Supplementary Material

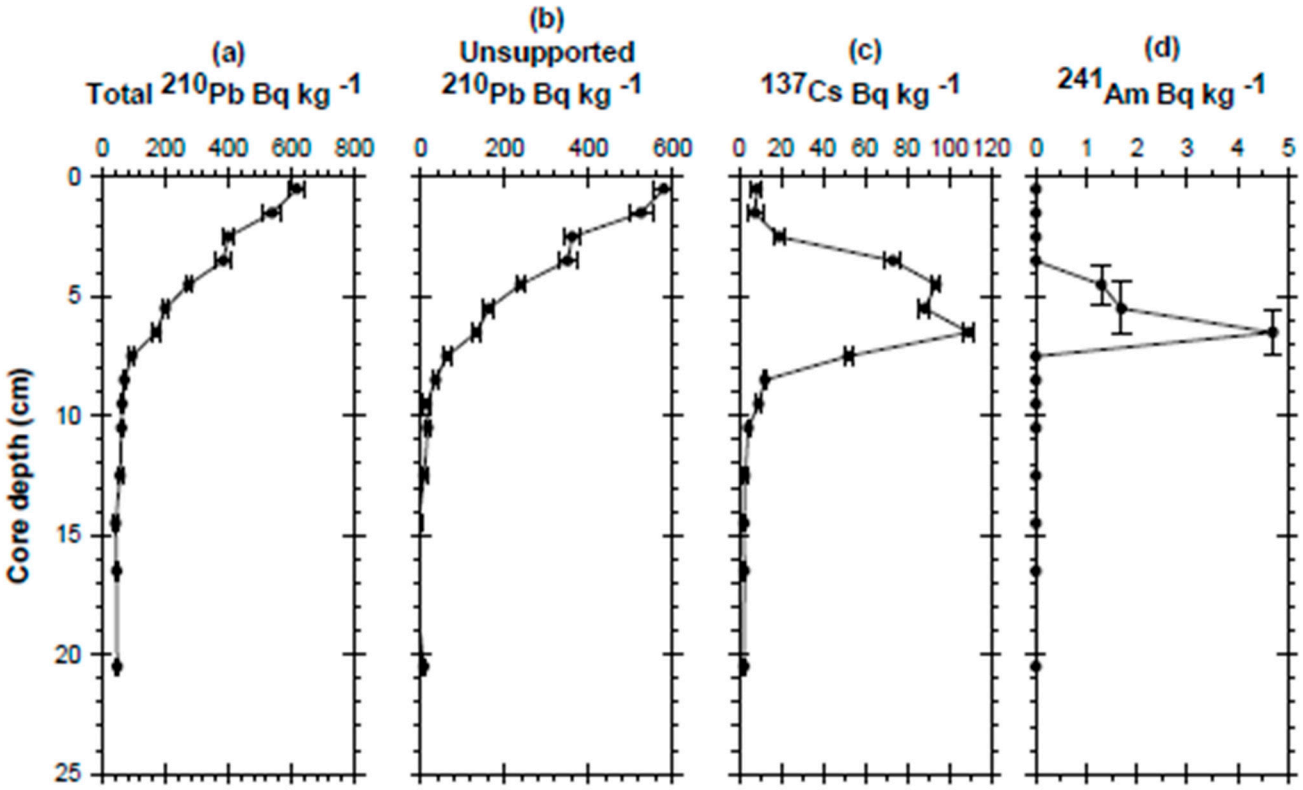


Figure S1 Fallout radionuclide concentrations in the Blace core: (a) total ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and (d) ^{241}AMS versus depth. Error bars represent analytical uncertainty (Shaw, 2013).

