Newsletter no. 4

January 2009/JV/CA/FMH

Introduction

The wet ponds have now been in operation for some time, in Odense and Århus from the beginning of 2008 and in Silkeborg from the early autumn, 2008. The photos below show the ponds adapting perfectly into the environment. The primarily activity at this moment (and for the rest of the project period) is monitoring, i.e. water sampling and analyzing and downloading and processing data from flow meters and other equipment at the facilities.

Recent photos of wet ponds

Odense, December 10th 2008

Århus, December 10th 2008

An atmosphere of winter in Silkeborg, December 12th 2008

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Monitoring status

The monitoring of the three systems is progressing well and the first results are emerging.

Odense

The facility in Odense is a wet pond followed by sand filters and sorption filters. The sorption filterers consists partly of one large filter filled with 40 m3 of crushed marine shells (Skellsand) and partly of three smaller filters filled by Skellsand, Olivin and sandwich construction made of Skellsand and iron coated olivine (Filtersil).

The combination of a wet pond followed by a sand filter and sorption filter has already proven very efficient. Especially with respect to removal of heavy metals and phosphorous the filters show very low outlet concentrations. (Figure 1). With respect to PAH'es the results are not conclusive as the inlet concentrations are very low, and the pond itself removes the major part of the PAH'es entering the facility.

