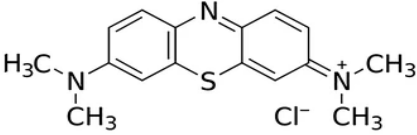


SUPPLEMENTARY MATERIALS

TABLES

Table S1. Structural formulae, main physicochemical properties, and other information for MB.

Data	
Structural formulae	
Molecular formulae	C ₁₆ H ₁₈ ClN ₃ S
IUPAC systemic name	[7-(Dimethylamino)phenothiazin-3-ylidene]-dimethylazanium chloride
Synonyms	Aizen methylene blue; Basic blue 9 (8Cl); Calcozine blue ZF; Chromosmon; C.I. 52 015; Methylthionine chloride; Methylthioninium chloride; Phenothiazine5-ium,3,7-bis, (dimethylamino)-, chloride; Swiss blue; Tetramethylene blue; Tetramethyl thionine chloride
Relative molecular mass	319.85 a.m.u.
Description	Dark green crystals or crystalline powder with bronze lustre, odourless, stable in air, deep blue solution in water or alcohol, forms double salts
Density	1.0 g/mL at 20 °C
Solubility	43.6 g/L in water at 25 °C; also soluble in ethanol
pKa	3.14 to 3.851
Vapour pressure	1.30 × 10 ⁻⁷ mm Hg at 25 °C

¹ Data retrieved from several bibliographic sources [33,52,53].

Table S2. Selected bibliographic references regarding maximum adsorption capacity $q_{\max}$ (in mg g⁻¹) of adsorbent materials of different origin for the removal of MB dye.

Adsorbent Material	Maximum adsorption capacity $q_{\max}$ (in mg g ⁻¹)	Reference
<i>Posidonia oceanica</i>	13.24-17.86	Present Study
<i>Posidonia oceanica</i>	5.56	[19]
<i>Enteromorpha</i> spp.	274	[20]
<i>Spirodela polyrrhiza</i>	144.93	[21]
<i>Ulva lactuca</i>	40.2	[22]
<i>Cystoseira barbatula</i>	38.61	[23]
<i>Sargassum muticum</i>	191.38	[24]
<i>Bifurcaria bifurcata</i>	2,744.5	[25]
<i>Fucus vesiculosus</i>	698.48	[26]
<i>Chlorella pyrenoidosa</i>	20.8-21.3	[27]
<i>Phaeodactylum tricornutum</i>	18.5-18.9	[28]
<i>Caulerpa lentillifera</i>	417	[29]
<i>Sargassum muticum</i>	279.2	[30]
Algae <i>Gelidium</i>	171	[31]
Algal waste	104	[31]
Composite material with polyacrylonitrile	74	[31]
Marine sediment (collected from unpolluted coastal areas of Chios, North Aegean, Greece)	0.98	Present Study

Marine sediment (collected from unpolluted coastal areas of Mytilene, Lesvos, North Aegean, Greece)	2.59	Present Study
Marine sediment (collected from a marine aquaculture industry, Selonda, Gera's Golf, Lesvos North Aegean, Greece)	6.80	Present Study
Sediment obtained from a canal in an industrial park (Ekman dredge, Taipei City, Taiwan)	56.0	[33]
River sediment (Sebou River, Morocco)	3.24	[32]
Wine-processing waste sludge	285.7	[54]

Table S3. Effect of adsorbate's initial concentration on the extent of dye's removal by adsorption on marine sediments (Experimental conditions: dye's initial concentration = C_i = 5 to 300 mg L⁻¹; volume of MB seawater solution = 50mL; dose of adsorbent = 2 g L⁻¹; contact time= 2h; pH=8.00; T=20°C±1°C). The average value of 6 replicates is shown.