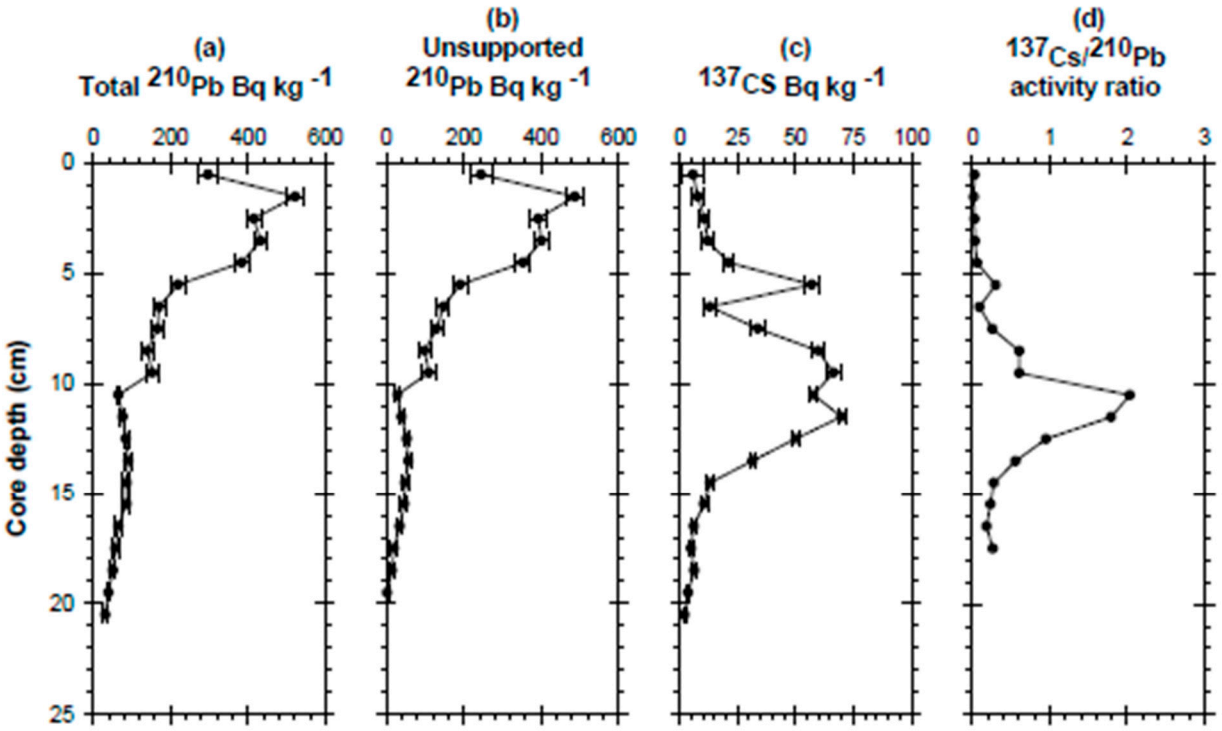


Figure S2 Fallout radionuclide concentrations in the Jadrtovac core: (a) total ^{210}Pb, (b) unsupported ^{210}Pb, (c) ^{137}Cs and (d) ^{137}Cs/^{210}Pb activity ratio versus depth. Error bars represent analytical uncertainty (Shaw, 2013).

