



# Challenges to sustainable development of marine sand in Korea

Dong-Oh Cho\*

*Marine Environment & Safety Research Division, Korea Maritime Institute, 1027-4, Bangbae 3-Dong, Secho-Gu, Seoul 137-851, Republic of Korea*

Available online 13 December 2005

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## Abstract

Marine sand is not only essential to the construction industry, but also functions as a habitat, nursery, and buffer for shorelines. As resources of sand on land are depleted the demand for marine sand has increased rapidly and is expected to continue. However, marine sand is limited in quantity and sand mining brings environmental externalities such as environmental degradation, habitat destruction and coastal erosion. Recently, the public and government agencies have recognized the value of marine sand. Although, sand mining is already well established and implemented, both the public and government in Korea are pushing for the sustainable development of marine sand.

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## 1. Introduction

Marine sand is not only an essential input in construction, but also functions as marine habitat and a buffer for shorelines. Marine sand is limited in quantity and should be managed sustainably.

Traditionally, large amounts of aggregates (sand and gravel) have been consumed in Korea in construction projects such as buildings, houses, apartments, roads, ports, dams, dikes, and reclamation, which are essential infrastructure for economic development. The construction industry has been important to the Korean economy on the whole as indicated by its large share in GDP.

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\*Tel.: +82 2 2105 2762; fax: +82 2 2105 2779.

E-mail address: [docho@kmi.re.kr](mailto:docho@kmi.re.kr).

Until now, most sand has been supplied by dredging rivers. However, sources of land-based sand are being depleted and marine sand has become a new source. The supply of marine sand has increased rapidly and is expected to increase continuously.

One problem is that marine sand is a limited natural resource and is no longer supplied from rivers because many underwater dikes have been constructed in major rivers to store water for agriculture. Scientists expect that the maximum period of mining sand will be less than 50 years, if the present consumption of sand continues. Also, excess dredging of marine sand may bring negative effects such as degradation of the marine environment, destruction of spawning and nursery habitats for certain fisheries, changes of underwater sea beds, currents and tides, and thereby erosion of coastal shorelines.

The problem of sustainable development of marine sand is one of the most controversial issues in Korea. Ocean users, such as fishermen and NGOs, have recognized the value of marine sand and are strongly opposing mining for sand. One government agency is trying to establish a new system for the conservation of marine sand.

However, the voice of the construction industry and other government agencies are powerful, and the development system for marine sand has long been established. Until now, the government has viewed the demand for aggregate very important to economic development policies in Korea. So, the government has emphasized the need to supply aggregate efficiently and has established a very strong system of supply, including marine sand.

This article reviews the status of supply and demand for marine sand; analyzes the imbalance between the development and conservation system for marine sand; extracts major issues on the sustainable development of marine sand; and identifies how the public, NGOs and the government are attempting to solve the problem of sustainable development of marine sand in Korea, of which lessons can be shared with the international marine society.

## **2. Status of demand and supply for marine sand**

### *2.1. Trends in demand for marine sand*

The market of aggregate consists of various firms: aggregate manufacturing firms that produce ready mixed concrete (REMICON), asphalt concrete (ASCON), cement-manufactured products, and concrete pipes; construction companies that use aggregate or aggregate products as its input; and aggregate transportation companies.

The demand for aggregate is the derived demand for the construction industry, which shares about 5.4% of the amount of the construction contract. The amount of construction contracts was US\$46,154 million, the market of aggregate US\$2308 million and that of marine sand US\$385 million in 2001 in Korea, which is a very attractive market for most mining firms (Fig. 1) [1].

The sources of sand in Korea are from coastal waters and from terrestrial sources, such as rivers, mountains and land. The total quantity of mining sand was 101.8 million cubic meters in 1992, peaked at 139.0 million cubic meters in 1996 and thereafter decreased due to a contraction of the construction industry caused by an economic crisis and recession in the late 1990s. Recently, however, with economic development, the total quantity of sand has increased to 119.6 million cubic meters in 2002 (Table 1).

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