



Application of a novel in situ multichannel fluorimeter for monitoring microbial activity in urban Kolkata, India.

Bethany Fox (1), Robin Thorn (1), Tapan Dutta (2), John Attridge (3), and Darren Reynolds (1)

(1) University of the West of England, Bristol, United Kingdom (bethany.fox@uwe.ac.uk), (2) Department of Microbiology, Bose Institute, Kolkata, India, (3) Chelsea Technologies Group Ltd., Surrey, United Kingdom

With increasing pressures on water sources due to population, industrialization, agriculture, urbanization and climatic changes, it has become essential for us to understand and monitor water quality effectively. Changes in water use and strain on this precious resource means we must develop new monitoring parameters, along with using technological advances to assist application of these parameters. As an emerging economy, India suffers water quality issues related to all of these pressures. The Indo-UK Water Quality initiative aims to bring together technologies, ideas, problems and solutions from both the UK and India to help solve water quality issues in India.

Water Quality – TEST (Technology Enhanced Sensing and Treatment) is a three year project focussed on utilising UK developed novel technologies for monitoring water quality using novel parameters, and using a novel off-grid treatment technology to provide biologically safe drinking water. The project also aims to use UK technology expertise to aid the development of a biosensor for endocrine disrupting chemicals, with the collaborating research team at the Bose Institute, Kolkata.

The water quality monitoring aspect of the project centres around the monitoring of naturally occurring fluorescent organic matter within surface freshwaters. Aquatic fluorescent organic matter (AFOM) has been explored within the past two decades, focussing on the origins and characterisation of this AFOM. Recent research has demonstrated the potential for utilising tryptophan-like fluorescence (TLF or Peak T) to monitor microbial activity within aquatic systems, and using this ecosystem response to infer water contamination, such as sewage input or nutrient loading. Novel in situ fluorescence sensors (V-Lux, Chelsea Technologies Group Ltd.) have been developed to facilitate the real-time fluctuations in these organics; this is essential for monitoring this phenomenon, as the dynamics are fast-acting.

Water Quality – TEST aims to deploy V-Lux sensors in multiple locations within Kolkata, to monitor the biological health of the aquatic systems. Initial site scoping within Kolkata has already been undertaken to understand the demands and challenges of the urban waterways in Kolkata. From this scoping study an extended research secondment has been undertaken. It is this case study that will be presented here, demonstrating the first ever field data derived from the in situ V-Lux fluorimeter, obtained from 2 months field work on the Ganga River in Kolkata and from the East Kolkata wetlands. Alongside the V-Lux data, common in situ physicochemical parameters and laboratory biological analyses, obtained via discrete samples, were undertaken.