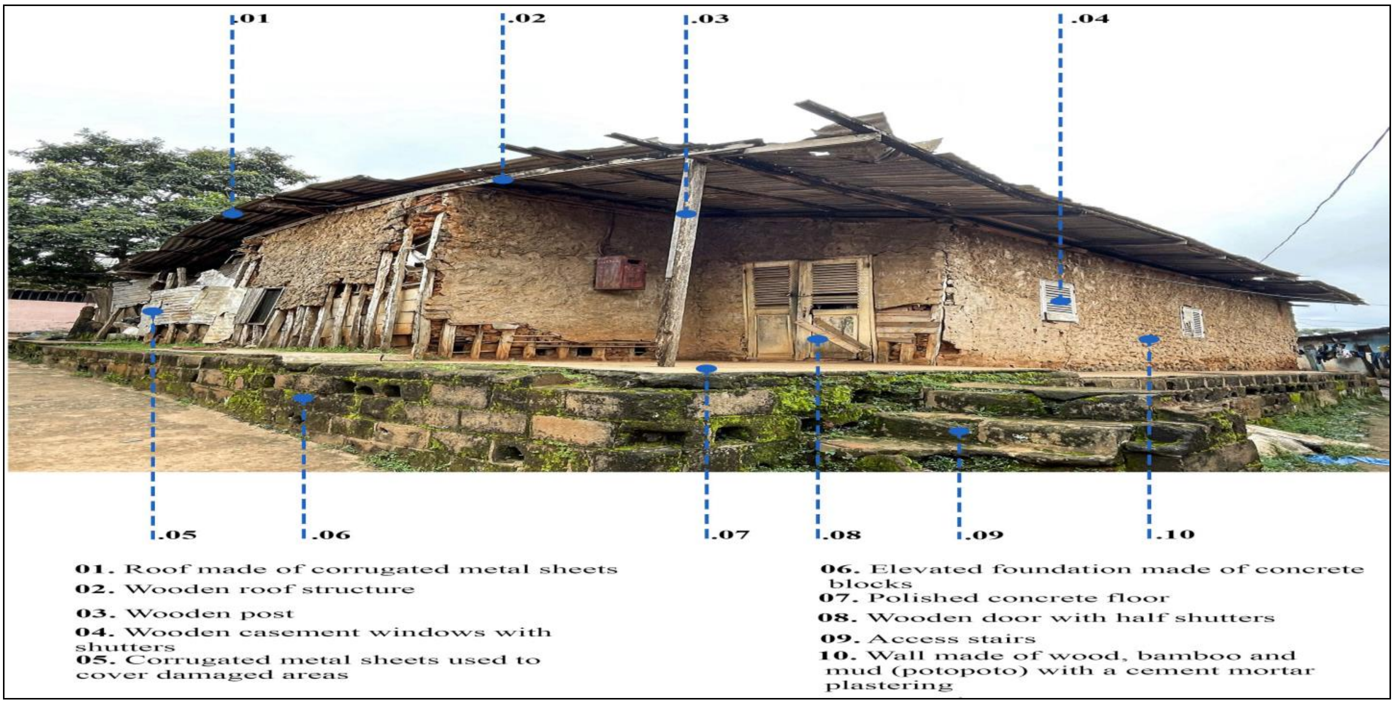

Fig 8: The Plastered Poto Poto Housing (01/2024)

➢ *The Cement Block House*

The use of imported building materials has influenced the production of housing in the neighborhood over time, giving rise to the cement block housing. Figure 9 presents this typology in more detail.

