Effects of tourists on water quality of the Tai O water channels

Wing Yin Mo, Kit Ling Lam, Yu Hin Lam

Department of Applied Science, School of Science and Technology, Hong Kong Metropolitan University

Introduction

The COVID-19 pandemic had a big impact on international travel, and people had to stay in Hong Kong because of it. This made local tourism much more popular, so more people are going to local places of interest. Tai O is one of the most popular tourist destinations in Hong Kong. The stilt houses (aka Pang Uk) built along the main water channels create a unique scene and attract tourists. Some of the stilt houses are residences, while some of them are engaged in business activities such as restaurants. The majority of the stilt houses are not connected to the public municipal sewage treatment system, and the sewage generated in the neighborhood is directly discharged into the water channel underneath the stilt houses. Despite the lack of sewage treatment, the environment is generally odorless. It is believed that the sewage generated from the stilt houses are either carried away by tidal action or consumed by the surrounding mangrove swamps. However, the impact of tourists on water quality has never been studied. Therefore, a study was performed to compare the water quality of the water channel before and after a weekend, when much more tourists visited Tai O.

Materials and methods

Surface water samples were collected across the Tai O water channels on 8/12/2022 & 11/12/2022. Fig 1 shows the locations of all sampling points. Physiochemical parameters of the water samples were measured. Temperature, pH, conductivity, salinity, turbidity, dissolved oxygen, and total dissolved solid were measured in situ using a Horbia U50 portable multiparameter meter. Ammoniacal nitrogen, nitrite, nitrate, total kjeldahl nitrogen, orthophosphate, and total phosphate, were analyzed using flow injection analyzer (FIA). T-test was used to detect significant differences ($p<0.05$) between the two sampling days.
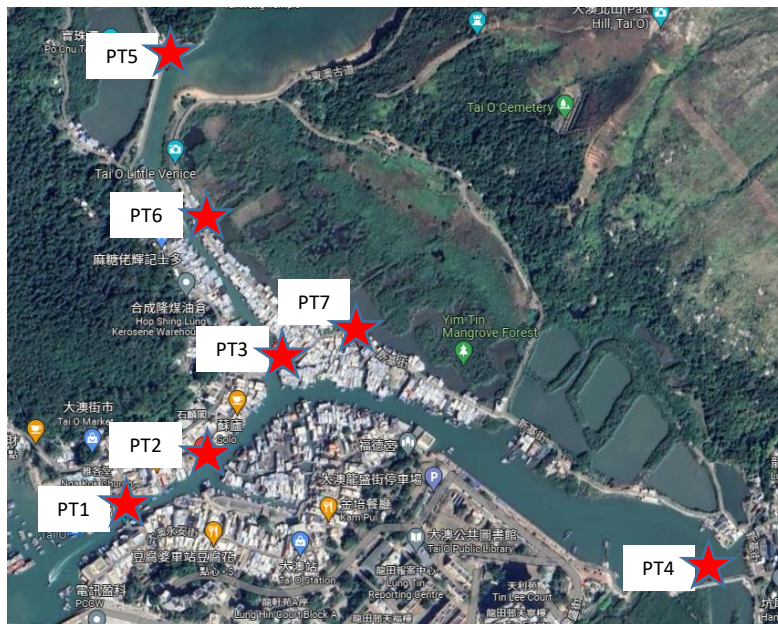

Figure 1 Sampling locations of this study

Results and discussion

Table 1 shows the selected physiochemical parameters, and those with significant differences between the two sampling days were bolded. Except for nitrite, all physiochemical parameters of the water collected from PT 3 were at significantly higher levels during the weekend. PT 3 is located at the center of the Tai O neighborhood. With more tourists visiting, more excrement was discharged into the water channels. Moreover, the higher levels of turbidity observed in PT1, PT3, PT4, and PT7 and lower levels in PT5 and PT6 during the weekend suggest that water currents could play an important role in the distribution of pollutants in Tai O.

Table 1 shows the selected parameters before and after the weekend.

Sample points	Turbidity		Ammonical nitrogen	
	8/12/2022	11/12/2022	8/12/2022	11/12/2022
PT1	**5.13 ± 1.33**	**10.8 ± 2.35**	0.084 ± 0.065	0.038 ± 0.020
PT2	4.83 ± 2.22	12.6 ± 6.58	0.067 ± 0.058	0.042 ± 0.031
PT3	**5.07 ± 0.67**	**21.1 ± 3.00**	**0.042 ± 0.010**	**0.179 ± 0.033**
PT4	0.43 ± 0.40	4.40 ± 0.46	0.056 ± 0.007	0.095 ± 0.019
PT5	**39.9 ± 11.5**	**17.4 ± 2.85**	0.006 ± 0.005	0.005 ± 0.002
PT6	**95.1 ± 15.4**	**39.0 ± 24.3**	0.045 ± 0.023	0.015 ± 0.005
PT7	**0.700 ± 0.26**	**4.33 ± 1.57**	0.087 ± 0.016	0.070 ± 0.004
	Nitrate		Nitrite	
PT1	**0.054 ± 0.027**	**0.096 ± 0.009**	**0.017 ± 0.006**	**0.026 ± 0.000**
PT2	**0.069 ± 0.025**	**0.079 ± 0.019**	0.021 ± 0.008	0.021 ± 0.007
PT3	**0.100 ± 0.008**	**0.077 ± 0.005**	0.026 ± 0.000	0.025 ± 0.000
PT4	0.050 ± 0.006	0.047 ± 0.009	**0.014 ± 0.001**	**0.022 ± 0.006**
PT5	**0.031 ± 0.005**	**0.052 ± 0.012**	**0.011 ± 0.000**	**0.025 ± 0.000**
PT6	**0.089 ± 0.009**	**0.068 ± 0.006**	0.025 ± 0.000	0.025 ± 0.001
PT7	**0.061 ± 0.012**	**0.085 ± 0.005**	0.025 ± 0.000	0.025 ± 0.000
	Total kjeldahl nitrogen			
PT1	0.251 ± 0.100	0.221 ± 0.015		
PT2	0.221 ± 0.038	0.165 ± 0.074		
PT3	**0.215 ± 0.006**	**0.369 ± 0.062**		
PT4	**0.156 ± 0.014**	**0.245 ± 0.014**		
PT5	0.115 ± 0.030	0.108 ± 0.003		
PT6	0.200 ± 0.030	0.195 ± 0.035		
PT7	0.306 ± 0.007	0.310 ± 0.018		

All the data were statistically analysed by *t*-test using Microsoft Excel. The level of significance was $P < 0.05$.

Figure 2 Research staffs collecting water samples from the Tai O water channels

Acknowledgement