

Supplementary Material 1: Mean (\bar{X}), standard deviation (SD) and range (Min., Max.) of the water parameters at the three study sites with different level of degradation (Vohimarina, D1= low; Andreba, D2= intermediate; Anororo, D3= high). Presented are data measured within the vegetation during the rainy season (surface water and deep water) determined during four periods a day: 7000–1000h, 1000–1300h, 1300–1600h and 1600–1900h. Asterisks shown with the values of the surface water indicate statistical significant differences between surface water of sampled marsh vegetation and open water (n= 112, Table 1). Asterisks presented with the values of the deep water indicate statistical significant differences between deep water of sampled marsh vegetation and open water (n= 112) (significance level: $p \leq 0.05 = *$, $p \leq 0.01 = **$, $p \leq 0.001 = ***$).

Water parameters	D1 (n= 32)				D2 (n= 32)				D3 (n= 32)					
	\bar{X}	SD	Min.	Max.	\bar{X}	SD	Min.	Max.	\bar{X}	SD	Min.	Max.		
Surface water (0–10 cm)	Rainy season	Conductivity ($\mu\text{S cm}^{-1}$)	64	4.7	39	68	83	12.7	67	124	51	8.8	38	77
		DO (mg L^{-1})	4.6**	0.9	2.9	6.1	3.0	1.7	0.7	8.0	3.1	2.3	0.5	11.0
		DO (%)	61*	12.4	40	86	44	26	10.1	118	42	32	6.5	154
		pH	7.3	0.4	6.8	8.2	6.4	0.1	6.1	6.7	6.3	0.3	5.9	7.2
		Temp ($^{\circ}\text{C}$)	26.4***	0.9	24.3	28.7	29.9	2.2	27.1	34.5	26.2	1.2	24.4	28.9
		Max. Water level (cm)	201*	29	130	225	168***	17.2	150	200	185	23	130	200
		Light (lux)	313*	344	3.6	1250	26***	28	0.0	114	171***	498	0.0	2653
Deep water (150 cm)	Rainy season	Conductivity ($\mu\text{S cm}^{-1}$)	65*	2.7	61	78	103*	10.3	80	117	50	6.3	41	60
		DO (mg L^{-1})	4.3***	1.0	2.4	5.9	1.9	0.4	0.7	2.7	2.6*	0.8	1.7	4.8
		DO (%)	57***	13.6	31	79	26	6.0	8.3	37	35	11.5	23	64
		pH	7.2	0.4	6.0	8.2	6.3	0.1	6.1	6.4	6.3	0.1	6.0	6.6
		Temp ($^{\circ}\text{C}$)	25.5**	0.4	24.6	26.2	26.8	0.5	26.0	28.2	25.1	0.6	23.8	26.4
		Max. Water level (cm)	202*	29	130	225	168***	17.2	150	200	185	23	130	200
		Light (lux)	0.0	0.0	0.0	0.0	1.2	4.8	0.0	24	0.0	0.0	0.0	0.0

Supplementary Material 3: Mean (\bar{X}), standard deviation (SD), and range (Min., Max.) of the water parameters measured within the open water at Andreba (D2= intermediate-degraded) during the four daily periods (0700–1000h, 1000–1300h, 1300–1600h and 1600–1900h).