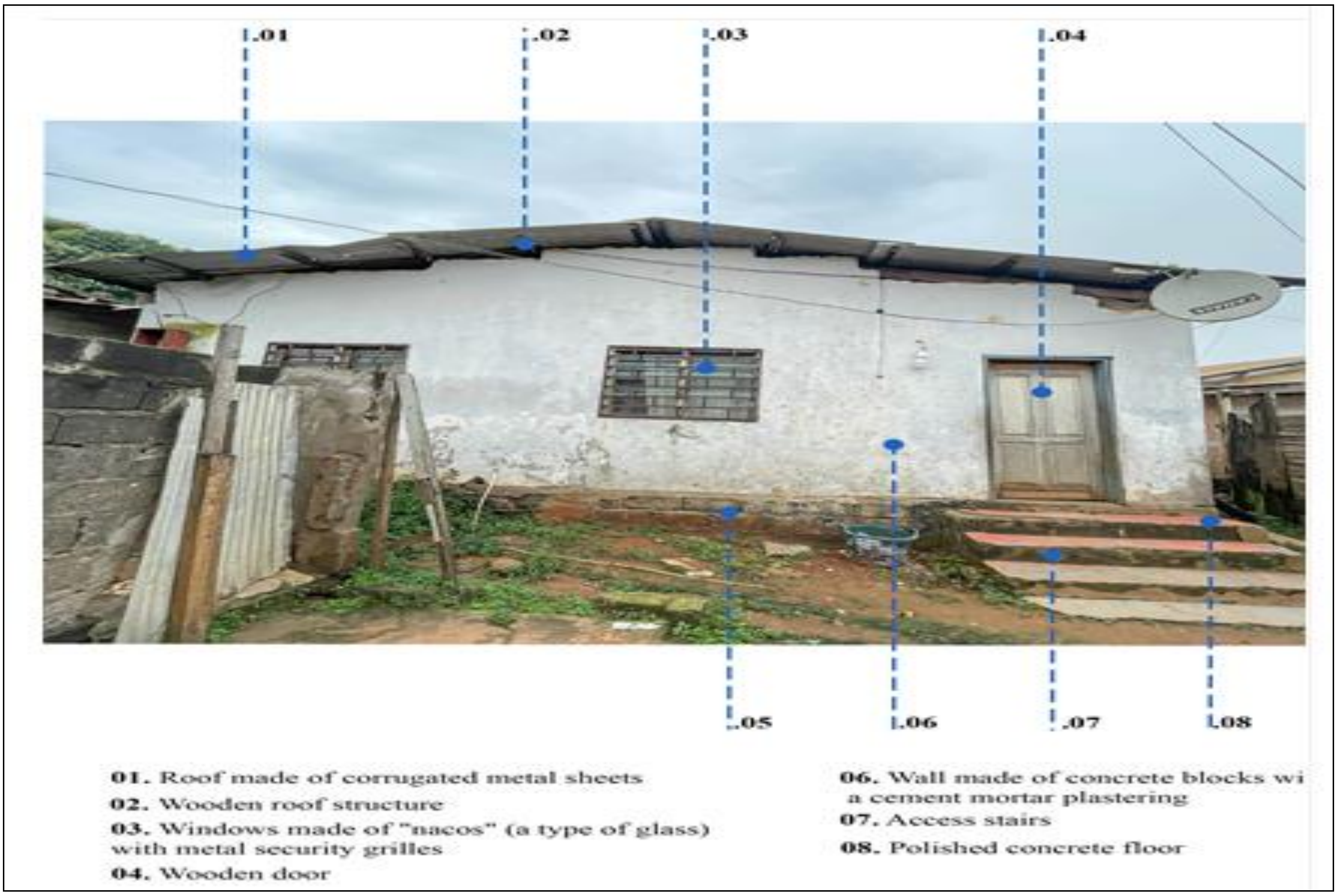

Fig 9: Precarious Housing in Concrete Blocks (01/2024)

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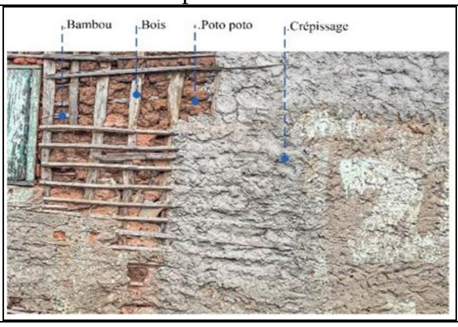
➢ *Description of the Main Techniques Used*

The main construction techniques are described in Table II. This description presents the materials involved in the realization of the technique and the implementation method used in the area.

Table 2: Description of the Main Techniques Used

Techniques	Description
Foundation in concrete blocks	
	The 15x20x40cm concrete blocks are laid all around the construction area up to the desired height. Then, rammed earth is used to fill the inside of the concrete block walls to create a solid platform on which the building will be installed.
Walls made of wood + bamboo + poto poto plastered	
	This is an ancient traditional construction method that uses natural materials such as wood, bamboo, and earth. It consists of forming a structure with vertical wood strips firmly driven into the ground and bamboo running through them, and then filling it with clay soil until a flat surface is obtained. A plaster coating is then added on top.
Concrete block wall	
	The rows of concrete blocks are arranged one above the other up to the desired height. The binding agent used is cement mortar and the most common size of concrete block is 15x20x40cm. A plastering is generally done on the wall.
Wooden frame + corrugated metal sheets	
	The commonly used roof structure in the area has a very simplified design. It consists solely of purlins on which the corrugated iron sheets are nailed. In some cases, rafters are added as well.
Polished Concrete Floor	
	The technique consists of compacting and leveling the ground, then pouring a cement mortar screed on top, and finally sprinkling cement on the screed while it is still very damp. After drying, a smooth surface is obtained.

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Openings with Louvered Shutters	
	The openings commonly used in the area are 1 or 2 leaf wooden openings with louvered shutters or half-louvered shutters. The louvered shutters are fixed and allow air to circulate in the house even when the openings are closed.

B. Strengths and Weaknesses of Different Construction Techniques

Table III summarizes the strengths and weaknesses of the construction techniques as used in the neighborhood. These strengths and weaknesses are evaluated based on economic, environmental, and sociocultural aspects.

