

Supplementary Material

Supplementary Figures and Tables

Supplementary Figure 1. Photographs of benthic communities found on turbid coral reefs in southern Singapore. (a) Coral communities on the reef crest of Pulau Hantu that comprise high coral cover, but relatively low structural complexity. A SedPod, which allows for sediment resuspension by currents, is deployed on the reef crest to measure net sediment accumulation rates on reefs; (b) coral communities on the reef crest (2–3 m depth) of Kusu Island which are dominated by massive (e.g. *Porites* sp.) corals and other stress-tolerant taxa (e.g. *Goniopora* sp.); (c) foliose/platy coral on the fore-reef slope at Pulau Hantu (~5 m depth) showing evidence of sediment deposition and partial mortality on the colony surface; (d) sponge and gorgonian communities on the reef slope of Kusu Island (~9 m depth), below the euphotic depth, where benthic cover is predominately fine mud and rubble, and non-autotrophic reef taxa.

Supplementary Figure 2. Long-term changes (27 years) in coral cover (%) between 1986 and 2012 at Pulau Hantu and Kusu Island, Singapore (data modified from Guest et al, 2016). Data are plotted for: (a) the shallow reef crest (3 m depth), and (b) the deeper reef slope (7 m depth).

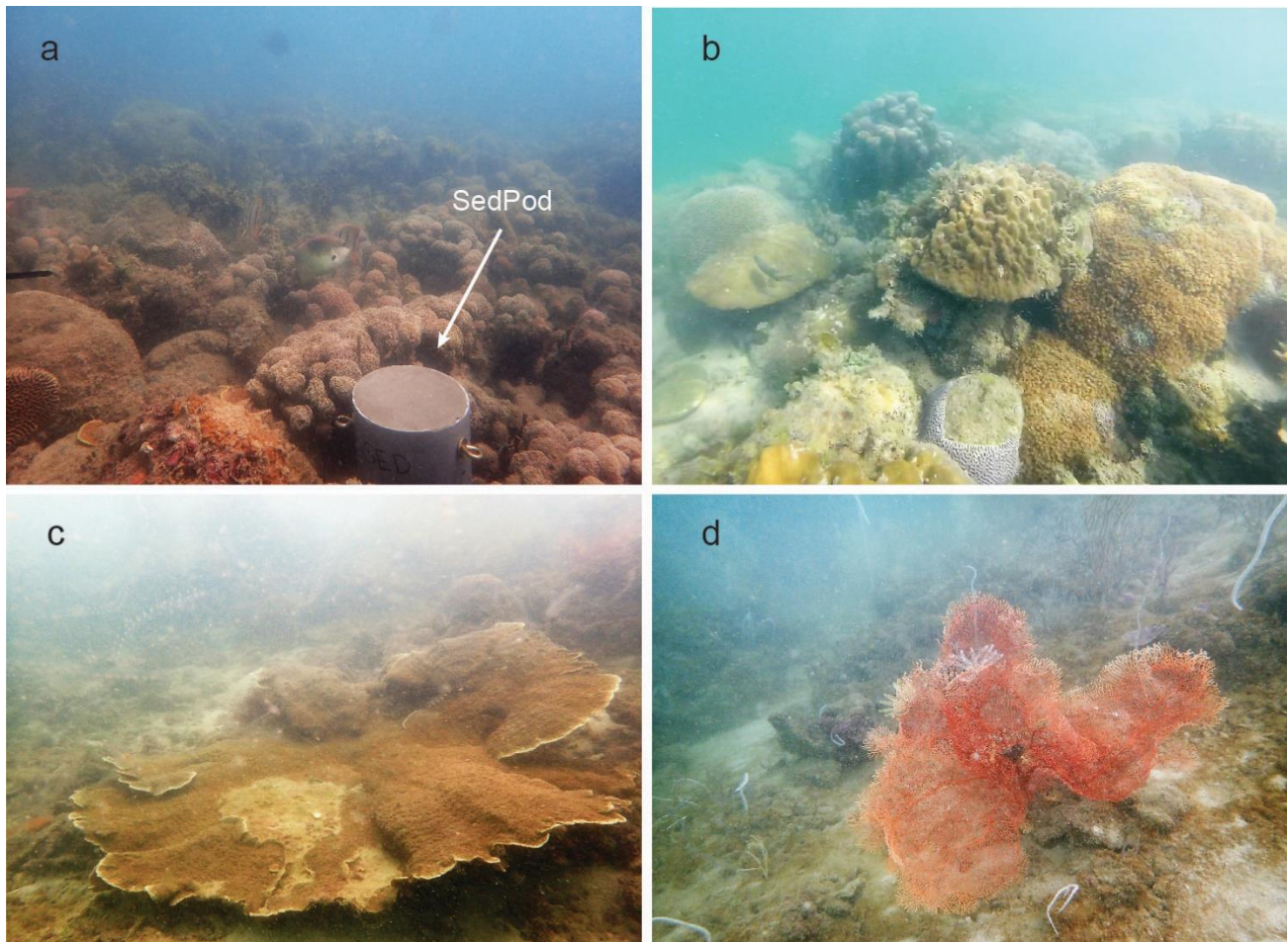
Supplementary Table 1. Turbidity percentile values (SSC; mg l^{-1}) for the 100th (maximum), 99th, 95th, 80th, 50th (median) percentiles and mean derived from running mean time periods (1 hour, 1 day, 3 days, 7 days, 12/14 days) for Kusu Island and Pulau Hantu in southern Singapore.

