

# **The estimation of carrying capacity and its application to the environmental and mariculture systems in Korea**

Hyung Chul Kim<sup>1</sup> and Won Chan Lee<sup>2</sup>

*1 West Sea Fisheries Research Institute, NFRDI, Incheon 400-4201, Republic of Korea*

*2 Marine Environment Research Team, National Fisheries Research & Development Institute, Busan*

*619-902, Republic of Korea*

hckim@momaf.go.kr

MOMAF (Ministry of Maritime Affairs and Fisheries) of Korea is the government regulator responsible for the protection and management of the seawater environment, with overarching duty to further sustainable development. To evaluate carrying capacity of the environment is better informs for development to minimise environmental impacts.

The mechanism of water pollution in Lake Shihwa and Masan Bay, ones of highly eutrophicated artificial lakes and bays in Korea, has been studied using a numerical model. The 3D physical-biochemical coupled model was performed for the purpose of diagnosis and prediction of water qualities in two coastal systems and their carrying capacity were estimated.

Mollusc culture is one of the most important types of mariculture, with suspension feeding bivalves being among the most cultivated organisms. Bivalve production was unstable and slowly decreased in coastal bay systems, Korea, in the last years, mostly because in eutrophication and overstocking in culturing grounds.

For carrying capacity modelling of shellfish system, we developed a new numerical model coupled oyster growth model with an ecosystem model. Physical and biological processes such as water transport and mixing, primary production, feeding and growth of the cultivated oyster, *Crassostrea gigas* and benthic-pelagic exchange were included in the model, and reasonable seeding density to gain the marketable size was evaluated in Goseong Bay, Korea.

Two major concepts are may be proposed; Carrying capacity in terms of the environment is the limit of self-purification, namely the limit of pollutant loads negatively affects to the environment. Second, carrying capacity in terms of the aquaculture organisms is the maximum productivity without negatively affecting growth rate.

Considering these carrying capacity from a different standpoint, are adapted to Korea bay systems towards a sustainable development of the environment and aquaculture.