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Treatment of phosphorus and bacteria in alkaline and sand filters used for on-site sanitation – preliminary results from a full-scale study

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Abstract:

Introduction

Many on-site wastewater treatment facilities in Sweden consist of a septic tank followed by a sand filter. These facilities do not meet the Swedish EPA's treatment performance standards (Swedish EPA, 2006), especially with regard to the treatment and recycling of phosphorus (P). Due to the discharge from the small wastewater facilities Sweden's contribution to P emissions to the Baltic Sea are considerable (HELCOM, 2005). To prevent eutrophication of the receiving waters, many of these facilities have recently been upgraded by adding an alkaline bed filter for P treatment (P filters). As many on-site wastewater facilities are located at lakes and watercourses used for recreational purposes, the discharge of bacteria is an important issue to ensure a good bathing water quality as stipulated in the EU bathing water directive (EU, 2006).

Aim

The aim of this study is to investigate full-scale on-site sand filters and P filters towards their performance to treat P and bacteria from wastewater, depending on their operation time and load.

Methods

Four sand filters and four P filters with different operation time and hydraulic load are chosen for the study. The filters are located in the province of Västerbotten, Sweden. During three sampling campaigns – one undertaken in autumn 2015 and two in spring 2016 – inflow and outflow samples are taken from the filters and analyzed on total and dissolved P, total and dissolved organic carbon, total suspended solids, pH and biological oxygen demand. Furthermore, the samples are analyzed on two indicator bacteria, *E. Coli* and Enterococci, both being included in the EU bathing water directive for the assessment of bathing water quality (EU, 2006). Flow measurement is done manually and the sampling is flow-proportional. Tracer tests are planned to better understand the flow distribution and residence times in the filters.

Results

The results of this study will help to assess how often the filter material in the P filters needs to be exchanged and if pH is a suitable parameter to assess a filter's function with regard to P treatment. Comparison of treatment performance of filters with different ages and loads will be possible. A comparison of bacteria discharge from sand filters and alkaline filters will help the municipalities to decide if P filters are a viable option to upgrade existing facilities.

References

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