

Alternative Green Building Materials

Akanksha Agrawal¹, Tasnim Depalpurwala², Kranti Mewada³

^{1,3}Fourth Year Student, Department of Architecture, SDPS Women's College, Indore, India

²Assistant Professor, Department of Architecture, SDPS Women's College, Indore, India

Abstract: In India various tremendous environmental problems are rising in the construction industry due to leading urbanization. Increase in demand of houses leads to the consumption of more energy, resources and raw materials which are responsible for the rise in the carbon content in the air. It is important to preserve ecology and its finite energy resources and need to find better and more sustainable methods of designing their buildings in order to reduce their negative environmental impact. Therefore, it is a need of an hour to use more sustainable and locally available materials which are eco-friendly and lead to a better tomorrow. The aim is to consider the impact of various green construction materials on environment, and study different construction technique.

Keywords: Green Building

1. Introduction

Architecture is not only about creating spaces, planning and designing but also which type of material is used for constructing it. In building construction industry, it has been seen that materials, which were being used earlier are still very popular. Different types of alternative building materials are available which provide better, efficient, durable and cost effective construction and also ensure the usage of available limited resources in a judicious way with least possible degradation of environment.

Construction and civil engineering activities have experienced a rapid growth due to improvements in procurement of building materials. However, the current scenario in the developing construction industry has posed many challenges due to some unsustainable aspects of the highly polluting and the exhaustive nature of building materials. At the same time, possibilities are generated which give rise to innovative and unconventional resources to emerge due to the widening gap in demand and supply of building materials. Also it has met the need for the requirement of energy efficient and economical methods of construction.

2. Need of green building material

The demand for building materials has been continuously rising with increasing the need for housing both in rural and urban areas. The resources which are used to manufacture construction materials depletes natural resources as it uses energy and releases pollutants to the land and water which leads to environment degradation. Commercial exploitation of traditional building materials by various industries has made the

situation worse. It has, therefore, become necessary to resolve this housing problem by providing some sustainable solution and by making the alternative materials easily available.

3. Alternative green material

Large number of feasible alternative building technologies have been developed and spread over a period of 2.5 decades. Today, the world depends on concrete as one of the main materials for building construction but concrete is actually harming the environment more than it is helping. To illustrate, 16% of all fossil fuel consumed every year is utilized to turn those raw materials into construction products.

In relation to this, there are several green alternatives for building material which can give a lower impact on the environment. Some of them are: Stabilized mud blocks, Compressed Stabilized Earth Blocks, Steam cured blocks, Straw bale, bamboo, Fine concrete blocks, Rammed earth blocks, Mud concrete blocks, Lime cements, Composite beam and panel roofs, Reinforced brickwork/tile-work roof, Composite mortars for masonry.

A. CSEB blocks

Compressed Stabilized Earth Blocks (CSEB), also called pressed Earth Blocks, are one of the construction material which are made using damp soil under high amount of pressure to form blocks. They are composed of dry inorganic subsoil, non-expansive clay, aggregates and Portland cement. CSEBs are used in India as environmental friendly alternative to clay bricks.

Case study

Vikas community auroville



Fig. 1. Vikas Community, Auroville

The Vikas Community was built in Auroville. It includes 23 apartments and communal spaces like a community kitchen, sports grounds, and landscape incorporating rainwater catchment systems. The buildings were built using Compressed Stabilized Earth Blocks (CSEB), ferrocement elements and other appropriate building technologies.

B. Bamboo

Bamboo is a cheap, fast growing material with excellent statistics according to the mechanical properties. Bamboo is a versatile, strong, renewable and environmentally friendly material bamboo has been traditionally used as a building material and in present times used in low cost housing, building temporary structures and other indigenous architectural expressions. The structural advantages of bamboo are its strength and light-weight whereby properly constructed bamboo buildings are inherently resistant to wind and earthquakes properties.

Case study:

Uravu bamboo grove

Uravu bamboo grove is an eco-friendly community tourism project in wayanad Kerala, India. the objective of this project is to develop a sustainable and eco-friendly tourism venture. Uravo Eco Link started applying new techniques of cement reinforced with bamboo and nut and bolt joineries for bamboo bridges and roof constructions and full bamboo bent structures. Construction of houses with bamboo benefits to the local people.



Fig. 2. Uravu Bamboo Grove, Wayanad, Kerala

C. Straw bale

straw bale is used in its raw state -requiring no further processing and is quite affordable. By using straw bale, the building will naturally provide very high levels of insulation for climate change. Straw bale is a low impact, low carbon building material that has gained more acceptance by the public. However, areas with extreme humidity and high rainfall is not an appropriate choice for straw bale construction.

Case study:

Straw bale school in Malawi East Africa

The project is a proposal for a secondary school located in south-east Africa Malawi. The design brief focused on modularity, incremental expansion, deployment and

sustainable technologies. Local material infill such as "straw bale cubes" including voids for light and ventilation are injected on the entire surface to create a breathable skin. In addition, local material infill such as earth, terracotta could also be explored. The entire system explores ease of repair and future maintenance advocating local construction practices.



Fig. 3. Straw bale school in Malawi East Africa.

4. Future scope

Green building minimizes the impact on the environment and indirectly helps to reduce the global warming effects. Green buildings and the concept of smarter living offers various opportunities for changing an average Indian's lifestyle. As the general public becomes more aware of the advantages of green buildings, developers will get creative and find new ways to brand, market and sell green buildings, hence creating a conducive atmosphere for the sector to grow exponentially.

5. Conclusion

The world depends on concrete as one of the main material for building construction but concrete harms the environment more than it is helping. In regards to this, some features of green alternatives for building material are studied which can give a lower impact on the environment and benefit the construction industry and human health.

Green construction material reduces side effects on the environment which results to the construction of efficient and sustainable structures. These also lessen the environmental pollution content, like greenhouse gas emission, resource depletion, soil pollution, health hazards, ozone depletion etc. Hence there is an urge to use the eco-friendly materials for the better tomorrow and healthy life of coming generations.

References

- [1] <https://www.slideshare.net/RashidIqbalSaleemi/thesis-green-building>
- [2] <http://becoindia.in/green-building-material/>
- [3] <https://www.slideshare.net/jaspreetrooprai138/alternate-building-materials>
- [4] <https://happho.com/compressed-stabilised-earth-blocks-alternative-clay-bricks/>
- [5] <https://www.slideshare.net/tusharchoudhari5/bamboo-construction-final-ppt>
- [6] <https://uravuecolinks.com>