

Proposal and validation of a performance assessment framework for urban storm water systems

Summary

Over the past two decades, performance assessment (PA) has been one of the areas showing the greatest advancement in the water sector. PA aims to measure effectiveness and/or efficiency of an activity or process using performance metrics, supporting the decision-making process and the continuous improvement of water utilities. Despite the potential benefits, few projects, and initiatives on PA have been undertaken regarding storm water systems (SWS). The present thesis aims to develop a performance assessment framework (PAF), applicable to both conventional SWS and sustainable urban drainage systems (SUDS), objective driven and focused on systems' functioning aspects, to promote the adoption of PA by water utilities, municipalities, and other institutional organisations.

The developed PAF integrates eight objectives, 25 assessment criteria and 80 performance metrics. The PAF is applied to five real case studies served by conventional SWS or SUDS, to test its applicability and validate its components. The assessment of two case studies served by conventional SWS, as part of the internal validation phase, revealed problems related to flooding occurrences, illicit domestic connections, insufficient hydraulic capacity, and lack of self-cleaning capacity in some pipes. The SUDS case study translated an overall acceptable performance, with the identification of the advantage of management trains in SUDS layout. The external validation phase was carried out in collaboration with two Portuguese water utilities, leading to the consolidation of the PAF proposal. For each water utility, case studies were selected. The assessment identified areas with vulnerabilities to flooding occurrences and parts of the SW infrastructure needing urgent rehabilitation. Lack of funding, data availability and regulatory frameworks for SWS are some of the listed factors that hinder the PA implementation. The PAF provides a reference basis in the sector, applicable to different types of SWS, covering different performance dimensions. It facilitates and promotes the implementation of PA, to prepare for current and future challenges.

Keywords

Performance assessment, framework, performance metrics, indicators, storm water systems, water utilities.



PhD student

Liliana Ferreira dos Santos

PhD program

Civil Engineering (IST, University of Lisbon)

Supervisor

Maria Adriana Cardoso (LNEC)

Co-supervisor

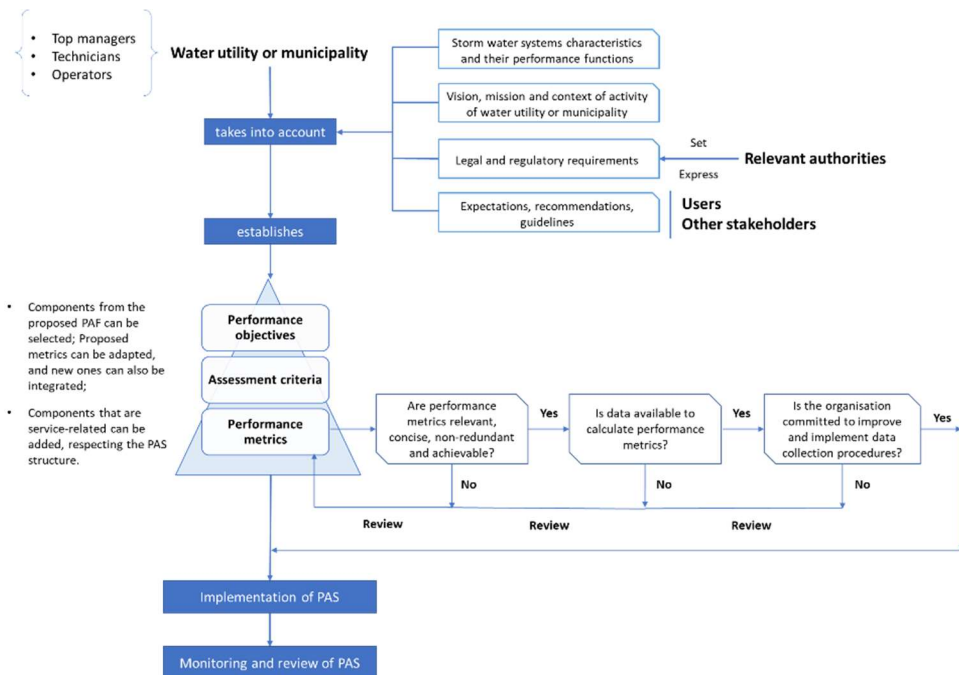
Ana Fonseca Galvão (CERIS, IST, University of Lisbon)

Period

2016-2021

Funding

FCT scholarship (PD/BD/114461/2016)



Schematisation of the establishment of performance assessment systems (PAS) for storm water systems based on the proposed performance assessment framework (PAF).