

## Case Study - Malatech Bioaugmentation

### 330 m<sup>3</sup>/d Municipal Wastewater Treatment Plant of multiple villages with food industry load

#### Goals of bioaugmentation:

Increasing the treatment capacity of the overloaded activated sludge biology, eliminating fines, and effluent limit violations. The plant treats the municipal wastewater of the surrounding villages, but more than 20% of its influent is a pre-treated effluent of a nearby food-processing industry. The COD, and TN load of this wastewater fraction made the plant seriously overloaded, and the expansion of the plant was not on the agenda for the near future. Effluent violations have become continuous for COD, BOD, TSS, NH<sub>4</sub>-N, TP. Besides the plant struggled with heavy filamentous blooms, and incontrollable foaming throughout the entire year, not just at seasonal turns. Operator aimed to reduce or preferably eliminate environmental fines by increasing the biology's treatment capacity by only bioaugmentation without CAPEX.



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**Title:** Municipal wastewater treatment plant optimization

Our client is a regional municipal operator of potable water, wastewater canalization, and wastewater treatment plants. This small WWTP is an outdated, but in terms of treatment technology, still a decent plant. It has a circular-layout biology equipped with anaerobic, anoxic, and aerobic reactors capable for full biological nutrient removal. The infrastructure is old, but it was able to deliver perfect outlet quality until the authorities provided a permission for a local food-processing company to release its poorly pre-treated effluent into the municipal canalization system. The industry has barely met with effluent quality standards defined for releasing into municipal network. The cumulative load especially in terms of COD, and TN has resulted that the municipal plant became overloaded. Nitrification has stopped first, followed by continuously high filamentous count due to the nature of the industrial COD part, which resulted a collapse of the biology. MLSS has been continuously washed out from the secondary clarifier due to poor sludge settling conditions. The Dissolved Oxygen concentration could not climb higher than 0.6-0.7 mg/l at the end of the aerobic reactor. The operator has started to receive fines by the authority for nearly all meaningful effluent parameters.

Since the renovation of the plant was not in schedule for the near future, the operator opted for Malatech Bioaugmentation which is suitable for increasing even heavily overloaded WWTP's biological treatment capacity.

First, we restored COD, BOD removal, and optimized sludge structure to prevent further washout by Bioclean TM, and BioGuarde I. DO concentrations started to rise, reaching 1.2-1.5 mg/l for the end of the aerobic basin. The next step was to kickstart nitrification by Ammonia Guarde.

The shock dosage of Bioclean TM was 3 kg/d on week 1, followed by 2 kg/d on week 2, then 1 kg/d on week 3, and also 1 kg/d on week 4. The maintenance dosage was 0.25 kg/d, dosed into the raw influent after pretreatment.

BioGuarde I was used at 0.5 l/d dosage for the first 2 weeks only. Ammonia Guarde was introduced at 0.5 l/d dosage on week 3,4,5,6.

From week 7, a simple maintenance dosage only with Bioclean TM at 0.25 kg/d has proven to be enough for maintaining good results summarized as follows. **We managed to eliminate fines for all parameters in such a hopeless situation.**

