Martin Luna Juncal

Martin.lunajuncal@griffithuni.edu.au

http://orcid.org/0000-0002-0580-6375

https://www.researchgate.net/profile/Martin-Luna-Juncal

https://scholar.google.com.au/citations?user=f6r1d5oAAAAJ&hl=en

Summary

A surge in global population over the past half-century has created several significant issues that require addressing, one of which is the deterioration of waterways, resulting from a growing need to use more fertilisers for food production. Consequently, this increased reliance on water and fertiliser has led to the significant degradation of surface and ground-water systems through processes such as eutrophication. Not only is remediation of such waterways costly in a financial sense, but there are also significant social and environmental concerns that decrease the value and capacity of these regions to recover. Therefore, mitigating fertiliser fluxes into river and creek systems is paramount to ensure that waterways can be appropriately maintained; however, monitoring and managing this issue can also be costly and time-intensive, thus requiring a modernisation in the approaches and even, the mindset, when water quality monitoring is being discussed within government and industry. Currently, the dominant form of monitoring requires manual grab samples, followed by a laboratory analysis to obtain data pertaining to the health of a waterway. This is inefficient and requires a significant time investment. Furthermore, this method also limits the frequency at which a waterway's health can be monitored which, in environmentally sensitive regions, could pose a significant threat. This research focuses on the collection and application of high-frequency, real-time data to assist in the development of a Decision-Support System (DSS). Consequently, the project will focus on using existing mobile monitoring stations to collect real-time, high-frequency nitrate, turbidity, salinity, conductivity, temperature, dissolved oxygen (DO) and pH data from waterways around Queensland using optical sensors. Subsequently, coupling this data with external parameters such as tide, rainfall and agriculture management data, would allow for the conceptualisation and implementation of a DSS that can assist in predicting optimal fertiliser applications to croplands, particularly in environmentally sensitive areas.

Research Expertise

- Water Quality Monitoring
- Environmental Science and Engineering
- Data Processing
- Agriculture Management
- Nutrient Runoff
- Aquatic Chemistry