

INFLUENCE OF WATER QUALITY OF HORI RIVER AT MATSUSIGE LOCK GATE AREA DUE TO THE NAKAGAWA CANAL

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1. INTRODUCTION

Study of water quality around Matsusige Lock Gate areas is very important for the living organism of the Hori River. Matsusige Lock Gate area is that area where Nakagawa canal is connected to Hori River, as shown in **Fig.1**. Therefore, abundant observations were carried out over there. Firstly, observations have been done at Matsusige and Sanno Bridges at the spring and neap tides. And secondly, observations were carried out to find out the distributions of velocity using ADCP along the longitudinal profile of Hori River. Overall, the water quality of the Hori River was greatly influenced by the inflow from Nakagawa Canal during tidal changes. The extremely high levels of dissolved oxygen from inflow Nakagawa Canal to Hori River give a good indication for the better inhabitant. Moreover, very low value of DO at neap tide, when the impact of inflow from Nakagawa Canal has not occurred, indicates the bad status of water quality. The severe pollution of water in Hori River becomes an important environment problem and inflow from the Nakagawa Canal would be the best way to create and restore a sustainable water system of the Hori River for the better inhabitant for fishes and other living organisms and enabling better environment around the Nagoya City.

2. MATERIAL AND METHODS

An observation has been made at Matsusige Bridge and Sanno Bridge during flood and ebb tides using water quality meter (WQC-24) on 6th and 28th September of 2011, which corresponded to neap and spring tides. Regmi et al., 2011 reported that there is a strong relation between the velocity and deposited sludge during the tidal behaviors. Therefore, ADCP was used along the longitudinal profile (North wise direction) of the Hori River on 29th June 2011 of spring tide.

3. RESULTS AND DISCUSSIONS

Relatively high DO levels were observed in both bridges as shown in **Fig.2** at different times at spring tide (especially, in Flood tide) while lower DO levels occurring at neap tide. The relatively high DO levels at spring tide were attributable to the influence of Nakagawa Canal which contains enriching chlorophyll in water with oxygen as shown in **Fig.2**. This effect can also be seen at Naka Bridge of the upperstream as shown in **Fig.2**. The red line in **Fig.2** means the operation time of transmission of water from Nakagawa canal to Hori River at spring tide. Moreover, The ADCP was used to get the longitudinal profile of vertical distribution of Hori River. The velocity distribution was calculated to see character of velocity during the spring tide of low and flood tides of different location as shown in **Fig.3**. According to **Fig.3**, it was depicted that middle stream area i.e. near the Matsusige Lock Gate area, the effect of velocity was seen high in low tide due to the influence of Nakagawa canal. The blue color of **Fig.3** indicates the flow from the Nakagawa canal to the downstream area.

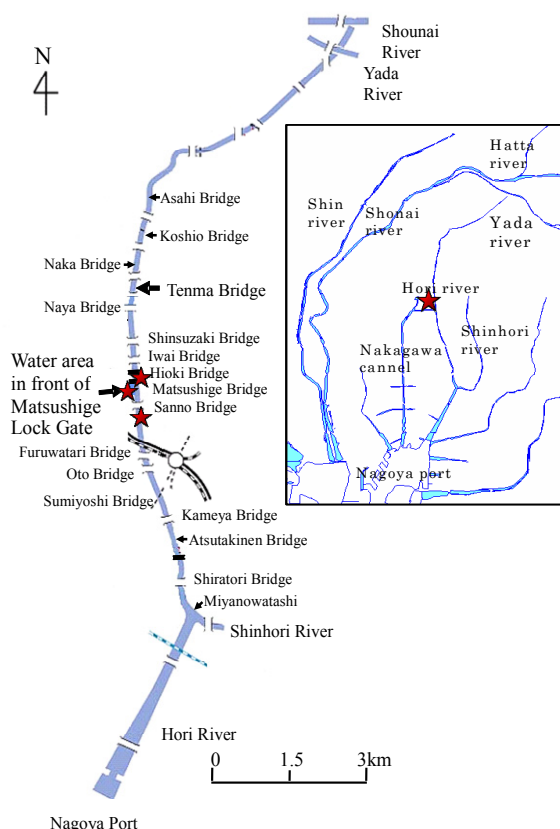


Fig.1 Longitudinal profile of Hori River & rivers around Nagoya port

Key Words: Matsusige Lock Gate, Water quality, Spring and neap tides, ADCP, DO & Chlorophyll