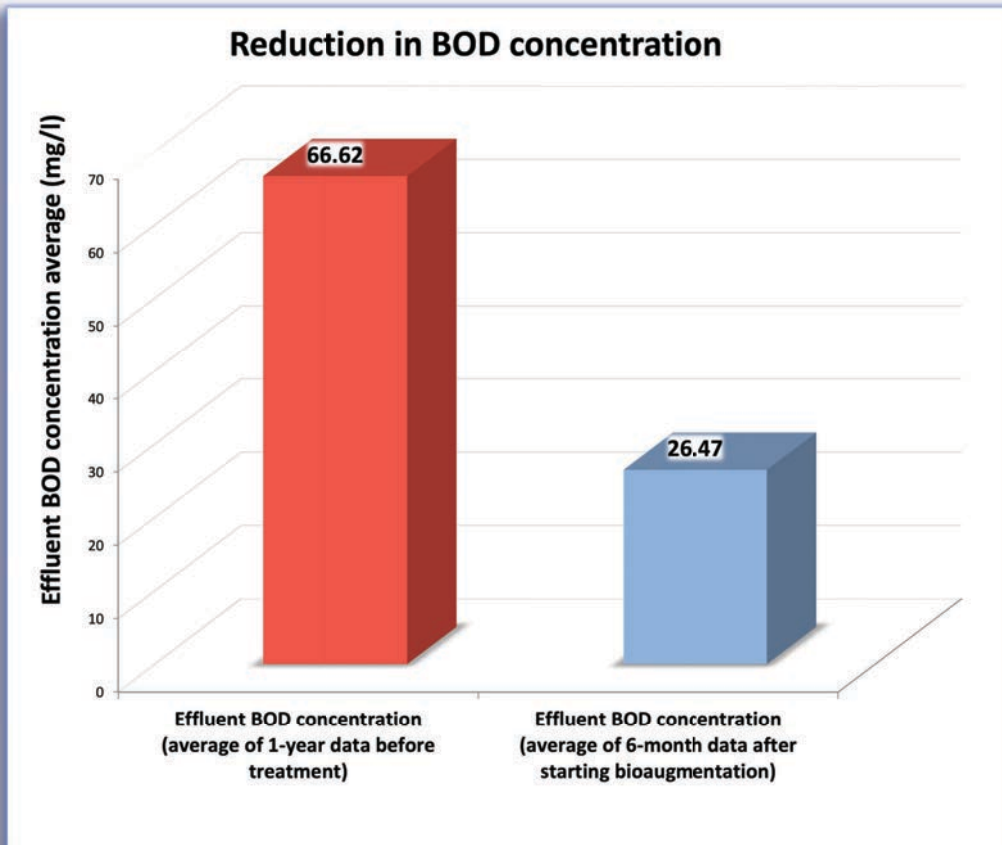
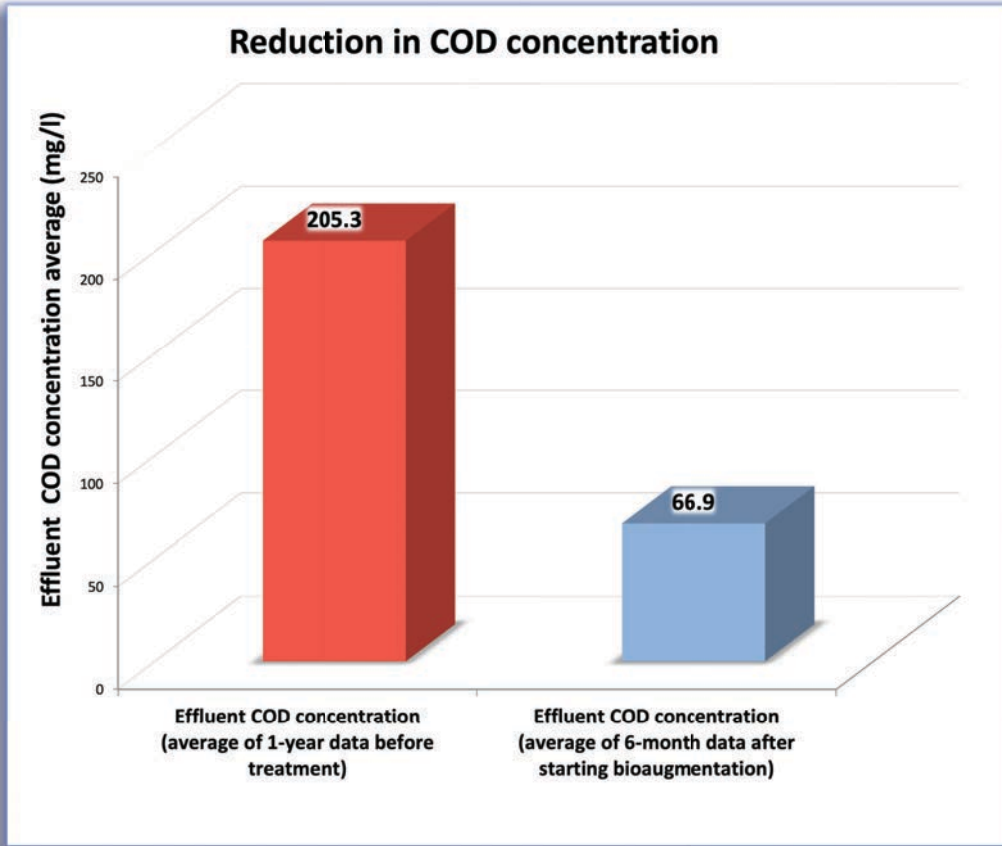
### **Results:**