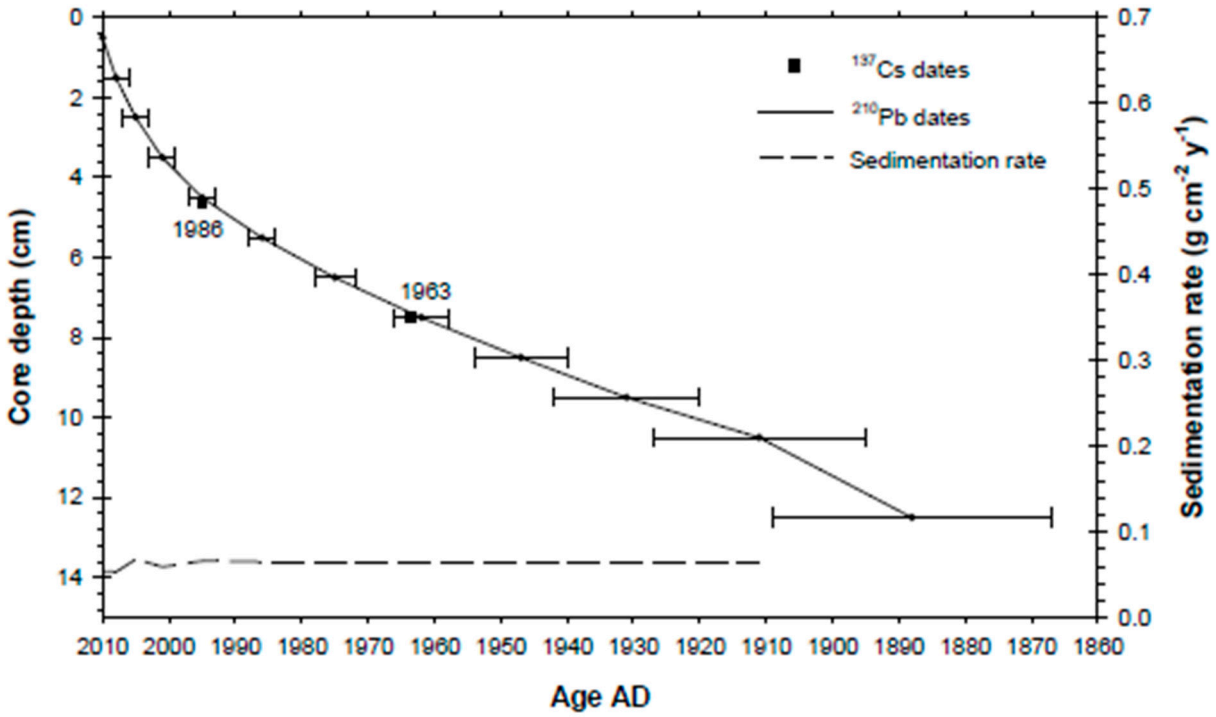


Figure S3 Radiometric chronology for the Blace core, based on CRS ^{210}Pb and ^{137}Cs dates (1963, 1986), with calculated sedimentation rates (Shaw, 2013).

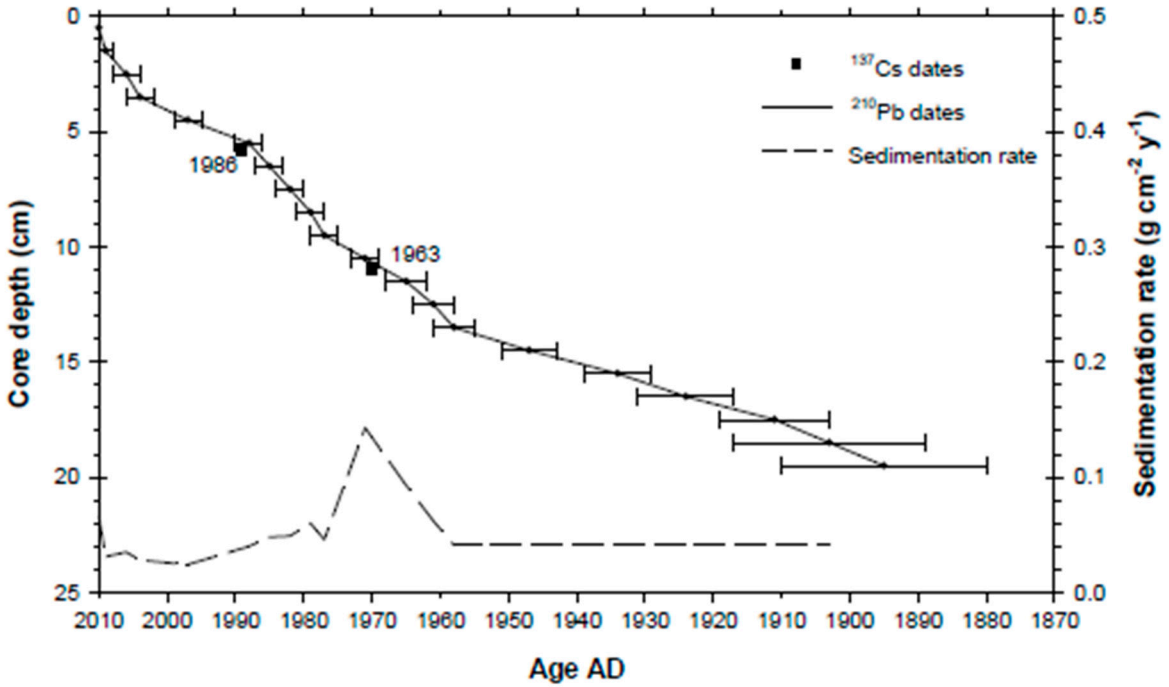


Figure S4 Radiometric chronology for the Jadrtovac core, based on CRS ^{210}Pb and ^{137}Cs dates (1963, 1986), with calculated sedimentation rates (Shaw, 2013).

