DEVELOPMENT OF NEW TECHNOLOGY USING BAMBOO TO CONSTRUCT A SPIRITUAL PLACE IN THE GAMBIA (SENEGAMBIA REGION)

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Abstract - This paper evaluates the current conditions of Gambia and Senegambia Region low-income tropical housing with a focus on construction methods and materials in order to identify the key areas for improvement. Surveys are carried out to collect relevant information on prevailing construction methods/materials and on their environmental impacts in rural areas. Low quality, high waste, and energy intensive production methods, as well as excessive soil extraction and deforestation, are identified as the main environmental damage of the current construction methods and materials. The embodied energy is highlighted as the key area which should be addressed to reduce the CO2 emissions of low-income tropical housing. The results indicate that the embodied energy of fired bricks in Gambia more than general clay

Keywords - Affordable Bamboo, Climate Change, Sustainability

I. INTRODUCTION

The environment in the Gambia is exceptionally exposed to diverse natural hazards. Due to this factor this paper investigates a material which can be substituted for wood and steel in the construction industry. Bamboo is a natural raw material, which is one of fastest growing plant. Bamboo is not new construction material. It is utilized for building mud houses and small huts in the villages for centuries.

Bamboo is a durable and very flexible building material. It can be utilized for flooring walls, roofing, concrete reinforcement and scaffolding. It's very light and easy to transport tis paper is aimed to examine bamboo and its environmental benefits, it's properties, properties and qualities. In the Gambia the rate of bamboo use is very low in the construction industry

II. WHY BAMBOO

Bamboo as a natural raw material existed in the world since the days of creation. In the construction sector wood and steel have been the major materials used for construction. Which the forest been reaped down year in year out for logs of timber for construction. Experiments and researchers have discovered the fact that bamboo as a natural raw material and a strong capability to that of wood, bricks also as strong as steel and it is environmental friendly, cheap, locally accessible, it can be considering to be a suitable substitute material for flooring, roofing and reinforcement in place of steel in buildings
Bamboo a composite material is readily accessible in Gambia and has not be utilized bamboo possesses a vast advantageous usage scheme which is environmental friendly, in respect to tree(wood) which are gathered within 12-30 years, bamboo can be collected within 3-5 years

Sustainability

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It's lightweight, very flexible and one of the strongest naturally-present materials of all time. And as manufacturers and businesses become more interested in sustainability and lowering their carbon emissions, natural materials such as bamboo are setting up to experience their own age of renaissance.
Climate change is a very real global problem that is, to some extent, beginning to be addressed at different levels around the world. Many climate scientists are adamant that the widely accepted 2ºC target for temperature rise form pre-industrial (pre-1990) levels is still not entirely safe; however, there is a unanimous agreement among them that adopting this policy has the potential to avoid the worst impacts of climate change (Climate Energy Institute, 2013). Added to this is the issue of the Earth's depleting resources.

Strength and Durability: Bamboo is heartier than oak and stronger than steel. It is flexible and lightweight, and is water-resistant, minimizing the risk for warping and

Affordability: It is easily grown and harvested, making it one of the most cost effective construction materials available

Tensile strength: Bamboo has higher tensile strength than steel because its fibers run axially.

Fire Resistance: Capability of bamboo to resist fire is very high and it can withstand temperature up to 4000 C. This is due to the presence of high value of silicate acid and water.

Elasticity: Bamboo is widely preferred in earthquake prone regions due to its elastic features.

Weight of bamboo: Bamboos due to their low weight are easily displaced or installed making it very easier for transportation and construction.
Unlike other building materials like cement and asbestos, bamboo poses no danger to health.
They are cost effective and easy to use; they are especially in great demand in earthquake prone areas.

III. PROBLEMS / TASK

What Happens When Bamboo is Not Handled Correctly, bamboo housing in Africa is relatively low, mainly due to lack of innovation and appropriate technology for processing local bamboo species



Fig.1 photo courtesy of Ghana Waddle and Daub Construction

Once cut, insects may attack bamboo or wood. For that reason, it is highly recommendable that bamboo, once cut go immediately through a special immunization and drying process.
Bamboo in permanent contact with soil, like wood, will rot and attract insects. For that reason, we discourage bamboo and soil contact.

