

Long term application of a constructed wetland for phytoremediation of domestic wastewater: macrofauna biodiversity assessment

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What are Constructed Wetlands?

Constructed wetlands (CW) are engineered systems that are inspired and mimic many processes (physical, biological, and chemical) and functions that occur in natural wetlands. They comprise several components, impermeabilization liners and substrate, and as the key elements the plants and their associated microorganisms. They were thought primarily for wastewater treatment but nowadays are considered an NBS of excellence in terms of flexibility of their application and services provided (Calheiros et al, 2020).



Figure 1: Constructed wetland at Paço de Calheiros, Portugal

Problem Statement:

Tourism development has increased in popularity in the rural areas of Portugal in recent years, bringing new challenges to the infrastructures used for it. This is the case of sewage management because of the lack of adequate infrastructure and economic capability. Tourism facilities, in particular, possess a special challenge because of huge variability in sewage production and composition as a consequence of variations in number of guests and their activities (Calheiros et al, 2015).

Framework:

A CW was implemented in 2010 at Paço de Calheiros, a tourism house surrounded by a farm, located in Calheiros - North of Portugal in a rural area dominated by agriculture and forests. The CW was designed to be placed after a previously installed septic tank that acted as the main treatment before the CW was established. It is an horizontal subsurface flow system planted with a polyculture of (Figure 2): a) *Agapanthus africanus*, b) *Canna flaccida*, c) *Zantedeschia aethiopica*, d) *Canna indica*, and e) *Watsonia borbonica*.



Figure 2: Constructed wetland plants (Calheiros et al 2018)



Figure 3: Biodiversity associated to constructed wetland (Calheiros et al 2020)

Aims & Approach

The aim of the study is to monitor the efficiency of the CW, after long term operation, based on phytoremediation processes, to treat the wastewater from the tourism unit. Wastewater quality will be assessed through the analysis of physico-chemical and microbiological parameters towards its reuse for irrigation purposes. CW substrate will also be analyzed concerning the meso and macrofauna associated to the system (Figure 3). The work to be developed is of outmost importance since it has a real implication on the water management of a tourism unit.

References:

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