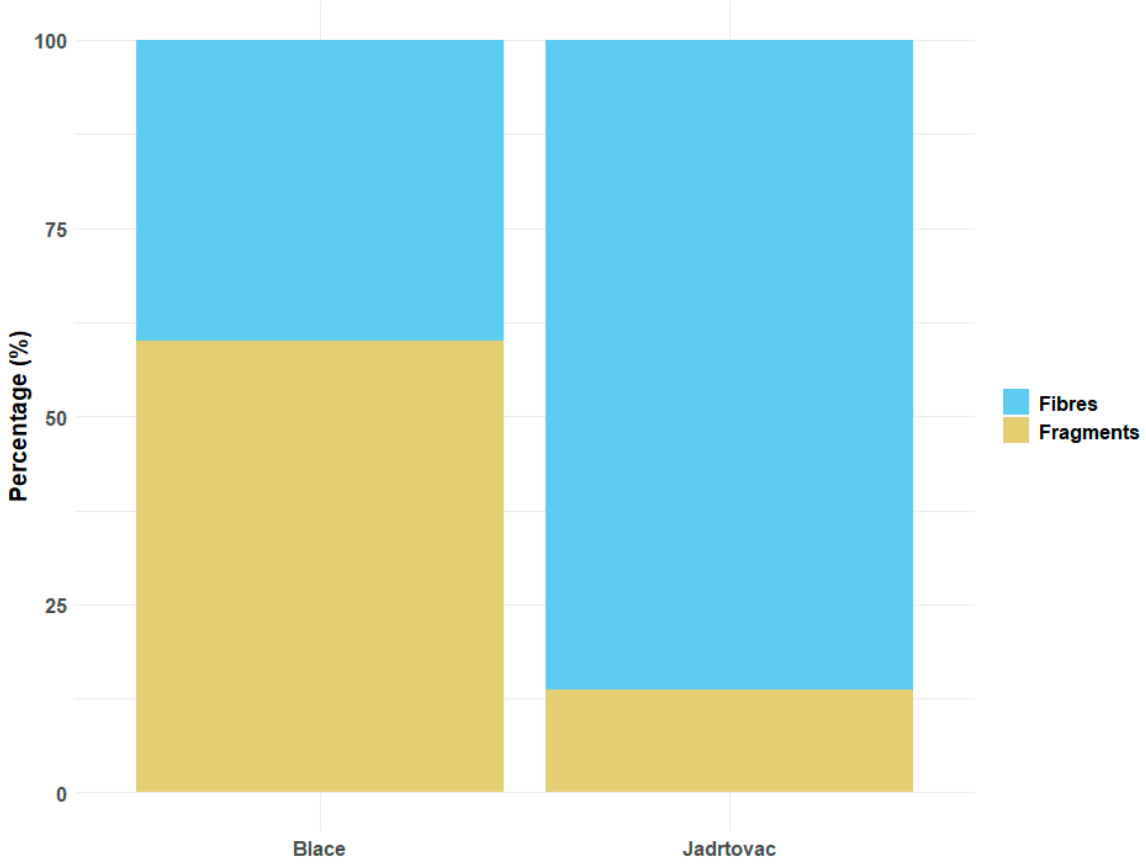


Figure S5. Cumulative distribution of MP types (fibres and fragments) across all depths in core sediments from Blace and Jadrtovac.

Table S1 Vertical distribution of biogeochemical, sedimentological, and microplastic parameters in sediment cores from Blace, Croatia, showing temporal trends from 2021 to 1807 based on 1 cm depth intervals.

Depth (cm)	Inorganic P (µmol/g)	Total P (µmol/g)	Organic P (µmol/g)	C-org (%)	N-Tot (%)	C/N Ratio	Organic matter (%)	Carbonates (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Total MPs	Fibre	Fragment	MPs g^{-1}	Timeline
0-1	11.757	37.53	25.773	4.255	0.58	7.336207	19.245	25.3	0	26.933	68.725	4.343	3	1	2	0.15	2021
1-2	11.069	20.752	9.683	0.735	0.265	2.773585	5.974	37.613	0	23.958	71.151	4.891	4	1	3	0.12	2017