Table 3: Strengths and Weaknesses of Different Construction Techniques

Techniques	Strengths	Weaknesses
Foundation in concrete blocks	• Easy to implement • Affordable cost compared to a reinforced concrete foundation • Durable when properly executed	• Absorption of humidity • Limited structural strength
Walls made of wood + bamboo + poto poto plastered	• Low cost • Durable with appropriate maintenance • Local know-how • Humidity regulator	• Sensitive to water • Vulnerable to insects
Concrete block wall	• Durable over time • Easy to implement • Weather resistance	• Higher carbon footprint compared to local materials • Poor thermal and acoustic insulation
Wooden frame	• The minimized structure allows for cost reduction • Environmentally-friendly materials • Aesthetics • Easy to implement	• Sensitive to humidity • Vulnerable to insects
corrugated metal sheets	• Durable over time • Easy maintenance • Lightness • Easy to implement	• Poor thermal and acoustic insulation • Sensitive to temperature variations
Polished concrete floor	• Durable • Easy maintenance • Cost-effective	• Risk of cracks • Difficult to repair
Openings with louvered shutters	• Environmentally-friendly materials • Aesthetics • Improved ventilation	• Sensitive to humidity • Ineffective thermal and acoustic insulation

IV. POTENTIAL TECHNIQUES AND MATERIALS

After analyzing the precarious housing and construction techniques in the area, we have compiled a list of potential techniques for our affordable housing project (Table IV). This selection was based on criteria such as cost, complexity, maintenance, level of community participation, and environmental impact.

Table 4: Description of Potential Techniques

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Foundation	
Dry Stone Foundation	
	Dry stone foundations involve strategically stacking stones to create a solid and stable base to support the building. This technique does not require the use of mortar. It is an ecological, low-cost, and durable solution, with a high level of community participation in its implementation. Dry stone foundations represent an excellent alternative to the concrete blocks that are predominantly used in the area
Walls	
Rammed Earth Wall	
	In this technique, a rigid formwork is assembled, and the layers of earth are manually compacted inside. The formwork is then moved upwards, and the layers accumulate over time. The resulting wall has a thickness between 30 and 40 cm. The earth used must be carefully prepared. The resulting wall is low-cost, eco-friendly, and has a high level of community participation in its implementation.
The Poto Poto Wall.	
	The technique already used on the site can be improved by implementing a more solid structure, by treating the bamboo and wood used against insects, by increasing the thickness of the walls for more stability, and by covering the walls with a clay plaster.
Roof structure	
Bamboo frame	
	The bamboos are carefully selected based on their size and sturdiness, then securely tied together to form a solid structure. Bamboo is inexpensive, eco-friendly, and durable.
Simplified wooden frame	
	The wooden frame/roof structure used here should be minimalist (consisting only of purlins and rafters) like the one already present on the site in order to reduce the cost of construction. This one must be preserved from moisture and water to increase its durability.
Roof	

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Bamboo roof	
	Bamboo roof This type of roofing first involves the careful selection and treatment of the bamboo. The bamboo culms are then split to form the tiles. The tiles are then fixed to the frame structure using woven natural fiber bindings. This technique requires a lot of time, skill, and delicacy.
Thatched roof	
	The first step is to lay a very compact first layer, called the "solin", which creates a robust base. The following layers are then laid in an overlapping pattern, creating a tiled effect. Each new layer is securely attached to the previous one using natural bindings such as willow or hemp. The work continues in detail, with the careful cutting and shaping of the roof edges to achieve a harmonious appearance. The grass is often pre-treated against pests.
Floor covering	
Polished concrete floor	
	The technique used on the site can be improved by first compacting the floor surface to be covered in order to increase the durability of the floor. This technique is inexpensive, durable, and easy to implement. It can also be used in damp rooms.
Rammed earth floor	
	After cleaning the surface, select a clay or silt soil without excess sand. Spread the soil on the floor, moisten, compact and then smooth the surface. A layer of fine sand or fine gravel underneath can improve durability. To improve resistance, it can be coated with a waterproofing layer such as linseed oil or beeswax. The result is aesthetic, eco-friendly and inexpensive.
Openings	

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Wooden openings with louvered shutters	
	The model already present on the site will be improved by adding a mesh screen inside to keep out insects. The technique is aesthetic, eco-friendly, easy to maintain and provides good natural ventilation.
Metal openings with louvered shutters	
	The half-louvered metal openings are inexpensive, very durable, and easy to maintain, secure and provide good natural ventilation. A mesh screen will be added on the inside to keep out insects.
Ceiling	
Woven bamboo ceiling	
	For the construction, the bamboo rods are carefully woven to obtain panels with an aesthetic appearance. These panels are then fixed onto a wooden support. The woven bamboo ceiling is eco-friendly, durable, inexpensive and resistant to humidity
Bamboo stalk ceiling	
	The bamboo stalks are selected, graded, and woven together to create a solid, aesthetic, durable, and eco-friendly suspended ceiling.

V. EVALUATION MATRIX OF THE SUSTAINABILITY OF POTENTIAL TECHNIQUES

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Table V presents an evaluation of the techniques in the context of the informal settlement and according to the defined economic, environmental, and socio-cultural criteria.

