

# The Transformations of Vernacular / Traditional Architecture to Modern Architecture in West Africa, Liberia

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**Abstract**—This paper tells the changes of vernacular architecture to modern architecture and how it can improve in some traditional design to show a nation culture beauty. This will also help to keep the memories of old architecture from one generation to another. (Modernizing traditional architecture) currently cultures desire for new and innovative ways of doing everything has created many technological and lifestyle improvements, but as a result, many perfectly good and well suited technologies have also been abandoned to the detriment of some culture and the environment. For example, modern and industrial construction techniques are taking a huge toll on the world ecology by producing staggering amounts of CO<sub>2</sub> emissions and toxic waste, and by consuming resources at unsustainable rates. How could it look like when looking back on the development of construction materials throughout human history and find ways of creating the structures that protect us and enrich lives without damaging the world? As it turns out, building trades have only become a destructive force in the last few hundred years. Before that time, most structures were built with methods that did little to no harm to the environment and worked within the natural capacities of the local ecology. Vernacular with continuities changes, transformations and adaptations to the different social and economic conditions of each period. Despite some views to the contrary, there continues to be a tendency to consider innovative building technology as the hallmark of modern architecture because tradition is commonly viewed as the antonym of modernity. This study investigates the transformation of traditional building to modern building and the concepts inherent in the vernacular of West Africa, particularly in Liberia.

**Keywords**—Liberia; building technology; innovation; vernacular architecture; modern architecture

## I. INTRODUCTION

Africa's first republic, Liberia, was founded in 1822, as a result of the efforts of the American Colonization Society to set free American slaves in West Africa. Thousands of freed slaves and free African-Americans arrived in the years ahead and in 1847 the colony became the Free and Independent Republic of Liberia. The name comes from the English word "liberty" and refers to the nation's origin as a colony of free blacks repatriated to Africa from the United States in the early nineteenth century. Although the settlers and their

descendants, known as Americo-Liberians, defined the boundaries of the nation-state, made English the official language and have historically dominated the intellectual and ruling class. Liberia's indigenous population is composed of 16 different ethnic groups. The new arrivals brought skills such as designing building, iron smelting, weaving, spinning, and the cultivation of rice and other staple crops in addition to political and social skills and traditions. Liberia is rich in natural resources and has during long periods of time been one of the world's largest rubber producers. Other important natural resources are palm oil, timber and minerals.

Prior to the country's founding by African-Americans in 1822, the indigenous people of what was then the Grain Coast constructed their houses in the Sudanese style of African architecture. (See "Fig. 4") Village houses were rectangular or circular, seven or eight feet high, with conical roofs that rose to a peak in the middle. They had from one to six rooms, with the kitchen and bathroom being separate structures several yards from the house



Fig. 1. Map of west Africa and Liberia. Photo taken by Paul Julien, 1932 Rotterdam Photo Museum.

<sup>a</sup> source: [https://en.wikipedia.org/wiki/West\\_Africa#/media/File:Map\\_of\\_West\\_Africa.gif](https://en.wikipedia.org/wiki/West_Africa#/media/File:Map_of_West_Africa.gif) and <https://action10.org/ik-about-countries/>



Fig. 2. Map of west Africa and Liberia.

a. source:  
[https://en.wikipedia.org/wiki/West\\_Africa#/media/File:Map\\_of\\_West\\_Africa.gif](https://en.wikipedia.org/wiki/West_Africa#/media/File:Map_of_West_Africa.gif)  
and <https://action10.org/ik-about-countries/>



Fig. 3. Map of west Africa and Liberia.

a. source:  
[https://en.wikipedia.org/wiki/West\\_Africa#/media/File:Map\\_of\\_West\\_Africa.gif](https://en.wikipedia.org/wiki/West_Africa#/media/File:Map_of_West_Africa.gif)  
and <https://action10.org/ik-about-countries/>



Fig. 4. Traditional home during ancient era.

a. <http://www.hpsol-liberia.net/architectural-history/>



Fig. 5. Liberia location on the Map of Africa.

a. <http://fromanativeson.com/wpcontent/uploads/2015/01/1400136456-liberia-o.jpg>

**A. Location**

Liberia, officially the Republic of Liberia, is a country on the West African coast. It is bordered by Sierra Leone to its west, Guinea to its north and Ivory Coast to its east, the Atlantic Ocean to its south. It covers an area of 111,369 square kilometers and has a population of around 4,700,000 people. Liberia is still recovering from the lingering effects of civil war and related economic dislocation. The process of rebuilding the social and economic structure of this war-torn country is difficult, and statistics indicate that about 85% of the populations live below US\$1.25 a day.