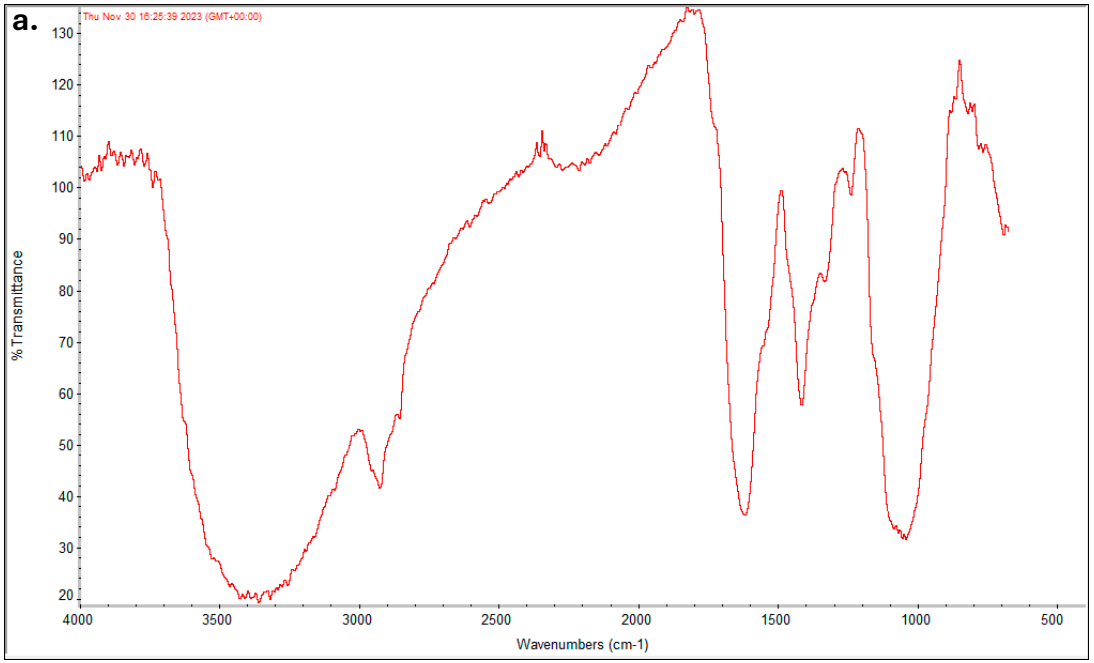
2-3	12.085	16.321	4.237	1.215	0.045	27	4.264	39.009	0	32.447	63.488	4.065	0	0	0	0	2014
3-4	12.201	19.975	7.774	0.42	0.075	5.6	3.927	42.97	0	35.251	60.604	4.145	1	0	1	0.02	2011
4-5	11.934	15.441	3.507	0.13	0.05	2.6	1.148	42.552	0	23.212	72.492	4.296	2	2	0	0.04	2007
5-6	13.068	18.071	5.003	0.57	0.065	8.769231	3.551	40.957	0	28.053	65.873	6.075	0	0	0	0	2004
6-7	11.5	16.866	5.366	0.645	0.07	9.214286	4.959	39.687	0	27.488	67.467	5.045	0	0	0	0	1989
7-8	14.64	19.892	5.252	0.495	0.035	14.14286	4.001	41.942	0	22.043	73.193	4.764	0	0	0	0	1973
8-9	13.688	22.371	8.684	1.135	0.11	10.31818	4.712	40.745	0	13.923	78.121	7.956	0	0	0	0	1958
9-10	13.637	21.117	7.48	1.395	0.05	27.9	6.05	36.663	0	15.908	76.592	7.499	0	0	0	0	1942
10-11	14.384	23.69	9.306	1.415	0.125	11.32	7.018	31.889	0	14.146	73.603	12.251	0	0	0	0	1927
11-12	12.737	22.117	9.38	1.205	0.165	7.30303	6.784	30.708	0	19.963	68.574	11.463	0	0	0	0	1907
12-13	16.383	27.974	11.592	1.635	0.17	9.617647	7.721	32.966	0	14.27	75.424	10.306	0	0	0	0	1887
13-14	10.718	23.162	12.444	1.32	0.16	8.25	7.189	32.957	0	23.97	67.292	8.739	0	0	0	0	1867
14-15	13.184	24.245	11.061	1.17	0.15	7.8	6.854	32.62	0	27.1	64.549	8.35	0	0	0	0	1847
15-16	12.839	25.259	12.42	0.855	0.135	6.333333	6.285	30.401	0	19.96	69.673	10.366	0	0	0	0	1827
16-17	13.375	26.517	13.143	1.005	0.13	7.730769	6.943	28.799	0	23.631	66.033	10.336	0	0	0	0	1807

