Chapter 5
Versatility of Cockle Shell in Concrete: A Conspectus

ABSTRACT

A conspectus based upon a compelling topic, namely, versatility of cockle shell use in concrete to replace partially the natural coarse aggregates and river sand, which is yet to be investigated, is covered in this chapter. An introduction to enlighten the reader with this promising waste material precedes a review of environmental issues with cockle shell which would reduce harm to environment and preserve natural materials for future generation. Cockle trade is an important subtitle that covers cockle shell waste generation, research, and development related to the deployment on the use of cockle shell, processing cockle shell for making construction material are discussed in detail. Experiments were conducted, and the test data revealed that the use of cockle shell as partial replacement of coarse aggregates enhanced the strength of concrete and as partial replacement of sand improved the performance of mortar bricks.

INTRODUCTION

Construction industry contributes to the establishment of various types of structures in meeting with the demands of expanding population. In relation to that, the growing needs of construction trade requires natural resources such as granite aggregates and sand to be harvested from the environment.
Both granite aggregates extracted from local quarries and sand mined from river are utilized for the production of construction materials such as concretes and bricks. The continuous quarrying of granite aggregate, a non-renewable material, poses negative impact on the environment in terms of destruction of wild life habitat, climate change and possible depletion in future. The excessive river sand mining has opened up the door for water pollution and ecological imbalance to the river bed environment which directly affects the quality life of surrounding community. In view of sustainable construction, explorations for other alternative materials which could be used as partial or full replacement of coarse aggregates or sand would not only benefit the construction industry and also contribute to the cleaner environment.

At the same time, the active cockle trade in Malaysia generates a large amount of cockle shells that are disposed-off as waste. Cockle, being an important protein source in South East Asian region contributes to the growth of this industry. In practice, the harvested cockle are processed to obtain its edible meat before being produced as canned food or sent to fresh market. The cockle shells are usually dumped as waste in large quantity at dumping site which causes pollution. Issues of waste disposal at landfill sites become a burden to those industries owing to the extra cost which needs to be spent for waste management. In addition, disposal of these wastes in increasing quantity is creating a negative impact on the environment. It is observed that the freely available wastes when used as mixing ingredient for the production of construction material would produce an environmental friendly material. This would decrease the dependency on natural resources and also reduces the amounts of cockle trade waste ending at landfill.

Related Environmental Issues

The rapidly growing Malaysian construction industry has increased the demand for concrete production, which directly leads to higher consumption of granite aggregates and fine aggregates. Although, this country still have sufficient granite aggregates reserves but continuous quarrying activities would cause ecological imbalance, affect community’s healthy life style and aggregates depletion in the future. This issue has been touched by local researchers (Hainin et al. 2012) who stated that extensive use of granite aggregates in construction would disturb the environment and eventually bring the local granite supply to an end. Imported aggregates have been used
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