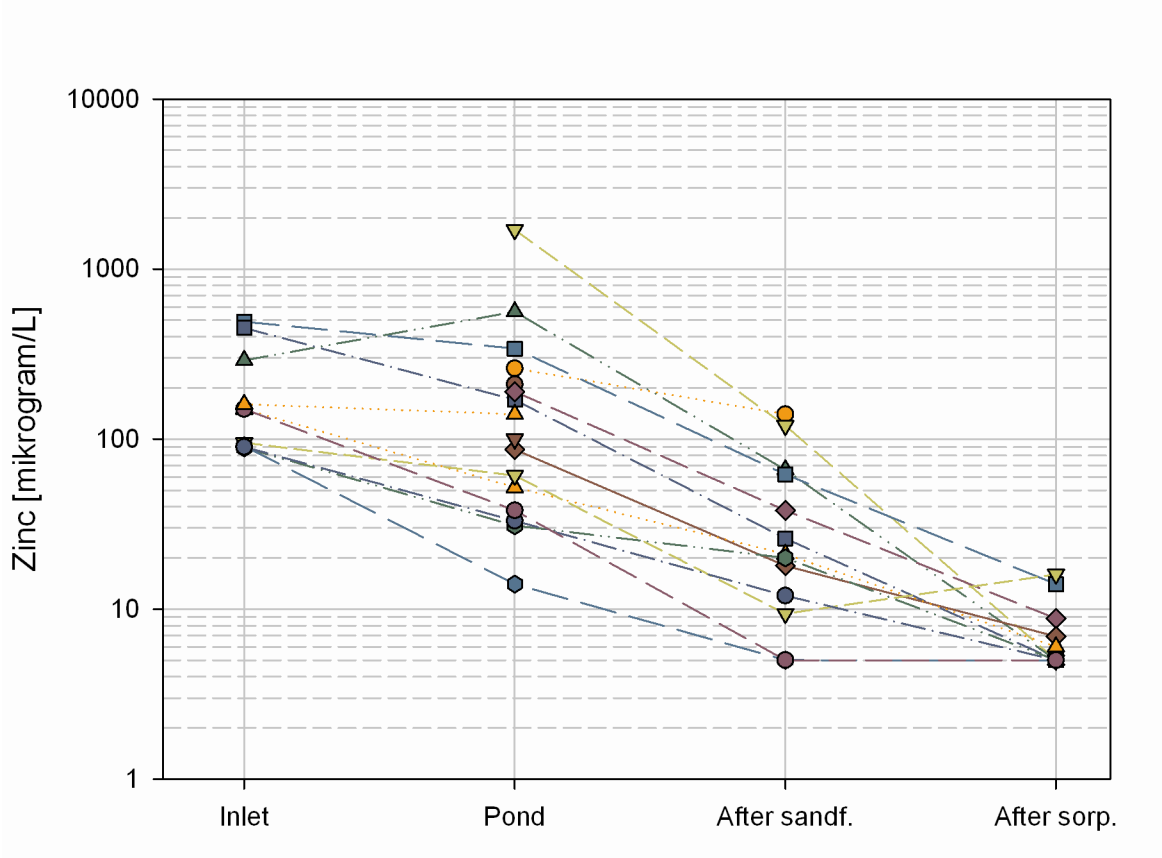

Figure 1. Removal of zinc in the facility in Odense

It is furthermore worth noticing that the outlet concentration is constantly low and independent on the inlet concentration to the facility. This was especially pronounced last winter, where some very high pond inlet concentration of especially copper was observed. Even though copper concentrations were above 1000 µg/L, the outlet concentrations from the filters were constantly low. In other words, this setup of the treatment chain protects effectively the receiving water against pulse loadings as they for example occur by illegal discharges.

With respect to the hydraulic capacity of the sand filters, these are however lower than expected. The reduced capacity has lead only a side stream of the water flow passing the filter system.

Another part of the experiences gathered with the combination of sand filter and sorption filter was that the sand filter released iron oxides which then clogged the sorption filters – further reducing the

hydraulic capacity of the system. The actual hydraulic capacities will be presented in the final reports on the project.

Århus

The facility in Århus is constructed of a wet pond followed by a sand filter. During a dry weather period in the early spring, iron salts will be added to the water, allowing the bottom sediments to be enriched with iron. It is expected that the iron enrichment will increase the pollutant trapping capacity of the bottom sediments. Up till now, the effect of the facility without iron enrichment is assessed and the results from these measurements will be compared to the results after enrichment. As for the other facilities, there are furthermore conducted continues measurements of a number of water quality parameters. An example of an oxygen measurement is shown in Figure 2. With respect to iron enrichments of bottom sediments, it is important that the oxygen concentration is not zero over longer periods. Until now, the measurements indicate that there is no problem with low oxygen concentrations in the pond and that the iron enrichment therefore will not have undesired side effects.

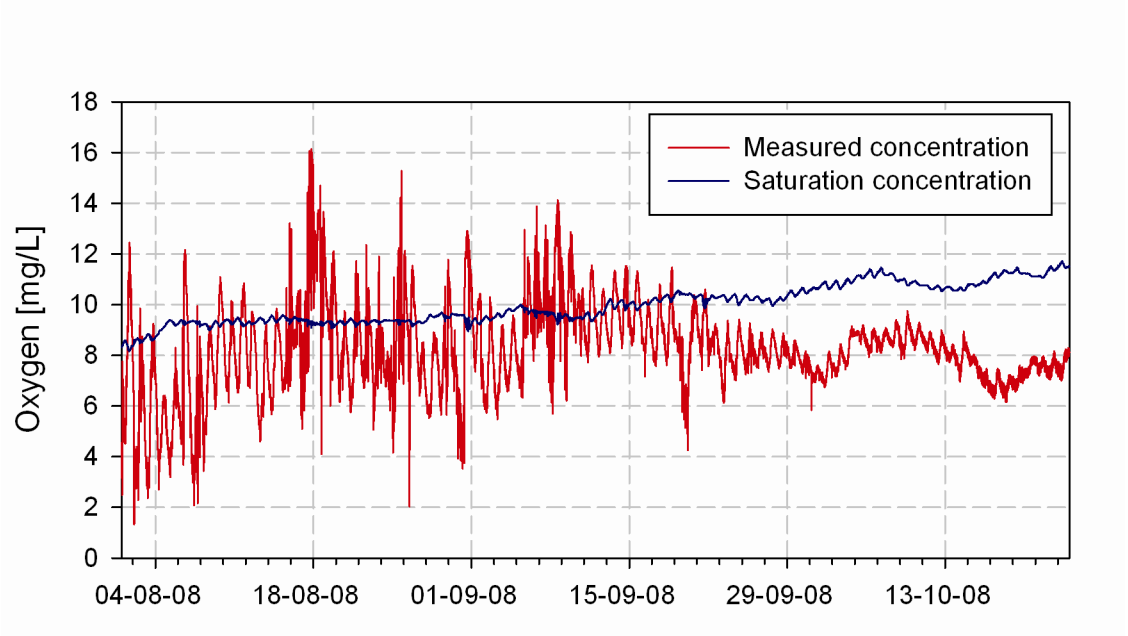

Figure 2. Oxygen concentrations and oxygen saturation concentration, autumn 2008, Århus facility

