

## Mediterranean Marine Science

Vol 19, No 2 (2018)



### Ecological Quality Status of the Algiers coastal waters by using macroalgae assemblages as bioindicators (Algeria, Mediterranean Sea)

*KHADIDJA CHABANE, LAMIA BAHBAH, HALIMA SERIDI*

doi: [10.12681/mms.15951](https://doi.org/10.12681/mms.15951)

#### To cite this article:

CHABANE, K., BAHBAH, L., & SERIDI, H. (2018). Ecological Quality Status of the Algiers coastal waters by using macroalgae assemblages as bioindicators (Algeria, Mediterranean Sea). *Mediterranean Marine Science*, 19(2), 305-315. <https://doi.org/10.12681/mms.15951>

Supplementary Material

**Ecological Quality Status of the Algiers coastal waters by using macroalgae assemblages as bioindicators (Algeria, Mediterranean Sea)**

KHADIDJA CHABANE, LAMIA BAHBAH and HALIMA SERIDI

*Mediterranean Marine Science 19 (2), 2018*

**Table S1.** List of species in the study area. The coverage of each species (mean from seven samplings) is expressed as % sampling surface. The species are grouped in two Ecological Status Groups (ESG).

TAXA	ID	ESG	CEA	COF	CEK	CES	CCL	COT	COO
<i>Ahnfeltiopsis devoniensis</i> (Greville) P.C.Silva & DeCew 1992	Ahd	IA	9.88	4.89	0.00	0.05	0.00	13.45	0.00
<i>Ahnfeltiopsis pusilla</i> (Montagne) P.C.Silva & DeCew 1992	Ahp	IA	12.53	0.00	0.00	1.10	0.25	16.95	0.10
<i>Cystoseira amentacea</i> var. <i>stricta</i> Montagne 1846	Cys	IA	97.61	0.00	0.00	21.00	0.00	98.80	0.00
<i>Cystoseira crinita</i> Duby 1830	Cyr	IA	0.80	0.00	0.00	0.45	0.00	38.25	0.00
<i>Gymnogongrus crenulatus</i> (Turner) J.Agardh 1851	Pal	IA	16.45	0.00	0.00	4.00	0.00	77.95	1.15
<i>Cystoseira compressa</i> (Esper) Gerloff & Nizamuddin 1975	Cyc	IB	0.00	5.95	0.00	0.75	46.85	88.70	48.15
<i>Padina pavonica</i> (Linnaeus) Thivy in W.R.Taylor 1960	Pap	IB	0.00	1.40	0.00	0.00	0.00	60.15	0.00
<i>Plocamium cartilagineum</i> (Linnaeus) P.S.Dixon 1967	Plo	IB	1.00	3.83	0.00	1.80	0.00	10.80	0.00
<i>Rhodophyllis divaricata</i> (Stackhouse) Papenfuss 1950	Rhd	IB	0.00	0.00	0.00	2.35	0.00	11.55	0.00
<i>Sargassum vulgare</i> C.Agardh 1820	Sar	IB	0.00	44.87	0.00	17.15	0.00	93.00	0.00
<i>Ellisolandia elongata</i> (J.Ellis & Solander) K.R.Hind & G.W.Saunders 2013	Ele	IC	56.53	61.79	40.49	12.05	63.75	89.75	72.00
<i>Jania adhaerens</i> J.V.Lamouroux 1816	Jaa	IC	27.30	6.24	0.10	5.85	11.80	40.00	21.25
<i>Jania longifurca</i> Zanardini 1844	Jal	IC	2.76	0.00	0.00	1.80	0.75	33.35	4.80
<i>Jania rubens</i> (Linnaeus) J.V.Lamouroux 1816	Jar	IC	58.90	16.80	11.70	11.65	16.25	80.05	20.75
<i>Lithophyllum incrustans</i> Philippi 1837	Lit	IC	72.80	0.95	0.00	4.80	1.15	65.30	0.05
<i>Peyssonnelia squamaria</i> (S.G.Gmelin) Decaisne ex J.Agardh 1842	Pys	IC	19.70	0.05	0.00	0.45	0.00	60.45	0.20
<i>Asparagopsis armata</i> Harvey 1855	Asa	IIA	45.50	84.60	0.00	18.00	31.95	46.00	5.65
<i>Asparagopsis taxiformis</i> (Delile) Trevisan 1845	Ast	IIA	17.50	49.80	0.00	9.75	79.80	17.00	6.50
<i>Caulerpa cylindracea</i> Sonder 1845	Cac	IIA	0.00	94.30	0.00	0.15	69.25	9.90	16.25
<i>Champia parvula</i> (C.Agardh) Harvey 1853	Chp	IIA	1.93	0.00	0.00	0.15	0.00	1.05	0.00
<i>Chondria capillaris</i> (Hudson) M.J.Wynne 1991	Chc	IIA	1.41	0.00	0.00	0.30	0.00	0.35	0.00
<i>Chylocladia verticillata</i> (Lightfoot) Bliding 1928	Chv	IIA	0.00	0.00	0.00	1.70	0.00	10.40	0.00
<i>Colpomenia sinuosa</i> (Mertens ex Roth) Derbès & Solier in Castagne 1851	Coi	IIA	7.70	6.70	0.00	10.65	0.80	12.80	0.00
<i>Cryptopleura ramosa</i> (Hudson) L.Newton 1931	Crr	IIA	0.00	0.00	0.00	0.00	0.00	0.75	0.00
<i>Cutleria adspersa</i> (Mertens ex Roth) De Notaris 1842	Cut	IIA	0.00	0.00	0.00	0.10	5.60	1.25	0.15
<i>Dictyota dichotoma</i> (Hudson) J.V.Lamouroux 1809	Dic	IIA	0.00	0.00	0.00	5.75	52.30	5.40	40.95
<i>Dictyota fasciola</i> (Roth) J.V.Lamouroux 1809	Dif	IIA	0.00	65.10	0.00	11.75	0.00	10.75	0.00
<i>Dictyota</i> sp.	Dis	IIA	0.00	0.00	0.00	0.00	0.00	0.80	0.00

