

USE OF ECOFRIENDLY MATERIALS – AN APPROACH TOWARDS ENVIRONMENTAL SUSTAINABILITY

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Abstract

Construction is one of the major activity contributing to infrastructure development. Problems are rising in construction industry due to leading urbanization. Increase in demand of houses which lead to consumes more energy, resources and raw materials. Sustainable construction can lead to environmental sustainability. Sustainable development can only be achieved by conserving the natural resources and reducing the impact on environment. Use of conventional building materials lead to resource depletion and pollution problems. Use of eco-friendly materials rather than use of traditional building materials can be one of the efficient way to achieve sustainable construction. The purpose of this paper is to highlight how the use of ecofriendly building material can reduce the adverse impacts on environment.

Keywords: sustainability, environment impacts, eco-friendly materials.

1) INTRODUCTION:

Sustainable development means satisfying present needs without affecting the needs of future generations. Economy of the world depends upon the magnitude of available natural resources. Sustainable development can be achieved by optimum utilization of these available natural resources.. Use of ecofriendly materials can reduce the environment impact and also saves energy. Concrete is most widely used and versatile construction material possessing several advantages over steel and other constructions materials. Use of concrete in different infrastructure activities leads to consumption of large volume of natural aggregates.

The recycled concrete aggregate have some properties like the natural aggregates but the strength is less than the natural aggregates. We can use the industrial by product to some extent, which do not affect the fresh and hardened properties of the concrete and gives the similar result as normal concrete. A large number of researches have been directed towards the utilization of waste materials. To increase the durability of the concrete made with recycled concrete aggregates, admixture & fibre can be used, the admixture increase the workability of the concrete at same water cement ratio, whereas the fibre increase compressive, tensile & flexural strength of the concrete. The required durability characteristics are more difficult to define than the strength characteristics, specification often use a combination of performance & prescriptive requirements, such as workability, compressive strength, Split tensile strength, flexural strength and water-cement material ratio to achieve a durable concrete. End result may be a high strength concrete, but this only comes as a construction & demolition waste of requiring a durable [1]

Developing an awareness regarding optimum use of use of available natural resources and recycling of the available natural resources can be an effective alternative. Such activities can bring a reduction in the use of nonrenewable sources. Present paper is an effort to highlight the need of using recycled aggregates as an ecofriendly material to lead the sustainable growth.

2) NEED TO USE RECYCLED AGGREGATES

Generation of Building demolition waste and its disposal is a critical and global problem. As per report of Hindu online of March 2007, India generates 23.75 million tons demolition waste annually. As per report of Central Pollution Control Board (CPCB) Delhi, in India, 48 million tons solid waste is produced out of which 14.5 million ton waste is produced from the construction waste sector, out of which only 3% waste is used for embankment. For production of concrete, 70-75% aggregates are required. Out of this 60-67% is of coarse aggregate & 33-40% is of fine aggregate. The use of recycled aggregate generally increases the drying shrinkage creep & porosity to water & decreases the compression strength of concrete compared to that of natural aggregate concrete. It is nearly 10-30%

as per replacement of aggregate. Recycling reduces the cost (LCC) by about 34-41% & CO₂ emission (LCCO₂) by about 23-28% for dumping at public / private disposal facilities [2]. Waste arising from Construction and Demolition constitutes one of the largest waste streams within the EU, Asian and many other countries. For example, it is estimated that core waste (described as those types of materials which are obtained from demolished building or civil engineering infrastructure) amounts to around 180 million tonnes per year or 480kg/person/yr in the EU. This ranges from over 700 kg/person/yr in Germany and the Netherlands to under 200 in Sweden, Greece and Ireland. The estimates for the UK are 30million tonnes/yr and just over 500 kg/person/yr respectively, putting the UK in second place behind Germany. At the same time, the results of a recent study undertaken by the CSIR Building and Construction Technology has revealed that nearly a million tonne of C & D waste ends up in landfills in South Africa. This is in addition to large quantities that are dumped illegally. Thus, construction demolition waste has become a global concern that requires sustainable solution. It is now widely accepted that there is a significant potential for reclaiming and recycling demolished debris for use in value added applications to maximize economic and environmental benefits. As a direct result of this, recycling industries in many part of the world, including South Africa, at present converts low-value waste into secondary construction materials such as a variety of aggregate grades, road materials and aggregate fines. Often these materials are used in as road construction, backfill for retaining walls, lowgrade concrete production, drainage and brickwork and block work for low-cost housing. [3]

The systematic management of available natural resources can reduce the use of nonrenewable resources and also energy and finally reduces the impact on environment which can lead to economic and sustainable environment.

III. WAY TOWARDS SUSTAINABLE GROWTH

Use of recycled aggregates can lower the project costs of different infrastructure projects such as roads. It also proves to be ecofriendly in different ways.

- 1) Eliminate the expense of aggregate material import and export. [4]
- 2) Recycled aggregate yield more volume by weight (up to 15%) which improve project cost. [4]
- 3) Reduce disposal costs - Disposal of concrete rubble and other waste construction materials by dumping or burial is a less attractive and more expensive option. Reconstruction of urban streets and expressways results in an enormous amount of waste concrete being generated and creating a massive disposal problem. Recycling can therefore alleviate some of these problems and offer savings to the owner agencies in terms of material acquisition and disposal costs. [5]
- 4) Less fuel burnt in delivery.: Production of virgin aggregate can use more fuel to crush due to larger initial size of rock needing to be crushed to desired grade. [5]

IV. REDUCTION IN ENVIRONMENT IMPACT

- 1) Use of recycled aggregate can lead to reduction of land fill areas and other environmental hazard which may cause health problem [6]
- 2) Use of recycled aggregate can lower the waste management cost which can improve world economy as a whole
- 3) Use of recycled aggregate can directly reduce the use of natural aggregate which lead to sustainable development and sustainable environment.
- 4) Recover concrete is generally inert thus less chemical effect. [6]
- 5) Use of recycled aggregate after suitable recycling process can remove the hazardous material in the construction demolition waste thus reducing the soil pollution and water pollution which may likely to take place by way of percolation of rain water through landfill.
- 6) Use of recycled aggregate can reduce the transportation of the virgin aggregate thereby reducing the fuel consumption which may reduce the CO emission and reduce air pollution.[6]
- 7) Reduction in the road and vehicle use can also reduce the air pollution and noise pollution to certain extent.

V. FUTURE SCOPE

- 1) .Due to lack of dumping sites all over the world in the present scenario, so there is need to save the land, this process leads to sustainable environment.
- 2) .By various researches Percentage of CNC can be worked out with 100% replacement of NCA with RCA.
- 3) .To produce and secure a system of sale based packed precast concrete batches, in which CNC waste and recycled coarse aggregate concrete will be present.

- 4) .It is feasible to use recycled aggregates in combination with different industrial wastes such as flyash, CNC lathe waste etc.
- 5) . research scope is there to use much more waste materials with recycled aggregates and lead towards sustainable environment and sustainable growth.

VI. CONCLUSION

It can be stated that the recycled aggregate can be used as a substitute of natural gravel in the production of concrete mixtures for temporary structures. Use of recycled aggregate is ecofriendly as it can lead towards better solid waste management and also cope up with the rising demands of aggregates leading to economy in terms of costs and energy saving leading to sustainable growth around the globe.

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