

This supplemental material accompanies the manuscript:

“Coral restoration effectiveness: multiregional snapshots of the long-term responses of coral assemblages to restoration”

Section 1. Statistical analysis

Table S1. Hard coral cover among treatments Posthoc with Tukeys' contrast on linear models

	Estimate	SE	t value	p-value
Koh Tao - Thailand <i>LM: ~Treatment+Site</i>				
restored - control	-9.464	10.153	-0.932	0.620439
unrestored - control	-42.036	10.153	-4.140	0.001263 **
unrestored - restored	-32.572	6.421	-5.072	0.000181 ***
Landaa Giraavaru - Maldives <i>LM: ~Treatment+Site</i>				
restored - control	5.017	8.381	0.599	0.8187
unrestored - control	-19.517	8.381	-2.329	0.0719
unrestored - restored	-24.533	5.301	-4.628	<0.001 ***
Florida Keys - USA <i>GLM: log(x+1)~Treatment+Site</i>				
restored - control	1.8037	0.5118	3.524	0.00559 **
unrestored - control	0.6422	0.5118	1.255	0.42888
unrestored - restored	-1.1615	0.3237	-3.588	0.00497 **
St Croix – US Virgin islands <i>GLM: log(x+1)~Treatment+Site</i>				
restored - control	0.18957	0.30882	0.614	0.811
unrestored - control	-0.06923	0.28887	-0.240	0.968
unrestored - restored	-0.25880	0.18911	-1.369	0.375

Table S2. Structural complexity among treatments. Posthoc with Tukeys' contrast on linear models

	Estimate	SE	t value	p-value
Koh Tao - Thailand <i>LM: ~Treatment+Site</i>				
restored - control	1.2500	0.3005	4.160	0.00126 **
unrestored - control	-0.4167	0.3005	-1.387	0.35929
unrestored - restored	-1.6667	0.1900	-8.771	< 1e-04 ***
Landaa Giraavaru - Maldives <i>LM: log(x+1) ~Treatment+Site</i>				
restored - control	-0.26569	0.15655	-1.697	0.22496
unrestored - control	-0.67211	0.15655	-4.293	< 0.001 ***
unrestored - restored	-0.40642	0.09901	-4.105	0.00145 **
Florida Keys - USA <i>LM: ~Treatment+Site</i>				
restored - control	-0.3333	0.2679	-1.244	0.4346
unrestored - control	-0.8333	0.2679	-3.111	0.0140 *
unrestored - restored	-0.5000	0.1694	-2.951	0.0198 *
St Croix – US Virgin Islands <i>LM: ~Treatment+Site</i>				
restored - control	0.0750	0.2077	0.361	0.92912
unrestored - control	-0.7875	0.1943	-4.054	0.00311 **
unrestored - restored	-0.8625	0.1272	-6.782	< 0.001 ***

Table S3. Coral juveniles among treatment. Posthoc on Kruskal Wallis with Nemenyi test

Koh Tao - Thailand Kruskal Wallis Nemenyi test		
	control	restored
restored	0.452	-
unrestored	0.452	0.043

Landaa Giraavaru – Maldives Kruskal Wallis Nemenyi test		
	control	restored
restored	0.64	-
unrestored	0.90	0.88

Table S4. Coral juveniles among restored sites in Koh Tao. Posthoc on Kruskal Wallis with Nemenyi test

	Biorock	Chalok
Chalok	0.822	-
Tanote	0.200	0.05*

Table S5. Coral generic richness among treatments. Posthoc with Tukeys' contrast on general linear models and Kruskal Wallis with Nemenyi test

	Estimate	SE	t value	p-value
Koh Tao - Thailand <i>GLM: ~Treatment+Site Distribution=poisson</i>				
restored - control	5.667	2.557	2.216	0.0896
unrestored - control	1.333	2.557	0.521	0.8588
unrestored - restored	-4.333	1.617	-2.680	0.0352 *
Landaa Giraavaru - Maldives <i>GLM: ~Treatment+Site Distribution=poisson</i>				
restored - control	-36.500	4.902	-7.446	< 0.001 ***
unrestored - control	-23.833	4.902	-4.862	< 0.001 ***
unrestored - restored	12.667	3.100	4.086	0.00153 **
Florida Keys - USA <i>GLM: ~Treatment+Site Distribution=poisson</i>				
restored - control	0.2222	0.7349	0.302	0.9498
unrestored - control	-0.8889	0.7349	-1.209	0.4542
unrestored - restored	-1.1111	0.4648	-2.390	0.0639
St Croix – US Virgin Islands <i>Kruskal-Wallis</i>				
	control	restored		
restored	1.00	-		
unrestored	0.74	0.77		

