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A Study of Sustainable Lifestyle and Construction Techniques Adopted by Resilient Pastoralist of the Horn of Africa.

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ABSTRACT

Pastoralism is a system composed of people, natural resources, livestock, and social relations. Pastoral systems make a substantial contribution to both national and regional economies and are described as the most important and sustainable economic activity in the rangelands. Moreover, pastoralism is an asset for food security under global climate change. Pastoralists comprise a notable part of Ethiopia's population, accounting for some 12 million of the total population of about 92 million. Pastoralists in Ethiopia have been economically, socially, and politically marginalized because they have been given inadequate attention by policymakers in the past. Furthermore, Pastoralists keep moving from high-land to low-land with the seasons and rise and fall of the flood waters in the rivers. Even though, pastoralists have developed innovative and sustainable strategies for living in harmony with their environment, despite facing challenges such as climate change, resource scarcity, and economic pressures. Secondly, access to productive rangeland has long been a critical issue affecting pastoralists in Ethiopia. This paper explores the sustainable living and construction techniques adopted by the resilient pastoralist of the Afar region of Ethiopia, Africa. Through qualitative research methods, including observations and case studies, the study aims to provide a diverse understanding of the sustainable lifestyle and construction techniques of the resilient people of the Horn of Africa.

KEY WORDS: Sustainable Construction, Pastoralist, Construction Materials.

INTRODUCTION

Ethiopia's Afar region is known as one of the toughest environments on earth. Pastoralism is a way of life for 12 million Ethiopians here. Because they are in the utmost and most unreachable areas of the country, pastoralist communities have historically been economically and socially disregarded and underserved in terms of basic social services and economic setup. According to the African Union (2010), "African pastoralism is defined by a high reliance on livestock as a source of economic and social wellbeing, and various types of strategic mobility to access water and grazing resources in areas of high rainfall variability" and "Livestock or livestock-related activities contribute at least 50 percent of the total value of marketed production and subsistence production consumed by an average household." The critical role of livestock in pastoral livelihoods has influenced waves of development projects from the 1970s that have focused on livestock development, and activities such as natural resource management, water development, veterinary services, and livestock marketing.

The United Nation report indicates that the world will continue to urbanize over the next three decades, increasing from 56% in 2021 to 68% in 2050. The building sector is a key contributor to climate change, accounting for 40% of global energy consumption and 39% of CO₂ emissions. Therefore, it can be said that conventional buildings and construction processes consume a huge amount of energy and resources worldwide. Buildings and construction consume 40% of the raw stone, gravel, and sand used globally each year, and 25 % of the virgin wood. Buildings also account for 40% of the energy and 16% of the water used annually worldwide (World Watch Institute 1995). Raw materials for the building sector are extracted, processed, transported, added in the construction phase and finally disposed of. All these stages imply environmental impacts that lead to resource depletion and biological diversity losses. Developing countries are yet to be constructed and they have a relatively low degree of industrialization making the construction industry one of the biggest factors impacting the biophysical environment in the region (UNEP 2002). Increasing energy efficiency and reducing resource use is needed to shift towards more sustainable buildings and construction. Therefore, it is vital to promote the use of sustainable building construction materials to reduce carbon footprint. The concept of sustainability links together the three aspects of ecological, economic and social well-being. This study is an attempt to explore the Sustainable Construction materials and techniques adopted by Resilient pastoralists of Horn of Africa.

When compared to traditional construction, sustainable construction offers the following advantages as shown in table 1.

Table 1. Differences between sustainable Habitat and Traditional Construction.

Sustainable Construction	Traditional Construction
Positive impact on the atmosphere	Material sourcing destroys the atmosphere.
Easier to afford through a small investment	Houses are too much costly to lower and middle class
Little skill requirement to build; little to no training time for the workforce	Needs education in trade schools, and lengthy apprenticeships.
Less time is consumed on construction.	More time is consumed in construction.
Structural simplicity, less maintenance	Luxurious long-term maintenance

MATERIALS AND METHODS.

The local community here constructs the house using locally available materials. For example, a substructure of a house is constructed using local rock stones. This technique saves total manufacturing costs and transportation costs of bricks or ACC blocks. While the superstructure is constructed using bamboo and mud as shown in Figure 1. The energy consumption of different materials is shown in Table 2 below.



Figure 1. Construction of structure using locally available stones, mud and bamboo (Source: Author)

Table 2 Energy comparisons of different construction material (AL-sakkaf, 2009)

Building materials	Unit	Energy (kWh)
Cement	Cubic meter	250
Concrete	Cubic meter	200
Regular Fired brick	Cubic meter	100
Mud block	Cubic meter	25

Mud is one of the oldest and most universally used construction materials. Even at the start of human development, people build houses with mud. Mud construction occurs throughout most of the world. To address the hot and dry thermal conditions, the building smartly incorporates the cooling properties of wind. 'Butterfly' roofs of corrugated steel capture wind and redirect it into the building which is made of wood and corrugated steel sheets as shown in Figure 2.

This reduces transportation cost of materials drastically. Moreover, insulation made of low- grade sheep's wool is incorporated into ceilings to further reduce the heat effect of the sun.



Figure 2. Construction of houses using bamboo. (Source: Google)

The ingredients of earthen building systems include a binder soil typically clay, clay-silt mixture or loam, and inorganic or organic tempering materials. Sand and gravel are the most used inorganic tempers while straw and cow dung are the most used organic tempers. Soil may be stabilized using materials such as lime, cement, asphalt emulsion, calcite gypsum, or cactus juice, or maybe un-stabilized (Arooz and Halwatura, 2017)

Table 3. Properties of stabilized mud blocks (Vimala and Kumarasamy, 2014)

Block size	215 mm x 125 mm x 75mm
Dry strength	8.2 N/mm ²
Wet strength	3.1 N/mm ²
Water absorption	12 %

Roads are constructed using local crushed stone dust as shown in figure 3 below.



Figure 3. Raw material for road construction. (Source: Author)

After laying the materials, compaction is done, and the road is ready to use for all types of vehicles including animal-driven iron wheels vehicles as shown in Figure 4.



Figure 4. Collector road made from compaction of locally available materials. (Source: Author)

CONCLUSIONS

The study of sustainable lifestyle and construction techniques adopted by resilient pastoralists in the Horn of Africa gives valuable insights into the adaptive techniques of these communities. The findings highlight the innovative ways in which pastoralists have developed sustainable practices to cope with environmental challenges, like harsh climatic conditions and limited water resources. Sustainable construction is believed to minimize the negative environmental impact of buildings by enhancing efficiency in materials and energy use. Sustainable buildings and construction work to fulfill their performance requirements with minimum adverse environmental impacts while encouraging improvements in economic, social, and cultural conditions at local, regional and global levels. Sustainable development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs. A lot can be learned from the traditional craft of building: the use of local materials, methods of natural ventilation and creating shade, or protecting from rain and humidity. Sustainable buildings are user-friendly, and easy to maintain. They are economical because they do not waste resources, either when they are constructed, or when used. The study helps to a deeper understanding of sustainable living practices and offers valuable lessons for fostering sustainability and resilience in other regions facing same kind of challenges.

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