Table 5: Evaluation Matrix of Techniques Inspired by Corrinna Salzer (2010)

Nº	**Techniques**	**Initial cost**	**Maintenance**	**Durability**	**Complexity**	**Recycling and reutilization**	**Local availability**	**Carbon footprint**	**Embodied energy**	**Social impact (inclusion, employment)**	**Knowledge transfer**	**Potential of the technique**
	Percentage of evaluation	10 %	10 %	10 %	10 %	10 %	10 %	10 %	10 %	10 %	10 %	100 %
	0 Foundation											
0.1	Dry Stone	6,0	8,0	8,5	7,0	7,0	7,0	7,0	6,5	7,0	8,0	72
	1 Wall											
1.1	Rammed earth	8,0	5,0	6,5	6,5	6,0	8,5	7,5	7,5	7,5	8,0	71
1.2	Bamboo+ wood+ Poto poto	7,0	5,0	6,5	5,0	5,0	7,0	6,5	7,0	7,5	8,5	65
	2 Roof structure											
2.1	Wood (Rafters + Purlins)	6,0	7,0	5,5	6,5	5,0	6,5	6,0	6,0	6,0	5,0	59,5
2.2	Bamboo	8,0	6,0	5,0	6,5	2,0	7,0	8,0	8,0	7,5	7,5	65,5
	3 Roof covering											
3.1	Bamboo tiles	7,5	5,0	6,5	4,0	5,0	6,0	7,0	8,0	7,5	7,5	64
3.2	Thatch	8,0	5,0	6,5	6,5	5,0	8,5	7,5	7,5	7,5	8,5	70,5
	4 Ceiling											
4.1	Woven bamboo	7,0	5,5	5,5	6,0	1,0	7,0	8,0	7,5	8,0	7,5	63
4.2	Bamboo stalk	8,0	6,0	6,0	6,5	2,0	7,0	8,0	8,0	7,5	7	66
	5 Floor covering											
5.1	Polished concrete	5,5	7,5	7,0	7,0	2,0	5,0	4,0	4,0	4,0	3,0	49
5.2	Rammed earth	8,0	5,0	6,0	6,5	6,5	8,5	7,5	7,5	7,5	7,5	70,5
	6 Openings											
6.1	Wooden openings with louvered shutters	5,0	5,0	5,5	5,5	4,5	6,5	5,5	6,5	5,5	5,5	55
6.2	Metal openings with louvered shutters	4,0	6,5	7,0	5,0	5,5	5,0	3,0	3,0	4,0	5,5	48,5

VI. TOWARDS THE ARCHITECTURAL PROJECT

A. Target Audience

The target audience of our project is a standard household from the Elig Effa I informal settlement. According to the data cited in the literature review, we can estimate the average cost of an affordable housing unit for the populations of the settlement at 40,000 FCFA/m2 (66.21 USD). This amount corresponds to the weighted average of the construction costs of the different types of informal housing present in the settlement.

B. Design Approach

In the context of informal settlements, access to decent and affordable housing is a major challenge, given the economic, social, and environmental problems faced by the populations. Faced with this situation, our project aims to combine a participatory approach and ecological architecture to provide a sustainable solution. With these two approaches, our objective is to propose safe, durable, and affordable housing for populations with sometimes very low incomes, and that optimally meet the needs of the residents.

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Based on the various analyses carried out in the settlement, we have opted for a housing model with the following characteristics:

- *A Shared Housing Model*

In order to reduce the built-up area ratio (COS) in the settlement, we have opted for a shared housing model that will allow us to house 4 families on a 170 m2 plot. This choice will allow us to use the space more efficiently and reduce construction costs.

- *An Incremental Model*

Informal settlements are often characterized by unstable socioeconomic conditions, with families having changing needs over time. An incremental/expandable housing model offers the necessary flexibility to adapt to these needs. The choice of an incremental/expandable housing model also contributes to the reduction of construction costs.

C. *Architectural program*

The housing model consists of two distinct blocks with a shared space in the middle. Each block comprises two 3-room apartments.

- *Ground Floor:*

- Two (2) 3-room apartments
- One (1) shared space
- Upper floor:
- Two (2) 3-room apartments
- One (1) shared space

Table 6 presents the projected areas of the housing model and Figure 10 presents the functional diagram of the model.

Table 6: Projected Areas of the Housing Unit

Floor	**Spaces**	**Room**	**Area (m^2)**
Ground floor	Common spaces	Hall	4 m^2
		Stair	5 m^2
		Shared spaces	11 m^2
		Total Common spaces	20 m^2
	Apartment type T3	Living room	18 m^2
		Kitchen	6 m^2
		Balcony	4 m^2
		Corridor	4 m^2
		Bathroom	6 m^2
		Bedroom 1	9 m^2
		Bedroom 2	9 m^2
		Total apartment T3	56 m^2
	Total ground floor= Common spaces + Apartment T3 nº1 + Apartment T3 nº2		*132 m^2*
First floor	Common spaces	Hall	4 m^2
		Stair	5 m^2
		Shared spaces	11 m^2
		Total Common spaces	20 m^2
	Apartment type T3	Living room	18 m^2
		Kitchen	6 m^2
		Balcony	4 m^2
		Corridor	4 m^2
		Bathroom	6 m^2
		Bedroom 1	9 m^2
		Bedroom 2	9 m^2
		Total apartment T3	56 m^2
	Total first floor = Common space + Apartment T3 nº1 + Apartment T3 nº2		*132 m^2*
Net floor area = Total Ground floor+ Total first floor			264 m^2

