Estimation of Total Nitrogen Load Discharges from Rivers on Harimanada, Seto Inland Sea

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播磨灘（瀬戸内海）における河川由来の全窒素負荷量推計;

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1. Introduction

Harimanda region in the Seto Inland Sea (Fig. 1), has been suffering changes in nutrients content since the eutrophication scenery developed in the late ’70s, to the actual oligotrophication situation that is affecting seaweed production and fishery in the region. A better understanding of nutrients input from the rivers could be a useful tool to elucidate the mechanisms that are actually driving the availability of the nutrients in the area [1]

2. Methods

An integrated hydrological model that combines meteorological (precipitation, solar radiation, etc), geographic (elevation, use of land, vegetation, etc.) and observed data from Prefectural and National Government (point source input flows and TN concentrations, and rivers flow and TN concentration), was used to simulate the total nitrogen (TN) discharge in Harimanda from the most important rivers of Hyogo prefecture (Honshu and Awaji islands) and Shikoku island (Fig. 1).

The period of time considered for calculations was of eight years (from 2009 to 2016). Each river basin was modeled using a 3rd order mesh (1x1 Km). Nitrogen load per mesh was calculated considering the use of land (size and number of cities contained in the watershed, farm distribution, etc.), vegetation and atmospherical and meteorological conditions. To improve the quality of the results, the model was validated in the Kako River [2] and TN input from point sources was considered in Hyogo Prefecture (industries, government buildings, etc.).

3. Results and Discussion

For each river, TN loads were calculated for the selected years. Fig 2 shows the results for TN loads. As it was expected, there is a direct dependence on the size of the watershed and the total amount of discharged nutrients. The bigger the size of the watershed, the higher the values of TN discharged, with the exception of the Mihara River on Awaji Island, which had the highest TN discharged values per unit area.

In addition, it was found that for those watersheds with similar sizes like Mihara and Kasuga River, TN discharged depends on the distribution of land use in the watershed (size of cities contained, the extension of farms, mountain terrain, etc.).

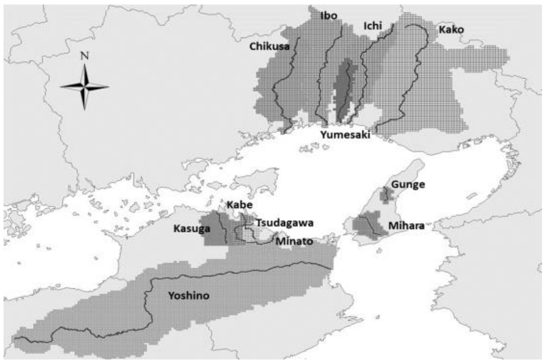

Fig. 1- Harimanada region and rivers selected for study

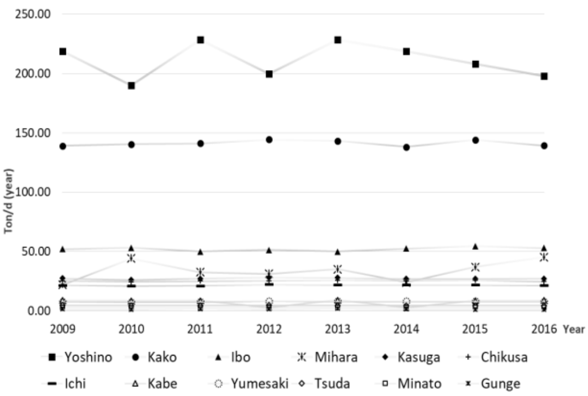

Fig. 2 – TN discharged Ton/day for each river

References:

[1]Tetsuo Yanagi; Eutrophication and Oligotrophication in Japanese Estuaries, Oligotrophication in the Seto Inland Sea; Springer, 2015.

[2]Mori, M.; Shimadera, H.; Matsuo, T.; Kondo, A.; Koga, Y.; Suzuki, M.; Analysis of nitrogen dynamics in Kako river basin using hydrological and water quality models during rainfall and normal stage of water; General Meeting of Japanese Society of Hydrology and Water Resources; September 2019, Chiba.