Water parameters		D2 (n= 20)																
		7000–1000h				1000–1300h				1300–1600h				1600–1900h				
		\bar{X}	SD	Min.	Max.	\bar{X}	SD	Min.	Max.	\bar{X}	SD	Min.	Max.	\bar{X}	SD	Min.	Max.	
Surface water (0–10 cm)	Dry season	Conductivity ($\mu\text{S cm}^{-1}$)	99	15.7	70	123	100	23	67	150	94	17.4	70	134	99	24	70	156
		DO (mg L^{-1})	4.3	2.3	0.3	7.7	3.4	2.2	0.1	7.6	3.3	1.6	0.7	6.0	3.6	1.4	0.9	5.7
		DO (%)	57	33	1.9	107	49	33	1.6	135	50	24	6.8	97	52	22	10.3	89
		pH	7.0	0.5	6.3	7.9	6.7	0.3	6.2	7.4	6.8	0.2	6.4	7.1	6.7	0.3	6.2	7.7
		Temp ($^{\circ}\text{C}$)	27.9	3.2	21.3	32.5	32.8	4.9	25.8	40.8	33.1	4.5	27.2	41.3	29.6	2.5	25.4	32.7
		Max. Water level (cm)	2.8	1.8	1.0	6.5	2.1	1.3	1.0	5.0	3.3	2.5	1.0	10.0	3.9	3.0	1.0	10.0
		Light (lux)	277	215	14.3	766	384	261	48	936	463	304	27	1272	179	179	22	699
	Rainy season	Conductivity ($\mu\text{S cm}^{-1}$)	86	11.1	71	109	81	8.2	69	95	80	8.7	67	93	79	9.9	66	94
		DO (mg L^{-1})	1.4	0.8	0.2	3.0	3.2	1.6	0.7	6.6	4.7	2.0	1.0	7.5	4.3	2.0	1.2	6.8
		DO (%)	22	17.1	2.3	82	46	23	10.0	98	71	33	14.1	117	62	30	15.8	103
		pH	6.3	0.1	6.1	6.5	6.3	0.1	6.2	6.6	6.5	0.1	6.3	6.7	6.5	0.1	6.3	6.8
		Temp ($^{\circ}\text{C}$)	26.9	0.7	26.0	28.3	29.9	2.3	26.2	34.9	31.3	2.8	26.9	35.2	30.4	2.3	27.1	35.3
		Max. Water level (cm)	182	9.4	170	205	182	9.4	170	205	182	9.4	170	205	182	9.4	170	205
		Light (lux)	98	74	10.0	242	245	180	2.4	525	158	144	0.0	448	94	104	0.0	364
Deep water (150 cm)	Rainy season	Conductivity ($\mu\text{S cm}^{-1}$)	100	10.8	80	122	97	10.4	74	112	91	11.0	75	110	94	11.9	76	117
		DO (mg L^{-1})	1.9	0.3	1.4	2.4	1.9	0.4	1.2	2.6	2.1	0.3	1.5	2.5	2.3	0.3	1.7	3.1
		DO (%)	26	4.0	18.2	33	27	5.1	16.6	33	29	4.4	19.1	35	31	4.9	23	43
		pH	6.2	0.1	6.1	6.4	6.3	0.1	6.1	6.4	6.3	0.1	6.2	6.4	6.3	0.1	6.2	6.6
		Temp ($^{\circ}\text{C}$)	26.2	0.3	25.8	27.1	27.0	0.6	26.2	28.0	27.4	0.5	26.6	28.2	26.7	0.6	26.0	28.1
		Max. Water level (cm)	182	9.4	170	205	182	9.4	170	205	182	9.4	170	205	182	9.4	170	205
		Light (lux)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	30	0.0	99

Supplementary Material 5: Plant species, growth forms, site specific and plant species cover in % (\bar{X} = mean, SD= standard deviation, Max.= maximal cover; D= degradation level; 1= low (Vohimarina), 2= intermediate (Andreba), 3= high (Anororo); n.i.= unidentified species; H+= helophyte with a height \geq 2m, H- = helophyte with a height < 2m, Hy= hydrophyte, P= pleustophytes, E= endemic, I= invasive, NT= naturalized, NV= native).

Family	Species	Growth form	Status	Cover (%)											
				D1 (n= 61)			D2 (n= 59)			D3 (n= 55)			Total (n= 175)		
				\bar{X}	SD	Max.	\bar{X}	SD	Max.	\bar{X}	SD	Max.	\bar{X}	SD	Max.
Amaranthaceae	<i>Alternanthera sessilis</i>	H-	NT	0	0.3	2	0	0.3	2	0	0	0	0	0.2	2
Asteraceae	<i>Ethulia conyzoides</i>	H-	NT	0	0	0	0.2	1.3	10	0	0	0	0.1	0.8	10
Commelinaceae	<i>Commelina aff. lyallii</i>	H-	-	0	0	0	0	0.3	2	0.1	0.4	2	0	0.3	2
Convolvulaceae	<i>Argyrea vahibora</i>	H+	E	1.2	4.1	20	2.4	9.9	50	3	11.2	70	2.2	8.8	70
Convolvulaceae	<i>Ipomoea aquatica</i>	H-	-	0	0	0	0.1	0.6	4	0	0	0	0	0.3	4
Cyperaceae	<i>Cyperus madagascariensis</i>	H+	E	0.1	0.6	4	0	0.3	2	2.2	7.1	30	0.7	4.1	30
Cyperaceae	<i>Cyperus pectinatus</i>	H-	-	0	0	0	0	0.3	2	0	0	0	0	0.2	2
Cyperaceae	<i>Oxycaryum cubense</i>	H-	-	0	0	0	0.1	0.6	4	0.1	0.5	2	0.1	0.4	4
Cyperaceae	<i>Pycreus mundtii</i>	H-	-	0	0	0	1.0	2.2	10	0.8	2.8	20	0.6	2.1	20
Menyanthaceae	<i>Nymphoides indica</i>	Hy	NV	0.2	1.3	10	0	0	0	0	0	0	0.1	0.8	10
Nymphaeaceae	<i>Nymphaea nouchali</i>	Hy	NV	8.6	20.4	80	0.1	0.5	4	0	0	0	3	12.6	80
Onagraceae	<i>Ludwigia perennis</i>	H-	NV	0	0	0	0.2	1.3	10	0.2	1.3	10	0.1	1.1	10
Onagraceae	<i>Ludwigia stolonifera</i>	H-	NV	3.1	11.5	70	8.7	15	80	6.9	11	40	6.2	12.8	80
Phytolaccaceae	<i>Phytolacca</i> sp.	H-	-	0	0	0	2.2	10.3	60	0	0	0	0.8	6.1	60
Poaceae	<i>Echinochloa pyramidalis</i>	H-	NV	23.5	29.8	97.5	5.1	7.9	40	4.9	8.8	50	11.5	20.7	97.5
Poaceae	<i>Echinochloa stagnina</i>	H-	NV	0.2	0.8	4	0.3	0.7	2	0	0	0	0.2	0.6	4
Poaceae	<i>Leersia hexandra</i>	H-	NV	0	0.3	2	0.5	1.9	10	0.7	2.8	20	0.4	1.9	20
Poaceae	<i>Oryza sativa</i>	H-	NT	0	0	0	0.2	0.8	4	0	0.3	2	0.1	0.5	4
Poaceae	<i>Phragmites australis</i>	H+	NT	2.4	13.1	90	2.9	6.8	30	3.4	13.6	80	2.9	11.5	90
Polygonaceae	<i>Persicaria glabra</i>	H-	NT	0.5	1.9	10	1.3	3.5	20	4.8	11.6	60	2.1	7.1	60
Pontederiaceae	<i>Eichhornia crassipes</i>	P	I	0.4	1.5	10	24.4	31.1	90	53	41	97.5	25	36.1	97.5
Salviniaceae	<i>Salvinia</i> spp.	P	NV/I	1.3	3.4	20	31.4	32.5	97.5	14.4	25.8	100	15.6	26.8	100