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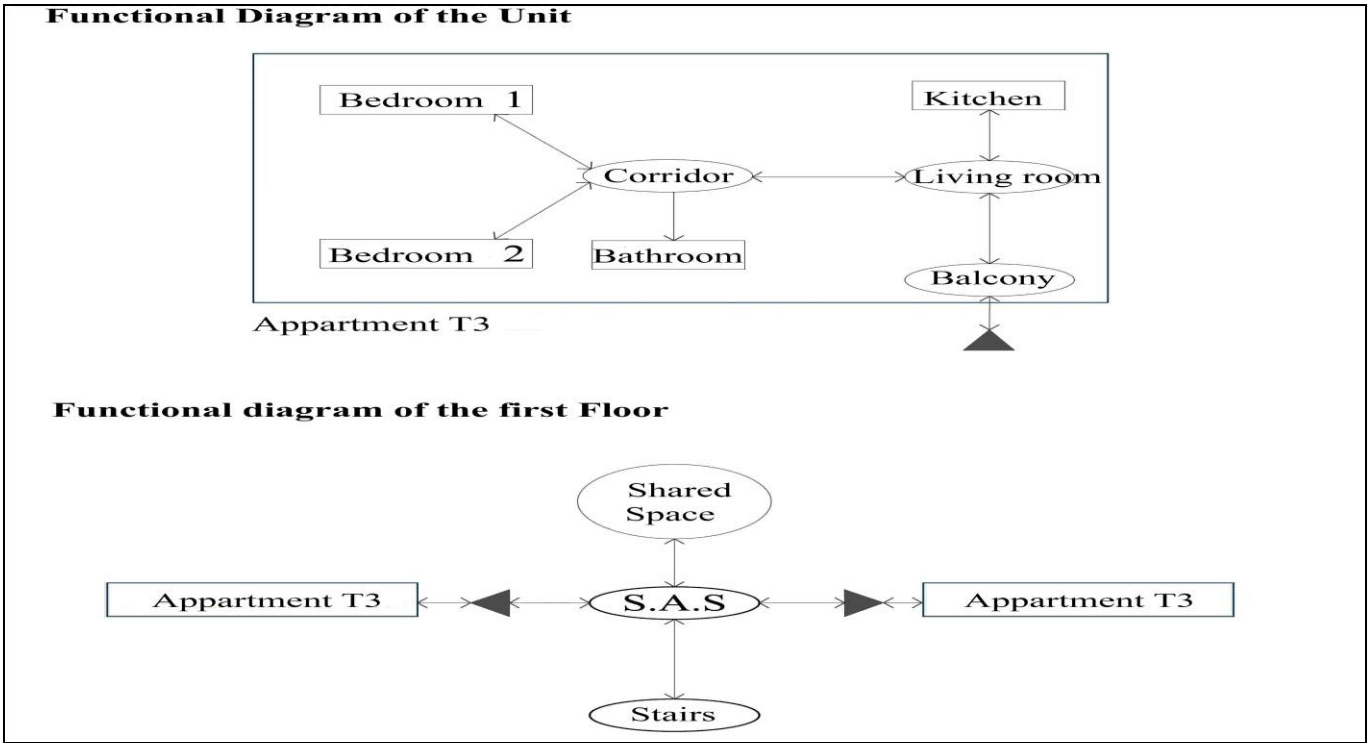

Fig 10: Functional Diagram of the Housing Unit

D. Design Strategies

- *Building Shape*

The chosen linear form allows to take maximum advantage of natural air currents and allows for better air circulation within the building. This form also allows to benefit from maximum indoor lighting.

- *Optimal Orientation*

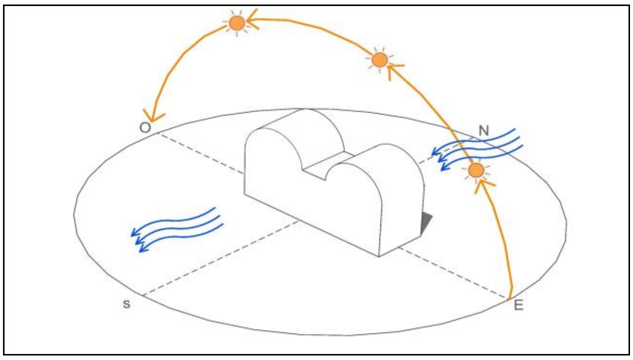

Fig 11: Building Orientation

The building will be oriented along the West-East direction in order to best take advantage of sunlight as well as the prevailing wind from the Northeast-Southwest direction (Figure 11).

- *Openings*

The housing unit has a Window to Wall Ratio (WWR) of 0.24. This allows us to reduce thermal losses and improve the building's efficiency while providing natural lighting. Figure 12 presents the various openings on the facades.