Table S6. Coral health prevalence among treatments. Posthoc with Tukeys' contrast on general linear models

	Estimate	SE	t value	p-value
Koh Tao - Thailand <i>GLM: ~Treatment+Site</i>				
restored - control	5.499	6.529	0.842	0.67592
unrestored - control	-24.433	6.529	-3.742	0.00328 **
unrestored - restored	-29.932	4.129	-7.249	< 1e-04 ***
Landaa Giraavaru - Maldives <i>GLM: ~Treatment+Site</i>				
restored - control	-9.1227	1.7434	-5.233	<0.0001 ***
unrestored - control	-8.9282	1.7434	-5.121	<0.0001 ***
unrestored - restored	0.1945	1.1026	0.176	0.9826
Florida Keys - USA <i>GLM: ~Treatment+Site</i>				

restored - control	-1.897	2.594	-0.731	0.7431
unrestored - control	2.080	2.594	0.802	0.7005
unrestored - restored	3.976	1.640	2.424	0.0596
St Croix – US Virgin Islands		<i>GLM: ~Treatment+Site</i>		
restored - control	-15.340	2.217	-6.919	<0.001 ***
unrestored - control	-12.224	2.074	-5.894	<0.001 ***
unrestored - restored	3.116	1.358	2.295	0.0863

Table S7. Coral disease prevalence among treatments. Posthoc with Tukeys' contrast on general linear models

	Estimate	SE	t value	p-value
Koh Tao - Thailand		<i>GLM: log(x+1)~Treatment+Site</i>		
restored - control	0.7201	0.5733	1.256	0.428
unrestored - control	0.9191	0.5733	1.603	0.261
unrestored - restored	0.1990	0.3626	0.549	0.845
Landaa Giraavaru - Maldives		<i>GLM: log(x+1)~Treatment+Site</i>		
restored - control	1.1601	0.4092	2.835	0.0253 *
unrestored - control	0.7145	0.4092	1.746	0.2075
unrestored - restored	-0.4456	0.2588	-1.722	0.2159
Florida Keys - USA		<i>GLM: log(x+1)~Treatment+Site</i>		
restored - control	-0.5942	0.2137	-2.781	0.0284 *
unrestored - control	-0.7363	0.2137	-3.446	0.0065 **
unrestored - restored	-0.1421	0.1351	-1.051	0.5473
St Croix – US Virgin Islands		<i>GLM: log(x+1)~Treatment+Site</i>		
restored - control	0.42094	0.15296	2.752	0.0373 *
unrestored - control	-0.05327	0.14308	-0.372	0.9249
unrestored - restored	-0.47421	0.09367	-5.063	<0.001 ***

Table S8. Prevalence of compromised coral colonies among treatments. Posthoc with Tukeys' contrast on general linear models

	Estimate	SE	t value	p-value
Koh Tao - Thailand		<i>GLM: log(x+1)~Treatment+Site</i>		
restored - control	-0.7677	0.3477	-2.208	0.0909
unrestored - control	0.7480	0.3477	2.151	0.1012
unrestored - restored	1.5157	0.2199	6.893	<1e-04 ***
Landaa Giraavaru - Maldives		<i>GLM: log(x+1)~Treatment+Site</i>		
restored - control	0.6767	0.6425	1.053	0.546
unrestored - control	0.2779	0.6425	0.433	0.900
unrestored - restored	-0.3988	0.4064	-0.981	0.590
Florida Keys - USA		<i>GLM: log(x+1)~Treatment+Site</i>		
restored - control	0.2032	0.4020	0.505	0.867
unrestored - control	-0.3443	0.4020	-0.856	0.667
unrestored - restored	-0.5475	0.2543	-2.153	0.101
St Croix – US Virgin Islands		<i>GLM: log(x+1)~Treatment+Site</i>		
restored - control	1.8198	0.2296	7.928	<1e-04 ***
unrestored - control	1.5144	0.2147	7.053	<1e-04 ***
unrestored - restored	-0.3054	0.1406	-2.173	0.107