Supplementary Table 2. Daily light integral ($\text{mol photons m}^{-2} \text{d}^{-1}$) for the 50th (median), 20th, 5th percentiles and mean derived from running mean time periods (1, 3, 7, 12/14 days) for Kusu Island and Pulau Hantu in southern Singapore.

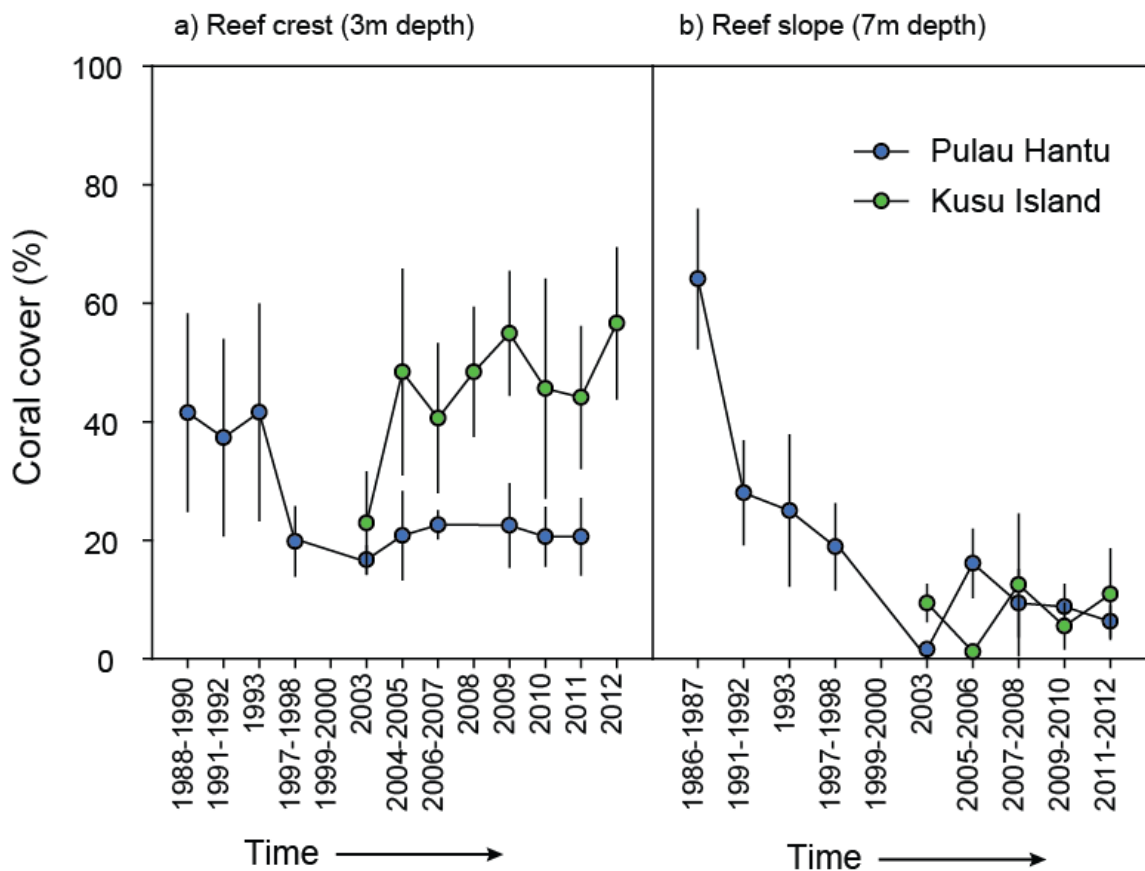
Supplementary Table 3. Current velocity percentile values (cm sec^{-1}) for the 100th (maximum), 99th, 95th, 80th, 50th (median) percentiles and mean derived from running mean time periods (1 hour, 1, 3, 7, 14 days) for both reef crest (2–3 m depth) and reef slope (7 m depth) zones on Kusu Island and Pulau Hantu in southern Singapore.