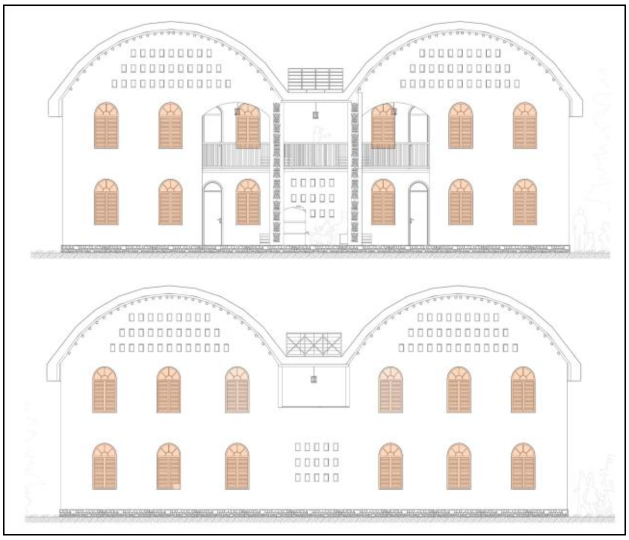
Fig 12: Illustration of Openings on the Facades

- *Natural Lighting and Ventilation*

All the rooms in the house receive direct natural light. Cross-ventilation is optimized through the use of louvers and ventilation outlets at the roof level. Figure 13 presents an illustration of the natural ventilation and lighting in the building.

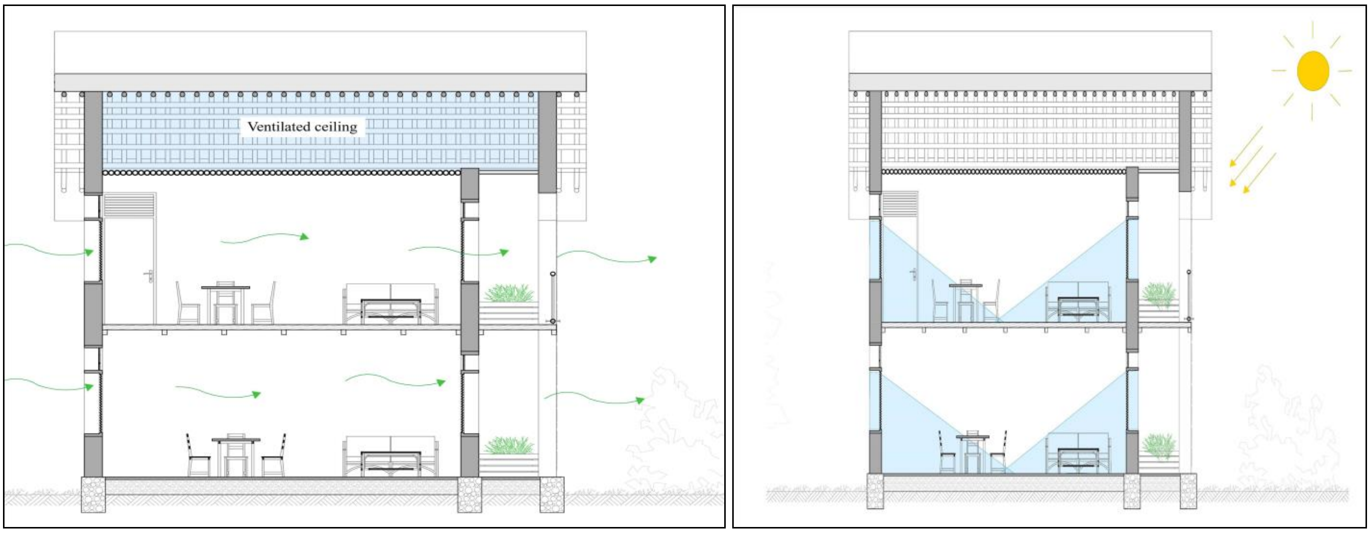

Fig 13: Illustration of the Lighting and Ventilation in the Building

➢ *Incremental Housing*

The building is designed to be realized in two main phases. This strategy allows to reduce the initial cost and spread the construction costs over a longer period, while still providing quick access to the operation of the housing unit. Figure 14 presents the different phases of the project.

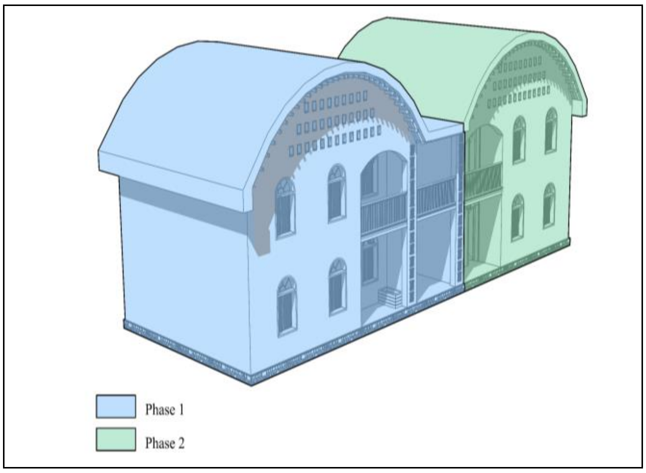

Fig 14: Phases of the Project

➢ *Distribution of Interior Spaces*

The shape and layout of the house are optimized to minimize the surface area while maintaining functional rooms. Circulation spaces like corridors are minimized. A shared outdoor space is integrated into the house to offer an extension of the living spaces in the building. Figure 15 presents the distribution of the spaces.

