ABSTRACT

In India various tremendous environmental problem are rising in construction industry due to leading urbanization. Increase in demand of houses which lead to consumes more energy, resources and raw materials which are responsible for the rise in carbon content in air and which are harmful to environment and human health. Nowadays we are facing various environmental impacts due to which we need to build with more sustainable materials which will lead to reduction of impacts on environment. In cities like Pune we are already noticing the change in weather patterns, hotter summers, shorter winters, insufficient monsoons. So taking the preservation of the city’s ecology and finite energy resources seriously is now more than important. Developers need to find better, more sustainable methods of designing their buildings in order to reduce their negative environmental impact. Therefore it is need of an hour to use more sustainable materials and locally available materials which are eco-friendly and a lead for better tomorrow. Considering to all this impacts this paper consist a five green construction materials with their advantages, disadvantages, durability and economical aspects in construction industry which can be an effective alternate material for conventional materials.

Keywords: Cost efficiency of green materials, Durability, Ecofriendly construction Materials, Energy efficiency & Sustainability.

1. INTRODUCTION

Buildings are actually responsible for maximum resource consumption therefore green building is only solution to the present trend of construction. Green building is described as people with healthy, comfortable and safe living, working and activities of the space, while the building full life cycle (material production, construction planning, design, construction, operation and maintenance ) process to achieve efficient use of resources (energy, disabilities, the water, materials) with minimum impact on the environment of buildings, also known as sustainable building envelope.

Establishment of institution by Formation of IGBC, TERI launch of LEED India the Government to encourage and BEEand TERI-GRSHA Sustainability in India
(Source: “A Review of Green Building Movement Timelines in Developed and Developing Countries to Build an International Adoption Framework” - SinemKorkmaz, DuyguErten, Matt Syal, Varun Potbhare)

The green building uses locally available building materials which are energy efficient, sustainable, and durable. Looking at the availability of local material lime is one of such material which reduces the internal room temperatures by 4 to 5° C as compare to cement in plastering work. Using lime in building it absorbs carbon rather than emitting which also lead to reduce hazardous impact on environment. [3]
2. WHY GREEN?
Experts and scientists from the world around have implored citizens of the planet to make it their personal goal to improve the environment we live in. Fossil fuels are being depleted at an accelerating rate, the atmosphere is getting proliferated with dangerous toxins and the world is becoming a more difficult place to live in. This is not the legacy that we should leave behind for our latter generations.

The environmental benefits of building green include the protection of ecosystems and biodiversity, improved air and water quality, less waste flowing into streams, and the conservation of natural resources. Green buildings can also result in lower operating costs because they typically use less energy and materials and improved indoor air quality, which improves the health of occupants. [3]

![Figure 27.1 Benefits of green building construction](image)

3. METHODOLOGY
As the energy required for manufacturing of cement and other construction material is more so it is major contributor to the consumption of our total energy source. Using such materials described below with their benefits towards environment. Following are the materials which we have selected looking in to their local availability, benefits, cost and durability.

3.1 Lime
Lime is our chief material which replaces the cement in building construction. It gives the good air quality by absorbing the carbon and emitting oxygen in the atmosphere. By looking at the ancient construction we can make it out the durability of lime in terms of quality and life of it as it get strengthen by time to time. The cost comparison of lime and cement is, cost of lime Rs. 7.5/kg. And that of lime is Rs. 6/Kg. Life span of lime building is much more as compared to cement building. [9]

![Figure3.1.1.Cooling of lime before use in construction](image)

3.2 Sand Lime Bricks
Sand Lime Bricks replaces the conventional bricks in the market of construction industry. The main constituents of sand lime bricks are sand, lime, fly ash, water. Using sand we can achieve the adhesiveness to hold the particles together. Its brittleness helps us to recycled it and reuse in other works.
3.2 Sand lime bricks

Cost of conventional brick is Rs. 5/brick and that of sand lime brick is Rs. 8/brick but sand brick is more durable than conventional brick. [10]

3.3 Eco-Friendly Tiles

An Eco-friendly tile replaces the conventional flooring and uses less energy in their production. It is cheap as compared to the conventional tile. They are available as per the client requirement in various patterns and also easy to place. This tile improves performance of indoor environment quality.