**B. Climate**

The climate, especially on the coast, is warm and humid year-round, dominated by a dry season from November to April and by a rainy season from May to October. The dusty and dry harmattan (desert winds) blow from the Sahara to the coast in December, bringing relief from the high relative humidity. Deforestation and drought in the Sahel have affected the climate, lengthening the dry season by almost a month in some areas. Mean annual temperatures range between 65 ° F (18 ° C) in the northern highlands to 80 ° F (27 ° C) along the coast. Rainfall is irregular, and the rainy season varies in intensity and begins earlier at the coast than in the interior. The greatest amount of rainfall, 205 inches (5,200 mm), occurs at Cape Mount and diminishes inland to about 70 inches (1,800 mm) on the central plateau. The interior has hot but pleasant days and cool nights during the dry season.

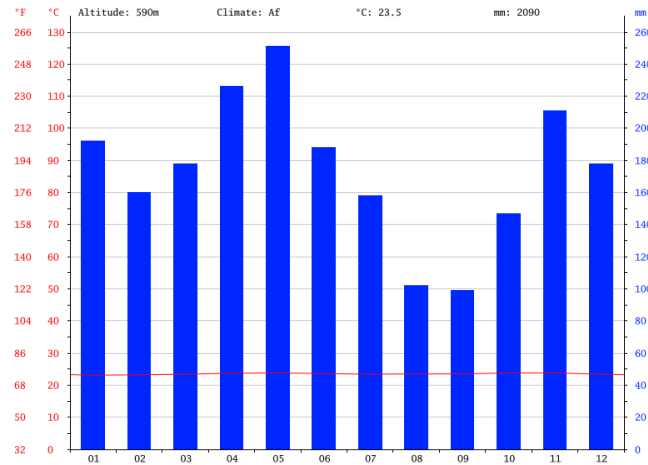


Fig. 6. Climate graph // weather by month Liberia.

a. <https://en.climate-data.org/asia/indonesia/north-sulawesi/liberia-623598/>

The driest month is September, with 99 mm of rain. Most of the precipitation here falls in May, averaging 251 mm.

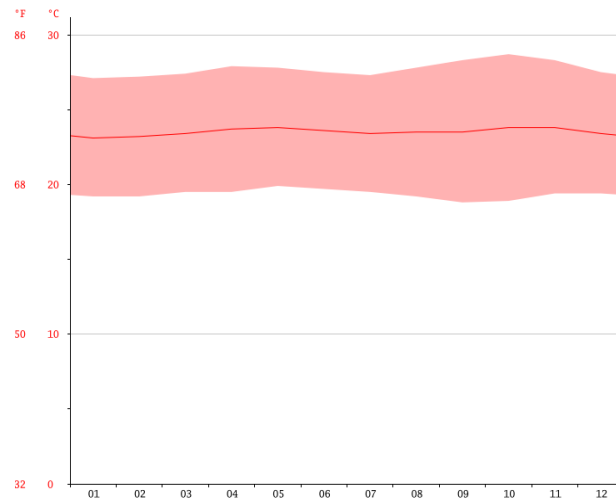


Fig. 7. Average Temperature Liberia.

b. <https://en.climate-data.org/asia/indonesia/north-sulawesi/liberia-623598/>

May is the warmest month of the year. The temperature in May averages 23.8 °C. January is the coldest month, with temperatures averaging 23.1 °C.

There is a difference of 152 mm of precipitation between the driest and wettest months. Throughout the year, temperatures vary by 0.7 °C.

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	23.1	23.2	23.4	23.7	23.8	23.6	23.4	23.5	23.5	23.8	23.8	23.4
Min. Temperature (°C)	19.2	19.2	19.5	19.5	19.9	19.7	19.5	19.2	18.8	18.9	19.4	19.4
Max. Temperature (°C)	27.1	27.2	27.4	27.9	27.8	27.5	27.3	27.8	28.3	28.7	28.3	27.5
Avg. Temperature (°F)	73.6	73.8	74.1	74.7	74.8	74.5	74.1	74.3	74.3	74.8	74.8	74.1
Min. Temperature (°F)	66.6	66.6	67.1	67.1	67.8	67.5	67.1	66.6	65.8	66.0	66.9	66.9
Max. Temperature (°F)	80.8	81.0	81.3	82.2	82.0	81.5	81.1	82.0	82.9	83.7	82.9	81.5
Precipitation / Rainfall (mm)	192	160	178	226	251	188	158	102	99	147	211	178

Fig. 8. Liberia weather by month // weather averages.