(continued)

Table S1 Continued

TAXA	ID	ESG	CEA	COF	CEK	CES	CCL	COT	COO
<i>Gastroclarium</i> sp.	Gas	IIA	0.00	0.00	0.00	0.00	0.00	1.15	0.00
<i>Gastroclonium clavatum</i> (Roth) Ardissonne 1883	Gas	IIA	5.05	0.00	0.00	0.70	0.00	0.00	0.00
<i>Gelidium crinale</i> (Hare ex Turner) Gaillon 1828	Gec	IIA	3.20	48.95	0.00	1.70	59.85	4.90	0.00
<i>Gelidium pusillum</i> (Stackhouse) Le Jolis 1863	Gep	IIA	8.63	25.25	0.00	3.60	0.30	7.75	0.00
<i>Gracilaria dura</i> (C.Agardh) J.Agardh 1842	Grd	IIA	12.59	0.00	0.00	0.65	0.00	9.75	0.00
<i>Grateloupia doryphora</i> (Montagne) M.Howe 1914	Gro	IIA	0.00	80.60	0.00	8.45	15.30	0.00	56.80
<i>Grateloupia lanceola</i> (J.Agardh) J.Agardh 1851	Grl	IIA	2.45	90.65	0.00	0.00	76.90	0.00	0.00
<i>Hypnea musciformis</i> (Wulfen) J.V.Lamouroux 1813	Hym	IIA	3.98	0.00	0.00	2.10	0.25	2.95	0.00
<i>Lomentaria compressa</i> (Kützing) Kylin 1931	Lam	IIA	1.47	0.05	0.00	5.35	0.00	4.85	0.00
<i>Millerella pannosa</i> (Feldmann) G.H.Boo & L.Le Gall in G.H.Boo <i>et al.</i> 2016	Mip	IIA	12.59	0.00	0.00	1.00	0.30	2.10	0.00
<i>Palisada thuyoides</i> (Kützing) Cassano, Senties, Gil-Rodríguez & M.T.Fujii in Cassano <i>et al.</i> 2009	Pat	IIA	1.60	0.00	0.00	1.00	0.00	2.35	0.00
<i>Pterocladia capillacea</i> (S.G.Gmelin) Santelices & Hommersand 1997	Pte	IIA	14.94	63.10	0.00	1.05	79.40	11.40	75.20
<i>Rissoella verruculosa</i> (Bertoloni) J.Agardh 1851	Ris	IIA	0.05	0.00	0.00	0.00	0.00	0.00	0.00
<i>Sphacelaria cirrosa</i> (Roth) C.Agardh 1824	Sph	IIA	1.15	0.00	0.00	0.25	0.00	0.00	0.00
<i>Sphacelaria</i> sp.	Sps	IIA	1.90	0.50	0.00	0.00	0.00	0.00	0.00
<i>Sphaerococcus coronopifolius</i> Stackhouse 1797	Spc	IIA	0.00	0.00	0.00	1.05	0.00	1.95	0.00
<i>Antithamnion cruciatum</i> (C.Agardh) Nägeli 1847	Anc	IIB	0.29	0.25	0.00	0.85	0.10	0.96	0.00
<i>Bornetia secundiflora</i> (J.Agardh) Thuret 1855	Bos	IIB	0.44	0.00	0.00	1.75	0.25	0.00	0.60
<i>Bryopsis muscosa</i> J.V.Lamouroux 1809	Brm	IIB	0.24	0.00	0.00	1.15	0.00	0.70	0.00
