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Assessment of macroalgal communities on shallow rocky reefs in the Aegean Sea indicates an impoverished ecological status

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Table S1. List of all sampling stations, ordered from the highest to the lowest latitude.

	Station Nr.	Station Name	Location Name	Latitude [°N]	Longitude [°E]
North Aegean	1	Fidonisi	Kavala	40.865	24.347
	2	Limenas	Thasos	40.786	24.715
	3	Kipos	Samothrace	40.420	25.685
	4	Pachia Ammos	Samothrace	40.393	25.573
	5	Petalo	Ammouliani	40.341	23.914
	6	Astakos	Ammouliani	40.308	23.944
	7	Drenia	Mt. Athos Gulf	40.307	23.960
	8	Kochylia-Castle	Chalkidiki	40.252	23.725
	9	Kalogria Coast	Chalkidiki	40.176	23.714
	10	Armenistis	Chalkidiki	40.158	23.917
	11	Peristeronisi	Chalkidiki	39.962	23.900
	12	Porto Valitsa	Chalkidiki	39.954	23.683
	13	Marathias	Chalkidiki	39.948	23.919
	14	Avlaki	Chalkidiki	39.915	23.654
	15	Korakas	Lesvos	39.391	26.342
	16	Pochis	Lesvos	39.294	25.910
	17	Trachili	Pelion	39.160	23.110
	18	Akr. Papas	Alonnisos	39.152	23.830
	19	Mikros Mourtias	Alonnisos	39.139	23.837
	20	Bora	Pelion	39.129	23.068
	21	Megalo Adelfi	N Sporades	39.104	23.979
	22	Chrousos	Lesvos	39.102	25.958
	23	Faros	Pelion	39.098	23.051
	24	Geroplina	Pelion	39.095	23.057
	25	Nero	Pelion	39.087	23.116
	26	Agia Vaso	Pelion	39.086	23.112
	27	Agios Fokas	Lesvos	39.005	26.168
	28	Vila	Lesvos	38.998	26.543
	29	Steno Valachou	Skyros	38.845	24.514
	30	Strongyli	Lichades	38.810	22.821
	31	Skala	Lichades	38.804	22.836
	32	Gatza Islet	Euboean Gulf	38.522	23.391
	33	Skorponeria	Euboean Gulf	38.506	23.354

Continued

Table S1 continued

	Station Nr.	Station Name	Location Name	Latitude [°N]	Longitude [°E]
	34	Englesonisi	Euboean Gulf	38.500	23.500
	35	Glaroi	Chios	38.444	26.146
	36	Pelagonisos Islet	Chios	38.320	25.940
	37	Limnionas	Euboean Gulf	38.288	23.937
	38	Purple Cave	Euboea	38.286	24.256
	39	Armirichi	Euboea	38.259	24.257
	40	Pachi	Chios	38.248	25.863
	41	Plomou	Chios	38.240	25.872
	42	Moula Rock	Chios	38.215	25.887
	43	Nepago	Chios	38.192	25.931
	44	Parathiro	Chios	38.174	25.963
South Aegean	45	Livadaki	Samos	37.795	26.984
	46	Gyaros	Gyaros	37.593	24.708
	47	Glaronisi Islet	Gyaros	37.582	24.752
	48	N Syros	Syros	37.508	24.894
	49	Agios Sostis	Kythnos	37.460	24.436
	50	Azolimnos	Syros	37.415	24.965
	51	Zogkakiou	Kythnos	37.384	24.458
	52	Ebriokastro Islet	Paros	37.149	25.296
	53	Santa Maria	Paros	37.142	25.295
	54	Mavros Kavos	Naxos	37.023	25.357
	55	Kasteli	Kalymnos	37.010	26.940
	56	Vathi	Kalymnos	36.973	27.036
	57	Panteronisi Islet	Antiparos	36.968	25.122
	58	Petalida Islet	Antiparos	36.955	25.078
	59	Fokia	Amorgos	36.930	25.964
	60	Pothi	Kalymnos	36.925	26.986
	61	Glaronisi Islet	Koufonisia	36.911	25.603
	62	Keros	Koufonisia	36.887	25.683
	63	N Ano Antikeri	Ano Antikeri	36.854	25.686
	64	Enetiko	Irakleia	36.853	25.485
	65	Fidousa reef	Schoinoussa	36.847	25.512
	66	Ano Antikeri Cave	Ano Antikeri	36.841	25.686
	67	E Irakleia	Irakleia	36.838	25.480
	68	Katapola - Faros	Amorgos	36.835	25.841
	69	Fidoussa Islet tip	Schoinoussa	36.832	25.523
	70	Kamares	Polyaigos	36.787	24.638
	71	Agios Georgios	Polyaigos	36.754	24.572
	72	Alogomandra	Milos	36.753	24.488
	73	Psathonisi Islet	Ios	36.748	25.367
	74	Akr. Roma	Milos	36.710	24.545
	75	Dyo Adelfia	Folegandros	36.619	24.985
	76	E Folegandros	Folegandros	36.600	24.960
	77	Fournoi	Kythera	36.353	22.972
	78	Charaki	Rhodes	36.165	28.098
	79	Kastellorizo	Kastellorizo	36.146	29.607

