MORPHEUS SUCCESS STORY
Segesholmsån river and Degeberga WWTP, Skåne, Sweden

Project MORPHEUS 2017 - 2019

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In the MORPHEUS project three Swedish Wastewater Treatment Plants (WWTPs) were investigated for their release of pharmaceuticals into the recipient. One of these was Degeberga WWTP which discharges its treated wastewater into the Segesholmsån river, ending in the Baltic Sea. Segesholmsån river has a length of 23 km and an average flow of roughly 0.6 m^3/s (Figure 1).

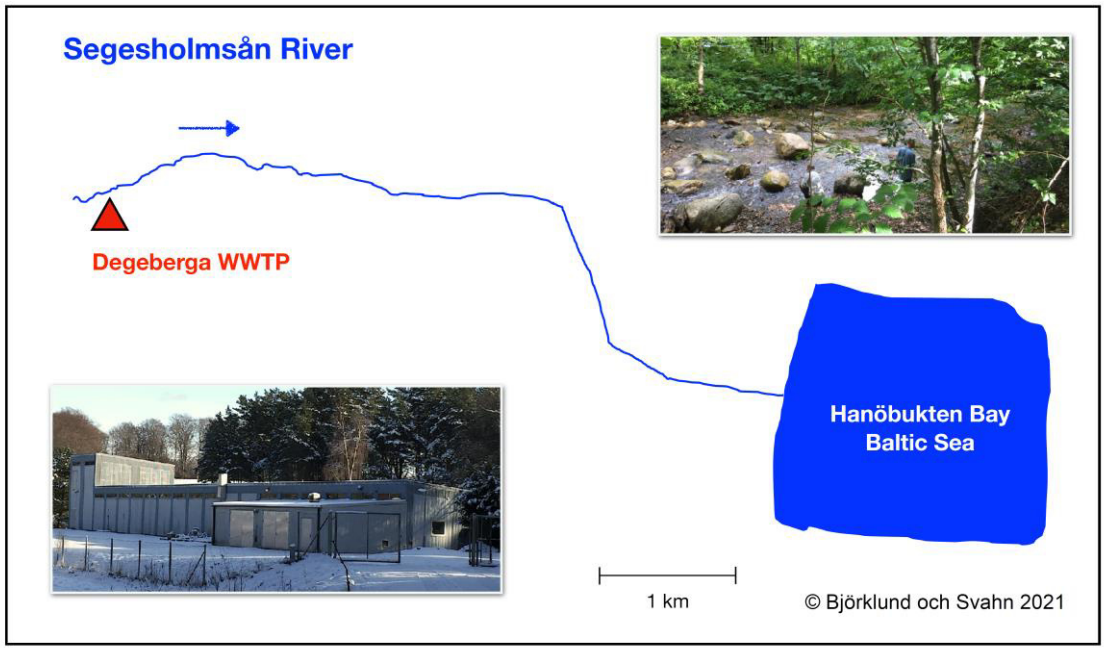

Figure 1. Degeberga WWTP at the Segesholmsån river during the MORPHEUS project prior to adding advanced treatment.

The Segesholmsån river is one of the best-preserved rivers in Region Skåne, with a relatively undisturbed stream with clean, cold and oxygen-rich water, which contains many sensitive species. The river houses both trout and rare species of caddisflies. Degeberga WWTP is dimensioned for 2000 PE but treats wastewater from 950 persons, and has no major industry connected to it. Despite being a relatively small WWTP it is fully equipped with several treatment steps. This includes 1. coarse debris screen, 2. aerated sand trap, 3. biological treatment by classical activated sludge, 4. chemical flocculation and sedimentation using $FeCl_3$ and 5. final polishing in sand filter. The combination of a very pristine river system and a small-size, but well-equipped WWTP with a sand filter made Degeberga WWTP an excellent choice to test advanced treatment within Kristianstad Municipality, with reasonable work and at realistic costs.

