

WATER TREATMENT IN THE OASIS OF FIGUIG – MOROCCO

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Abstract:

The lagoon system of Hammam Fokani is the first wastewater treatment experience in Figuig oasis. It is expected that the treated water would be used in agriculture.

The reductions recorded at the studied wastewater treatment plant shows a relatively performant operation with an average decrease of 3.17 Ulog for faecal coliforms and 50–60% for organic matter.

The increasing conductivity varies during its passage through the lagoons, in the exit of the plant, it is significantly higher than the discharge standards, but does not preclude the use of treated water for irrigation of a fairly wide range of crops.

Introduction:

The Oasis of Figuig (Morocco) is located in Morocco's far South-east, near the Algerian border. Water resources are scarce in the Oasis and the sanitation is very poor.

The Hammam Foukani a district of the city of Figuig witch arranges a waste water treatment pond (WWTP). This one started operating in 1998 and has 4 ponds in series (2 facultative and 2 maturation pond) (Figure 1). The population served is approximately 1200 PE and it has an average flow of circa 70 m³/day.

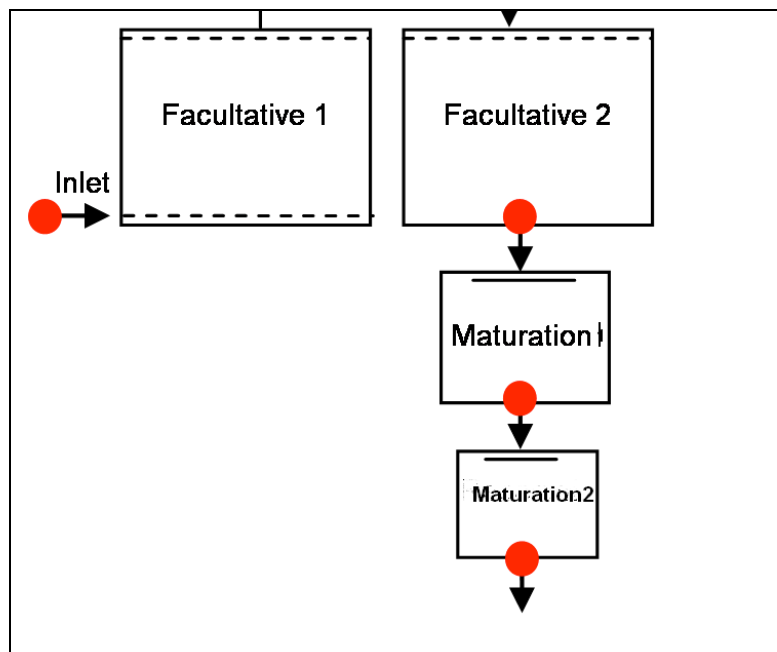


Figure 1: Diagram of Hammam Foukani's WWTP and sampling points.

Methods:

The average overall loading received by the plant is of 142 kg BOD₅/ha.d. The main characteristics of the WWTP are shown in Table 1.

Table 1. Design characteristics of the WSP of Hamman Foukani.

Ponds	Volume (m ³)	Surface (m ²)	Depth (m)	HRT (days)
Facultative 1	812	650	1,25	10
Facultative 2	812	650	1,25	10
Maturation 1	244	315	1	3
Maturation 2	200	100	2	1

HRT: hydraulic retention time

After some corrective measures (desludging of the first facultative pond, elimination of macrophytes that had invaded all the pond, construction of sand barrier) a monitoring programme was conducted. Physicochemical (Electrical conductivity (EC), pH, COD, SS, BOD₅, N-NH₄⁺, N-NO₃⁻, P-PO₄³⁻), microbiological (Fecal coliforms) and biological parameters (algae characterisation and quantification) were monitored from October 2008 to November 2009 making a total of 8 campaigns (2 campaigns per season). Samples were taken in each unit process of the WWTP. Analyses were performed according to Standard Methods (APHA, 2005).

Results and discussion

Table 2 presents the WSP average effluent quality and total removal efficiency.

Table 2. Average concentrations and total percentage removal of the WSP for the main physicochemical and microbiological parameters.

Parameters	Inlet	Facultative 1	Facultative 2	Maturation	Reservoir	Total removal
pH	7,4	8,1	8,2	8,4	8,4	-
EC (mS/cm)	3,2	3,3	3,4	3,4	3,4	-
COD (mg/L)	556	320	254	233	225	58 %
BOD ₅ (mg/L)	350	290	210	177	175	51 %
SS (mg/L)	289	190	174	155	151	48 %
N-NH ₄ ⁺ (mg/L)	42	29	230	17	17	57 %
P-PO ₄ ³⁻ (mg/L)	11	7	6	5	4	60 %
FC (Ulog)	7,7	6,6	5,7	4,7	4,4	3,3 Ulog

The inlet concentrations are high but characteristic of a wastewater from the small communities in Morocco (El Hamouri *et al.*, 2003; Mustapha, 2009).

Conclusions

The WSP performed well taking into account the short HRT (Hydraulic Retention Times) of the original design. The sanitary quality of the final effluent met the irrigation water standards for restricted irrigation the entire year according to the World Health Organization recommendations (WHO, 1989) and the draft of the future Moroccan legislation on wastewater reuse. According to this, the final effluent could be used for the irrigation of trees.

Organic matter (BOD₅, COD) and SS concentration at the final effluent were high, due to the high organic load that receives the pond and the short HRTs.

References

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