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A study on the applicability of the ecosystem model on water quality prediction in urban river outer moats of Yedo Castle, Nihonbashi River

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The objective of the study is to elucidate the waterside environment in the outer moats of Yedo Castle and the downstream of Nihonbashi River in Tokyo. Scince integrated sewage system has been installed in the area around the outer moats of Yedo Castle and the Nihon River basin, when rainfall exceeds more than the sewage treatment capacity, overflowed untreated wastewater is released into the moats and the river.
Because the moats is a closed water body, pollutants are deposited to the bottom without outflowing. While reeking offensive odors due to the decomposition, blue-green algae outbreaks affected by the residence time and eluted nutrient causes problems. Scince the Nihonbashi River is a typical tidal river in urban area, the water pollution problems in the river is complicated.
This study clarified the characteristics of the water quality in terms of dissolved oxygen saturation through on-site observations. In particular, dissolved oxygen saturation in summer, it is clarified that variations from a supersaturated state due to the variations of horizontal insolation intensity and water temperature up to hypoxic water conditions in the moats. According to previous studies on the water quality of Nihonbashi River, it is clarified that there are three types of variations of dissolved oxygen which desided by rainfall scale. The mean value of dissolved oxygen saturation of all layers has decreased by about 20% at the spring tide after dredging, then it recoveres gradually and become the value before dredging during about a year. Further more, in places where sewage inflows, it is important to developed a ecosystem medel and the applicability of the model. 9 variables including cell quota (intracellular nutrients of phytoplankton) of phosphorus and nitrogen with considerring the nitrification of ammonia nitrogen are used in the model. This model can grasp the sections (such as oxygen production by photosynthesis of phytoplankton, oxygen consumption by respiration of plankton, and bottom mud) of dissolved oxygen concentration.