Silkeborg

Similar to the two other facilities, the facility in Silkeborg is designed as a wet pond followed by a sand filter. In this facility, iron salts will be added flow proportionally to the incoming stormwater from the early spring on. Until then, measurements are conducted without addition and these measurements will be compared to the measurements with aluminum addition.
When adding aluminum, it is import that the water is not too alkaline and not to acidic for prolonged periods. The pH is therefore followed closely and until now it seems that the pH stays within the save range. Furthermore, pH measurements from the two other facilities also indicate no problems with pH. The wet pond is divided into three sections by earthen dams, and pH as well as other parameters is measured in the mid section and the outlet section. An example of pH measurements are shown in Figure 3.

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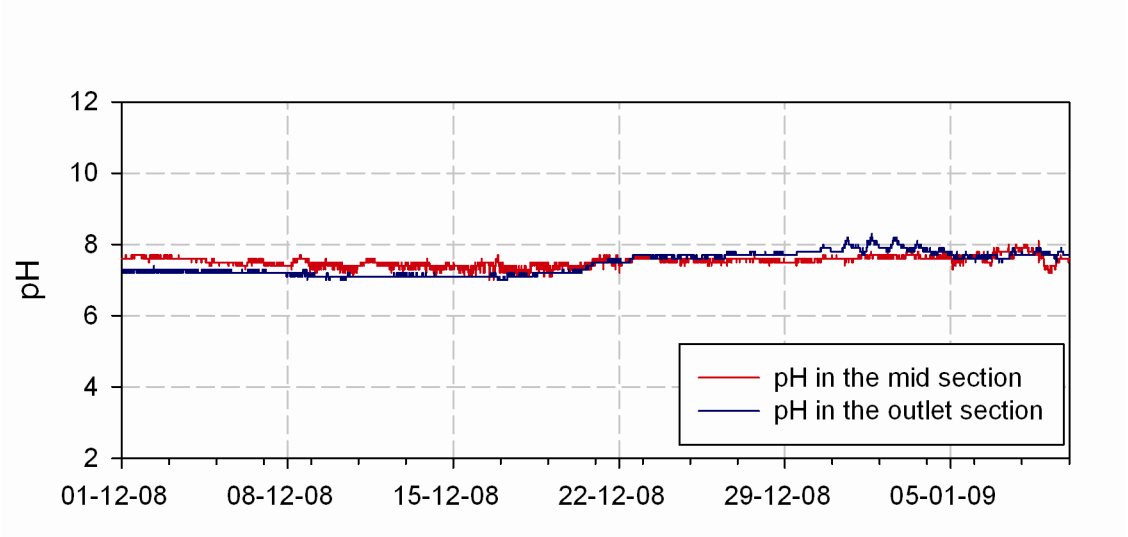

Figure 3. pH in the mid section and the outlet section of the facility in Silkeborg

Plants

During the period, the Life-Treasure project was presented at an International Water Association specialized scientific meeting: "the 11th International Conference on Wetland Systems Technology in Water Pollution Control" that took place 1-7 November in Indore, India (http://www.wetland2008.org/). The article presented was entitled "Integrating constructed wetlands and wet detention ponds for the treatment of urban stormwater runoff". The paper and oral presentation focused on the design, the different operational features of the three systems and preliminary results obtained during the time of operation.

Collecting samples of sediment in Silkeborg

Research activities in the three ponds have also been carried out during the period. The three wet-ponds have been sampled, and water, sediment and plants have been tested and analysed for various parameters. The sampling campaigns included the measuring of water quality parameters including pH, temperature, electric conductivity, total suspended solids and nutrients. The tests also included analysis of heavy metals and selected organic micro-contaminants in water, sediment and plants.

Routinely visits have been done to assess plant health, etc. In addition, the systems have been used for university educational purposes, and have been included in some of the technical visits and field trips required in different water, ecology and aquatic plant related courses.

Next newsletter

Newsletter no. 5 will be issued April/May 2009. Monitoring results will be the main topic.