<i>Callithamnion corymbosum</i> (Smith) Lyngbye 1819	Cag	IIB	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Callithamnion granulatum</i> (Ducluzeau) C.Agardh 1828	Cag	IIB	0.02	0.00	0.00	0.50	0.20	0.65	0.00
<i>Centroceras clavulatum</i> (C.Agardh) Montagne 1846	Cec	IIB	0.75	0.05	0.00	0.75	0.00	1.50	0.00
<i>Ceramium codii</i> (H.Richards) Mazoyer 1938	Ceo	IIB	1.30	10.95	0.00	0.75	0.05	3.05	0.20
<i>Ceramium diaphanum</i> (Lightfoot) Roth 1806	Ced	IIB	1.23	3.32	0.00	0.60	0.10	0.65	0.00
<i>Ceramium echionotum</i> J.Agardh 1844	Cee	IIB	0.15	0.00	0.00	0.20	0.00	0.60	0.00
<i>Ceramium gracillimum</i> (Kützing) Zanardini 1847	Ceg	IIB	0.00	0.27	0.00	0.00	0.00	0.00	0.00
<i>Ceramium siliquosum</i> (Kützing) Maggs & Hommersand 1993	Ces	IIB	0.05	0.00	0.00	0.50	0.00	0.30	27.30
<i>Ceramium tenerrimum</i> (G.Martens) Okamura 1921	Cei	IIB	0.42	0.60	0.00	0.06	0.00	0.35	0.05
<i>Ceramium virgatum</i> Roth 1797	Cev	IIB	5.39	14.04	18.05	0.40	24.55	1.85	32.45
<i>Chaetomorpha aerea</i> (Dillwyn) Kützing 1849	Cha	IIB	9.00	0.00	94.00	0.05	91.10	0.45	94.30
<i>Chaetomorpha ligustica</i> (Kützing) Kützing 1849	Chl	IIB	0.00	0.00	0.00	0.00	0.00	0.25	0.05
<i>Chondracanthus acicularis</i> (Roth) Fredericq & Leister 1993	Chr	IIB	7.58	15.73	0.00	5.05	1.75	10.75	0.00
<i>Cladophora albida</i> (Nees) Kützing 1843	Cla	IIB	4.94	4.85	0.00	0.75	0.10	5.30	0.05
<i>Cladophora hutchinsiae</i> (Dillwyn) Kützing 1845	Clh	IIB	0.10	0.00	0.00	0.20	0.00	1.50	0.00
<i>Cladophora laetevirens</i> (Dillwyn) Kützing 1843	Cil	IIB	0.35	0.05	0.00	0.20	0.00	1.90	0.00
<i>Cladophora lehmanniana</i> (Lindenberg) Kützing 1843	Cle	IIB	0.05	0.00	0.00	0.60	0.00	1.55	0.00
<i>Cladophora oligoclona</i> (Kützing) Kützing 1843	Clo	IIB	0.05	0.00	0.00	0.05	0.00	1.25	0.05
<i>Cladophora rupestris</i> (Linnaeus) Kützing 1843	Clr	IIB	0.00	0.00	0.00	0.20	0.82	1.10	0.00
<i>Cladophora</i> sp.	Cls	IIB	0.00	0.00	0.00	0.05	0.00	0.15	0.00
<i>Codium fragile</i> (Suringar) Hariot 1889	Cof	IIB	0.00	40.60	0.00	5.70	21.80	14.50	18.30
<i>Gayliella flaccida</i> (Harvey ex Kützing) T.O.Cho & L.J.McIvor in Cho <i>et al.</i> 2008	Gaf	IIB	0.05	0.00	0.00	0.00	0.00	0.20	0.00

