

**THE EDUCATION UNIVERSITY OF HONG KONG**  
**FACULTY OF LIBERAL ARTS AND SOCIAL SCIENCES**

**Research Output/Impact Prize for the Dean's Research Fund 2017-18**

**Brief Introduction of Awardee's  
Research Publication/Study and Future Research Development**

**Awardee (Dept):** Dr. Lincoln Fok, Associate Professor (SES)

**Publication Title:** Environmental Studies

A. *Briefly introduce your research publication/study for which you have received the prize.*

The ocean is one of the final sinks for anthropogenic solid waste. Accumulation of marine debris is ubiquitous on a global scale. There is abundance of macro debris in the oceans, with pieces easily identified by the naked eye, and they are adversely impacting the marine environment. We now also know that around 75% of the marine debris is made of plastics. However, a portion of the plastic debris that has been overlooked by the scientific community consists of debris of smaller particle sizes (<5 mm in particle diameter), which is also known as microplastics. The plastic pellet spillage which occurred in Hong Kong waters in July 2012 represents one of the many sources of microplastic pollution. These smaller plastic particles have a potential toxic effect on the biota. The toxicity may originate from the plastic itself or from the adsorbed hydrophobic pollutants such as DDT. It is suggested that accidental ingestion of microplastics by marine fauna is a potential pathway for bioaccumulation. A review for marine debris has been published by Li and Fok [1].

Hong Kong is known to produce significant amounts of plastic waste annually. Moreover, to the North is the Guangdong Province, which accounts for up to a quarter of the total production of plastics in China. There was however a lack of information on the abundance, temporal and spatial distribution of the various major types of microplastics in the fluvial, littoral and marine environments of Hong Kong. This knowledge gap needed to be filled in order for Hong Kong to understand the extent and severity of this emerging environmental issue. This is important because the marine waters of Hong Kong represent a valuable resource in terms of recreation, ecology and biodiversity and mariculture.

This research gap was filled through carefully designed field surveys covering sandy beaches, coastal seas and local rivers by the applicant. Related work was funded by a now fully-completed ECS (859413). Results have quantified the abundance and illustrated the temporal-spatial distribution of different types of marine microplastic debris in Hong Kong [2, 3], and in South China [4]. It was observed that the abundance for MP in the littoral zone of Hong Kong was over 3000 items per m<sup>2</sup>, one of the highest in the world. Spatiotemporal distribution of MP in both littoral and marine environments in Hong Kong pointed to the fact that the Pearl River is a major potential source of the local MP pollution [3]. This “master map” of microplastic pollution serves as an important source of intelligence from an environmental management perspective, as it gives insights to the nature and origin of microplastics. As international governments were starting to ban personal care and cosmetic products containing plastic microbead (which is a type of microplastic), Fok’s research team took the initiative to study microbead pollution in Hong Kong. We were the first to capture microbeads from marine sample [5], and the population of Hong Kong are emitting almost 1 billion microbeads per day to the coastal waters of the territory [6].

#### References

1. Li, W.C.\*, Tse, H.F., Fok, L., 2016. Plastic waste in the marine environment: A review of sources, occurrence and effects. *Science of The Total Environment* 566–567, 333-349. (SJR A)
2. Cheung, P.K., Cheung, L.T.O., Fok, L.\*, 2016. Seasonal variation in the abundance of marine plastic debris in the estuary of a subtropical macro-scale drainage basin in South China. *Science of The Total Environment* 562, 658-665. (SJR A)
3. Fok, L.\*, Cheung, P.K., 2015. Hong Kong at the Pearl River Estuary: A hotspot of microplastic pollution. *Marine Pollution Bulletin* 99, 112-118. (SJR A)
4. Fok, L.\*, Cheung, P.K., Tang, G., Li, W.C., 2017. Size distribution of stranded small plastic debris on the coast of Guangdong, South China. *Environmental Pollution* 220A, 407-412. (SJR A\*)
5. Cheung, P.K., Fok, L.\*, 2016. Evidence of microbeads from personal care product contaminating the sea. *Marine Pollution Bulletin* 109, 582-585. (SJR A)
6. Cheung, P. K., Fok, L.\*, 2017. Characterisation of plastic microbeads in facial scrubs and their estimated emissions in Mainland China. *Water Research* 122, 53-61. (SJR A\*)

#### *B. How you used/will use your prize and perhaps its usefulness to your research development?*

I will use it to develop the next GRF application, and support microplastic related KT and research work.

*C. Expected research outcomes/outputs/impacts arising from this prize.*

A GRF proposal. Collaborative works with NGOs and train undergraduate in research through environmental studies projects.