

## **ABSTRACT**

In the recent times Kenya has embarked on a zealous Big Four agenda, a plan to provide affordable housing, food security, affordable healthcare and manufacturing. Majorly the agenda has undertaken an initiative on the development of infrastructure such as highways, power projects, and industrial structures, among others.

In most of these projects concrete plays a key role towards this development and a large quantity of concrete is being utilized for this construction practices, with each passing year a trend has been observed, that is, the ever increasing cost of raw materials used in the construction industry. Along With this price increase, is the increased campaign by environmental conservationists to shift from materials that impact the environment negatively along with a proposed shift to renewable sources of energy and reduction of construction waste by recycling.

For a long time Natural River sand has been the most popular choice for use as a fine aggregate for concrete mixes, its sources being river banks or pits which have come at a cost of depletion making it costly, scarce and resulting in devastating environmental degradation.

On the other hand, quarry dust a natural occurring material, a byproduct of the crushing process in quarrying activities, as rock is crushed into various sizes dust is generated called quarry dust and is formed as a waste product. For a long time it has been regarded as a useless waste and only in recent times has it been used as a material substitute of natural river sand as a form of fine aggregate.

Quarry dust has been used for various activities in construction industries among them are as a building material, road development material and making concrete bricks. However it is important to spot out that as a waste material of quarry mined masonry stone the properties of the stone fines are likely to vary with time, and to also consider the fact that an aggregate is as strong as the parent material's unconfined compressive strength nevertheless this project focuses on quarry dust supplied in Nairobi area which is mainly from one source.

From various research it has been established that concrete containing quarry dust as fine aggregate can be effectively utilized in the construction industry, with the incorporation of good quality materials, at times an appropriate dosage of super plasticizers, good mix designs and proper curing to produce a high strength concrete, therefore, promoting sustainable development and reduction of environmental pollution brought about by river sand mining.

This project also deals with the possibility of use of recycled dry concrete waste as a recycled coarse aggregate in concrete. Its proportions of replacement are 0%, 20%, 40%, 60%, 80% and 100% by mass of coarse aggregates. As demolition is the final stage of the life of any construction, this project aims to look at ways the waste materials generated from demolition especially waste concrete can be reused as course aggregates.

In this project I aim to compare the compressive, flexural strength and cost benefit of concrete class 25 made with river sand as a fine aggregate and ballast as a course aggregate to that made with quarry dust as a fine aggregate and several percentage replacements of ballast coarse aggregate with recycled concrete and additionally to assess its sustainability and the benefits it will bring to the environment if fully integrated in construction together with the cost benefits analysis if implemented or integrated into a project