Continued

Table S1 continued

Station Nr.	Station Name	Location Name	Latitude [°N]	Longitude [°E]
80	Achata	Karpathos	35.551	27.216
81	Agios Onoufrios	Crete	35.550	24.067
82	Falasarna	Crete	35.488	23.573
83	Agia Pelagia	Crete	35.430	24.973
84	Tendopoula	Crete	35.291	26.294
85	Kolokytha	Crete	35.252	25.759
86	Trapezia	Crete	35.193	24.054
87	Damnoni	Crete	35.171	24.410
88	Agios Pavlos	Crete	35.101	24.563
89	Livari	Crete	35.010	26.156

Table S2. Number of photographic samples taken per depth.

Depth [m]	N region	S region	Total	Proportion [%]
0	222	201	423	16.8
5	762	816	1578	62.6
15	322	197	519	20.6
Sum	1306	1214	2520	100

Table S3. Name and description of the invertebrate morphofunctional groups.

Morphofunctional group	Description	Examples
Perennial animals, boring	Species that bore into the substrate	*Lithophaga lithophaga*, *Cliona* spp., *Rocellaria dubia*
Perennial animals, cup-like or tooth-like		*Balanophyllia europaea*, *Calyx nicaeensis*
Perennial animals, encrusting	Species growing as crusts over hard substrate, typically not higher than 2-3 cm	*Crambe crambe*, *Phorbas* spp., *Reptadeonella violacea*
Perennial animals, massive	Large invertebrates with an upright growth form	*Sarcotragus foetidus*, *Ircinia* spp.
Perennial animals, tree-like	Branching or tree-like invertebrates	*Axinella* spp., *Adeonella* spp., *Myriapora truncata*
Perennial animals, tube-forming	Creating calcareous tubes	Polychaeta
Seasonal animal turf	Low-lying, turf-like growth form, typically not higher than 2-3 cm	*Aglaophenia* sp.

Table S4. Name and description of the substrate categories.

Category	Description
Bare rock	Bare rock areas
Pebbles/Sand	
Unidentified substrate	Unclear parts of the photograph
Substrate holes	

Table S5. Reef-EBQI strata of multicellular photosynthetic organisms (MPOs), their corresponding macroalgal/substrate categories of the current study, MPOs percentage area cover categories, their respective reef-EBQI grades and rescaled scores (Thibaut *et al.*, 2017).