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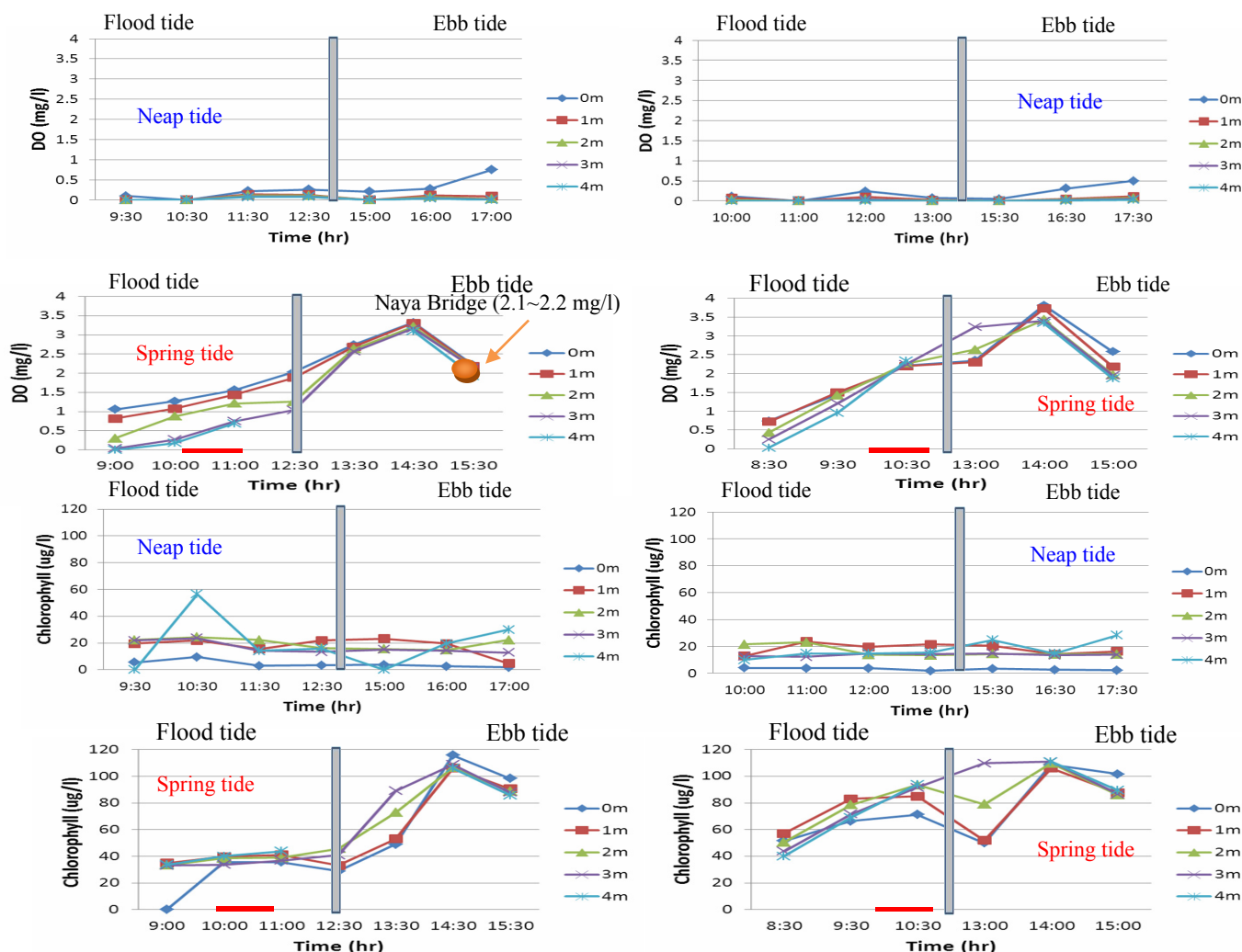


Fig. 2 Distribution of DO and Chlorophyll at neap and spring tides at Matsusige (left) and Sanno (right) bridges

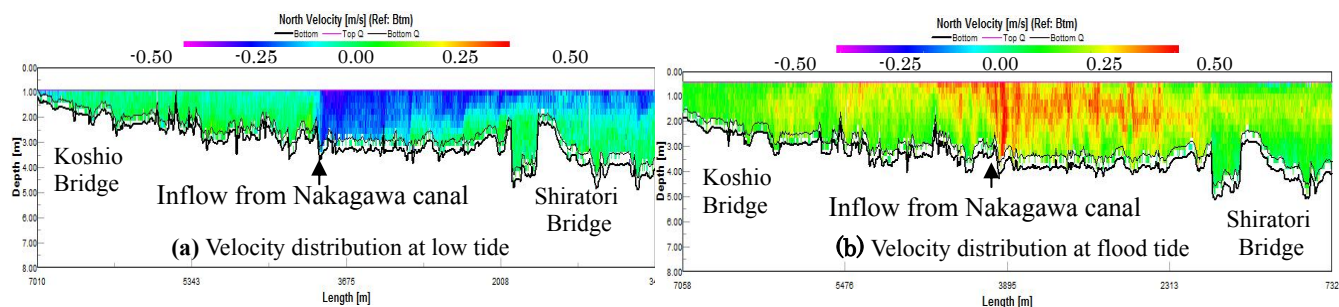


Fig.3 The longitudinal distribution of water velocity using ADCP of Hori River

4. CONCLUSIONS

The extremely high levels of dissolved oxygen from inflow Nakagawa Canal to Hori River give a good indication for the better inhabitant for fishes and other living organisms around the upstream area of Hori River. However, the effective quantity of inflow discharge, status of water quality of Nakagawa canal and the inflow time on tidal change of Hori River are still lacking. Therefore detailed observations and experiments should be necessary for enabling better environment around the Nagoya City in a near future.

Reference

- 1) Ugendra Regmi, Makoto Takeda, Naoki Matsuo, "A study on the impact of sludge on water quality of Hori River", Published in Annual Journal of Hydraulic Engineering of JSCE VOL. 55 pp. 675~680, 2011.