HeART of the Basin Scholarship Research

Ms Tiffany Brown - 2019

Quantification of microplastics in public tap water of Rockhampton and the Capricorn Coast.

Summary

In 2020, Tiffany completed an Honours project focussed on the quantification of microplastics in public tap water of Rockhampton and the Capricorn Coast. Microplastic contamination of drinking water is a rising global concern with several published studies confirming microplastic presence in public tap water. Microplastic (MP) presents potential risks to human health that have not yet been clearly established. However, exposure to MP is known to decline overall health of other organisms; having been shown to accumulate in vital organs, cause inflammation and abnormalities, decrease reproductive rates, and slow locomotor activity in both vertebrates and invertebrates.

Knowledge of the variation of microplastic contamination of tap water among locations and over time is lacking. A standardized methodology for the collection, isolation, and quantification of microplastics is also lacking, impacting the overall integrity of results and comparability among studies on a global scale. Thus, this study presented a spatio-temporal assessment of microplastic abundance per litre of water from public taps located in Rockhampton and the Capricorn Coast sourced from two separate water bodies and treated by two separate drinking water treatment plants.

To investigate microplastic abundance among taps and over time, six (6) replicates with a volume of 30 L were sampled from six (6) taps once per week for eight (8) consecutive weeks. Microplastic particles were detected in 99.29% of samples. The average microplastic abundance across the study was 106.1 ± 46.1 microplastic particles per litre sampled. A significant spatio-temporal interaction was detected where microplastic abundance was found to fluctuate unpredictably from tap to tap and over time. Research suggests possible sources may include the original water supply, drinking water treatment processes and infrastructure, and/or contamination obtained within the distribution systems (e.g. from pipes and plumbing). While MP contamination was evident, the source of microplastics was not investigated or determined in this study. This study is the first known study of its kind to confirm the presence of microplastic contamination in public tap water in Australia.

Significance of Study

Assessing the amount of MPs that humans are exposing themselves to through water consumption is vital for the assessment of risk to human health.

Currently, it is difficult to compare results described in MP research between studies due to the lack of uniformity throughout the methodology. Collection strategies, isolation techniques and quantification methods differ widely between publications and introduce bias to the results through potential exclusions and/or over and underestimations of MPs.

This study comprises a combination of the most promising methods identified from a review of the current literature to propose a cost and time-effective, replicable methodology for MP collection, isolation, and quantification.

This study is the first spatio-temporal assessment of MP abundance in tap water. The results of this study contribute a baseline for future MP research. The results of the study illuminate the current water quality supplied by Drinking Water Treatment Plants (DWTPs) in Rockhampton and the Capricorn Coast and indicate areas for improvement of the water treatment or transport process. The results may also implicate a MP contamination issue of the Fitzroy River and/or Water Park Creek. Confirming the source of MPs found, and causes of contamination, will require further research.

Support during study
- CQUniCares Launch Scholarship
- FPRH HeART of the Basin Scholarship

Work during study
- Casual research worker at CQU assisting Associate Professor Larelle Fabbro with aquatic ecological health assessments for various local mine sites.

About the HeART of the Basin Scholarship:

Fitzroy Partnership for River Health established the HeART of the Basin Scholarship in 2016. The Scholarship was established to expand research and understanding about waterway health in the Fitzroy Basin, with the award named to celebrate the significant contribution of inaugural Independent Science Panel Chair, Professor Barry Hart.

It was following recommendations by Professor Hart, that the Partnership evolved. The Hart report was prepared after the Fitzroy Basin floods in 2008 floods and a subsequent cumulative impact assessment study highlighted the need for an integrated monitoring and reporting system for water quality in the Fitzroy Basin.

The $2,000 scholarship is open to research students at CQUniversity studying Honours, Masters by Research or PhD to progress their learnings in a research topic relating to improving waterway health in the Fitzroy Basin.

For more information on the Fitzroy Partnership for River Health, please contact:

Executive Officer Dr. Leigh Stitz
Phone: 07 4999 2821
Email: Leigh.Stitz@riverhealth.org.au
Web: www.riverhealth.org.au

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