MPOs stratum	Macroalgal/Substrate categories	Coverage [%]	reef-EBQI grade	Rescaled score
Arborescent perennial	Canopy-forming macroalgae I; Canopy-forming macroalgae II	>50	4	10
Arborescent perennial	Canopy-forming macroalgae I; Canopy-forming macroalgae II	5-50	3	7.5
Shrubby	Articulated calcareous algae I; Articulated calcareous algae II; Shrubby algae; Foliose algae I; Foliose algae II; Massive algae	>50	2	5
Shrubby	Articulated calcareous algae I; Articulated calcareous algae II; Shrubby algae; Foliose algae; Foliose algae II; Massive algae	5-50	1	2.5
Turf/Encrusting	Seasonal algal turf; Encrusting calcareous algae; Mucilaginous algae		0	0

Table S6. Ecological status characterisation and range values of the reef-EBQI index (Thibaut *et al.*, 2017).

Ecological status	reef-EBQI range
Very High	7.50 - 10.00
High	6.00 - 7.49
Moderate	4.50 - 5.99
Poor	3.50 - 4.49
Bad	0.00 - 3.49

Table S7. The EEI-c ecological status groups (ESGs) and their functional traits according to Orfanidis *et al.* (2011), along with the corresponding macroalgal categories of the present study.

ESG	ESG functional traits	Macroalgal categories
IA	Slow growing, late- successional, thick perennial	Canopy-forming macroalgae I
IB	Slow growing, late-successional, thick perennial, thick plastic	Canopy-forming macroalgae II; Foliose algae I
IC	Slow growing, late-successional, shade-adapted, thick plastic	Articulated calcareous algae I; Articulated calcareous algae II; Encrusting calcareous algae
IIA	Fast growing, fleshy, opportunistic	Foliose algae II; Shrubby algae; Massive algae
IIB	Fast growing, filamentous, sheet-like, opportunistic	Seasonal algal turf; Mucilaginous algae

Table S8. Ecological status characterization and range values of EEI-c (Orfanidis *et al.*, 2011).

Ecological status	EEI-c range
High	≥ 8.09
Good	5.84 - 8.08
Moderate	4.04 - 5.83
Low	2.34 - 4.03
Bad	< 2.34

Table S9. Reef-EBQI values and corresponding ecological status per depth, and per site. ID = station ID. Colours denote different ecological status. Red: Bad, Orange: Poor, Yellow: Moderate, Green: High, Blue: Very high. Blank: no sampling carried out at the specific depth.

ID	0 m		5 m		15 m		Average	
	reef-EBQI	Ecol. status	reef-EBQI	Ecol. status	reef-EBQI	Ecol. status	reef-EBQI	Ecol. status
1	2.5	Bad	0.97	Bad			1.74	Bad
2			0.88	Bad			0.88	Bad
3			1.47	Bad			1.47	Bad
4			0.83	Bad			0.83	Bad
5	7.5	Very high	1.76	Bad			4.63	Moderate
6	4.09	Poor	0.69	Bad	2.5	Bad	2.43	Bad
7	2.5	Bad	0.97	Bad	3.61	Poor	2.36	Bad
8			1.76	Bad			1.76	Bad
9			7.78	Very high	1.91	Bad	4.84	Moderate
10			1.62	Bad			1.62	Bad
11	4.06	Poor	2.92	Bad	2.78	Bad	3.25	Bad
12	3.75	Poor	3.19	Bad			3.47	Bad
13	4.38	Poor	3.47	Bad			3.92	Poor
14			0.97	Bad			0.97	Bad
15			0.28	Bad	1.67	Bad	0.97	Bad
16			0.69	Bad	0.83	Bad	0.76	Bad
17	2.19	Bad	1.81	Bad			2	Bad
18			2.65	Bad	1.94	Bad	2.3	Bad
19	4	Poor	1.39	Bad	2.5	Bad	2.63	Bad
20	5	Moderate	1.88	Bad	1.53	Bad	2.8	Bad
21			0	Bad	1.67	Bad	0.83	Bad
22	4.69	Moderate	2.21	Bad			3.45	Bad
23	4.72	Moderate	1.53	Bad	2.5	Bad	2.92	Bad
24	4.23	Poor	1.53	Bad	1.91	Bad	2.56	Bad
25	4.72	Moderate	2.64	Bad	2.35	Bad	3.24	Bad
26	3.44	Bad	2.22	Bad			2.83	Bad
27	4.69	Moderate	3.33	Bad			3.33	Bad
28			1.53	Bad	0.69	Bad	1.11	Bad
29			3.47	Bad			3.47	Bad
30	6.56	High	4.72	Moderate			5.64	Moderate
31			0.28	Bad			0.28	Bad
32			2.36	Bad			2.36	Bad
33	6.25	High	5.56	Moderate			5.9	Moderate
34	3.13	Bad	7.5	Very high			5.31	Moderate
35	3.33	Bad	1.39	Bad	0.28	Bad	1.67	Bad
36			1.67	Bad	1.67	Bad	1.67	Bad
37	2.81	Bad	2.22	Bad			2.52	Bad
38	9.38	Very high	2.21	Bad			5.79	Moderate
39	8.75	Very high	5.42	Moderate			7.08	High
40			1.53	Bad	2.92	Bad	2.22	Bad
41	4.69	Moderate	2.34	Bad			3.52	Poor
42	3.75	Poor	1.39	Bad	2.5	Bad	2.55	Bad
43	4.38	Poor	2.36	Bad			3.37	Bad
44	4.38	Poor	1.94	Bad			3.16	Bad

