*MEDCOAST 99 – EMECS 99 Joint Conference, Land-Ocean Interactions: Managing Coastal Ecosystems*
*9 – 13 November 1999; Antalya, Turkey, E. Özhan (Editor)*

# Sustainable Usage of Coastal Ecosystems

## Koji Omori and Hidetaka Takeoka

***Center for Marine Environmental Studies (CMES), Ehime University***
***2-5 Bunkyo-cho, Matuyama, Ehime 790, Japan***
***Tel +81-89-927-9643  Fax +81-89-927-9630***
***e-mail: ohmori@sci.ehime-u.ac.jp***

**Abstract**

The overloading of organic matter that unbalances the rate of oxygen supply on the bottom sediment induces the depletion of dissolved oxygen in the bottom layer, which leads to the breakup of sustainable material cycle between the surface and bottom sediment layers. A one-dimensional mathematical model, which can predict a sustainable upper limit and/or an optimum of organic loading rate only from the exchange rate of water mass between organic loading area and its neighbouring waters.

The sustainable upper limit of organic loading rate can be estimated as follows: Qp, max=D0/(A/E+Dz/kd), where E is a lateral exchange rate of water mass, and A is the surface area where organic matter is loaded. The kd is a diffusion coefficient and Dz is the depth of the bottom boundary layer between the bottom and sediment layers. The exchange rate of water mass per organic loading area and the diffusion rate of dissolved oxygen through the bottom boundary layer have a positive effect on Qp, max. Then, the optimum loading rate of organic matter, Qp, opt, that can be sustainable and keep the best condition of a coastal ecosystem whose oxygen decomposition rate must be the maximum will be between zero and the upper limit, Qp, max. The Qp, opt has been inevitably influenced by Qp, max, and additionally by the ratio of anaerobic decomposition rate to aerobic one.