Water Quality and Antibiotic Distribution in Shan Pui River and Mai Po Inner Deep Bay Ramsar Site in Hong Kong, China

Carol LAU Po Ying*, LAM Kit Ling*, Panda CHAN Ping Lung, Fred LEE Wang Fat, Steven XU Jingliang**
Department of Applied Science, School of Science and Technology, Hong Kong Metropolitan University

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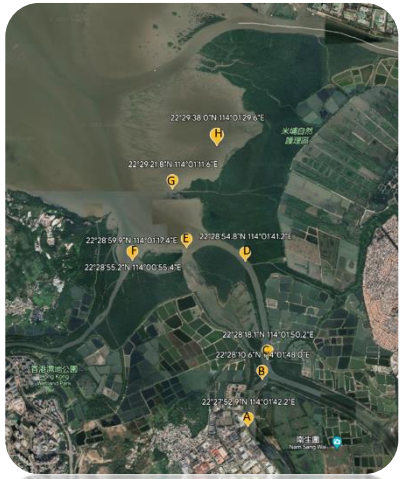
Introduction:

Mai Po Inner Deep Bay Ramsar Site has been designated as a Ramsar Site since 1995. It nurtures approximately 440 bird species with 13 globally threatened species. The Ramsar Site is a natural shallow coastal bay located within the Yuen Long Basin and acquires water from both Hong Kong and Shenzhen. Shan Pui River is located within the Wetland Buffer Area, and pollutants from the River may affect the water quality of the Ramsar Site.

Study aim:

This study aims to investigate the water quality and antibiotic distribution of Shan Pui River and the Mai Po Inner Deep Bay Ramsar Site to provide an overall understanding of the current situation of antibiotic pollution of the sites.



Sampling sites:

Water samples of 8 sampling points (from A to H) along the Shan Pui River and the intertidal flat of the Mai Po Inner Deep Bay Ramsar Site were collected in summer (June 2022) and winter (Jan 2023).

Methodology:

In-situ assessment

Temperature (TEMP °C), pH, conductivity (COND ms/cm), turbidity (TURB NTU), dissolved oxygen (DO mg/L), total dissolved solids (TDS mg/L), and salinity (ppt) were determined using the U-50 multi-parameter water quality checker (Horiba).

Laboratory measurement

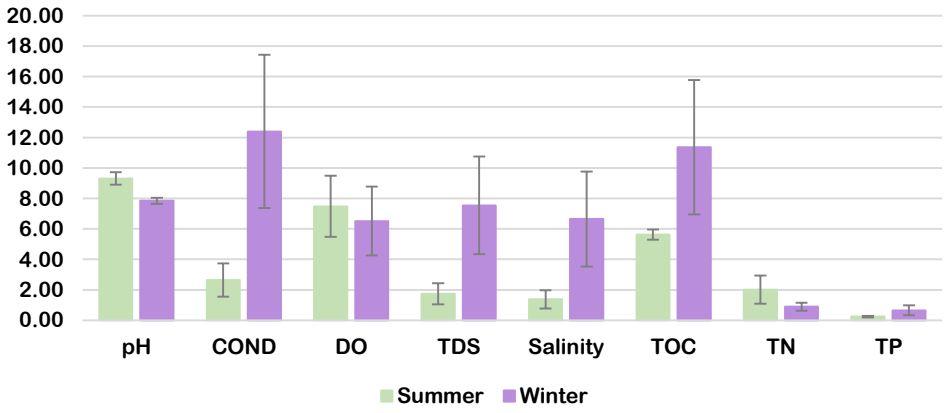
Total organic carbon (TOC ppm), total phosphorus (TP mg/L), and total nitrogen (TN mg/L) in the water samples were measured with the TOC-L analyzer (Shimadzu) and Flow Injection Analyzer (Lachat) respectively using standard methods, while the concentration of 19 antibiotics of four categories including tetracyclines, quinolones, macrolides, and sulfonamides was quantified by solid-phase extraction coupled with liquid chromatography-tandem mass spectrometry.

Results:

The physicochemical properties of the water samples were significantly different in summer and winter, and between sampling points. In general, higher TN concentrations of the water samples were observed in summer, whereas higher salinity, TP, TOC concentrations and total antibiotics quantity were measured in winter.

In addition, The mean concentration of doxycycline (168.16 ng/L) was the highest, which was followed by chlortetracycline (164.18 ng/L) found in the water samples in winter. This study indicated that concentrations of different antibiotics in the water samples were very high when compared the results from *Deng et al. 2018*. Appropriate management of domestic and industrial wastes is necessary to reduce environmental degradation.

Physicochemical Parameters of Shan Pui River and Mai Po Inner Deep Bay Ramsar Site



The Concentration of 19 antibiotics in the water samples