# International Virtual Conference on:
# Nature-based Wastewater Treatment in Southeast Europe and Turkey

## INNOQUA Demosite Overview and Performance in Turkey

Özge Yılmaz, Ph.D.

3rd Nov. 2020

# SİNOP DEMOSITE

Sinop is located in the northern part of Turkey at the Black Sea coast.
It has a population of 200,000 people living in the city centre and nearby villages.
Almost 90% of the population have access to a sewage system,
while the remaining 10% use septic tanks as their main form of sanitation.


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# SİNOP DEMOSITE

## *Beneficiary*

The INNOQUA system treats the wastewater from a residential complex with 8 detached houses and a building for social activities. The complex has the capacity to host approximately 55 people.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# SİNOP DEMOSITE

## *INNOQUA System*

- *Design Capacity:* 3m$^3$/day
- *Source of Wastewater:* Toilets, bathrooms and kitchen
- *Specific Scientific Research Objectives:*
  To assess the potential of the INNOQUA technology to be implemented in residential housing.

## *Configuration*

In Turkey the INNOQUA system consists of a lumbrifilter, daphniafilter and a UV unit.


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# SİNOP DEMOSITE

Unfortunately, **not all houses were occupied** and as such the influent was significantly **lower in both concentration and volume than expected**.

After 160 days the influent was supplemented with **domestic wastewater from an external source**.

Average flowrate: 500 Litres/day

Average hydraulic loading rate: 138 Litres/$m^2$/day.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# SINOP DEMOSITE

## *Lumbrifilter*

Lumbrifilter operational since 09.07.2019

Generally lumbrifilter was observed to be highly resilient to variable conditions (particularly during COVID-19 lockdown).

Regarding the analyses results, the performance of INNOQUA system in Sinop demosite seems sufficient (particularly for Lumbrifilter).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# SINOP DEMOSITE

## *Daphniafilter*

Daphniafilter operational since 15.11.2019

Removal rates were variable during the demonstration phase.

Less than expected removal rates due to underloading, which caused problems in sustaining sufficient populations of daphnia.


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# SINOP DEMOSITE

## *UV system*

The UV system has been working on- and off- since mid 2019.

Removal rates were fairly constant except for days with extreme presence of population.

Maintenance were required twice, one due to the UV lamp and one resulting an electrical short-circuit.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

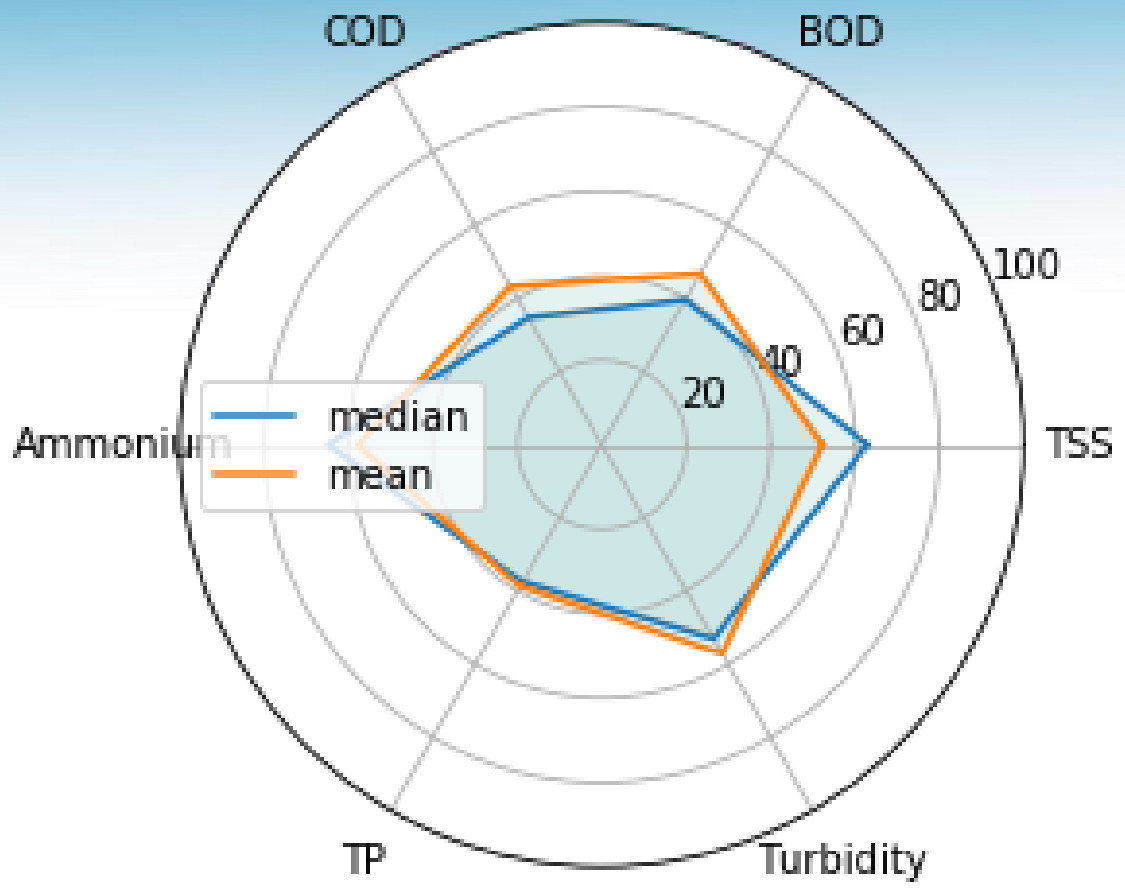
# SINOP DEMOSITE

## *System performance*

| | Removal rate (%) | | | | | | Log Removal (%) |
|---|---|---|---|---|---|---|---|
| | **TSS** | **$BOD_5$** | **COD** | **$NH_4$-N** | **TP** | **Turbidity** | **Faecal Coliforms** |
| **Average** | 52.26 | 46.77 | 43.25 | 57.93 | 38.78 | 57.13 | 1.6 |
| ***Standard deviation*** | ±32.79 | ±28.54 | ±30.62 | ±26.32 | ±19.16 | ±23.52 | ±0.83 |
| ***Median*** | 62.96 | 39.64 | 34.76 | 64.91 | 37.54 | 53.02 | 1.7 |

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# SINOP DEMOSITE




- Lumbrifilter presented significant average removals of **$NH_4$-N (63.7%),** turbidity (49.7%), TSS (39.5%), $BOD_5$ (37.6%) and COD (33.7%).
- Although, Lumbrifilter was not specifically designed to eliminate **TP removal** efficiencies for this parameter averaged 48.4%.
- Daphniafilter contributed to removal of all parameters including turbidity.
- An average of 1.6 log removal was achieved in the UV unit.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# SINOP DEMOSITE

## Practical issues during operation

- *Lack of wastewater and low pollutant inflow resultantly → remedied with transfer of wastewater from external sources*
- *Clogging in Lumbrifilter inlet → remedied easily with alternative inlet configuration*
- *Submergence of the UV lamp → repositioning of the pipes was sufficient accompanied with a lamp change*

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.

# THANK YOU FOR YOUR ATTENTION

https://innoqua-project.eu

https://www.facebook.com/innoqua/?fref=ts

https://twitter.com/innoqua_project

https://www.youtube.com/channel/UCIXqfr195fpErX21V2-K

https://www.linkedin.com/company/innoqua-project/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689817.