S1			S2			S3		
C_o (mg L ⁻¹)	C_e (mg L ⁻¹)	q (mg g ⁻¹)	C_o (mg L ⁻¹)	C_e (mg L ⁻¹)	q (mg g ⁻¹)	C_o (mg L ⁻¹)	C_e (mg L ⁻¹)	q (mg g ⁻¹)
5	0.10	0.22	5	0.04	0.21	10	0.13	0.44
10	0.25	0.41	10	0.49	0.43	20	0.15	0.88
20	0.45	0.88	20	3.07	0.76	30	0.33	1.32
30	1.11	1.24	30	5.36	1.06	40	0.56	1.75
40	1.45	1.59	40	13.37	1.11	50	0.75	2.20
50	4.86	2.02	50	17.35	1.46	100	8.66	3.87
100	14.25	3.70	100	48.76	2.29	150	22.22	7.48
150	27.12	3.82	150	65.93	2.23	200	34.55	9.12
200	43.02	3.92	200	78.88	2.36	250	46.66	10.43
250	70.11	4.11	250	112.20	2.65	300	52.22	10.98

Table S4. Kinetic model constants and correlation coefficients for adsorption of MB dye using the three selected marine sediments as adsorbents¹.

Pseudo-first-order model			
Parameter (units)	S1 sediment sample	S2 sediment sample	S3 sediment sample
K_1	0.030	0.053	0.061
C_e	3.76	84.92	25.79
R^2	0.9609	0.9649	0.6862
Pseudo-second-order model			
Parameter (units)	S1 sediment sample	S2 sediment sample	S3 sediment sample
K_2	0.021	0.002	0.022
C_e	6.22	90.09	96.15
R^2	0.9999	0.9997	0.9999

¹The units of the isotherm constants are mentioned in section 2.4. Adsorption kinetics

FIGURES

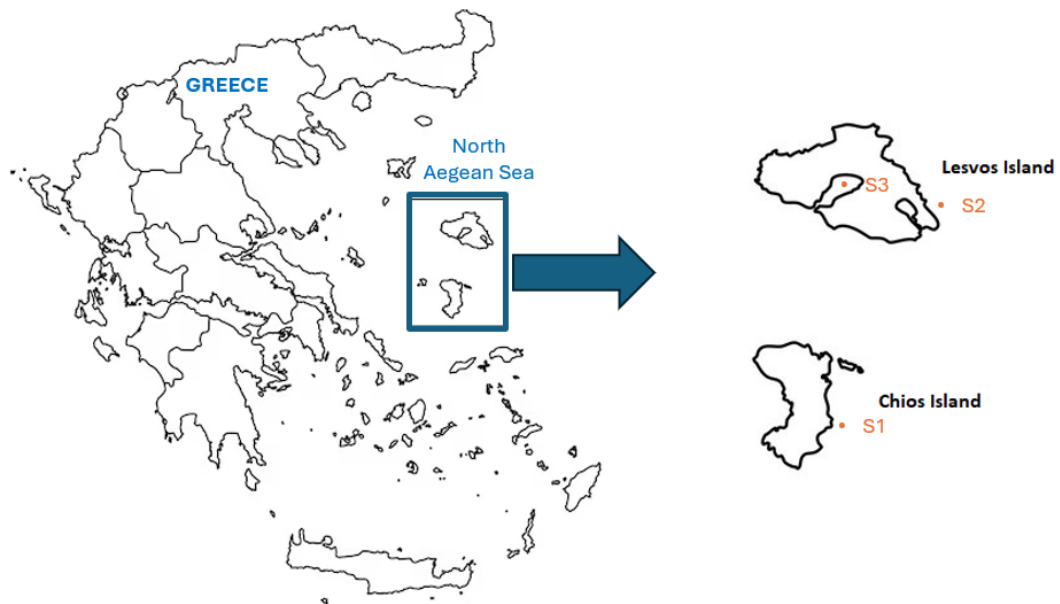


Figure S1. Map of sampling locations of marine sediments and seagrass biomass.

