

WFD⁴ / MDG⁴

Smallwat11

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STUDY OF THE INFLUENCE OF SUBSTRATE GRANULOMETRY ON THE BEHAVIOR OF WETLANDSES

Introduction

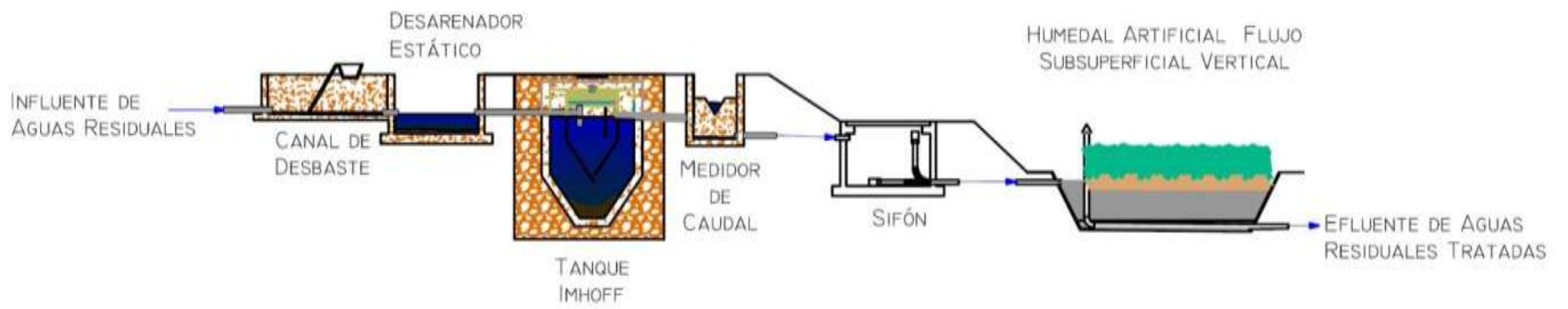
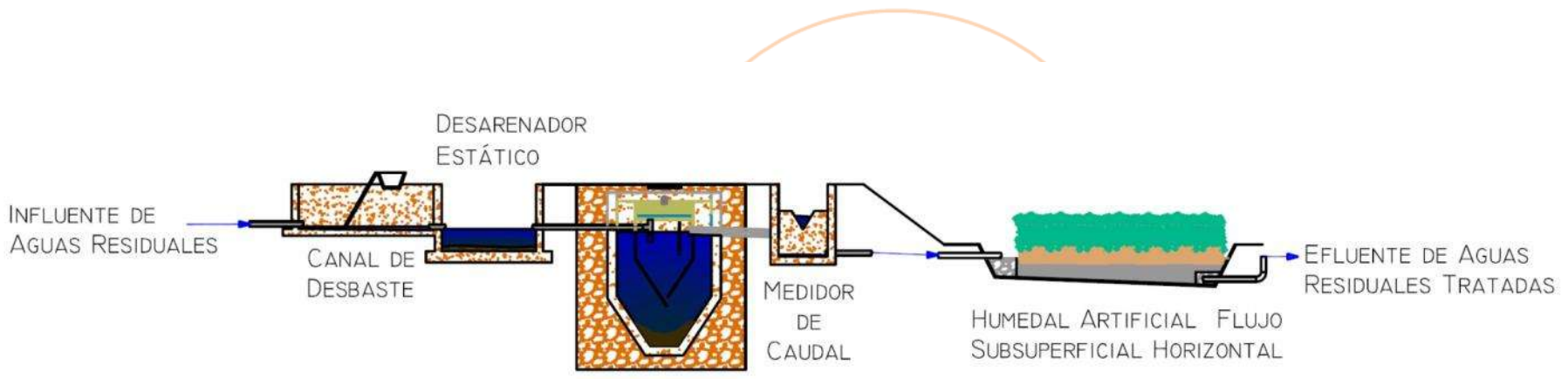
- Constructed wetlands are now debugging technology more degree of implementation is having, in small towns at the international level
- The most widespread classification of them is made based on the movement of water to treat
- In all modes there are three common elements that star treatment processes, the substrate, vegetation and water circulation

Methods

- For the investigation has proceeded to the construction of three artificial wetland pilot units in Experimental Plant Centa
- It has been used to study the urban wastewater from the town of Carrión de los Céspedes (Sevilla, Spain)
- This wastewater is subjected to pretreatment (grinding, sandblasting and degreasing) and primary treatment consisting of an Imhoff tank



