The University of Hong Kong
School of Biological Sciences

Public Seminar

"Heavy metal contamination in Hong Kong mangroves: multiscale impacts on key ecosystem components"

Miss Rebekah J. Butler
for the degree of Doctor of Philosophy

Date: 30 November 2020 (Monday)
Time: 4:30pm - 5:15pm
Via zoom (please contact ppchan@hku.hk for details)

About the speaker:

Rebekah is a PhD candidate in Dr Cannicci's Integrated Mangrove Ecology lab (iMEco Lab). Her research interests centre around the influence of human activity on coastal systems.

Abstract:

Coastlines continue to develop exposing coastal ecosystems to elevated levels of pollution. Hong Kong's mangroves are no exception receiving inorganic and organic input from human activities. To assess the current spatial variation of heavy metal (HM) pollution in Hong Kong's mangroves I analysed the concentration of Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn in mangrove sediments, flora and fauna throughout five mangroves using an Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Noting considerable levels of HM contamination at Mai Po Marshes Nature Reserve (MPMNR), I explored the physiological influence of HM on keystone species of crab by comparing the thermal tolerance of *Parasesarma bidens* populations' exposed to varying levels of metal pollution *in situ* by analysing oxygen consumption and cardiac activity. The suppression of oxygen consumption and a reduced thermal optimum observed in *P. bidens* from MPMNR indicated narrowing and shifting thermal windows in crabs exposed to metal pollution, reducing their resilience to future climate change.

In contrast, mangrove plants displayed no spatial variation in HM bioaccumulation throughout sites indicating HM tolerance. To investigate this observation, I analysed HM concentrations in several plant tissues of the mangrove plant *Kandelia obovata* at MPMNR and found HM exclusion at the root level and reduced HM translocation to aerial plant tissues. Finally, I used HM and stable isotope analysis (SIA) to investigate the trophic transfer of HM within the brachyuran crab community at MPMNR and found the potential biomagnification of As and Cd in consumers. These results highlight the potential of HM to bioaccumulate and biomagnify in food webs, which is particularly concerning for the management and conservation of protected areas such as MPMNR.

My research indicates that HM have the potential to influence mangroves at multiple scales of biological organisation and highlights the importance of considering impacts of pollutants on mangrove systems that may be missed by current assessments of mangrove health, which focus on forest area and consider quantity instead of quality.