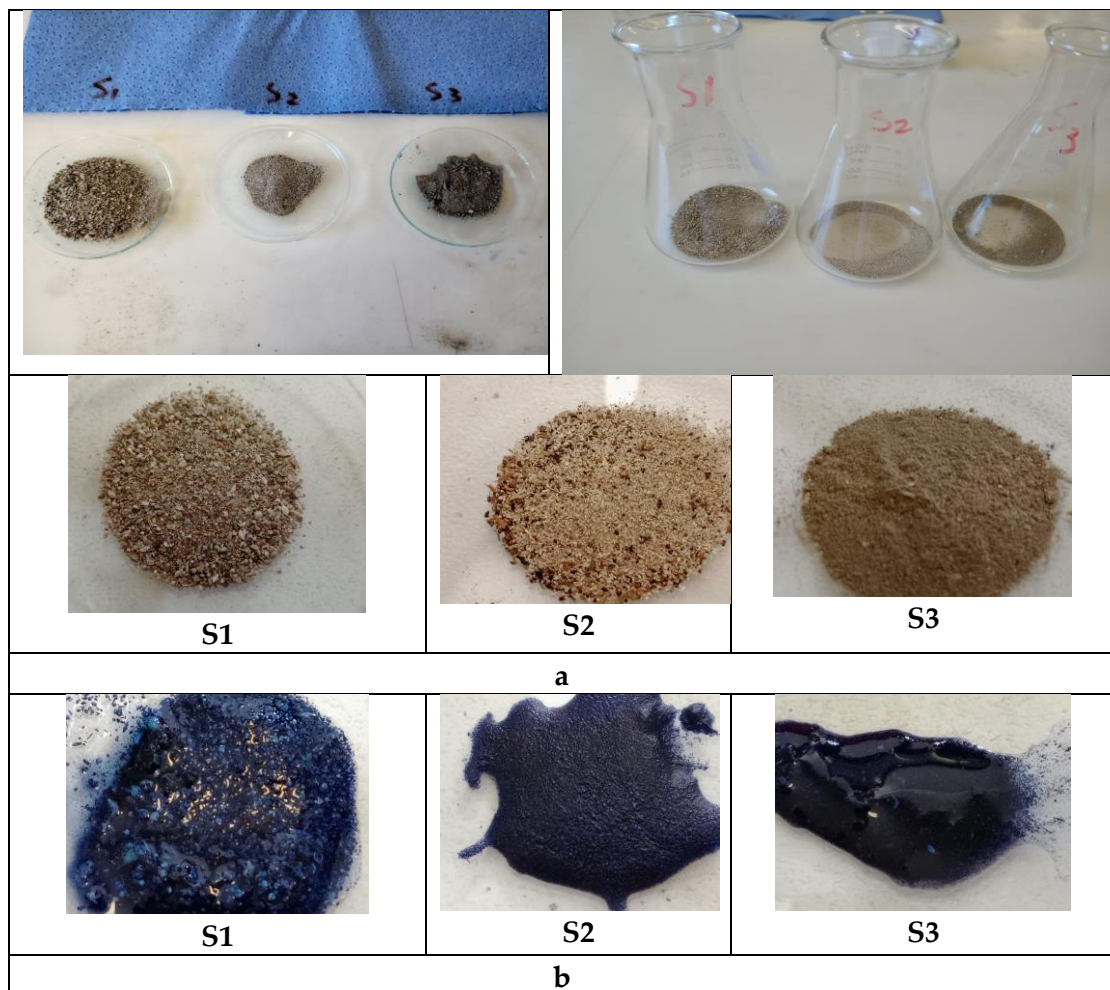


Figure S2. Photos taken from several stages of the experimental procedure: (a) sediments prior their use in adsorption experiments, and (b) sediments after use in adsorption experiments.