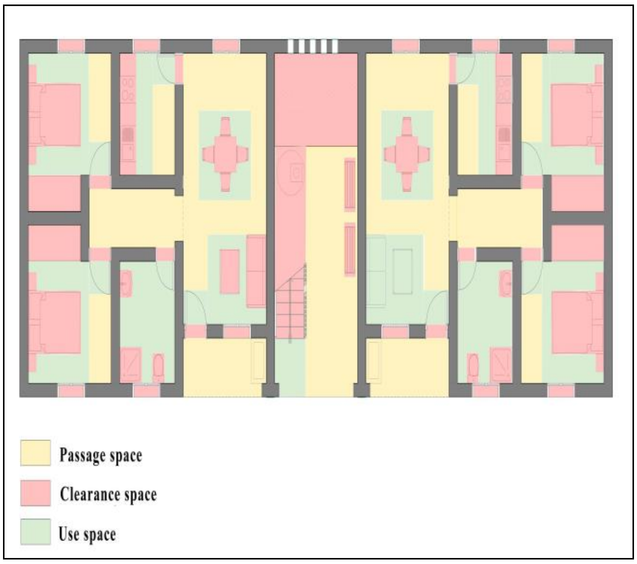

Fig 15: Illustration of the Layout of the Spaces

➢ *Renewable Energy*

We have opted for the use of solar energy, which is a sustainable energy source. It is free, unlimited, and allows for long-term savings, even though the acquisition cost of the equipment may seem high. Figure 16 presents the placement of the solar panels on the roof.

Fig 16: Placement of Solar Panels on the Roof

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➢ *Choice of Materials*

The materials and techniques are chosen to facilitate the construction of the building and involve the local community in the implementation process. We have also taken into account the ecological aspect and the cost of the materials. Figure 17 shows the different used materials.

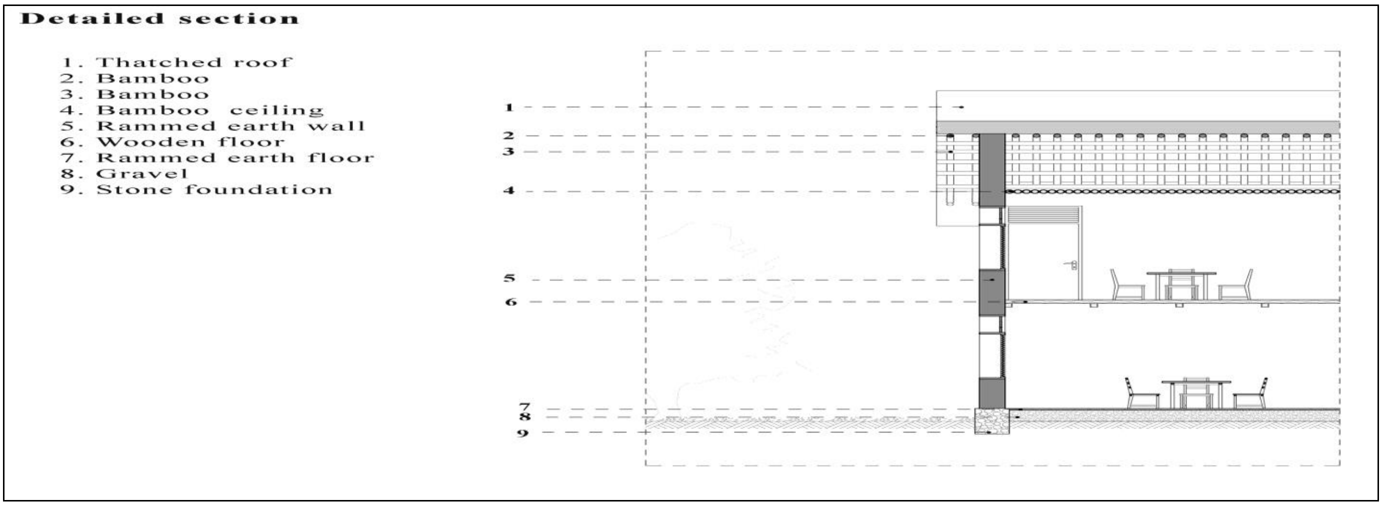

Fig 17: Detailed Section

➢ *Summary Cost Estimate*

Table 7 presents a summary cost estimate for the realization of the project.

