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Performance evaluation of duplex constructed wetlands for the treatment of diesel contaminated wastewater

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2 **Performance evaluation of duplex constructed wetlands for the treatment of diesel**  
3 **contaminated wastewater**

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18

19 **Abstract**

20 A duplex constructed wetland (duplex-CW) is a hybrid system that combines a vertical flow  
21 (VF) CW as a first stage with a horizontal flow filter (HFF) as a second stage for a more  
22 efficient wastewater treatment as compared to traditional constructed wetlands. This study  
23 evaluated the potential of the hybrid CW system to treat influent wastewater containing diesel  
24 range organic compounds varying from C<sub>7</sub> – C<sub>40</sub> using a series of 12-week practical and  
25 numerical experiments under controlled conditions in a greenhouse (pH was kept at 7.0 ± 0.2,  
26 temperature between 20 and 23° C and light intensity between 85 and 100-μmol photons m<sup>-2</sup>  
27 sec<sup>-1</sup> for 16 h d<sup>-1</sup>). The VF CWs were planted with *Phragmites australis* and were spiked with  
28 different concentrations of NH<sub>4</sub><sup>+</sup>-N (10, 30 and 60 mg/L) and PO<sub>4</sub><sup>3-</sup>-P (3, 6 and 12 mg/L) to  
29 analyse their effects on the degradation of the supplied petroleum hydrocarbons. The removal  
30 rate of the diesel range organics considering the different NH<sub>4</sub><sup>+</sup>-N and PO<sub>4</sub><sup>3-</sup>-P concentrations  
31 were simulated using Monod degradation kinetics. The simulated results compared well with

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