### C. Culture

Since the War, Liberia lost its culture value for Architecture. According to Elijah Karnley, M.P.M, B.Arch, BS/CCRP, (June 15, 2007) Liberia can strengthen its Architectural culture by institutionalizing the profession through an organized body and system that would appropriate the level of professionalism and the true meaning of architecture. Before the civil war, Liberia Architecture was valuable in West Africa and some modern materials coming from the USA. Successful farmers and government officials employed architects, draftsmen and construction workers to build their mansions, townhomes and farmhouses. Those houses, in the cities and towns and near the St. Paul River settlements, were constructed of stone and brick, stone being obtained from a quarry they built at a place called Mamba Point in the capital city of Liberia. Most of the Material used at the time was made out of traditional material. The brick was mostly imported from America, as the settlers preferred imports to the lower quality homemade bricks.

The continuity in vernacular architecture is related to space and time, involves structural, typological, functional and social issues. One can observe this continuity in form of materials, technologies, planar and design elements in Contemporary structures. With introduction to modern technologies and Materials in Liberia, people are trying to adhere to some principles from vernacular Architecture. The lessons learnt from sustainable architecture can facilitate in design of modern structures, with actually are against all “Green” principals. Designers can create a sustainable environment by culminating traditional vernacular with modern.

1) *The main transformation process in West Africa, Liberia:* The transformation of vernacular architecture in modern constructions in terms of vernacular architecture culminates through the appropriate use of local materials, local technologies and local people. It is the outcome of the people’s needs at that time. It is definitely sustainable as it is a product of several experimentations. The structures themselves cannot be prototyped but the technologies and

<sup>a</sup> <https://en.climate-data.org/asia/indonesia/north-sulawesi/liberia-623598/>

materials can be adapted for the same materials and technologies. The first factor influencing the development of vernacular construction practices is related to the availability of local building materials. In many areas, the locally available resources have governed the use of the following constituent materials for walls simple plans, load-bearing walls, use of natural materials for construction. Overall, vernacular architecture is a way of living.



Fig. 9. Traditional home during ancient era, 1822.

<sup>a</sup> <http://www.hpsol-liberia.net/architectural-history/>



Fig. 10. President J. J. Roberts' residence actually looked like this in 1850.

<sup>a</sup> <http://www.hpsol-liberia.net/architectural-history/>

## II. EARTH CONSTRUCTION: ADOBE

### A. Adobe Bricks

Adobe bricks (mud bricks) are made of earth with a fairly high clay content and straw. If produced manually the earth

mix is cast in open molds onto the ground and then left to dry out. Adobe bricks are only sun-dried, not kiln-fired. When used for construction they are laid up into a wall using an earth mortar.



Fig. 11. Liberia: Gbaita villager making bricks in a wooden form.

<sup>a.</sup> <http://www.africavernaculararchitecture.com/liberia/>

1) *Modern adobe brick*: Modern adobe bricks consist of a mixture of clay, sand, straw, and emulsified asphalt. Clay holds bricks together just like the cement in a concrete block. It contains primarily an aluminum salt and is made up of extremely fine particles.



Fig. 12. Building Constructed with Adobe Bricks

<sup>a.</sup> <https://www.pinterest.com/ecohomesliberia/ecohome-liberias-west-african-stylebook/>  
(<https://www.pinterest.com/pin/377106168768604823/>)

Using adobe has the following advantages:

- It doesn't pollute ecosystem and hence a "Green Material". It is inexpensive, stores thermal mass and has optimal heating transfer features for heating in the summer and cooling in the winter.
- Soil is a suitable Substance for construction and is available all around the world as well as the soil materials need the least amount of Processing.
- The Use of adobe is very common in some of the world's most hazard-prone regions, such as Latin America, West Africa, and other Parts of Asia.
- Adobe Constructions Would be continued to be used in the Poorer Countries Because of its easy availability and better thermal properties. Many experiments are going around the globe to improve upon the seismic properties of the adobe.

a) *Compressed earth blocks (CEB)*: Compressed Earth Block (CEB) is one name given to earthen bricks compressed with hand- operated or motorized hydraulic machines. Their Main characteristics include uniform

building component sizes, use of locally available materials and reduction of transportation. Uniformly sized building components can result in less waste, faster construction and the possibility of using other pre-made components or modular manufactured building elements.

b) *Transformation of compressed earth blocks in modern constructions*: Compressed Earth Blocks emerged in the fifties. Since then there is a considerable progress in its production technology and its application in building has continued to progress. Research centers, industrialists, entrepreneurs and builders have developed a very Sophisticated body of knowledge, making this technology the equal today of competing construction technologies. EB Production is strictly manufactured to meet scientific requirements for product quality control that include identification, selection and extraction of the earth used, to quality assessment of the finished block.

