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Study on dune sand as an alternative to river sand in building construction

Recent studies have shown that the supply of river sand for the country is critical. Serious environmental problems have arisen as a result of over-mining river sand in Kelani Ganga, Maha Oya and Daduru Oya. In view of the urgent need to find alternative materials, the National Building Research Organisation (NBRO) initiated research studies on dune sand, off-shore sand and crushed rock. NBRO carried out detailed studies on dune sand in Puttalam District. Sand samples were taken from the dunes and subjected to laboratory and field studies. Their physical and engineering properties namely, particle size distribution, chloride content, clay silt and dust content, shell content, specific gravity and water absorption were studied in addition to other parameters such as workability and strength of mortars and concrete made

from dune sand. Compressive strength of concrete cubes were tested and compared with test results on other types of sand. Results indicated that many physical and engineering properties were similar to those of river sand. However, the particle size distribution curves (grading curves) were found be confined to a narrow envelope in the fine zone. Hence it may be regarded as ideal for use in plaster mixes but it could also be applied in concrete mixes as any other fine sand. Dune sand samples had a very low chloride content and were free of shells or harmful amounts of organic materials. Mineralogical analysis revealed that those sands contain heavy minerals but in very low concentrations.

During the field survey it was noted that dune sand was being hardly exploited for commercial purposes. However, there were few small scale cement block manufacturers as well as construction workers who used dune sand for construction work and block making by mixing with river sand. Laboratory trials were carried out for plastering and block making. Dune sand was found to be quite suitable for plaster work. The fine finish obtained eliminated the need for further finishing by lime floating. Cement blocks cast had a good surface finish but difficulties were encountered in de-moulding of blocks in 'green' stage.

The study was extended to map out the dunes in the area using differential GPS Methodology and to make an approximate estimate of the quantity of sand extractable from the dunes distributed from the Madurankuliya to Kalpitiya. This was estimated to be about 15x106 m3 which is three times the total annual sand demand for construction work in Sri Lanka.