Supplementary Table 4. Summary of gross and net sedimentation accumulation rates ($\text{mg cm}^{-2} \text{d}^{-1}$) and sediment characteristics collected using tube trap (gross) and SedPods (net) deployed on the reef crest (2–3 m depth) and reef slope (7 m depth) of Kusu Island and Pulau Hantu, southern Singapore. Sediment characteristics of benthic sediment collected from the reef surface are also shown.

Supplementary Table 5. The proportion (%) of reef current velocities (cm s^{-1}) recorded over the deployment period at reef crest (2–3 m depth) and reef slope (7 m depth) of Kusu Island and Pulau Hantu, southern Singapore.



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Guest, J. R., Tun, K., Low, J., Vergés, A., Marzinelli, E. M., Campbell, A. H., ... & Steinberg, P. D. (2016). 27 years of benthic and coral community dynamics on turbid, highly urbanised reefs off Singapore. *Scientific reports*, 6, 36260.

Supplementary Table 1. Turbidity percentile values (SSC; mg l⁻¹) for the 100th (maximum), 99th, 95th, 80th, 50th (median) percentiles and mean derived from running mean time periods (1 hour, 1 day, 3 days, 7 days, 12/14 days) for Kusu Island and Pulau Hantu in southern Singapore.

SSC (mg l ⁻¹)		P100	P99	P95	P80	P50	mean
Kusu Island							
	1 hour	107.9	90.0	61.0	23.7	7.9	15.7
	1 day	74.0	73.1	59.2	19.8	8.9	14.9
	3 days	39.6	39.5	38.6	22.5	9.3	14.0
	7 days	21.4	21.4	20.9	19.6	13.6	13.2
	14 days	19.3	18.8	16.9	15.5	13.7	11.6
Pulau Hantu							
	1 hour	221.3	197.1	127.9	73.5	26.4	42.5
	1 day	141.4	140.1	118.1	75.3	25.0	41.1
	3 days	100.5	99.1	92.6	72.5	26.0	40.5
	7 days	99.7	98.6	92.3	72.5	25.9	40.5
	12 days	63.8	63.7	63.6	60.1	42.4	41.3

Supplementary Table 2. Daily light integral (mol photons m⁻² d⁻¹) for the 50th (median), 20th, 5th percentiles and mean derived from running mean time periods (1, 3, 7, 12/14 days) for Kusu Island and Pulau Hantu in southern Singapore.

Daily light integral (mol photons m⁻² d⁻¹)		P50	P20	P5	mean
Kusu Island					
	1 day	13.8	9.1	3.8	13.9
	3 days	13.9	11.1	5.0	14.2
	7 days	14.0	11.7	10.2	14.7
	14 days	14.5	14.1	13.9	15.7
Pulau Hantu					
	1 day	5.9	4.0	2.3	6.4
	3 days	6.7	4.7	3.7	6.5
	7 days	6.2	5.8	5.0	6.4
	12 days	6.5	5.9	5.0	6.6

Supplementary Table 3. Current velocity percentile values (cm sec^{-1}) for the 100th (maximum), 99th, 95th, 80th, 50th (median) percentiles and mean derived from running mean time periods (1 hour, 1, 3, 7, 14 days) for both reef crest (2–3 m depth) and reef slope (7 m depth) zones on Kusu Island and Pulau Hantu in southern Singapore.

