

Phytoplankton community in estuary after reclamation during *Karenia mikimotoi* bloom at low and high tide --- A case study in the man-made channel in Guiwan River, Shenzhen

Li FL^{1,2}, Zhu HL³, Wong YS², Tam NFY^{1,2,3}, Lee FWF^{1,2}, Zhou HC^{4*}, Xu SJL^{1,2*}

1. Greater Bay Area Mangrove Wetland Research & Development Centre, Hong Kong Metropolitan University, Hong Kong SAR, China; 2. Department of Science, School of Science and Technology, Hong Kong Metropolitan University, Hong Kong SAR, China; 3. City University of Hong Kong Shenzhen Research Institute, Shenzhen, China; 4. College of Life Sciences and Oceanography, Shenzhen University, Shenzhen, 518071, China

Introduction

The estuary is an important link between the sea/bay and land rivers, and its ecological location and function especially locates in artificial river channels are extremely important. Phytoplankton community in the estuary of a man-made channel in Guiwan River, Shenzhen was studied during *Karenia mikimotoi* bloom at low and high tide, aiming to reveal the response of artificial riverine algae to red tide.

Methods

$$\text{Relative abundance (Y)} : Y = \frac{N_i}{N_T}$$

$$\text{Shannon-Wiener diversity (H')} : H' = -\sum_{i=1}^n (P_i) (\ln P_i)$$

$$\text{Pielou's evenness (J')} : J' = \frac{H}{H_{max}}$$

Results and Discussion

Total 51 algae species, belonging to 6 phyla and 36 genera, were found in the late stages of *K. mikimotoi* bloom. Most species were Bacillariophyta (54.9%) but the dominant species was *K. mikimotoi* (Pyrrophyta) with

the relative abundance of 85-99.4% at high tide and 67.8-93.1% at low tide (Table 1, Fig. 1).

K. mikimotoi blooming greatly reduces the population density and dominance of other algae and also significantly reduces the biodiversity index (H') and evenness index (J') of the algal community, thus weaken the ecological function of the algal community in the estuary of man-made Guiwan River.

Under the *K. mikimotoi* blooming, most water quality show extremely eutrophic level and very heavy pollution state.

No significant relationship was found between the relative abundance of *K. Mikimotoi* (Fig. 2) and the water quality parameters of Guiwan estuary, and it is presumed that the *K. mikimotoi* blooming is mainly brought by tidal action.

Table 1 Algal composition of the Guiwan, Shenzhen estuary

Phyla	Genus	Species	Percentage of Genus (%)	Percentage of Species (%)
Cyanophyta	4	5	11.1	9.8
Bacillariophyta	18	28	50.0	54.9
Cryptophyta	1	1	2.8	2.0
Pyrrophyta	4	5	11.1	9.8
Euglenophyta	4	6	11.1	11.8
Chlorophyta	5	6	13.9	11.8
Total:	36	51	100	100

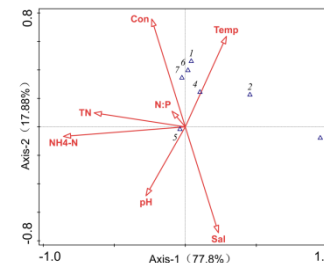


Fig. 2 CCA analysis of the relative dominance of algal communities and water quality

- 1 *Navicula spp.*
- 2 *Nitzschia spp.*
- 3 *Skeletonema spp.*
- 4 *Cryptomonas erosa*
- 5 *Karcnia mikimotoi*
- 6 *Peridinium spp.*
- 7 *Euglena spp.*

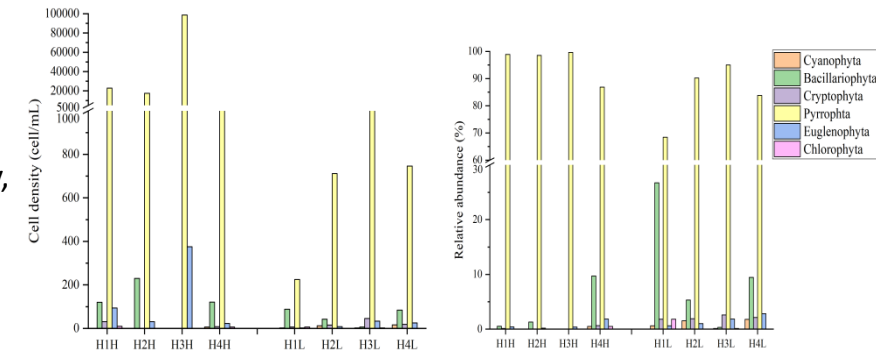


Fig. 1 Comparison of algal communities between high tide and low tide

Conclusion

The water environment of Guiwan estuary is weak against the *K. mikimotoi* blooming, and there are signs of *K. mikimotoi* retention in the river though the salinities were low after the ebb tide, which may cause the risk of continuous outbreak/hazard and needs more attention.

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