Continued

Table S9 continued

ID	0 m		5 m		15 m		Average	
	reef-EBQI	Ecol. status	reef-EBQI	Ecol. status	reef-EBQI	Ecol. status	reef-EBQI	Ecol. status
45			2.5	Bad			2.5	Bad
46	0	Bad	0	Bad	0	Bad	0	Bad
47			0.14	Bad	0.14	Bad	0.14	Bad
48	4.69	Moderate	0.56	Bad	0	Bad	1.75	Bad
49			0.16	Bad			0.16	Bad
50	4.38	Poor	0	Bad			2.19	Bad
51			2.5	Bad			2.5	Bad
52	2.19	Bad	0.69	Bad	0	Bad	0.96	Bad
53			0.97	Bad	0	Bad	0.49	Bad
54	4.69	Moderate	1.76	Bad			3.23	Bad
55			0.63	Bad			0.63	Bad
56	1.46	Bad	0.14	Bad	0.56	Bad	0.72	Bad
57	4.06	Poor	2.64	Bad			3.35	Bad
58	0.94	Bad	1.94	Bad			1.44	Bad
59	10	Very high	0	Bad			5	Moderate
60	1.25	Bad	0.42	Bad	0	Bad	0.56	Bad
61	5.31	Moderate	1.94	Bad			3.63	Poor
62	5	Moderate	0.69	Bad			2.85	Bad
63	9.06	Very high	1.53	Bad			5.3	Moderate
64	7.14	High	1.25	Bad			4.2	Poor
65			4.03	Poor			4.03	Poor
66	2.19	Bad	0.83	Bad	0	Bad	1.01	Bad
67	5.28	Moderate	0.56	Bad	0	Bad	1.94	Bad
68			0.42	Bad	0	Bad	0.21	Bad
69	7.75	Very high	0	Bad	0	Bad	2.58	Bad
70	4.69	Moderate	0.83	Bad			2.76	Bad
71	8.75	Very high	2.08	Bad			5.42	Moderate
72			1.81	Bad			1.81	Bad
73	7.19	High	1.94	Bad			4.57	Moderate
74	1.25	Bad	0.69	Bad			0.97	Bad
75			2.08	Bad			2.08	Bad
76	4.38	Poor	1.94	Bad			3.16	Bad
77			0.28	Bad			0.28	Bad
78			2.36	Bad			2.36	Bad
79			0	Bad			0	Bad
80			0.31	Bad			0.31	Bad
81			3.06	Bad			3.06	Bad
82			2.65	Bad			2.65	Bad
83	7.81	Very high	1.81	Bad			4.81	Moderate
84			0.14	Bad			0.14	Bad
85	2.19	Bad	1.03	Bad			1.61	Bad
86	5	Moderate	1.11	Bad			3.06	Bad
87			4.31	Poor			4.31	Poor
88			2.36	Bad			2.36	Bad
89			0.28	Bad			0.28	Bad