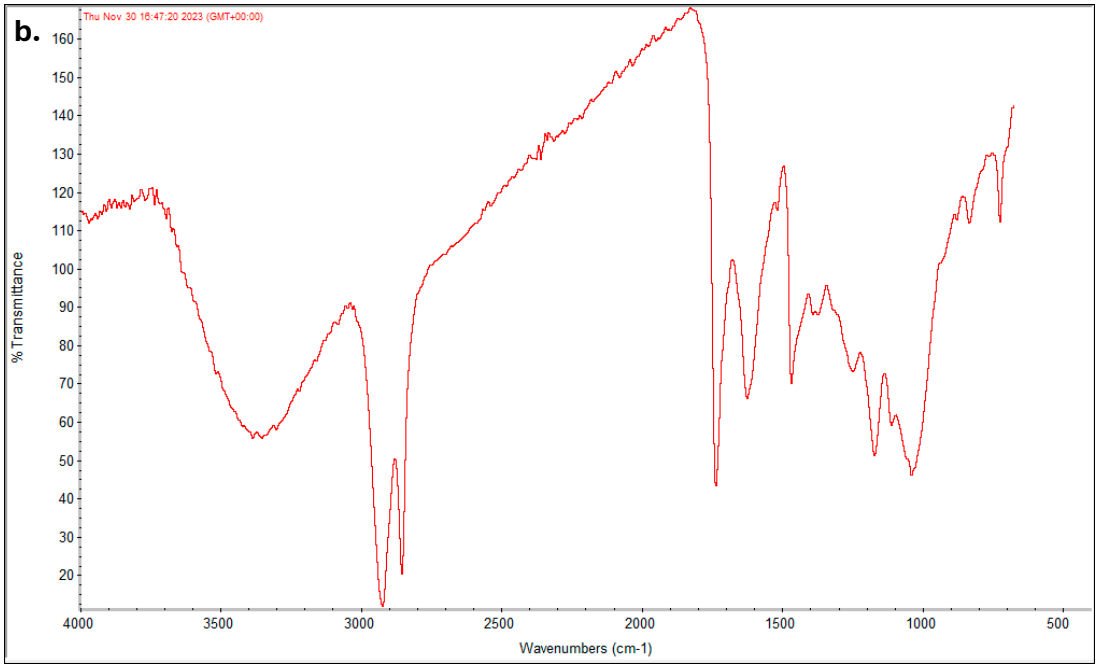
Table S2 Vertical distribution of biogeochemical, sedimentological, and microplastic parameters in sediment cores from Jadrtovac, Croatia, illustrating temporal trends from 2020 to 1884 based on 1 cm depth intervals.