The MORPHEUS project provided Kristianstad Municipality with pharmaceutical occurrence data from both Degeberga WWTP and the Segesholmsån river. For example, the WWTP outlet concentrations of the two semi-persistent pharmaceuticals diclofenac (pain killer) and oxazepam (anxiety drug) were 1132 and 846 ng/L, respectively. Thereby the total yearly burden of these two pharmaceuticals to the river was 0.16 kg. These occurrence data were part of an application submitted by Kristianstad Municipality to the Swedish EPA for funding to upgrade Degeberga WWTP with a granulated activated carbon filter (GAC-filter). The reason for choosing GAC was that a combination of a sand-filter followed by a GAC-filter had proven very successful in a previous large-scale pilot-study performed at Kristianstad WWTP.

In November 2018 the Swedish EPA granted 90% of the requested 1.1 million Euros applied for by Kristianstad Municipality. Shortly after the construction of the GAC-filter was initiated (Figure 2).

Figure 2. Construction of advanced treatment with granulated activated carbon at Degeberga WWTP in the spring of 2020.

The new advanced treatment system was ready and in full operation in the summer of 2020 (Figure 3).

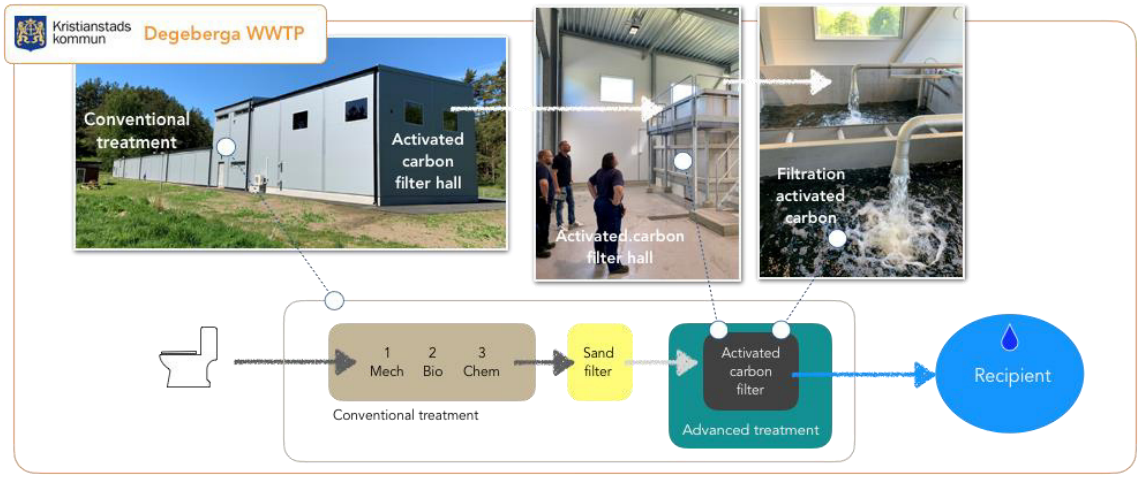

Figure 3. Overview of the full-scale advanced treatment with a combined Sand-GAC-filter at Degeberga WWTP in the summer of 2020.

During the construction phase Kristianstad University was responsible for the chemical analysis of the wastewater and the river water, and continues to measure pharmaceutical residues also in 2021. The analytical data provided by the MORPHEUS project to the Swedish EPA in 2018 will be continued and provide a long time series of pharmaceutical data. This will give insight into how the chemical burden to the recipient will decrease as a consequence of implementation of advanced treatment. It is a great example of how an Interreg South Baltic project lives on into the future, supporting a concrete model of how green and blue growth can be accomplished in the South Baltic Sea area. Degeberga WWTP may also serve as an example of how advanced treatment in Region Skåne, as well as in the South Baltic as a whole, can be implemented in reality.

Recently Kristianstad Municipality also decided to build a completely new wastewater treatment plant in the city of Kristianstad treating water for more than 52000 people and several major food industries. The budget is roughly 50 million Euros and will make this new modern WWTP ready for upgrading with advanced treatment. In this process the knowledge obtained during the construction of Degeberga WWTP can be used to take knowledge-based decision as the personnel at Kristianstad Municipality will have first-hand experience from the Sand-GAC-filter in Degeberga.

Erland Björklund & Ola Svahn 2021

MORPHEUS
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