

Application of a holistic approach for the selection of wastewater treatment technologies

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The selection of wastewater treatment technologies for a given application can be a complex and onerous task. Due to the multitude of technological options available, the application of decision-support tools can be a valuable step toward developing efficient, sustainable and cost-effective technical solutions. This paper presents a holistic approach that incorporates a broad spectrum of analyses to tailor technology selection to the needs of specific sites and stakeholders. The approach is similar to that used for the environmental assessment process, and may be suited to selection tasks on various scales and in a diverse range of engineering and science disciplines. In the examples presented, the approach is applied to the selection of wastewater treatment solutions in two different environments: 1.) Selection of wastewater treatment processes in an industrial environment; and 2.) Selection of a polymer for waste activated sludge thickening in a municipal environment. To apply the holistic approach, decision matrices made up of weighted factors that cover technical, economical and environmental parameters were developed and the results show that an analysis of the interaction of these factors provides a more integrated approach to select wastewater treatment solutions in both environments. The method allows the alternatives to be ranked based on a set of adjustable performance parameters that are used as variables within the decision matrix. The results from the first part of the study identified a moving bed bioreactor as the most suitable wastewater treatment process for an industrial application out of three possibilities (moving bed bioreactor, sequencing batch reactor and high rate anaerobic reactors in series). In the second part of the study, nine polymers were tested at bench scale over different dosages. The decision matrix identified one polymer as the most effective alternative for waste activated sludge thickening at a domestic wastewater treatment plant.

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