

OBSERVATION ON THE PHYSIOCHEMICAL CHARACTERISTICS OF HORI RIVER

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1. Background

Urban River is an important component of urban ecosystem. With the rapid development of city economy in 1960s, urbanization had resulted many problems of river-environment, especially deterioration of water quality in many rivers of Japan. Hori River is one of the examples of that, which flows from north to south part through the downtown of Nagoya city, Japan. This river is the manmade river and it was built for the purpose of transporting goods and materials during the construction of Nagoya castle about 400 years ago. The water pollution was rapidly increasing in Hori River due to the contamination with waste water during a period of rapid economic growth in 1960-1970. As a result, Hori River in Nagoya city was highly polluted, almost anaerobic, black colored, bad smelling and containing lot of solid waste having BOD exceeding 50 mg/l. In Hori River, Saline water is the major key, which has an adverse impact on water quality. The behavior of the water quality is strongly influenced by phasing between tidal stage and tidal waves of the Nagoya port. The main goal of this present study is to assess the impact of different tidal behavior on the physiochemical characteristics of Hori River.

2. Observed Methods

Field observations were performed on different location of the bridges of the Hori river. The observations were carried out during a neap tide of January 2010 as shown in **Fig.2**. It was started at 8am on the 11th of January and finished at 5pm on the same day as shown in **Table1**. The samples were taken at Asahi Bridge, Naka Bridge (upstream), Matsushige

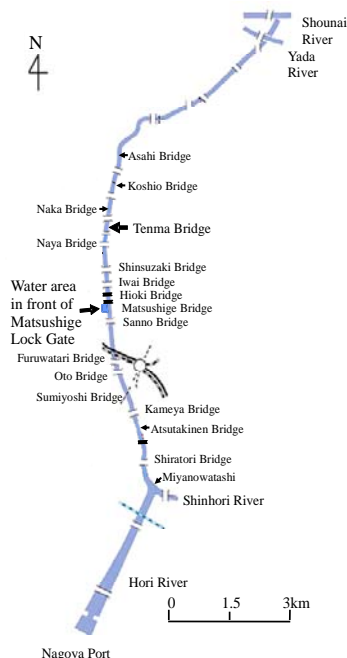


Figure 1 Longitudinal section of Hori River

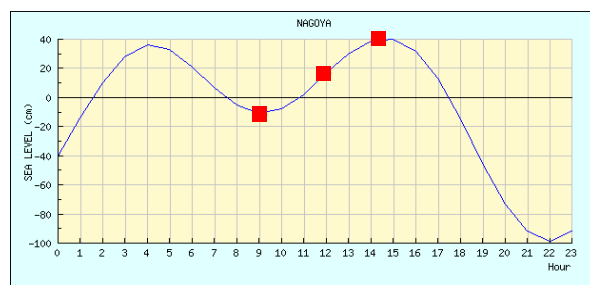


Figure 2 Water levels at Nagoya port¹⁾

Table 1 Observation date

Tide	Date	Observed Start TIME	Type of tide
Neap tide	January 11 2010	9:00	Low tide
		11:55	Flood tide
		14:45	High tide