Methods



Characteristics of Artificial Wetlands studied

	granulometry	thickness	total surface	vegetation present
HV1	sandy 1-2 mm	5 cm	317 m ²	<i>Phragmites australis</i>
	gravel 4-12 mm	60 cm		
	gravel 25-40 mm	15 cm		
HH2	gravel 12 - 20 mm	60 cm	277 m ²	no
HV3	gravel 4-12 mm	30 cm	288 m ²	no
	gravel 3-8 mm	30 cm		
	gravel 4-12 mm	10 cm		
	gravel 25-40 mm	15 cm		

HV1: Artificial Wetland Vertical Subsurface Flow nº1

HH2: Subsurface flow constructed wetlands Horizontal nº2

HV3: Artificial Wetland Vertical Subsurface Flow nº3

Results and discussion

Influent and Imhoff tank

- Influent characterization noted that urban waste water treated with the concentration typical of small populations
- The percentages of pollution reduction achieved in the Imhoff tank was customary for these types of systems, 36% for BOD₅, 35% for COD and 51% in Total Suspended Solids.

	<i>BOD₅ (mg/l)</i>	<i>COD (mg/l)</i>	<i>TSS (mg/l)</i>	<i>BOD₅/COD</i>	<i>Nt (mg/l)</i>
<i>Mean values</i>	383	738	268	0,53	65,8

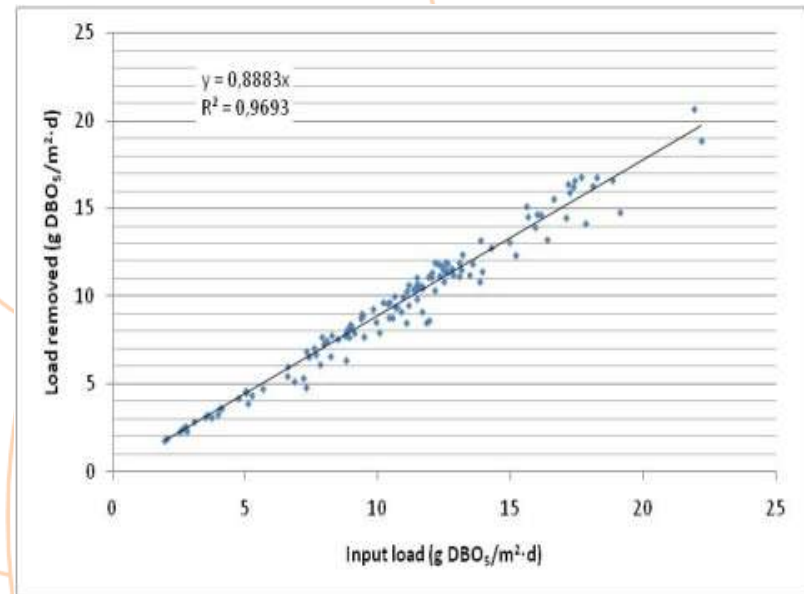
Results and discussion

Surface load

- The surface organic load applied during the study period was 10.7 g DBO₅/m².d in the case of HV1, from 10.6 to 8.4 for HV3 and the HH2.
- Regarding the solid surface charge values were 5.2 g TSS/m².d applied in the HV1, HV3 and 5.3 in the 4.1 for the HH2.
- For total nitrogen the average surface charge applied was 2.5 g Nt/m².d for HV1 and HV3 and 1.9 for the HH2.

Results and discussion

- To calculate the removal efficiencies of various pollutants, it is chosen to represent and perform a load analysis
- Thus integrated into a single value different influencing factors such as size of wetland and flow rate, this allows a better comparison between different systems.



Mean values of reduction of contaminants studied Artificial Wetlands

	% BOD₅ reduction	% SST reduction	% Nt reduction
HV1	89	80	61
HH2	81	90	26
HV3	91	83	61

HV1: Artificial Wetland Vertical Subsurface Flow nº1

HH2: Subsurface flow constructed wetlands Horizontal nº2

HV3: Artificial Wetland Vertical Subsurface Flow nº3

Conclusions

- The mode of Vertical Flow Wetland has presented a better performance than the horizontal flow. Even operating at higher load levels in Vertical Flow Wetlands have achieved higher removal efficiencies of organic matter and nitrogen.
- It has been found in Vertical Flow Wetlands under study (planted and unplanted), the filter media type used, particle size and thickness, exert a greater influence on purification yields are achieved, the fact that have or not to vegetation.
- In summary, it can be concluded that the technology of constructed wetlands is a valid solution for the treatment of wastewater generated in small agglomerations. Featuring a very robust to cope with the sharp fluctuations in flow and loads to be treated, typical of this population range