



Constructed Wetlands as solutions for small scale communities: Experience from Antiparos Island, Greece

Challenge

- Small Aegean Island with permanent population of 1,211 inhabitants (2011) and 1,000 seasonal residents & tourists (2012)
- Lack of infrastructure for wastewater management with serious impacts on local economy
- Groundwater & marine contamination
- Generation of unpleasant odours



Applied solution

The WWTP of Antiparos was put in operation in 2015 for the treatment and reuse of urban wastewater. The main treatment process of the WWTP is **constructed wetlands** which offers construction simplicity, low operational and maintenance costs and adaptability to varying hydraulic and pollution loads

Engineered Systems

Pre-treatment processes

- Screening & grit removal
- Sedimentation

Post-treatment processes

- Chlorination - dechlorination

Natural Systems

Constructed Wetlands

- 6 vertical subsurface flow beds

Stabilization Pond

- Type: Maturation pond



Technical demonstration

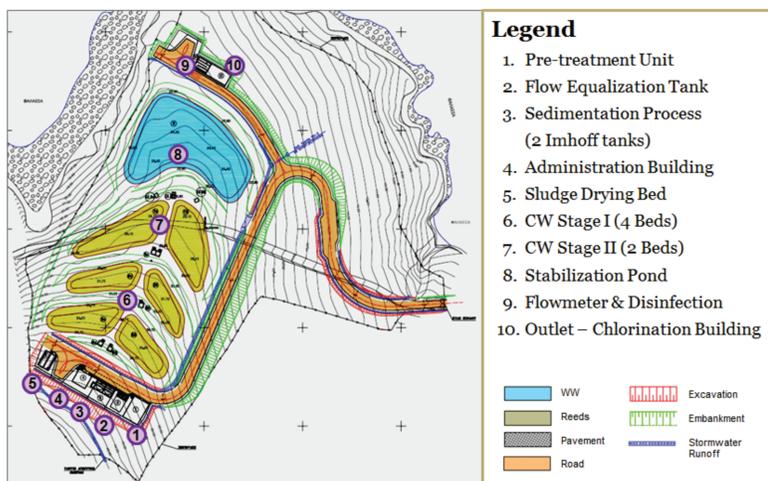


Figure 1: The layout of Antiparos WWTP

Primary treatment

- Two coarse screens
- Bar spacing: 6mm
- Aerated grit chamber

Sedimentation

- 2 parallel Imhoff tanks
- Volume: 70 m³

Chlorination

- Meander: 45 m²

Constructed Wetlands

- 4 beds for stage I (460 m² each)
- 2 beds for stage II (750 m² each)
- Bottom slope: 1%

Stabilization Pond

- Average depth: 1.5 m
- Min. retention time: 7 days

Results

Inflow

For 2018:

- August: 600 m³/d
- September: 380 m³/d
- October: 150 m³/d
- November – January: 70 m³/d

Monitoring & Evaluation

- Sampling period: February 2016 – January 2019 (except February – April 2018 due to ongoing repairs)
- Monitoring results are presented only for 2018
- 4 sampling points (influent, before 1st stage of CW, after 2nd stage of CW, after stabilization pond, effluent)

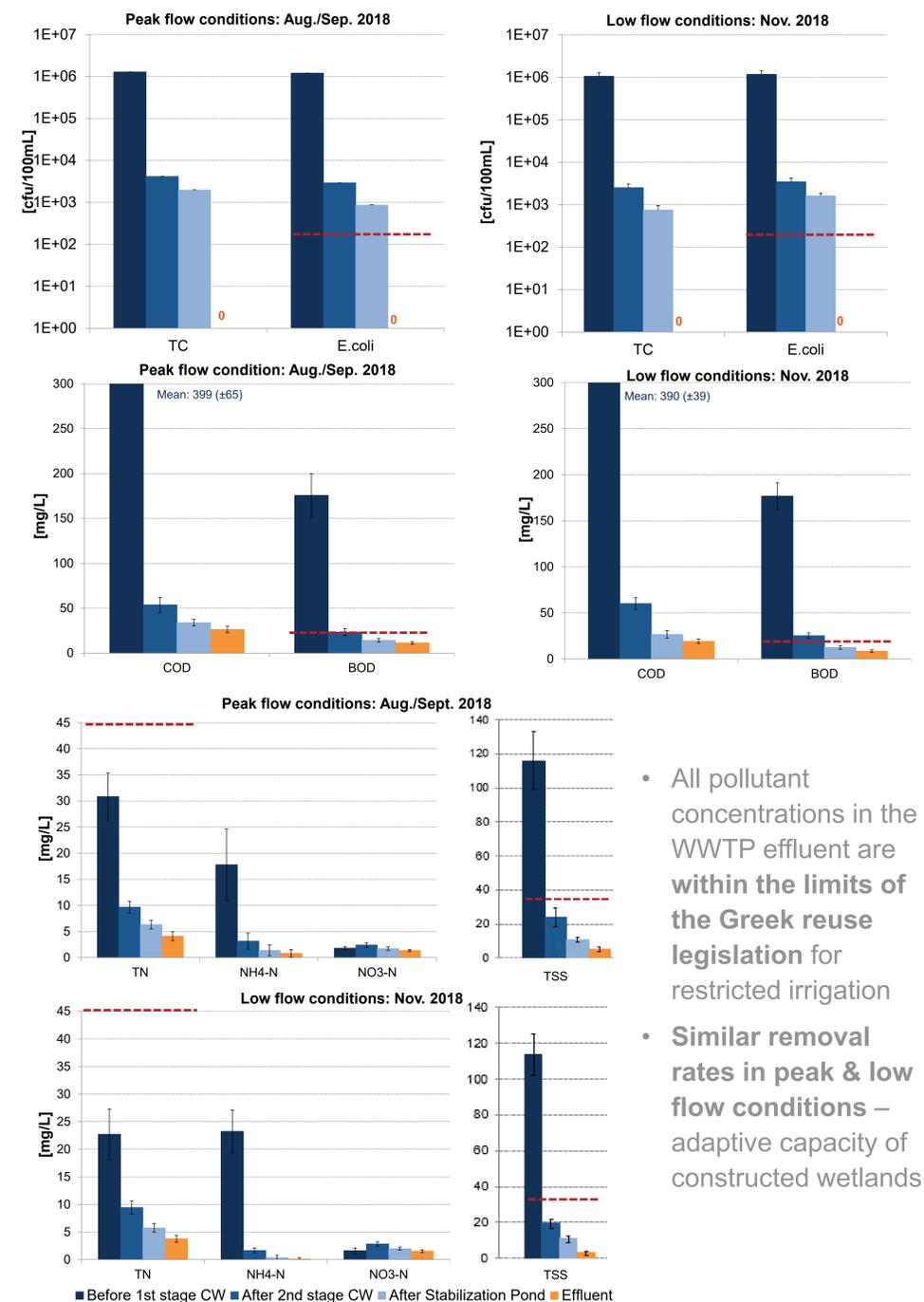


Figure 3: Average concentrations (\pm STDEV) for TC, E.coli, COD, BOD₅, TN, NH₄-N, NO₃-N, TSS during two intensive sampling campaigns; Red dotted line: Greek reuse legislation limits for restricted irrigation

Benefits:

- Reliable performance and improved quality of treated WW
- Reuse of reclaimed water for restricted irrigation
- Environmental protection
- Low operational & maintenance costs

• All pollutant concentrations in the WWTP effluent are **within the limits of the Greek reuse legislation** for restricted irrigation

• **Similar removal rates in peak & low flow conditions** – adaptive capacity of constructed wetlands