Table S10. EEI-c values per site (0 m depth stations only) and Reef-EBQI values per site (0 m depth stations only), along with the corresponding ecological status according to each index. Reef-EBQI values are the same as in Table S9, but are also provided here for direct comparisons. Colours denote different ecological status. Red: Bad, Orange: Low (EEI-c) / Poor (reef-EBQI), Yellow: Moderate, Green: Good (EEI-c) / High (reef-EBQI), Blue: High (EEI-c) / Very high (reef-EBQI). Blank: no sampling carried out at the specific depth. ± denotes standard deviation.

ID	EEI-c	Ecological status	reef-EBQI avg.	Ecological status
1	4.1 ± 1.8	Moderate	2.5	Bad
2				
3				
4				
5	9.1 ± 1.8	High	7.5	Very high
6	6.5 ± 2.8	Good	4.09	Poor
7	6.8 ± 1.6	Good	2.5	Bad
8				
9				
10				
11	7.6 ± 2.5	Good	4.06	Poor
12	5.9 ± 1.3	Good	3.75	Poor
13	8.4 ± 1.1	High	4.38	Poor
14				
15				
16				
17	6.5 ± 4.0	Good	2.19	Bad
18				
19	7.5 ± 0.9	Good	4	Poor
20	8.9 ± 1.8	High	5	Moderate
21				
22	7.6 ± 2.0	Good	4.69	Moderate
23	7.2 ± 1.8	Good	4.72	Moderate
24	6.1 ± 0.7	Good	4.23	Poor
25	7.4 ± 1.4	Good	4.72	Moderate
26	5.3 ± 1.8	Moderate	3.44	Bad
27	8.0 ± 1.1	Good	4.69	Moderate
28				
29				
30	7.8 ± 2.0	Good	6.56	High
31				
32				
33	6.7 ± 3.1	Good	6.25	High
34	4.8 ± 1.18	Moderate	3.13	Bad
35	5.6 ± 2.8	Moderate	3.33	Bad
36				
37	7.1 ± 1.9	Good	2.81	Bad
38	9.8 ± 0.4	High	9.38	Very high
39	8.6 ± 1.5	High	8.75	Very high
40				
41	5.0 ± 0.7	Moderate	4.69	Moderate
42	4.3 ± 1.9	Moderate	3.75	Poor
43	8.7 ± 1.0	High	4.38	Poor
44	7.5 ± 0.8	Good	4.38	Poor

Continued

ID	EEI-c	Ecological status	reef-EBQI avg.	Ecological status
45				
46	3.0 ± 1.9	Low	0	Bad
47				
48	7.8 ± 1.4	Good	4.69	Moderate
49				
50	7.0 ± 2.3	Good	4.38	Poor
51				
52	2.5 ± 0.9	Low	2.19	Bad
53				
54	6.7 ± 3.4	Good	4.69	Moderate
55				
56	5.8 ± 0.9	Moderate	1.46	Bad
57	5.5 ± 1.9	Moderate	4.06	Poor
58	1.8 ± 0.7	Bad	0.94	Bad
59	9.8 ± 0.7	High	10	Very high
60	4.3 ± 1.4	Moderate	1.25	Bad
61	8.8 ± 2.6	High	5.31	Moderate
62	6.4 ± 1.0	Good	5	Moderate
63	9.5 ± 0.7	High	9.06	Very high
64	5.2 ± 1.6	Moderate	7.14	High
65				
66	7.7 ± 1.0	Good	2.19	Bad
67	6.2 ± 1.9	Good	5.28	Moderate
68				
69	7.6 ± 1.9	Good	7.75	Very high
70	4.9 ± 1.5	Moderate	4.69	Moderate
71	7.5 ± 2.6	Good	8.75	Very high
72				
73	6.2 ± 1.9	Good	7.19	High
74	4.1 ± 1.0	Moderate	1.25	Bad
75				
76	5.2 ± 1.3	Moderate	4.38	Poor
77				
78				
79				
80				
81				
82				
83	7.9 ± 1.9	Good	7.81	Very high
84				
85	8.4 ± 2.0	High	2.19	Bad
86	4.1 ± 1.5	Moderate	5	Moderate
87				
88				
89				