As it shown on the diagrams, effluent quality has been restored, and the plant can handle the increased load. **COD, and BOD removal became stable, as well as nitrification. The improved sludge structure and settleability eliminated sludge washouts from the secondary clarifiers which was caused by increased hydraulic load, and loose flocs before our treatment.**

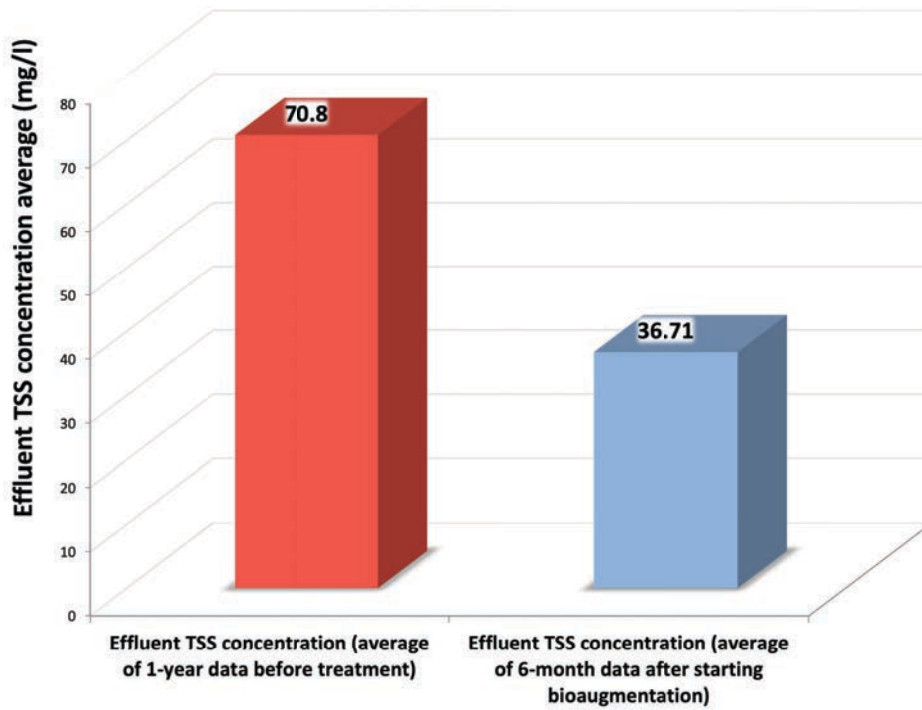
**We kickstarted nitrification on week 3 by the heterothrophic nitrifiers of Ammonia Guarde. We kept dosing the product for a month until the autotrophic community stabilized again.**

**Total Phosphorus removal:** The complex Bioclean TM solution's other key strength also has been demonstrated here: massive enhancement of Biological Phosphorus removal. Bioclean TM has a decent positive impact on **both poly-Phosphate formation, and excess Phosphate uptake.**

There is no Ferric or Aluminium salt addition at the plant, no chemical Phosphorus removal at all.



### Reduction in Total Suspended Solids concentration



### Reduction in NH4-N concentration

