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Title: Change of Water Quality in Osaka Bay During Past 70 Years

Authors: Keiji Nakatsuji Dr, Professor, Department of Civil Engineering, Osaka University
2-1 Yamadaoka, Suita City, Osaka 565-0871, Japan
Tel/Fax 06-879-7613/7616 HYPERLINK mailto:nakatsuj@civil.eng.osaka-u.ac.jp nakatsuj@civil.eng.osaka-u.ac.jp

Kohji Muraoka Dr, Professor, Department of Civil Engineering, Osaka University
2-1 Yamadaoka, Suita City, Osaka 565-0871, Japan
Tel/Fax 06-879-7603/7607 HYPERLINK mailto:muraoka@civil.eng.osaka-u.ac.jp muraoka@civil.eng.osaka-u.ac.jp

Nobuyuki Yamane Ph.D., Chief Engineer, CTI-Engineering, Osaka Branch.
1-2-15 Otemae, Chuo-ku, Osaka City, Osaka 540-0008, Japan
Phone/Fax 06-6944-7747/7861, HYPERLINK mailto:n-yamane@osaka.cti.co.jp n-yamane@osaka.cti.co.jp

Abstract:

Osaka Bay is a typical semi-enclosed estuarine waters with an oval-shape with 58 km in length and 30 km in width, open to the Seto Inland Sea and The Pacific Ocean through the Akashi Strait and the Kitan Strait in western area. The Yodo and Yamato Rivers flow in at the head of the bay which contains the amount of organic matters and nutrients in the upper stratified layer. The pollution has been fast deteriorating at the bay head combined with lots of development projects in coastal waters. The rapid industrialization during the period from 1950 to 1970 tends to cause more and more problems in our environment.

In the present paper, we discuss three main subjects.

- (a) The structure of water qualities in Osaka Bay and their temporal changes are examined on the basis of the sets of field data collected during the period from 1928 to 1992.
- (b) In order to evaluate the impacts from the land area to the marine environment, pollutant loading of COD, suspended solids (SS), nitrogen (N) and phosphorus (P) is calculated based on the data of population, number of domestic animals, amount of chemical fertilizers and industrial products in 1920 to 1995.
- (c) Using hydrodynamic ecosystem model confined with 3-D baroclinic flow model, we estimate the structure of water qualities in Osaka Bay during the past 70 years.

Main results are as follows.

- (1) The distribution of water qualities are significantly influenced by the density structure and the residual baroclinic current system.
- (2) According to data analysis, water quantities in the bay head have already polluted even in 1928 and 1936. The temporal changes of COD and P between observed values and estimated pollutant loads show similar tendency. It is very interesting that there is four or five years delay.

(3) Numerical simulation taking the estimated pollutant load from land and the reclamation land in 1935 to 1990 into account, clarified the effects of quality regulation of reduction (COD and P) and the change of coastline due to many reclamation projects.