### B. Traditional Mud Houses in Liberia

Mud is extensively used for Construction in rural areas as it is readily available and is widely accepted.



Fig. 13. Liberia house in Nimba County photo taken by Rebecca Dutton.

<sup>a.</sup> <http://www.africavernaculararchitecture.com/liberia/>



Fig. 14. Liberia house in Nimba County photo taken by Rebecca Dutton.

<sup>a.</sup> <http://www.africavernaculararchitecture.com/liberia/>



Fig. 15. Liberia house in Nimba County photo taken by Rebecca Dutton.

<sup>a.</sup> <http://www.africavernaculararchitecture.com/liberia/>

III. MODERN ARCHITECTURE

A. Later in the Early 18th Century, Masonry, Came About in Liberia and Modern Construction Begins to Take over as It Is Today (Stone, Brick, or Concrete Blocks)

In Liberia, masonry work is the leading method people are using to build modern design. It has adapted to our culture and norms. In “Fig. 13”, this lady learned this skill to be able to adapt to what society have to offer to life in Liberia.



Fig. 16. Masonry Work.

<sup>a.</sup> [https://www.globalgiving.org/pfil/18672/GG\\_Large.JPG](https://www.globalgiving.org/pfil/18672/GG_Large.JPG)

1) *Stone*: Stone is a highly durable, low maintenance building material with high thermal mass. It is versatile, available in many shapes, sizes, colors and textures, and can be used for floors, walls, arches and roofs. Stone blends well with the natural landscape, and can easily be recycled for other building purposes. The use of stone in construction has declined because of the factors as cost and durability of the material over the last hundred years, but it is resurfacing in various forms that include facades, partitions, and floorings.

Modern Materials such as concrete, steel and glass are replaced the stone at many places but still in many rural areas where the stone is available in plenty and can be quarried easily, stone structures are seen in abundance. In modern buildings, stone come handy as façade materials. Many decorative features carved in stones are used as an aesthetic feature in modern constructions.



Fig. 17. The Miller McAllister United Methodist Church.

<sup>a.</sup> <https://www.umnews.org/en/news/symbols-of-past-and-future-in-liberia-church>



Fig. 18. Ganta United Methodist High School (Stone Building).

<sup>a.</sup> <https://gumslr.weebly.com/galleries.html>

2) *Brick*: The use of burnt clay bricks is widespread where wood or coal fuel is available. Clay brick is a traditional building material used for centuries in many parts of Liberia and the World. Stone is the locally available material in some regions. Bricks are inexpensive, lightweight, durable, easy to install, fireproof, low maintenance and could be easily ornamented. We can see the wonderful brick buildings constructing by Liberia Ever Green Group of Companies. The exposed brick work is bold example of how intelligently bricks are used in construction. Brick industry has developed a strategy to minimize the environmental impact of brick construction, increase its energy efficiency and use of renewable energies.



Fig. 19. Brick Construction.

<sup>a.</sup> <http://libevergreen.com/construction.html>



Fig. 20. President Weah lays first block for the construction of the 14 military hospitals.

<sup>a.</sup> <https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwiD3N-70PPfAhWRdN8KHeBhA9oQjRx6BAgBEAU&url=https%3A%2F%2Fpublicagenda1.com%2F2018%2F05%2F04%2Fpresident-weah-performs-first-brick-laying%2F&psig=AOvVaw2C7VqeD-4FsFnfEClDEx74&cust=1547773633130252>

### B. Concrete Blocks

A short description of how typical Liberian homes are constructed with Concrete blocks. There are two common types of houses in Liberia. First is the sturdy concrete-block style. Concrete is mixed with sand and manually packed into moulds to create cinder blocks at the housing site. The blocks are then laid in a two foot deep trench dug in the earth. Then dirt is filled in around the walls. On top of the dirt is poured the concrete for the floors. Doors and windows are framed with wood that is mortared to the concrete walls. The roofing supports are wooden planks or poles and the roofing material is sheets of corrugated zinc. The ceilings in this type of houses are drop ceilings with wooden sheets “tiling” the ceiling. Walls are plastered. Floors are mostly bare concrete. Fixtures are minimal — most homes don’t have appliances, sinks, or cabinets. Basically, there are several empty rooms and the stuff in the room determines what it can be called. Kitchens are bare rooms with a charcoal stove inside. Bedrooms are bare rooms with a mattress in them. Whenever it’s necessary to change a room’s function, just move the furniture. In “Fig. 16” it shows some construction work with Concrete Blocks.