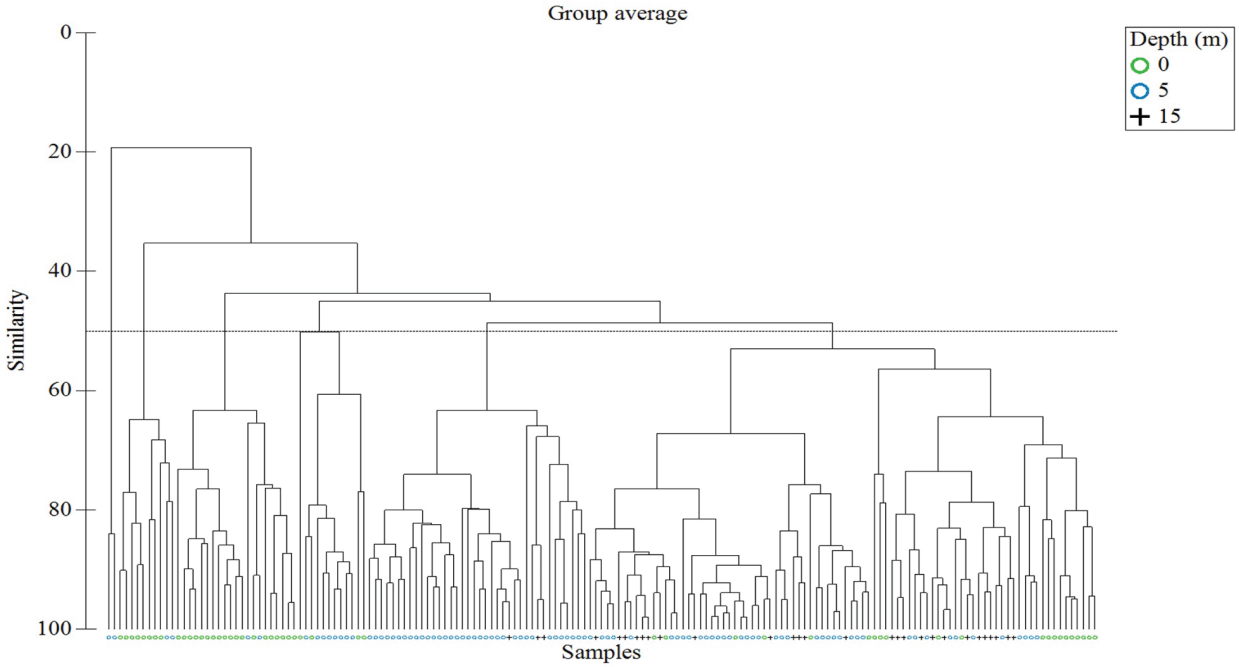

***Fig. S1*:** Cluster analysis based on area cover data of the macroalgal morphofunctional groups found at 0, 5 and 15 m depth in the Aegean Sea.

