

SUPPORTING INFORMATION

Inside Story of gas processes within stormwater biofilters: Does greenhouse gas production tarnish the benefits of nitrogen removal?

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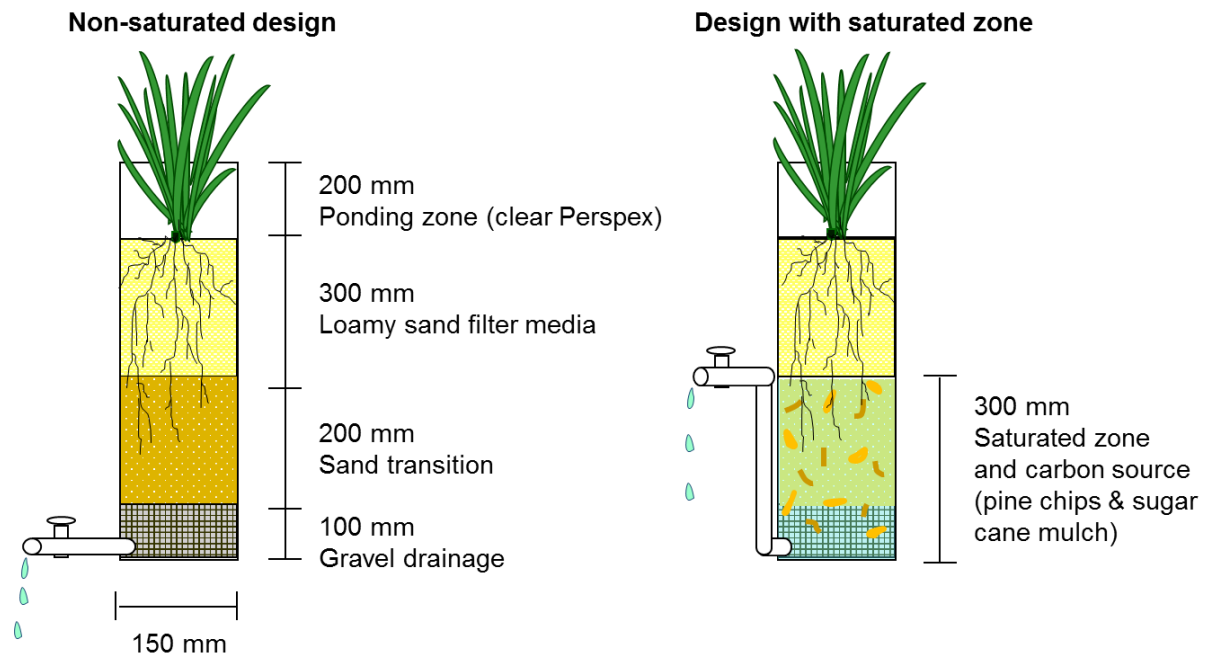


Figure S1 Experimental biofilter column design, showing free-draining (‘non-saturated’) designs at left and designs with saturated zone and carbon source at right

Table S1 Concentrations of nitrite/nitrate (NO_x), dissolved organic nitrogen (DON) and particulate organic nitrogen (PON) in the semi-natural stormwater inflow and effluent from biofilter columns, averaged for each replicated design (n=5) across all sampling events conducted under wet conditions or dry conditions, with standard deviation shown in brackets