Keywords: Water quality, HORI RIVER, Observation, Urban river

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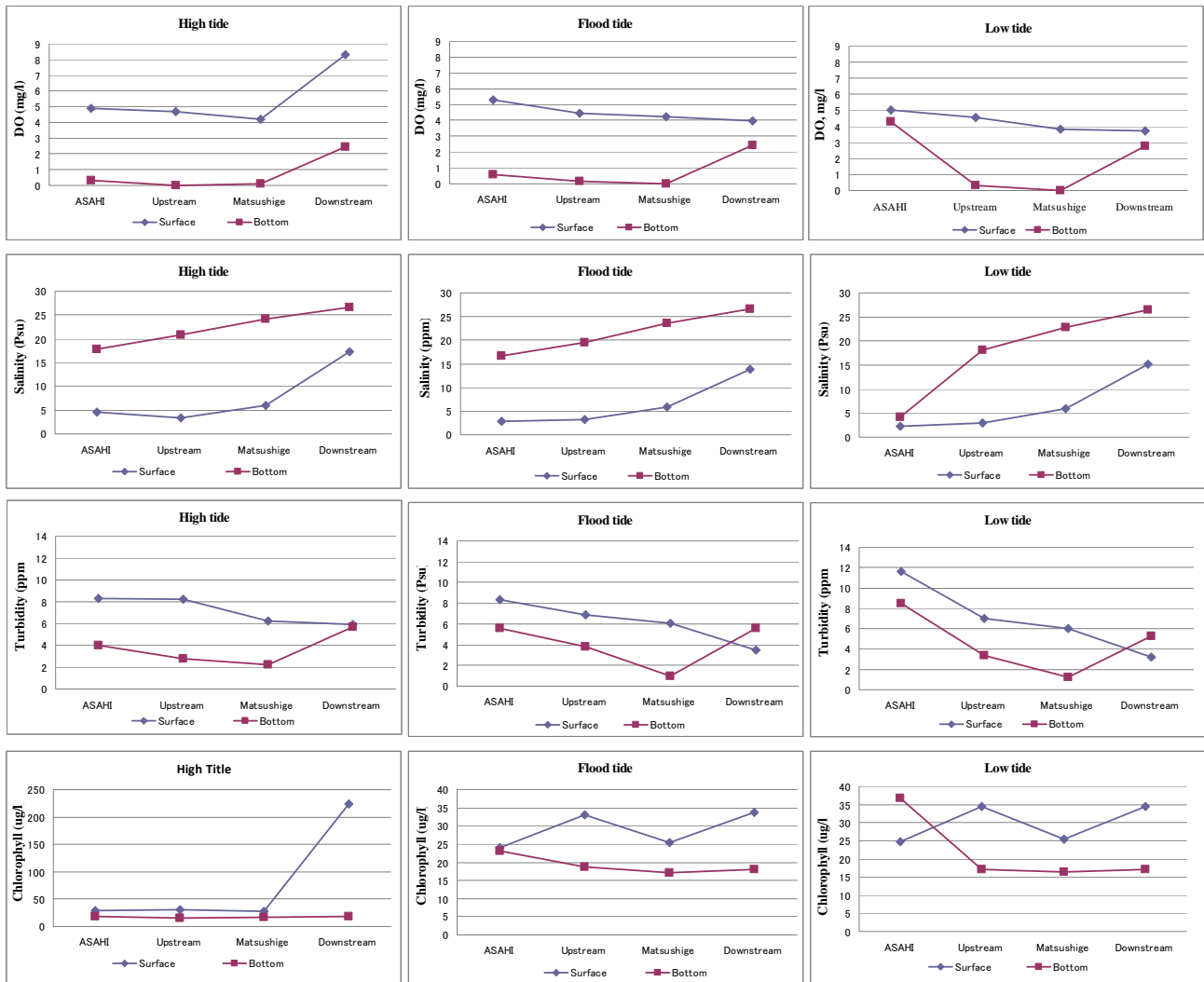


Figure 3 Distribution of DO, salinity, turbidity and chlorophyll

lock gate and Siratori Bridge (downstream). The distances of Naka bridge and Matsusige lock gate from mouth of rivers are 9.7km and 7.6km as shown in **Fig.1**. Observations were done along the river with the help of ship and data were collected at surface and bottom layer of high, low and flood tide with water quality meter (WQC-24).

3. Results and Discussions

Different physicochemical parameters i.e. dissolved oxygen, salinity, turbidity and chlorophyll were observed in the winter season (January) of spring tide of high, flood and low tide as shown in above **Fig.3**. Dissolved oxygen in surface area are high in Asahi Bridge and then gradually decrease in the downstream areas. But these values are high in downstream area of high tide. This might be due to the high chlorophyll near the Nagoya port. Also the bottom layer of upstream and Matsusige lock gate has almost zero DO due to the high accumulation of sludge with fine materials. Salinity values in surface and bottom layers are higher in downstream areas due to the estuary region. However, in the flood tide, the difference of salinity became homogenous in all points. On the other side, the values of turbidity in the surface areas at Asahi Bridge are higher in comparisons to the downstream areas in all tides and especially very high value in low tide. Turbidity are high in downstream areas of bottom layer because of the saline water. And during the high tide, the value of chlorophyll was found very high in downstream area of surface layers.

4. Conclusion

From this study, it can be concluded that the water quality of Hori River is strongly affected by tidal behavior of Nagoya port. In the different tides, the character of water quality has been changed i.e. the stratification occurs in all time, and in the high tide, the value of chlorophyll is high in downstream areas.

Reference 1) Japan Meteorological agency, <http://www.jma.go.jp/jma/index.html>