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Supplementary figure 1: Estimate of the nutrient loads over time of the (a) Swartkops and (b) Sundays River estuaries.

Supplementary table 1: The range of values for estuarine ecosystem services based on data transfer, demonstrating how different classifications and uses of areas can influence the value of these services. The areas are described in Table 2 and Figure 1 in the main text. Using Area 1 and based on value data transfer from Bönhke-Hendricks and De Groot[1] the estimated economic value of an estuary is ZAR27 million (USD1.4 million), but using Watson et al.[2], the value is ZAR375 million (USD20.3 million). This highlights the need for estuary studies to be conducted at a local level to accurately account for site-specific characteristics and complexities (USD1 = ZAR18.4519).

Study		Turpie and Clark[3]		Böhnke-Henrichs and de Groot[1]	Watson et al.[2]
		Lower bound	Upper bound		
Area 1	ha	603	603	603	603
	Value 1	ZAR51 452 551 (USD2 788 756)	ZAR77 178 826 (USD4 183 134)	ZAR27 428 592 (USD1 486 644)	ZAR104 325 358 (USD5 654 490)
Area 2	ha	691	691 (61+630)	691 (61+630)	691 (61+630)
	Value 2	**ZAR35 360 000** (USD1 916 333)	**ZAR53 040 000** (USD2 874 500)	ZAR31 415 333 (USD1 702 552)	ZAR119 489 033 (USD6 475 703)
Area 3	ha	1294	1294	1294	1294
	Value 3	ZAR86 810 192 (USD4 704 674)	ZAR130 215 288 (USD7 057 012)	ZAR58 844 783 (USD3 189 090)	ZAR223 817 657 (USD12 129 789)
Area 4	ha	845	845	845	845
	Value 4	ZAR45 392 544 (USD24 600 477)	ZAR68 088 816 (USD3 690 070)	ZAR38 436 950 (USD2 083 089)	ZAR146 195 936 (USD7 923 083)
Area 5	ha	1908	1908	1908	1908
	Value 5	ZAR150 825 484 (USD8 173 981)	ZAR226 238 226 (USD12 260 971)	**ZAR86 793 065** (USD4 730 746)	**ZAR330 119 672** (USD17 890 822)
Area 6	ha	2168	2168	2168	2168
	Value 6	ZAR166 549 212 (USD9 026 128)	ZAR249 823 818 (USD13 539 192)	ZAR98 628 005 (USD5 345 140)	ZAR375 134 171 (USD20 330 381)

Values in bold indicate the value in the database.[4]

Supplementary table 2: Dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphate (DIP) concentrations at the head of the Swartkops and Sundays River estuaries as they are reported in the literature

Swartkops River estuary head							Sundays River estuary head						
Year	**Reference**	**Unit**	**Mean DIN**	**Nitrogen (kg/annum)**	**Mean DIP**	**Phosphorus (kg/annum)**	**Year**	**Reference**	**Unit**	**Mean DIN**	**Nitrogen (kg/annum)**	**Mean DIP**	**Phosphorus (kg/annum)**
1994	Scharler and Baird[5]	µM/L	30.9	34 279	6.8	16 681	1994	Scharler and Baird[5]	µM/L	72.7	264 760	0.6	4832
2001	Human et al.[6]	mg/L	0.3	23 760	0.6	47 520	2006	Potgieter[8]	Mmol/m^3	171.35	190 088	9.27	22 741
2002	Snow[7]	µM/L	39.4	43 709	30.4	74 575	2018	Lemley et al.[12]	µM/L	13.39	48 764	3.47	27 945
2006	Potgieter[8]	Mmol/m^3	122.57	135 974	73.09	179 300	2021	Orolowitz[10]	µM/L	24.06	87 632	3.01	24 200
2013	Human et al.[6]	mg/L	1.0	79 200	0.6	47 520	2022	Orolowitz[10]	µM/L	7.06	25 692	3.03	24 382
2019	Whitfield[9]	µM/L	123.33	136 819	61.35	150 489							
2019	Human et al.[6]	mg/L	2.9	229 680	3.4	269 280							
2020	Whitfield[9]	µM/L	164.55	182 543	70.48	172 902							
2020	Human et al.[6]	mg/L	3.2	253 440	2.9	229 680							
2021	Orolowitz[10]	µM/L	199.21	220 995	111.99	274 724							
2022	Lemley et al.[11]	µM/L	161.7	179 383	127.5	312 775							
2022	Orolowitz[10]	µM/L	262.14	290 802	101.43	248 829							

Supplementary table 3: Dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphate (DIP) concentrations at the mouth of the Swartkops and Sundays River estuaries

Swartkops River estuary mouth							Sundays River estuary mouth						
Year	**Reference**	**Unit**	**Mean DIN**	**Nitrogen (kg/annum)**	**Mean DIP**	**Phosphorus (kg/annum)**	**Year**	**Reference**	**Unit**	**Mean DIN**	**Nitrogen (kg/annum)**	**Mean DIP**	**Phosphorus (kg/annum)**
1994	Scharler and Baird[13]	µM/L	27.6	30 618	0.8	1963	1994	Scharler and Baird[13]	µM/l	29.6	107 798	0.4	3221
2019	Orolowitz[10]	µM/L	0.73	811	4.73	11 614	2021	Orolowitz[10]	µM/l	3.82	13 917	0.89	7205
2020	Orolowitz[10]	µM/L	3.07	3401	8.59	21 078	2022	Orolowitz[10]	µM/l	5.37	19 569	2.75	22 131
2021	Orolowitz[10]	µM/L	5.35	5938	5.43	13 325							
2022	Orolowitz[10]	µM/L	2.97	3295	1.17	2881							

Supplementary table 4: Cost of removing nutrients

Year	Capital and operating expenditure (ZAR/mL)	Removal estimate (kg/mL)	Removal cost (ZAR/kg)
1994	6890	44	157
2001	6050	39	156
2002	6000	38	158
2003	5970	37	160
2013	5800	30	193
2018	5780	26	219
2019	5800	26	227
2020	5800	25	233
2021	5850	24	242
2022	5850	23	250

Sources: Based on Naidoo et al.[14], Li et al.[15] and Lemly et al.[16]

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