(continued)

Table S1 Continued

TAXA	ID	ESG	CEA	COF	CEK	CES	CCL	COT	COO
<i>Halopteris scoparia</i> (Linnaeus) Sauvageau 1904	Hac	IIB	0.00	0.00	0.00	0.00	0.00	1.05	0.00
<i>Herposiphonia secunda</i> f. <i>tenella</i> (C.Agardh) M.J.Wynne 1985	Hes	IIB	1.91	0.25	0.00	0.75	0.10	2.85	0.00
<i>Herposiphonia tenella</i> (C.Agardh) Ambrohn 1880	Het	IIB	1.00	0.25	0.00	0.15	0.00	2.10	0.00
<i>Heterosiphonia crispella</i> (C.Agardh) M.J.Wynne 1985	Hec	IIB	0.81	0.00	0.00	1.15	0.00	2.20	0.00
<i>Polysiphonia denudata</i> (Dillwyn) Greville ex Harvey in Hooker 1833	Pod	IIB	0.00	0.00	0.00	0.75	0.00	2.10	0.00
<i>Polysiphonia mottei</i> Lauret 1967	Pom	IIB	0.00	0.00	0.00	0.15	0.00	1.05	0.00
<i>Polysiphonia opaca</i> (C.Agardh) Moris & De Notaris 1839	Poo	IIB	0.00	0.00	0.00	0.00	0.00	0.60	0.00
<i>Polysiphonia sertularioides</i> (Grateloup) J.Agardh 1863	Pos	IIB	1.63	8.45	0.00	1.85	14.55	2.40	0.10
<i>Spyridia filamentosa</i> (Wulfen) Harvey in Hooker 1833	Spy	IIB	6.30	0.00	0.00	0.00	0.10	2.95	0.00
<i>Symphocladia parasitica</i> (Hudson) Savoie & G.W. Saunders 2016	Syp	IIB	0.00	0.00	0.00	0.30	0.00	2.25	0.00
<i>Ulva compressa</i> Linnaeus 1753	Ulc	IIB	4.11	76.90	80.25	10.50	84.50	5.90	90.90
<i>Ulva intestinalis</i> Linnaeus 1753	Uli	IIB	3.67	57.30	0.00	9.50	89.10	9.75	77.50
<i>Ulva lactuca</i> Linnaeus 1753	Ull	IIB	17.53	30.05	37.05	1.40	79.90	0.95	88.75
<i>Ulva rigida</i> C.Agardh 1823	Ulr	IIB	49.88	88.40	92.55	16.25	94.75	38.75	91.75
<i>Valonia macrophysa</i> Kützinger 1843	Val	IIB	3.32	26.05	0.00	1.05	0.00	0.30	26.75
<i>Vertebrata fruticulosa</i> (Wulfen) Kuntze 1891	Vef	IIB	1.25	0.00	0.00	0.60	0.00	1.10	0.00
<i>Xiphosiphonia pennata</i> (C.Agardh) Savoie & G.W. Saunders 2016	Xip	IIB	0.10	0.00	0.00	0.65	0.00	0.65	0.00

**Table S2.** The calculation of the MALUSI index of an Algiers coastal site.

	Indirect pressures			Direct Pressures category A				Direct Pressures category B				Stability of water column	Confinement	MALUSI	EEI-c	EEI-c EQR
	Urban (codes 11)	Commercial & Industrial (codes 12, 13)	Agri-culture (codes 21-24)	Mariculture	Sediment nutrient release	Sewageout-fall	Irregular Fresh Water inputs	Harbour	SUM	Back-ground trophic status						
CEA	1	1	0	0	0	0	0	0	2	1	1	1	2.00	6.10	0.52	
CEK	2	2	1	0	2	1	0	0	8	1	1.5	1	12.00	3.72	0.22	
CES	2	1	1	2	0	0	0	1	7	1	1	0.75	5.25	5.24	0.41	
CCL	2	2	0	0	2	1	3	0	10	1	1	0.75	7.50	1.82	0.00	
COO	2	1	0	0	1	1	1	3	9	1	1	1.25	11.25	2.56	0.07	
COF	2	2	0	0	2	1	1	2	10	1	1.25	0.75	9.38	1.96	0.00	
COT	1	0	1	0	0	0	0	1	3	1	1	0.75	2.25	8.31	0.796	