Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

ACG35-13 Room:421 Time:April 28 17:45-18:00

Construction of the comprehensive aquatic model of the Ise Bay watershed

ONISHI, Takeo[1*] ; SUGIMOTO, Ryo[2] ; AOKI, Kazuhiro[3] ; SOMURA, Hiroaki[4] ; YOSHINO, Jun[5] ; HIRAMATSU, Ken[1]

[1]Faculty of Applied Biological Sciences, [2]Faculty of Marine Bioscience, Fukui Prefectural University, [3]National Research Institute of Fisheries Science, [4]Faculty of Life and Environmental Science, Shimane University, [5]Faculty of Engineering, Gifu University

Though Integrated Water Resource Management (IWRM) is recognized as an important philosophy for consistent management through terrestrial area to oceans in 1990s', lack of scientific prove and grounds is one of the essential obstacles to implement the philosophy into actual policy making processes. To enhance and enrich scientific basis of IWRM, objective evaluation of change of terrestrial area impacts on oceanic environment is essential. Thus, we are conducting to construct a comprehensive aquatic model which combines water, material, and ecosystem models throughout terrestrial area, rivers, and ocean. The study site is the Ise Bay and its catchment area. Our model is targeting at carbon, nitrogen, and phosphorous for material, and low trophic levels for ecosystems. In addition, model development is based on the philosophy that promotes a model to be opened for public.

The model structure is that combination of hydrological model, river model, oceanic model, and ecosystem model. For about hydrological model, PnET-BGC is used for natural vegetation, SWAT model for agricultural lands, and the tank model for domestic water outflow from urban area. For about river model flow model, one-dimensional open channel model using kinematic wave method is utilized. For ecosystem model, NPZD model was implemented into aquatic systems. And, for ocean model, ROMS was used. In addition, dam operational rules were included to consider the impacts of dams on river discharge regimes. Calibration and validation period was from 2000 to 2010. Simulation time step was 1 day, and spatial resolution of driving force (weather data) of the model was 2km. ASTER-GDEM is utilized for DEM, National Land Numerical Information for vegetation, and Basic Land Classification Survey for soil and geological data. The result showed that while river discharge was relatively good, the level of water quality was not acceptable. One of the possible reasons of this discrepancy was the incomplete implementation of agricultural water use. Moreover, since coupling with ocean model is not yet realized, thus, improvement of terrestrial model, coupling of terrestrial and ocean model, and sensitivity analysis is further required.

Keywords: Integrated Water Resource Management, Landuse change, Eutrophication, Hypoxia, Ise Bay