



## **Laboratory studies of dune sand for the use of construction industry in Sri Lanka**

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With the increase of the annual sand demand for the construction industry the excessive excavation of river sand is becoming a serious environmental problem in Sri Lanka. Therefore, it is necessary to explore the possibility for an alternative to stop or at least to minimize river sand mining activities. Dune sand is one of the available alternative materials to be considered instead of river sand in the country. Large quantities of sand dunes occur mainly along the NW and SE coastal belt which belong to very low rainfall Dry Zone coasts. The height of dune deposits, vary from 1m to about 30 meters above sea level. The objective of this paper is to indicate some studies and facts on the dune sand deposits of Sri Lanka.

Laboratory studies were carried out for visual observations and physical properties at the initial stage and then a number of tests were carried out according to ASTM standards to obtain the compressive strength of concrete cylinders and mortar cubes mixing dune sand and river sand in different percentages keeping a constant water cement ratio. Next the water cement ratio was changed for constant dune sand and river sand proportion.

Microscopic analysis shows that the dune sand consist of 95 % of quartz and 5 % of garnet, feldspar, illmenite and other heavy minerals with clay, fine dust, fine shell fragments and organic matters. Grains are sub-rounded to angular and tabular shapes. The grain sizes vary from fine to medium size of sand with silt. The degree of sorting and particle size observed with dune sands are more suited with the requirement of fine aggregates in the construction industry.

The test result indicates that dune sand could be effectively used in construction work without sieving and it is ideal for wall plastering due to its' -uniformity. It could also be effectively used in concrete and in mortars mixing with river sand. The best mixing ratio is 75% dune sand and 25% river sand as the fine aggregate of concrete. For mortar the mixing percentage is 50%. The best water cement ratio for mix proportion is 0.45.

It was observed that the available amount of dune sand can be extracted to meet the demand for sand in construction industry. However, the extraction of dune sand from the areas close to the sea will cause several social, environmental and legal problems. Therefore sand mining from dunes must be commenced after making a detailed Environmental Impact Assessment.