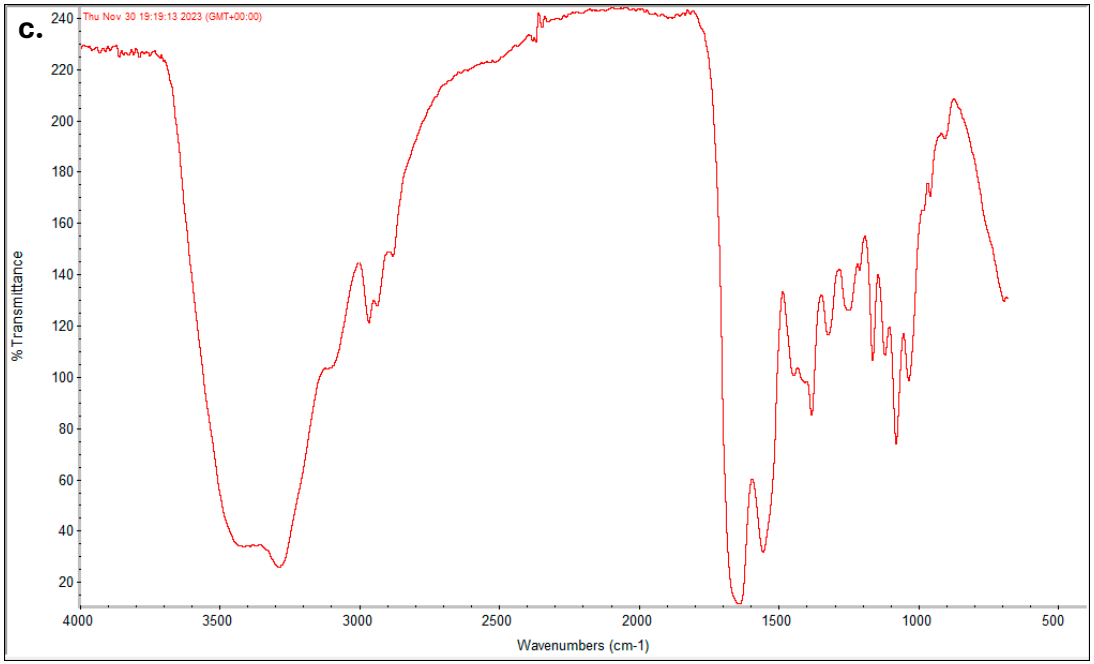
Depth (cm)	Inorganic P (µmol/g)	Total P (µmol/g)	Organic P (µmol/g)	C- org (%)	N – Tot (%)	C/N Ratio	Organic matter (%)	Carbonates (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Total MPs	Fibre	Fragment	MPs g^{-1}	Timeline
0-1	10.137	83.273	73.136	15.145	1.27	11.9252	55.608	3.84	12.825	48.383	37.263	1.529	3	2	1	0.31	2020
1-2	9.43	85.252	75.822	11.455	1.225	9.35102	41.407	2.795	23.16	45.105	30.439	1.297	1	0	1	0.09	2016
2-3	8.953	91.791	82.839	14.445	1.18	12.24153	66.577	0.982	7.088	55.627	35.528	1.757	2	2	0	0.19	2013
3-4	9.055	69.355	60.3	18.655	0.86	21.69186	36.449	5.746	10.171	48.609	38.3	2.919	5	4	1	0.49	2009
4-5	10.945	41.331	30.387	6.95	0.275	25.27273	7.492	22.396	0.515	43.464	48.794	7.227	2	2	0	0.15	2005
5-6	11.435	27.402	15.967	3.28	0.14	23.42857	6.262	38.645	0.086	31.539	58.641	9.734	0	0	0	0	2001
6-7	10.008	28.949	18.941	2.09	0.185	11.2973	10.928	41.588	0.155	29.151	58.62	12.075	1	1	0	0.03	1997
7-8	9.653	28.217	18.563	2.025	0.22	9.204545	8.779	34.901	0.119	28.633	59.282	11.965	1	1	0	0.02	1989
8-9	9.576	29.503	19.927	2.1895	0.275	7.961818	11.273	39.927	0.097	37.104	52.29	10.509	0	0	0	0	1981
9-10	10.887	49.989	39.102	3.78	0.42	9	16.402	28.937	0.107	42.857	49.396	7.64	1	1	0	0.03	1973
10-11	9.14	51.752	42.612	5.795	0.515	11.25243	19.334	8.793	0.181	41.385	50.858	7.576	2	2	0	0.06	1965
11-12	10.663	46.132	35.469	4.88	0.36	13.55556	15.155	18.254	0.025	39.948	51.702	8.325	2	2	0	0.07	1957
12-13	19.912	45.956	26.044	3.93	0.315	12.47619	14.031	22.634	0.136	40.169	50.778	8.916	0	2	0	0	1949
13-14	10.541	31.883	21.342	2.3	0.165	13.93939	7.133	35.524	0.032	31.873	56.721	11.374	0	0	0	0	1936
14-15	11.546	32.415	20.869	1.555	0.15	10.36667	6.378	39.535	0.056	32.734	56.758	10.451	0	0	0	0	1923
15-16	10.869	29.247	18.378	1.54	0.12	12.83333	6.626	38.438	0.822	31.254	57.754	10.17	0	0	0	0	1910
16-17	11.467	26.511	15.043	1.105	0.11	10.04545	7.203	46.301	0.033	22.626	65.606	11.735	0	0	0	0	1897
17-18	10.991	39.612	28.622	1.145	0.095	12.05263	7.195	38.977	0.217	32.541	55.64	11.602	0	0	0	0	1884

Table S3 Results of Wilcoxon rank-sum tests comparing sediment parameters between Blace and Jadrtovac salt-marsh cores. Significant differences are indicated as follows: *** p ≤ 0.001, ** p ≤ 0.01, * p ≤ 0.05, . p ≤ 0.1, ns = not significant. Parameters marked "Invalid" were excluded due to missing or incompatible data.

