Application number: MCEF22109

Metagenomics analysis of the biodiversity and functioning of microbial communities in the western and southern waters of Hong Kong

"I hereby irrevocably declare to the Management Committee and the Steering Committee of the Fund, that all the dataset and information included in this Completion Report have been properly referenced, and all necessary authorisations have been obtained in respect of the use of information owned by third parties in the Funded Project."

Any opinions, findings, conclusions or recommendations expressed in this Completion Report have been given or expressed without consultation with or reference to the Grantors and the Fund, and do not necessarily represent the views of the Grantors or the Fund."

Signature: _____

   (Project Leader, Chi Hung Tang)

Date: ___20 October 2025_____

Completion Report

October 2025

Executive Summary

This funded project aimed to investigate the influence of various environmental factors on the biodiversity and functioning of phytoplankton (mainly diatoms and dinoflagellates) in Hong Kong's western and southern coastal waters. A total of six rounds of field surveys and sample collections were conducted at six selected sites in the coastal waters of Hong Kong bi-monthly from May 2024 to March 2025.

Notable variation in seawater salinity was recorded, which ranged from around 10 PSU in July 2024 to up to > 35 PSU in Jan 2025 at some of the sites. Surface water temperatures followed the normal pattern that they were higher during summer months (range: 25°C – 30°C in May, July, September 2024) and were lower in winter months (range: 15°C – 23°C in November 2024, January 2025, and March 2025). Interestingly, seawater pH varied relatively greatly during the project period, from as low as pH 6.0 to as high as pH 9.0 among all sites. Strong correlations were observed between salinity and temperature, and between salinity and seawater pH.

Abundance of phytoplankton (i.e., diatoms and dinoflagellates) ranged from ~270 cells/mL to ~4000 cells/mL for all samples. Phytoplankton communities were dominated by diatoms throughout the whole project period. When all samples are considered, the diatom genus *Thalassiosira* (mean cell density at 51% of diatoms and 48% of phytoplankton), *Chaetoceros* (mean cell density at 11% of diatoms and 10% of phytoplankton), and *Dactyliosolen* (mean cell density at 9% of diatoms and 9% of phytoplankton) were abundant. The dinoflagellate genus *Prorocentrum* (mean cell density at 10% of dinoflagellates and < 1% of phytoplankton), *Gymnodinium* (mean cell density at 9% of dinoflagellates and < 1% of phytoplankton), and *Alexandrium* (mean cell density at 8% of dinoflagellates and < 1% of phytoplankton) were relatively abundant in the waters.

Environmental factors, including salinity, temperature, and pH, were found to be the major driving factors for the community composition of phytoplankton for all samples while dissolved oxygen levels and turbidity of seawater exerted very limited influence on the phytoplankton community.

A seminar and a workshop were conducted for students. Results of this project were presented at an international conference for the scientist community.

A way forward, findings of this funded project could contribute to a better understanding of the marine ecosystem in the western and southern waters of Hong Kong. Governmental departments such as the Environmental Protection Department and the Agriculture, Fisheries and Conservation Department may find the results valuable. However, there are still unknowns to be studied: 1) apart from temperature, how the new dimensions of seawater salinity and pH could affect the growth and community composition of marine phytoplankton, and 2) how locations in Deep Bay that experience high turbidity could support high abundance of phytoplankton. These new research questions generated from this funded project are certainly worthwhile of further investigation.