ABSTRACT

One of the main challenges of drinking water utilities is to ensure high quality supply, in particular, in chemical and microbiological terms. However, biofilms invariably develop in all drinking water distribution systems (DWDSs), despite the presence of residual disinfectant. As a result, water utilities are not able to ensure total bacteriological control. Currently biofilms represent a real paradigm in water quality management for all DWDSs. Biofilms are complex communities of microorganisms bound by an extracellular polymer that provides them with structure, protection from toxics and helps retain food. Besides the health risk that biofilms involve, due to their role as a pathogen shelter, a number of additional problems associated with biofilm development in DWDSs can be identified. Among others, aesthetic deterioration of water, biocorrosion and disinfectant decay are universally recognized. A large amount of research has been conducted on this field since the earliest 80's. However, due to the complex environment and the community studied most of the studies have been developed under certain simplifications.

We resort to this already done work and acquired knowledge on biofilm growth in DWDSs to change the common approaches of these studies. Our proposal is based on arduous preprocessing and posterior analysis by Machine Learning approaches. A multi-disciplinary procedure is undertaken, helping as a practical approach to develop a decision-making tool to help DWDS management to maintain, as much as possible, biofilm at the lowest level, and mitigating its negative effects on the service. A methodology to detect the more susceptible areas to biofilm development in DWDSs is proposed. Knowing the location of these hot-spots of the network, mitigation actions could be focused more specifically, thus saving resources and money. Also, prevention programs could be developed, acting before the consequences of biofilm are noticed by the consumers. In this way, the economic cost would be reduced and the service quality would improve, eventually increasing consumers' satisfaction.