A review of current and emerging approaches for water pollution monitoring

ABSTRACT

The aquatic ecosystem is continuously threatened by the infiltration and discharge of anthropogenic wastewaters. This issue requires the unending improvement of monitoring systems to become more comprehensive and specific to targeted pollutants. This review intended to elucidate the overall aspects explored by researchers in developing better water pollution monitoring tools in recent years. The discussion is encircled around three main elements that have been extensively used as the basis for the development of monitoring methods, namely the dissolved compounds, bacterial indicator, and nucleic acids. The latest technologies applied in wastewater and surface water mapped from these key players were reviewed and categorized into physicochemical and compound characterizations, biomonitoring, and molecular approaches in taxonomical and functional analyses. Overall, researchers are continuously rallying to enhance the detection of causal source for water pollution through either conventional or mostly advanced approaches focusing on spectrometry, high-throughput sequencing, and flow cytometry technology among others. From this review's perspective, each pollution evaluation technology has its own advantages and it would be beneficial for several aspects of pollutants assessments to be combined and established as a complementary package for better aquatic environmental management in the long run.