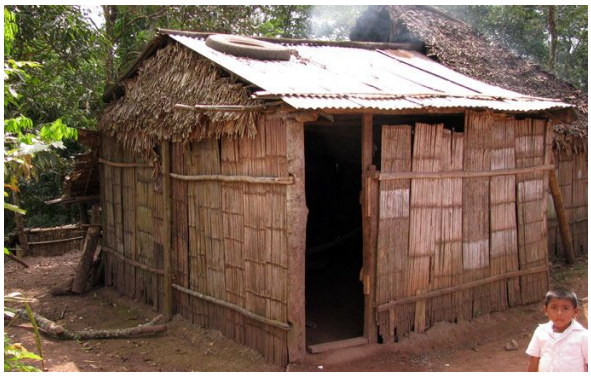


Fig.2 (photo courtesy of.guaduabamboo.com)

Once dried, bamboo, like wood, is flammable. Bamboo can be treated with a fire-resistant substance.

Bamboo does not have an equal diameter over all its length. The thickness of the internal walls also varies. For builders unfamiliar with this characteristic, this might present difficulties. Experienced builders have no problems.
The diameter of the bamboo diminishes when drying. If not dried completely in advance of construction, this has implications.
Quality bamboo construction requires special techniques for joints and terminals. Inexperienced builders attempt to drive nails into bamboo which could result in splitting the bamboo. Experienced builders use fine nails that do not split bamboo. When using thick nails, simple pre-drilling prevents splitting.
Bamboo is easy to cut, handle, repair, reposition and maintain, without the need for sophisticated tools or equipment.
Because of its extraordinary physical characteristics, bamboo is suitable for all types of structures and constructions.
Bamboo is non-polluting and does not have crusts or parts that can be considered waste. Instead of adding to the problems of polluting land-fills like conventional building waste, any part of the bamboo that is not used is recycled back into the earth as fertilizer or can be processed as bamboo charcoal.
Its circular form and hollow sections make bamboo a light building material, which is easy to handle, transport and store. Therefore, building with bamboo saves time.
Bamboo can be utilized for permanent and for temporary constructions.
In each of its nodes, bamboo has a dividing or transverse wall that maintains strength and allows bending thus preventing rupturing when bent. Because of this fantastic characteristic a bamboo construction offers superior earthquake-resistance.
The composition of the fibers in the walls of the bamboo allows it to be cut length-wise or cross cut in pieces of any length, using simple manual tools like the machete.
The natural surface of the bamboo is smooth, clean, with an attractive color which does not require painting, scraping or polishing.
Besides being used as a structural element, bamboo can also serve other functions, such as: flooring, wall paneling, water pipes, drainage, and furniture.
Another advantage of building with bamboo is, that it can be used in combination with other types of construction materials, like reinforcing materials for foundations.

Misconceptions about Bamboo as a Building Material

The incorrect use of bamboo in marginal construction has contributed to the misconception that bamboo is inferior to wood. Nothing can be further from the truth. Bamboo is a building material that offers superior earthquake protection compared to wood or cement block. Public awareness about the superior structural, mechanical and environmental qualities of bamboo is

growing daily especially among visionary leaders of the "green revolution"

SUMMARY

Over the last decade, the inception of the university has help to breach the gap in the human base resources to meet the country development aspiration. afford have been made in technological advancement, while special emphasis on integrating local construction methods and materials available in the Gambia to exploit the potential therein. This has created a unique construction ranging from methodology, techniques, equipment and materials. The outcome of this research is to demonstrate to the reader the unique construction technology that is extensively used in Africa.

REFERENCE

[1] Google:https://www.guaduabamboo.com/construction/advantages-of-building-with-bamboo
[2] Google:Ghana Waddle and Daub Construction (bamboo and mud) with prefabbed shuttered window insert.
[3] Jayanetti, D. L. and Follett, P. R. (1998): 'Bamboo in construction, An introduction' Published by TRADA Technology Limited and International Network for Bamboo and Rattan (INBAR) for DFID 199
[4] Wikimedia Bamboo construction: https://en.wikipedia.org/wiki/Bamboo_construct

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