Parameter	**W statistic**	**p-value**	**Significance**
C-org (%)	NA	NA	Invalid
Carbonates (%)	204	0.0959	.
Clay (%)	125	0.3687	ns
Inorganic P (µmol/g)	278	0.0000	***
MPs g^{-1}	100	0.0503	.
Organic Matter (%)	37	0.0000	***
Organic P (µmol/g)	8	0.0000	***
Sand (%)	22	0.0000	***
TN (%)	NA	NA	Invalid
Total P (µmol/g)	11	0.0000	***


a.
Thu Nov 30 16:25:39 2023 (GMT+00:00)
% Transmittance
Wavenumbers (cm-1)
4000
3500
3000
2500
2000
1500
1000
500


b.
Thu Nov 30 16:47:20 2023 (GMT+00:00)
% Transmittance
Wavenumbers (cm-1)
4000
3500
3000
2500
2000
1500
1000
500


c.
Thu Nov 30 19:19:13 2023 (GMT+00:00)
% Transmittance
240
220
200
180
160
140
120
100
80
60
40
20
4000
3500
3000
2500
2000
1500
1000
500
Wavenumbers (cm-1)

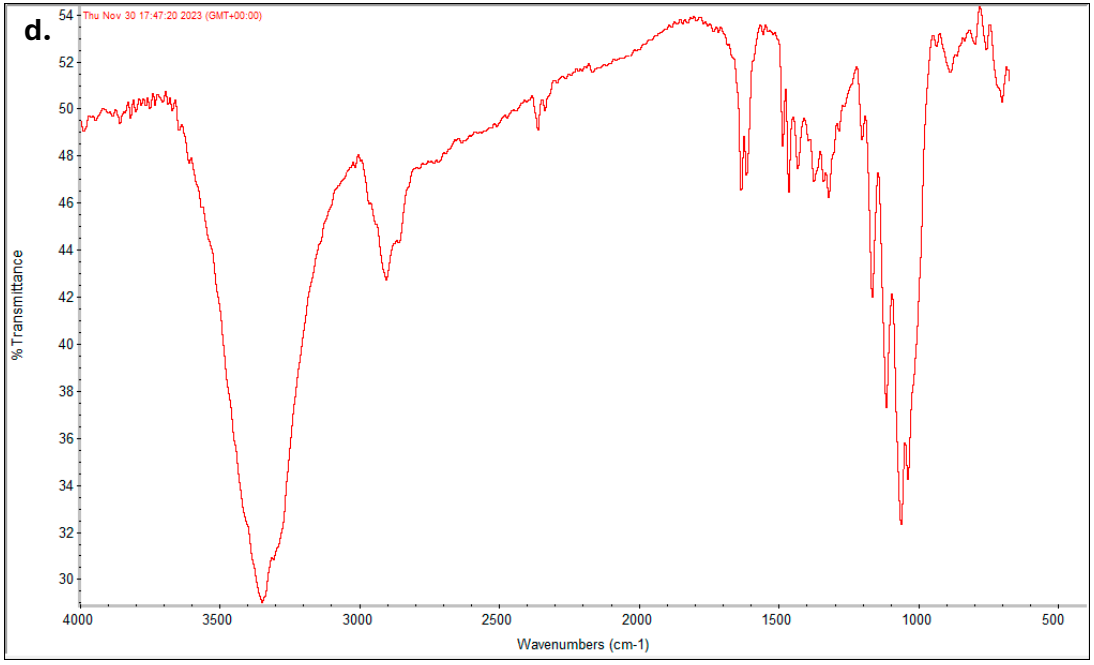

d.
Thu Nov 30 17:47:20 2023 (GMT+00:00)
% Transmittance
54
52
50
48
46
44
42
40
38
36
34
32
30
4000
3500
3000
2500
2000
1500
1000
500
Wavenumbers (cm-1)

Figure S6 FTIR spectra of selected microplastic particles isolated from sediment cores:
(a) Green fragment (rayon) from Jadrtovac
(b) White fragment (polyethylene) from Jadrtovac
(c) Blue fibre (cellophane) from Blace
(d) Brown fragment (nylon) from Blace