Table S9. Prevalence of predated upon coral colonies among treatments. Posthoc with Tukeys' contrast on general linear models, and Kruskal Wallis Nemenyi tests

	Estimate	SE	t value	p-value
Koh Tao - Thailand				
<i>GLM: log(x+1)~Treatment+Site</i>				
restored - control	-0.09541	0.40610	-0.235	0.969
unrestored - control	-0.05775	0.40610	-0.142	0.989
unrestored - restored	0.03766	0.25684	0.147	0.988
Landaa Giraavaru - Maldives				
<i>Kruskal Wallis</i>				
	control	restored		
restored	0.36	-		
unrestored	0.34	1.00		
Florida Keys - USA				
<i>Kruskal Wallis</i>				
	control	restored		
restored	0.0038*	-		
unrestored	1.0000	0.0038*		
St Croix – US Virgin Islands				
<i>Kruskal Wallis</i>				
	control	restored		
restored	0.56	-		
unrestored	0.92	0.33		

Table S10. Pairwise ADONIS investigating the compositional differences in coral assemblages among restoration treatments at the four program locations calculated from Bray-Curtis distance matrices. * indicates significant effect at $p < 0.05$. ** at $p < 0.01$ and *** at $p < 0.005$.

	F.Model	r²	p-value
Koh Tao - Thailand			
Unrestored vs Restored	1.411090	0.0810	0.231
Unrestored vs Control	4.525625	0.2204	0.008
Restored vs Control	3.641793	0.1854	0.014
Landaa Giraavaru - Maldives			
Unrestored vs Restored	3.329325	0.1722	0.015
Unrestored vs Control	2.293174	0.1253	0.045
Restored vs Control	3.785780	0.1913	0.005
Florida Keys - USA			
Unrestored vs Restored	3.520867	0.1803	0.014
Unrestored vs Control	3.876870	0.1950	0.006
Restored vs Control	1.355319	0.0780	0.261
St Croix – US Virgin Islands			
Unrestored vs Restored	6.956262	0.3669	0.001
Unrestored vs Control	3.146627	0.2077	0.017
Restored vs Control	3.507912	0.2262	0.004

Section 2. Effects of benthic attributes on the compositional differences of coral assemblages

In Koh Tao, ADONIS on the NMDS detected differences in hard coral cover (ADONIS: $F=6.27$, $p=0.001$), structural complexity (ADONIS: $F=5.56$, $p=0.002$), coral diversity (ADONIS: $F=2.83$, $p=0.026$), and coral health (ADONIS: $F=2.53$, $p=0.036$) that distinguished coral assemblages at the control reference treatments. Disease prevalence was the strongest factor separating coral assemblages at the restored treatments (ADONIS: $F=5.38$, $p=0.002$), and the prevalence of other indicators of compromised health distinguished the assemblages at the unrestored treatments (ADONIS: $F=2.36$ $p=0.022$).

In Landaa Giraavaru, ADONIS analyses on the NMDS detected differences in structural complexity that distinguished the composition of coral assemblages at the control reference treatments (ADONIS: $F=3.84$, $p=0.009$). Differences in the abundance of juvenile corals distinguished unrestored treatments, with more juveniles in unrestored treatments (ADONIS: $F=3.3$, $p=0.008$, Fig.9).

In the Florida Keys, ADONIS analyses of the NMDS detected differences in hard coral cover that distinguished the coral assemblages at restored treatments (ADONIS: $F=7.23$, $p=0.001$). Differences in structural complexity distinguished assemblages at control reference treatments (ADONIS: $F=6.26$, $p=0.002$), and differences in the prevalence of healthy coral colonies distinguished assemblages at unrestored treatments (ADONIS: $F=5.26$, $p=0.001$; Fig.9).

In St Croix, ADONIS analyses on the NMDS detected differences in hard coral cover (ADONIS: $F=4.53$, $p=0.003$) distinguishing coral assemblages at control reference

treatments. Higher structural complexity (ADONIS: $F=5.45$, $p=0.002$), and prevalence of diseased coral colonies (ADONIS, $F=5.15$, $p=0.001$) distinguished assemblages at restored treatments (Fig.9). The assemblages at unrestored treatments were distinguished by a higher prevalence of coral colonies with indicators of compromised health (ADONIS: $F=4.08$, $p=0.003$, Fig.9).