Tiles are replaced by the eco-friendly tiles. Eco-friendly tiles are cheap in cost as compared to regular tiles; these tiles are manufactured on the construction site so that its transportation charges are reduced. Cost of regular tiles (Ceramic) is Rs.40 and that of eco-friendly tiles is Rs. 35. [9]

3.4 Coloured Lime Plaster

Though low VOC (Volatile Organic Compounds) paints are available but by using coloured lime plaster as paint it reduces the painting for whole structural life. It is maintenance free, washable and water proof. Its shine and glossiness increases as the time passes. It gives better aesthetics look than conventional painting work.

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**Figure 3.2.1 Sand lime bricks**

**Figure 3.3.1 Eco-friendly tiles**

**Figure 3.4.1 Colour Lime Plaster**
Regular paints are replaced by coloured lime plaster. This is very cheap and long lasting as compared to regular paints. Cost of regular paint is Rs.10/sq. ft. and cost of coloured lime plaster goes Rs. 35/sq. ft. including three coats of plaster. [9]

3.5 Reflectasol Glass
Reflectasol glass gives better indoor quality than the normal clear glass. It keeps the inner temperature cool in hotter summers which reduce the energy consumption. This glass reduces the solar heat gain but allows the optimum lighting through the day which reduce electricity load. It is a good resistant of U.V rays which reduces the cause of skin retention of occupants. It also gives privacy as compare to the normal clear glass.

![Figure 3.5.1 SGG Reflectasol](image)

The regular glass is replaced by the reflectasol glass and the cost comparison of the glass is, reflectasol glass is 20% high costs as compared to normal glass. But the advantages of reflectasol glass are more and its life span is also more. [11]

4. RESULT
4.1 Lime
Lime usage as plaster in building reduces the internal temperature of room by 4 to 5°C as compare to cement. Lime reduces the carbon footprint in the environment and cement contributes the increase in carbon. The manufacturing of lime uses less energy as compared to cement production so it is ultimately reduces the carbon emission in air.

![Figure 28.1.1 Energy used in production of materials](image)
4.2 Sand lime bricks

<table>
<thead>
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<th>CLASS</th>
<th>MINIMUM MEAN COMPRESSIVE STRENGTH (WET) OF TEN BRICKS N/MM²</th>
<th>MINIMUM PREDICTED LOWER LIMIT OF COMPRESSIVE STRENGTH N/MM²</th>
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<td>40.5</td>
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<td>3</td>
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4.3 Eco – friendly tiles
Eco – friendly tiles are durable as compare to ceramic tiles and made from locally available materials. They are water proof and laid directly on floor as similar to plastering work. They are using less energy and locally available materials.

4.4 Coloured lime plaster
It has zero maintenance as compared to cement plastering and paint work. It is water proof and no water proofing is required externally. It is costly but eventually cheap. It gives better indoor quality and it is odourless.

4.5 SGG Reflectasol
The amount of heat transfer through 6mm thick glass in 1m² area is $U_g = 5.7 \text{ W/m²} .\text{oK}$ which is less as compared to normal clear glass. The Glazing thermal insulation is characterized by $U_g$.

5. FUTURE SCOPE
Green building reduces the impact on environment and indirectly helps to reduce the global warming effects. Green buildings and the concept of smarter living offers tremendous opportunity for changing an average Indian’s lifestyle. As the general public becomes more aware of the benefits of green buildings, developers will get creative and find new ways to brand, market and sell green buildings, hence creating a conductive atmosphere for the sector to grow exponentially. [4]

6. CONCLUSION
We have studied features of all construction material which are socially, economically benefits for construction industry and human health. Green construction material reduces side effects on environment.to make efficient sustainable structure as well as will lessen the environmental pollution content, and 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 generation. [6]

References


[10] www.royalorange.co.in