## IV. CONTEMPORARY BAMBOO ARCHITECTURE IN WEST AFRICA, LIBERIA

Seeing the global trends some organizations have engaged in research and development in the field of material science, treatment methods, building components, construction systems and products with bamboo for over few decades. The major organizations and institutes in India working in bamboo sector are:

April 20, 2008 — Context of NTFPs in Liberia's Forestry Sector Remobilization Semi-Industrial Processing of Bamboo and Rattan Products. A major concern will be to establish an industrial fabric that is both viable for Liberia and ... work and sets a drafting committee, where to institutions nominate their technical experts.

Plywood Industrial Research and Training Institute, Bangalore- In collaboration with TRADA and BMTPC, they have developed a modified walling system with Bamboo-create an up gradation of wattle and daub system; and also a construction system for two story bamboo Structure.



Fig. 21. This hut is used as a temporary school in the village of Nâ Jabacca in Liberia (Four hundred students attend the school).

<sup>a</sup> <http://archive.knoxnews.com/entertainment/family/knoxville-families-return-to-liberia-to-build-school-help-community-ep-410510473-359638851.html>

### A. Wood in Modern Constructions

Wood, one of the most readily available natural materials other than mud has been used extensively in Africa and many part of the World for centuries for almost all elements of its built environment of any nature scale of Complexities. The range of the methods of using wood, for a variety of building elements with simple as well as complex joinery details, in any historic settlement of these regions reflect the ingenuity of local craft persons in understanding wood as material. "Fig. 22" shows a modern design wooden/timber framed house.



Fig. 22. Wooden House

<sup>a</sup> <http://www.woodandpanel.com/wp-content/uploads/2013/10/timber-framed-classroom.jpg>

## V. CONCLUSION

### A. Some Advantages of Modern Architecture over Traditional Architecture

1) *Much faster*: Traditional forms were built by hand which is much slower requiring many more workers on site for a longer time. Manufacturing of components and assemblies off site allows for much quicker erection.

2) *More choices of materials*: Traditional forms were limited mostly to what can be cut from the forest or dug and quarried from the ground.

3) *More light*: Modern structures require less structural material which leaves a lot more of the exterior surface available for windows.

4) *More space*: Less structure leaves more room in the interiors.

5) *Better quality*: Don't be fooled by the old buildings that remain. Most of the buildings built before the modern eras are no longer around because they were not worth maintaining. It does remain to be seen how durable our most expensive buildings are but the average buildings are much better built than the average of a few hundred years ago. taking Europe as an exception but remember that their great collection of traditional buildings is an accumulation of the best ones built over two millennia.

6) *Much safer*: It is especially true in earthquake country. Traditional masonry structures are prone to collapse when they get shaken.

### B. Recommendations

These are few major recommendations to the Government and people:

- Liberia can improve in Architecture by investing in research in this area, and creating the avenue to be able to implement results of researches. Building human capacity of incoming architects, doing more research, form part of architectural exhibition, site seeing internationally, being aware of the latest building technologies and construction techniques.
- Well, think Liberia can improve in Architecture by hiring the services of resident Architectural firms time after time.
- By investing in educating more architects and by improving our engineering department, sector and colleges.
- Architects in Liberia should begin to publicize the changes that have occurred through designs and begin to build durable housing units.
- There should be annual exhibitions between architects of Liberia to showcase their talents in designing structures. This will help to massively improve Architecture in our country.
- By designing buildings with regards to regionalism and incorporating Liberian cultural heritage with modern architecture
- Firstly, Liberia architects need to observe the principles of design when producing designs for clients and with that being said the citizens of Liberia should also refrain from getting designs done by unprofessional to save costs. Secondly, the governmental agencies that are powered to gives permits to construction should seek that all requirements are met before construction in terms of drawings, safety, health, environmental and zoning laws and codes.
- By mixing modern architecture with ancient architecture... especially in ecumenical zone.

<http://www.fao.org/forestry/23514-0844c34823f11a36c65f6587345dc2b1d.pdf>

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[https://liberiafi.files.wordpress.com/2013/08/blaser\\_assessment-of-the-current-status-of-the-forest-sector-in-liberia.pdf...](https://liberiafi.files.wordpress.com/2013/08/blaser_assessment-of-the-current-status-of-the-forest-sector-in-liberia.pdf...)
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