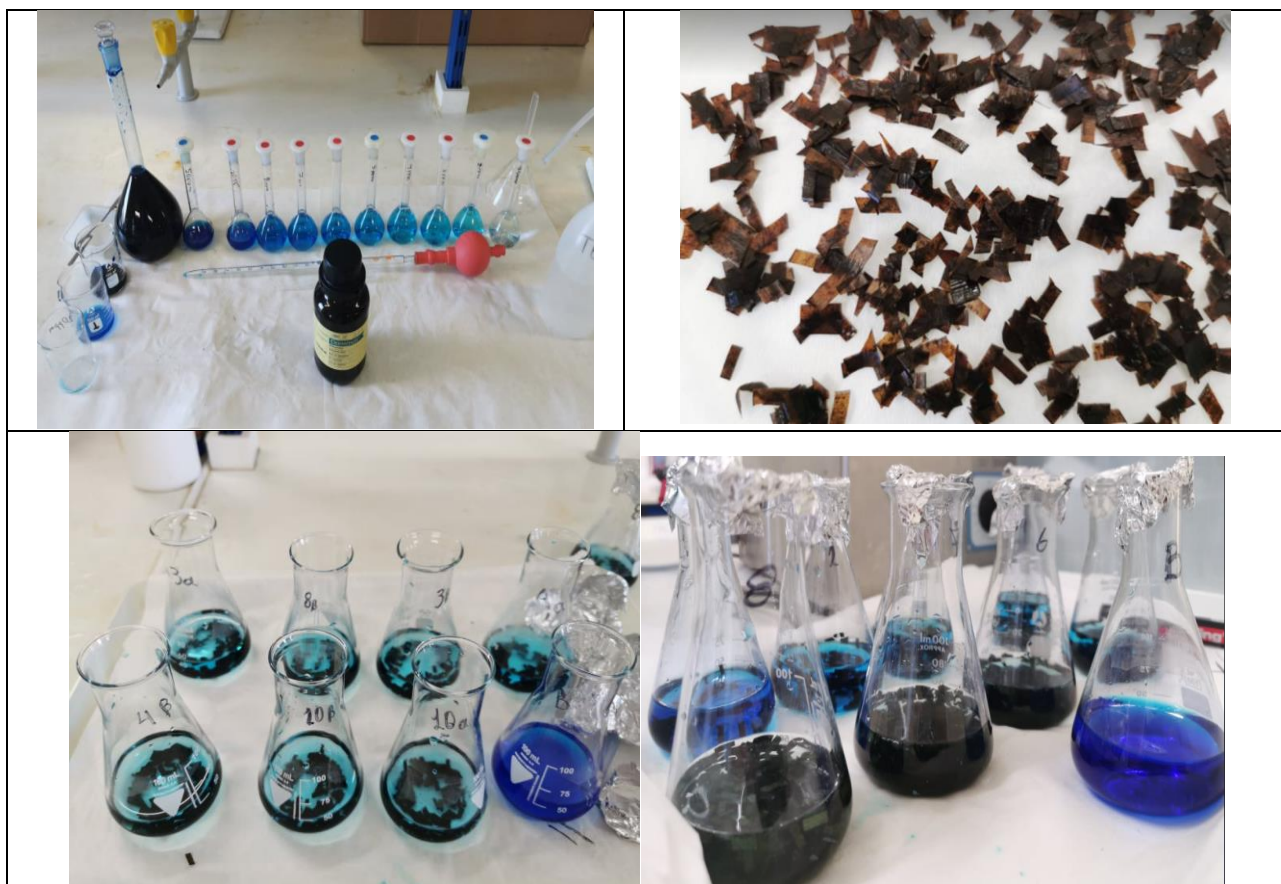


Figure S3. Photos taken from several stages of the experimental procedure testing the adsorbent capacity of *P. oceanica*.