Current velocity (cm sec^{-1})		P100	P99	P95	P80	P50	mean
Kusu Island (reef crest)							
	1 hour	25.1	15.8	12.0	8.7	6.8	7.2
	1 day	9.3	9.1	8.7	8.2	7.3	7.2
	3 days	8.8	8.7	8.5	8.1	7.3	7.2
	7 days	8.8	8.7	8.5	8.1	7.3	7.2
	14 days	8.3	8.3	8.2	7.9	7.3	7.1
Kusu Island (reef slope)							
	1 hour	29.4	17.1	10.1	4.8	2.8	3.8
	1 day	7.2	6.8	6.1	5.0	3.6	3.8
	3 days	6.5	6.3	6.0	4.9	3.6	3.8
	7 days	6.5	6.2	6.0	4.9	3.6	3.8
	14 days	5.6	5.6	5.5	4.8	3.7	3.8
Pulau Hantu (reef crest)							
	1 hour	57.2	42.0	35.7	18.9	5.2	10.2
	1 day	39.0	37.8	15.4	12.5	9.8	10.1
	3 days	22.0	21.9	20.6	12.8	9.7	10.1
	7 days	21.8	21.7	20.4	12.7	9.7	10.1
	14 days	17.3	17.2	16.6	12.3	9.8	10.2
Pulau Hantu (reef slope)							
	1 hour	114.2	107.4	46.7	19.4	5.0	12.7
	1 day	25.0	24.5	23.7	17.2	12.0	12.7
	3 days	24.6	23.8	22.8	16.2	12.4	12.7
	7 days	24.4	23.7	22.6	16.3	12.5	12.7
	14 days	21.8	21.5	21.0	15.8	12.4	13.0

Supplementary Table 4. Summary of gross and net sedimentation accumulation rates ($\text{mg cm}^{-2} \text{d}^{-1}$) and sediment characteristics collected using tube trap (gross) and SedPods (net) deployed on the reef crest (2–3 m depth) and reef slope (7 m depth) of Kusu Island and Pulau Hantu, southern Singapore. Sediment characteristics of benthic sediment collected from the reef surface are also shown.

	Kusu Island		Pulau Hantu	
	Reef crest	Reef slope	Reef crest	Reef slope
Tube traps				
Sediment accumulation rate ($\text{mg cm}^{-2} \text{d}^{-1}$)	18.2 ± 4.2	22.9 ± 0.3	9.8 ± 0.9	17.1 ± 0.8
Mean grain size (μm)	6.2	7.7	8.8	8.1
Mean settling velocity (cm s^{-1})	0.000	0.001	0.001	0.001
% gravel	0%	0%	0%	0%
% sand	4%	5%	8%	14%
% mud	96%	95%	92%	86%
Total organic carbon (%)	15%	13%	14%	13%
Total inorganic carbon (%)	3%	3%	2%	6%
Non-reef sediment (%)	83%	84%	84%	80%
SedPods				
Sediment accumulation rate ($\text{mg cm}^{-2} \text{d}^{-1}$)	0.0	1.2	0.1	0.7
Mean grain size (μm)	1.91	15.5	12.2	9.51
Mean settling velocity (cm s^{-1})	0.000	0.025	0.016	0.011
% gravel	0%	0%	0%	0%
% sand	17%	19%	20%	17%
% mud	83%	81%	80%	83%
Total organic carbon (%)	12%	13%	13%	13%
Total inorganic carbon (%)	9%	8%	7%	9%
Non-reef sediment (%)	81%	78%	79%	77%
Benthic sediment				
Mean grain size (μm)	1093	314	524	183
Mean settling velocity (cm s^{-1})	17.04	4.81	8.30	2.26
Sorting (σ)	2.1	3.5	2.8	3.0
% gravel	27%	12%	16%	8%
% sand	71%	58%	77%	43%
% mud	1%	29%	7%	48%
Total organic carbon (%)	5%	9%	4%	13%
Total inorganic carbon (%)	24%	22%	37%	29%
Non-reef sediment (%)	71%	69%	59%	59%

Supplementary Table 5. The proportion (%) of reef current velocities (cm s^{-1}) recorded over the deployment period at reef crest (2–3 m depth) and reef slope (7 m depth) of Kusu Island and Pulau Hantu, southern Singapore.

Current velocity (cm s^{-1})	Kusu Island		Pulau Hantu	
	Reef crest	Reef slope	Reef crest	Reef slope
0-5	80.3	22.9	50.2	48.9
5-10	13.5	63.7	16.3	19.0
10-15	3.4	10.4	7.2	7.7
15-20	1.4	2.2	6.6	6.1
20-25	0.8	0.6	5.1	4.6
25-30	0.4	0.2	4.5	4.3
30-35	0.1	0.0	2.6	2.9
35-40	0.1	0.0	1.5	1.5
40-45	0.0	0.0	0.8	3.6
45-50	0.0	0.0	0.7	0.7
50-55	0.0	0.0	0.5	0.2
55-60	0.0	0.0	0.4	0.2
60-65	0.0	0.0	0.4	0.0
65-70	0.0	0.0	0.3	0.0
>70	0.0	0.0	2.8	0.1