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Utveckling, kvalitet och miljö

Ville Tanskanen

Gryaab AB, Box 8984, 402 74 Göteborg, 031-64 74 00, gryaab.se

Master thesis proposal

Water and nutrient balance - Case study on Gothenburg and other Swedish city

Background

Future challenges for wastewater treatment are strongly connected to climate change through changes in local rainfall intensity and duration. Challenges proposed for a city spread wide, affecting drinking water sources, stormwater systems, wastewater collection and treatment. Responsibility for mitigation and adaptation is divided among a multitude of organizations inside a city, such as the water utilities, city development and traffic planning. Multiplicity of stakeholders highlight the need for common tools for deeper understanding of underlying processes. Water balance of a city can be seen as a tool for analysis and visualization of water-scenarios amplified by climate change.

Gryaab AB operates the Rya wastewater treatment plant (WWTP) of Gothenburg region. Wastewater treatment is facing stricter discharge standards and strongly fluctuating inflows due to climate change. As price and efficiency of wastewater treatment strongly correlates with dilution of influent, understanding underlaying connections is crucial for designing sustainable wastewater treatment of the future.

Aim

This thesis should answer the following:

- What are the pathways for water and nutrients in case cities?
- Which insights can be gained from the water and nutrient balance?

- What are the key differences between case cities?
- Results of the water balances visualized as Sankey-diagrams.
- How does the chosen system for wastewater handling influence nutrient release into receiving waterbody

Approach

The thesis should begin with a literature study. The literature study should focus on existing previously applied calculation models for water balance where nutrients can be included as concentrations.

Main part of thesis is to build a water balance calculation model and apply local conditions and data to produce an up-to-date water balance of the case-cities. Flows of nitrogen and phosphorus are to be included in the balance as concentrations resulting in nutrient mass flows. Results from calculation are visualized as Sankey-diagrams. Evaluation and discussed on key differences between case cities.

Input data for the study will be collected from different sources and databases inside the cites and scientific literature. A reference group with contacts inside cluster VA-teknik Södra is made available to support thesis work.

Contact

Ville Tanskanen, Development Engineer at Gryaab AB (ville.tanskanen@gryaab.se)