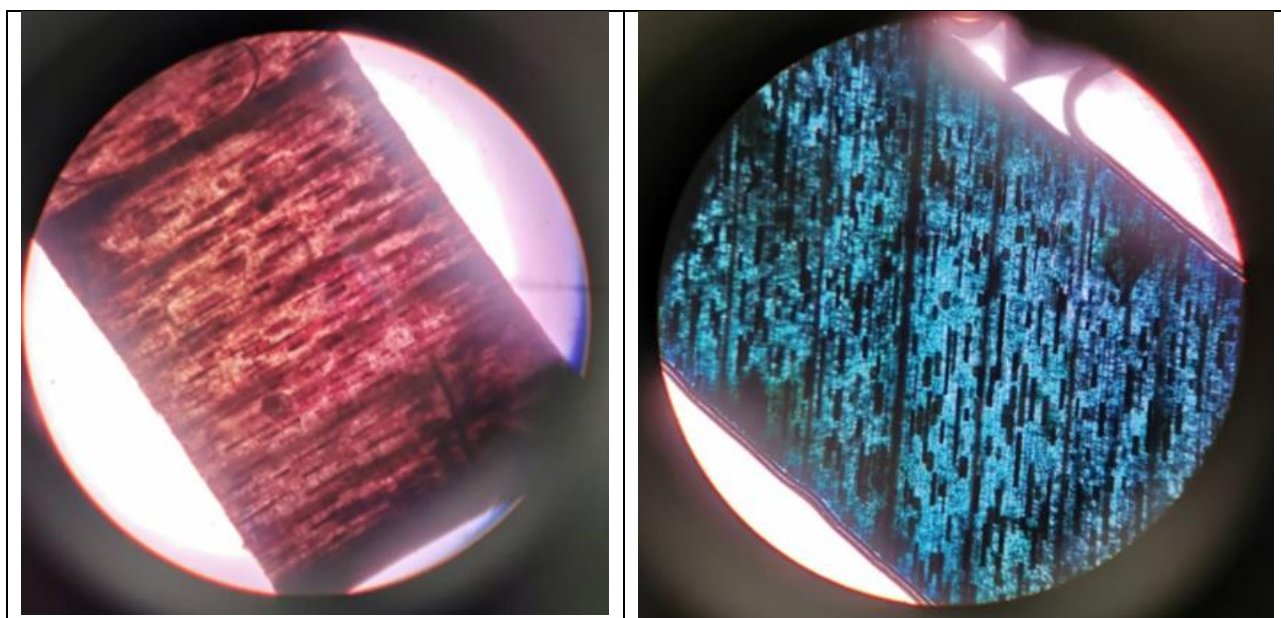


Figure S4. Microscopic observation of *P. oceanica* fibres prior and after performing batch adsorption experiment with MB.

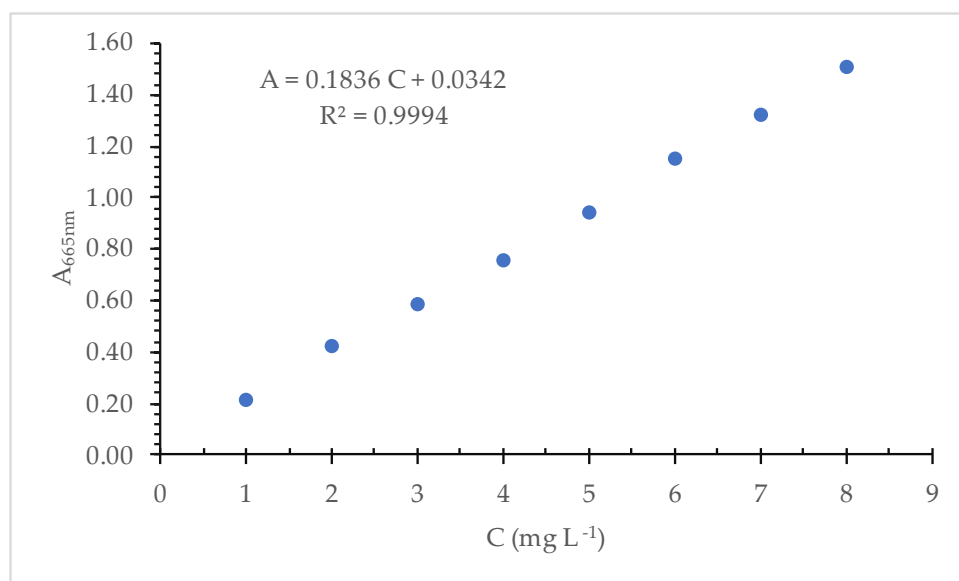


Figure S5. Calibration curve for the spectrophotometric determination of MB.