	Effluent NO _x (mg N/L)				Effluent DON (mg N/L)				Effluent PON (mg N/L)			
	Wet conditions		Dry conditions		Wet		Dry		Wet		Dry	
Inflow (mg N/L)	Average 0.99 (Standard deviation ± 0.06)				Average 0.44 (Standard deviation ± 0.12)				Average 0.38 (Standard deviation ± 0.16)			
Species / Design	free-draining	saturated zone	free-draining	saturated zone	free-draining	saturated zone	free-draining	saturated zone	free-draining	saturated zone	free-draining	saturated zone
Palmetto® Soft Leaf Buffalo	0.35 (0.13)	0.07 (0.07)	0.53 (0.11)	0.09 (0.05)	0.14 (0.04)	0.13 (0.02)	0.30 (0.09)	0.28 (0.10)	0.05 (0.06)	0.05 (0.04)	0.13 (0.05)	0.08 (0.04)
<i>Poa sieberiana</i>	0.20 (0.08)	0.03 (0.03)	0.86 (0.24)	0.33 (0.19)	0.12 (0.03)	0.12 (0.07)	0.40 (0.13)	0.32 (0.11)	0.04 (0.03)	0.04 (0.03)	0.16 (0.09)	0.13 (0.06)
<i>Dianella revoluta</i>	0.53 (0.16)	0.14 (0.13)	0.92 (0.14)	0.30 (0.15)	0.12 (0.07)	0.11 (0.02)	0.39 (0.12)	0.32 (0.10)	0.06 (0.07)	0.06 (0.04)	0.20 (0.10)	0.16 (0.10)
<i>Dianella tasmanica</i>	0.53 (0.14)	0.15 (0.14)	0.87 (0.14)	0.30 (0.18)	0.12 (0.08)	0.10 (0.02)	0.36 (0.11)	0.28 (0.09)	0.06 (0.07)	0.05 (0.06)	0.18 (0.11)	0.13 (0.07)
<i>Carex appressa</i>	0.22 (0.12)	0.05 (0.05)	0.70 (0.21)	0.28 (0.20)	0.12 (0.03)	0.11 (0.02)	0.32 (0.11)	0.30 (0.10)	0.04 (0.03)	0.04 (0.03)	0.11 (0.07)	0.19 (0.21)
<i>Carex tereticaulis</i>	0.30 (0.16)	0.12 (0.07)	0.72 (0.18)	0.27 (0.19)	0.12 (0.03)	0.12 (0.02)	0.33 (0.09)	0.34 (0.11)	0.04 (0.05)	0.04 (0.02)	0.08 (0.05)	0.14 (0.06)
<i>Gahnia sieberiana</i>	0.72 (0.12)	0.28 (0.28)	1.12 (0.14)	0.41 (0.19)	0.09 (0.04)	0.10 (0.04)	0.41 (0.17)	0.36 (0.13)	0.07 (0.07)	0.07 (0.06)	0.17 (0.09)	0.20 (0.11)
<i>Juncus pallidus</i>	0.18 (0.13)	0.01 (0.01)	0.55 (0.15)	0.12 (0.08)	0.11 (0.04)	0.10 (0.02)	0.36 (0.09)	0.30 (0.08)	0.06 (0.08)	0.04 (0.04)	0.21 (0.10)	0.20 (0.10)
<i>Juncus kraussii</i>	0.27 (0.15)	0.03 (0.03)	0.80 (0.18)	0.45 (0.24)	0.12 (0.04)	0.10 (0.02)	0.40 (0.13)	0.40 (0.16)	0.04 (0.03)	0.03 (0.02)	0.19 (0.10)	0.19 (0.13)
<i>Cyperus gymnocaulis</i>	0.29 (0.14)	0.09 (0.06)	0.76 (0.20)	0.37 (0.24)	0.13 (0.04)	0.12 (0.02)	0.45 (0.12)	0.39 (0.15)	0.05 (0.03)	0.04 (0.06)	0.32 (0.26)	0.30 (0.38)
<i>Allocasurina littoralis</i>	0.28 (0.17)	0.10 (0.07)	0.81 (0.14)	0.44 (0.16)	0.10 (0.04)	0.12 (0.02)	0.46 (0.23)	0.39 (0.13)	0.05 (0.03)	0.05 (0.04)	0.30 (0.15)	0.23 (0.13)
<i>Hypocalymma angustifolium</i>	0.69 (0.28)	0.21 (0.13)	1.40 (0.60)	0.59 (0.15)	0.12 (0.05)	0.13 (0.04)	0.46 (0.20)	0.43 (0.20)	0.05 (0.05)	0.05 (0.02)	0.22 (0.12)	0.16 (0.08)
<i>Leptospermum continentale</i>	0.12 (0.12)	0.02 (0.03)	0.69 (0.24)	0.37 (0.25)	0.10 (0.04)	0.10 (0.04)	0.39 (0.21)	0.42 (0.16)	0.03 (0.03)	0.04 (0.03)	0.21 (0.10)	0.17 (0.06)
<i>Hakea laurina</i>	0.40 (0.25)	0.07 (0.05)	1.18 (0.26)	0.64 (0.25)	0.16 (0.06)	0.16 (0.04)	0.49 (0.18)	0.41 (0.13)	0.08 (0.11)	0.06 (0.03)	0.20 (0.09)	0.18 (0.08)
<i>Melaleuca incana</i>	0.06 (0.10)	0.01 (0.02)	0.58 (0.19)	0.31 (0.21)	0.09 (0.03)	0.09 (0.03)	0.40 (0.19)	0.34 (0.15)	0.02 (0.01)	0.04 (0.03)	0.09 (0.05)	0.09 (0.06)
Non-vegetated control	1.40 (0.18)	1.04 (0.27)	1.79 (0.38)	0.48 (0.16)	0.12 (0.07)	0.11 (0.07)	0.29 (0.18)	0.30 (0.08)	0.06 (0.10)	0.10 (0.18)	0.10 (0.10)	0.08 (0.05)

Table S2 Pearson product-moment correlation coefficients for significant correlations between O₂ rate of decline, N₂O and CH₄ peak concentrations for each column in October, February and April and other gas data, harvest data and effluent data sets. Note: * p<0.05, ** p<0.01, *** p<0.001

Variable	Units	O ₂ rate decline from 100 %			Peak N ₂ O concentration			Peak CH ₄ concentration		
		Oct	Feb	Apr	Oct	Feb	Apr	Oct	Feb	Apr
Other gas data										
CH ₄ peak concentration	nM		0.57 [*]	0.39 ^{**}						
N ₂ O peak concentration	nM									
Harvest data										
Length longest shoot	mm						-0.33 [*]	0.60 ^{**}	-0.55 [*]	
Length longest root	mm			-0.30 [*]	-	-0.56 ^{**}	-0.31 [*]			
Depth visible roots upon	mm		-0.69 ^{**}			-0.52 [*]	-0.31 [*]			
Estimated depth 95 % roots	mm		-0.54 [*]	-0.31 [*]		-0.52 [*]	-0.40 ^{**}			
Total root length	cm						-0.37 [*]			
Total root surface area	cm ²						-0.35 [*]			
Average root diameter	mm					0.46 [*]	0.40 ^{**}			
Total root volume	cm ³									
	g				0.48 [*]				-0.53 [*]	
Total plant dry mass	g						-0.34 [*]		-0.48 [*]	
Proportion total dry mass in	-				0.54 [*]					
Change in dry mass over	g						-0.35 [*]		-0.54 [*]	
Relative Growth Rate (RGR)	g/day		-0.52 ^{**}						-	
Specific Root Length (SRL)	cm/g						-0.40 ^{**}			
Length roots less than 0.25	cm						-			
Proportion root length less	-						-			
Effluent quality data										
Total Nitrogen (TN)	mg/L		-0.44 [*]	0.60 [*]			0.36 [*]			

Nitrate/Nitrite (NO _x)	mg/L			0.37*	0.46*		0.49**			
Dissolved Organic Nitrogen	mg/L		-0.44*	0.47*						
Particulate Organic Nitrogen	mg/L			0.30*						