Supplementary Material 6: Shown are means and standard deviation of the vertical vegetation density at the three sites; D= degradation level, 1= low (Vohimarina), 2= intermediate (Andreba), 3= high (Anororo).

Height (cm)	Density (%)					
	D1 (n= 61)		D2 (n= 59)		D3 (n= 55)	
	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD
0–3	25.9	26.9	51.3	34.0	76.5	31.2
3–5	21.9	24.9	39.3	35.1	67.8	38.6
5–10	22.5	25.9	32.4	35.8	67.4	42.3
10–20	23.7	26.5	29.3	35.5	61.9	39.2
20–30	24.0	28.0	26.5	35.8	56.3	40.7
30–50	22.9	28.3	22.6	34.7	45.4	40.5
50–100	10.1	16.4	12.9	25.1	26.4	32.1
100–150	1.6	6.5	6.6	18.2	6.4	12.6
150–200	0.7	3.6	3.7	11.6	2.6	7.0
200–300	0.7	3.4	1.3	4.0	0.7	2.4
300–500	0.2	0.9	0.3	1.1	0.0	0.0

Supplementary Material 7: Shown are means and standard deviation of the vertical vegetation density of the lake shore vegetation at the three sites; D= degradation level, 1= low (Vohimarina), 2= intermediate (Andreba), 3= high (Anororo).

Height (cm)	Density (%)					
	D1 (n= 36)		D2 (n= 35)		D3 (n= 34)	
	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD
0–3	33.2	27.3	53.5	36.1	78.3	29.2
3–5	31.1	25.0	42.1	37.9	68.8	37.9
5–10	33.0	27.0	38.7	39.1	71.0	44.6
10–20	36.9	27.2	39.1	38.9	67.6	38.6
20–30	38.3	28.7	36.6	39.3	64.9	38.0
30–50	37.1	29.4	32.9	39.9	58.3	37.2
50–100	17.0	18.5	19.4	29.9	39.6	33.8
100–150	2.7	8.4	10.1	22.8	9.9	15.0
150–200	1.3	4.7	5.6	14.5	4.3	8.5
200–300	1.3	4.4	1.7	4.5	1.2	3.0
300–500	0.3	1.2	0.4	1.2	0.0	0.0

Supplementary Material 8: Shown are means and standard deviation of the vertical vegetation density on the open water at the three sites; D= degradation level, 1= low (Vohimarina), 2= intermediate (Andreba), 3= high (Anororo).

Height (cm)	Density (%)					
	D1 (n= 25)		D2 (n= 24)		D3 (n= 21)	
	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD
0–3	15.3	22.8	48.0	31.2	73.6	34.7
3–5	8.7	18.0	35.0	31.0	66.2	40.7
5–10	7.3	14.6	23.1	28.9	61.4	38.7
10–20	4.8	6.2	15.0	24.0	52.8	39.4
20–30	3.3	3.2	11.7	23.6	42.4	41.9
30–50	2.4	2.9	7.6	17.1	24.6	37.5
50–100	0.3	0.9	3.4	10.3	5.0	10.6
100–150	0.0	0.0	1.4	4.5	0.6	1.4
150–200	0.0	0.0	0.9	4.1	0.0	0.0
200–300	0.0	0.0	0.6	3.1	0.0	0.0
300–500	0.0	0.0	0.2	1.0	0.0	0.0