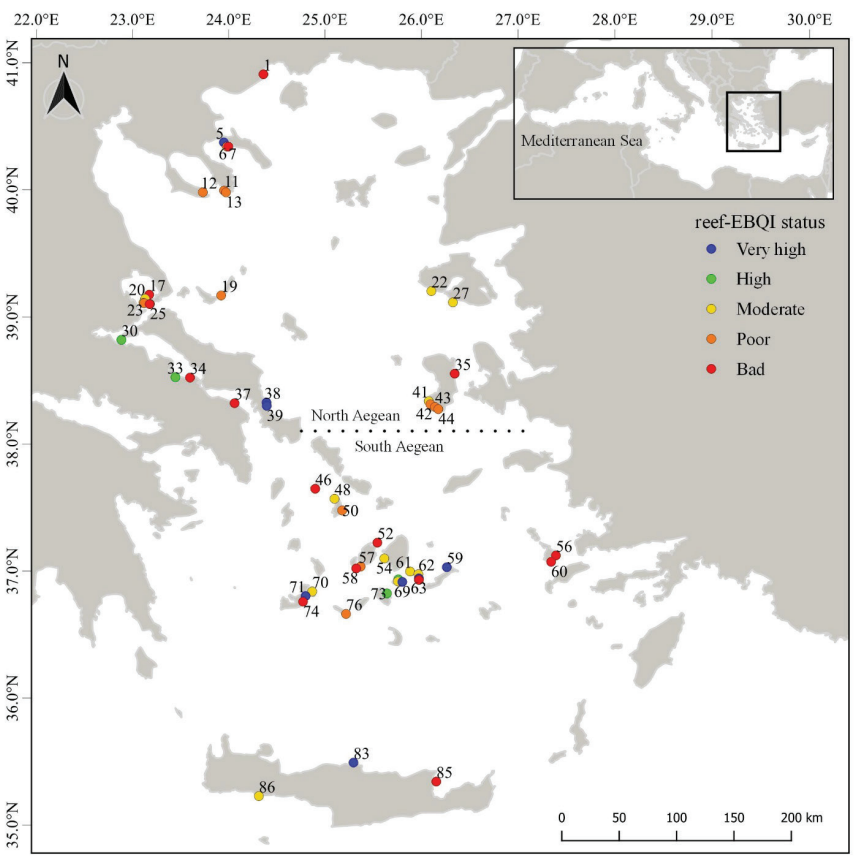

***Fig. S2*:** Map of the Aegean Sea depicting reef-EBQI values per site at 0 m depth.

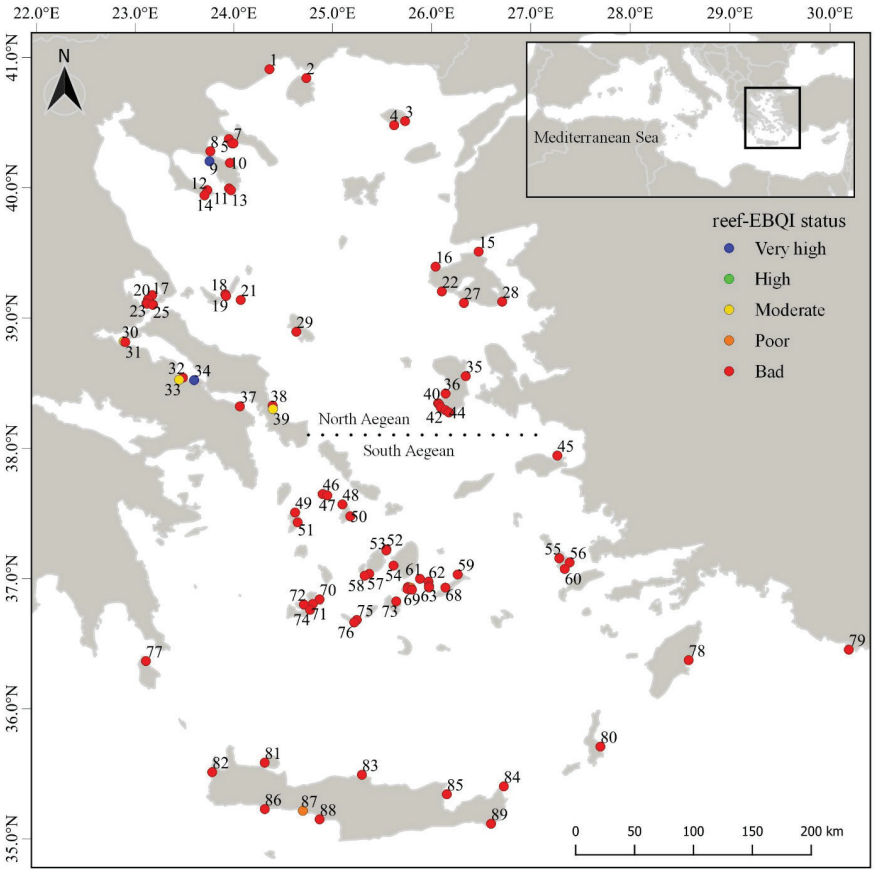