Table 7: Summary Cost Estimate

Designations	**Unit**	**Quantity**	**Unit price (FCFA)**	**Total price (FCFA)**
Rubble stone foundation	m^3	18	25000	450000
Rammed earth floor	m^2	64	6000	384000
Rammed earth (Formwork + Earth)	m^3	92	3000	276000
Wooden floor	m^2	64	20000	1280000
Bamboo	ml	1515	100	151500
Wooden doors and windows	m^2	51	25000	1275000
Thatched roof	m^2	100	7000	700000
1.1 Construction materials				4516500
Single-basin sink	u	2	40000	80000
Bathroom sink	u	2	40000	80000
WC	u	2	45000	90000
1.2 Sanitary equipment				*250000*
Total d'un bloc				4766500
Rubble stone foundation	m^3	2,5	25000	62500
Rammed earth floor	m^2	21	6000	126000
Rammed earth (Formwork + Earth)	m^3	5	3000	15000
Wooden floor	m^2	22	20000	440000
Bamboo	ml	122	100	12200
Wooden staircase	u	1	200000	200000
Thatched roof	m^2	30	7000	210000
2.1 Construction materials				*1065700*
2.2 1000L rainwater tank				*140000*
2.3 Solar energy system				*2500000*
Total Shared space				3705700
Total				12177900

The construction costs of the building are estimated at twelve million two hundred thousand FCFA. This is approximately 36,000 FCFA per square meter.

Considering a 7-year payback period, and assuming the construction is financed by a third party, the estimated rental cost of a housing unit is 37,000 FCFA.

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E. Projection du Quartier

Figure 18 presents a projection of the Elig Effa 1 neighborhood as an eco-neighborhood, which will allow for a total of 136 T3-type (3-bedroom) housing units.

Fig 18: Eco-Neighborhood Projection

VII. EVALUATION OF THE PROJECT'S IMPACTS

A. Economic Impact

- The reduction in construction costs thanks to the use of more affordable local materials is very positive, as it will allow for more financially accessible housing for the neighborhood residents. This is also a key element to promote social inclusion. The populations have indeed pointed out that the construction costs seemed affordable and corresponded to their modest incomes. This finally gave them the hope of accessing decent housing, which was a major concern for many residents.
- Job creation: The implementation of the project generates jobs and training opportunities, particularly in the fields of craftsmanship, construction and real estate management. This contributes to the socio-economic integration of the residents, especially the youth.
- The enhancement of local know-how and the local economy is very interesting, as it strengthens the territorial anchoring of the project and supports the local ecosystem.

B. Environnmental Impact

- The use of local construction materials, such as earth, wood and bamboo, helps reduce the carbon footprint of the housing compared to more energy-intensive industrial and imported materials. These natural and renewable materials also have the advantage of being biodegradable at the end of their life cycle.
- Better energy performance of the buildings: The natural thermal insulation properties of local materials, such as earth or wood, help improve the energy performance of the housing. This results in a reduction in heating and air conditioning needs, and therefore a decrease in energy consumption.
- Sustainable management of construction waste: Construction techniques using local materials generally generate less construction waste than conventional methods. Moreover, this waste can often be reused or recycled, thus limiting its impact on the environment.

C. Social Impact

- Improvement of housing conditions for low-income households: The project aims to offer affordable and better quality housing to the residents of the Elig Effa I neighborhood, who are mostly low-income households. This helps improve their living and comfort conditions in their homes.
- Strengthening social cohesion and neighborhood solidarity: The active participation of residents in the design and construction of housing promotes interactions and exchanges between the different communities in the neighborhood. This helps to build social connections, develop a sense of belonging, and strengthen local solidarity.
- Improved access to basic services: By being integrated into a more comprehensive neighborhood development approach, the housing project can also facilitate residents' access to essential services such as water and electricity.
- Strengthening the autonomy and empowerment of communities: The participatory dimension of the project allows the residents of Elig Effa I to actively participate in the decision-making and management processes of their living environment. This helps to strengthen their autonomy, their capacity for action, and their influence within their community.

D. Cultural Impact

- Valorization and preservation of traditional know-how: The use of local construction materials allows the enhancement and preservation of the ancestral construction techniques developed by the communities in the region. This contributes to passing on this know-how to future generations and maintaining a form of local craftsmanship.

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- Strengthening the cultural identity of the neighborhood: The architecture and aesthetics of the housing, designed in accordance with local traditions, reinforce the residents' sense of belonging and cultural identity. Residents can thus identify more with their built environment and develop a particular attachment to their neighborhood.
- Promoting intercultural exchanges: The implementation of participatory workshops and collaborative construction sites around the housing construction offers the opportunity to build connections between the different communities in the neighborhood. This helps promote intercultural exchanges, mutual learning, and understanding between the residents.
- Development of a sense of pride and collective responsibility: The active participation of residents in the design and construction of housing using local materials creates a sense of pride and collective responsibility towards the project. This reinforces social cohesion and the commitment of residents to the preservation and maintenance of their living environment.

VIII. CONCLUSION

In this article, we have undertaken an in-depth analysis of the precarious neighborhood and the different types of precarious housing that make it up. This study allowed us to identify a list of potential materials adapted to the area, which we then evaluated in detail to select those that will be used in our housing project. We have also developed a series of strategies to be implemented for the realization of our housing project. These strategies aim to ensure the viability and sustainability of the constructions while meeting the specific needs of the inhabitants. In addition to the material and strategic aspects, we have carried out an analysis of the economic, social, environmental and cultural impacts of our project. This analysis revealed the potential benefits and challenges, thus allowing us to better anticipate the consequences of our choices.

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