***Fig. S3*:** Map of the Aegean Sea depicting reef-EBQI values per site at 5 m depth.

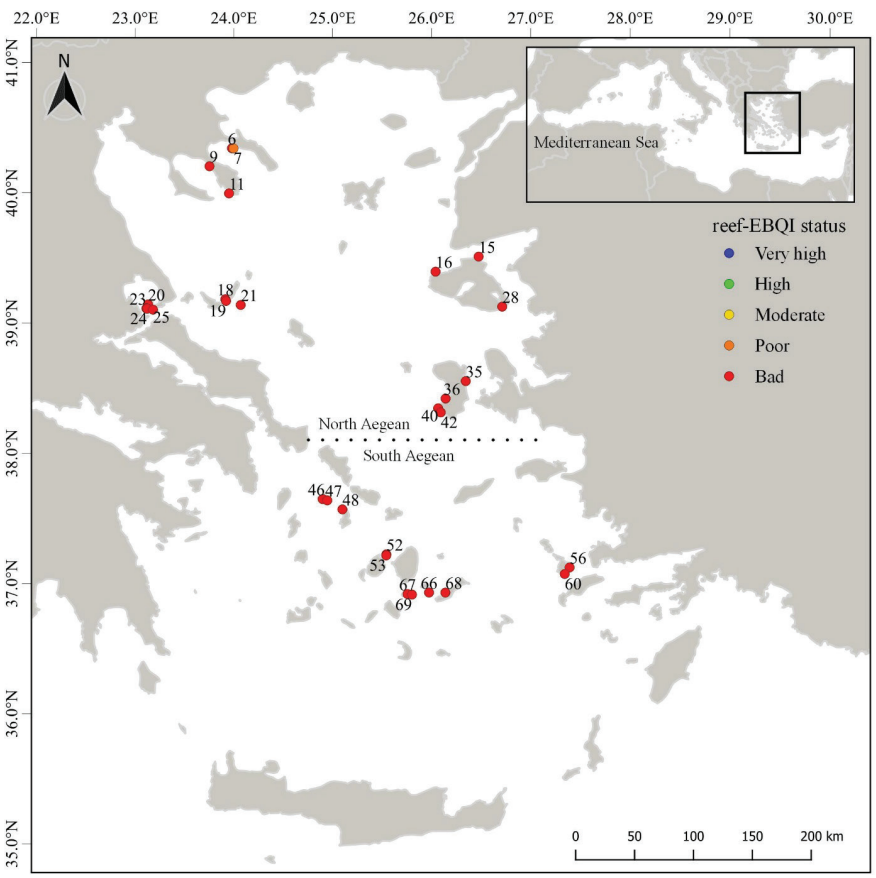

***Fig. S4*:** Map of the Aegean Sea depicting reef-EBQI values per site at 15 m depth.