SUPPLEMENTARY MATERIALS

Table S1. *Concentration (ng/g dw) of individual and total PAHs and investigated PAH sources in the coastal sediments of the study area*

PAH compounds	A1	B1	C1	Cesano1	Esino1	Metauro1	Misa1	Musone1	Potenza1
naphthalene	9,14	0,61	7,15	6,50	0,63	0,78	5,16	0,60	7,91
acenaphtylene	16,64	17,13	4,02	2,20	5,36	7,53	4,63	5,59	6,97
acenaphthene	1,94	2,00	3,05	3,11	2,08	2,39	2,49	2,03	2,68
fluorene	0,64	0,62	0,37	0,40	0,51	0,11	0,50	0,27	0,11
phenanthrene	7,04	5,49	1,31	2,01	4,03	1,68	3,18	1,14	0,84
anthracene	2,46	1,72	0,41	0,47	0,90	0,31	0,47	0,38	0,50
fluoranthene	5,84	6,90	10,53	7,83	3,95	1,41	5,52	1,28	20,15
pyrene	1,13	0,82	0,35	0,44	1,49	0,40	0,32	0,35	0,36
benzo(a)anthracene	0,59	0,26	0,23	0,23	0,57	0,28	0,21	0,27	0,29
chrysene	1,09	0,36	0,23	0,26	0,58	0,27	0,21	0,28	0,33
benzo(b)fluoranth	1,65	1,00	0,77	0,60	0,96	0,75	0,58	0,58	0,75
benzo(k)fluoranth	0,77	0,49	0,45	0,39	0,56	0,49	0,38	0,39	0,48
benzo(a)pyrene	0,79	0,28	0,28	0,12	0,52	0,16	0,18	0,17	0,16
dibenz(a,h)anthracene	0,99	0,89	0,87	0,75	0,87	0,98	0,76	0,76	1,01
benzo(ghi)perylene	0,85	0,65	0,39	0,27	0,51	0,28	0,29	0,25	0,36
indeno(1,2,3cd)pyrene	0,43	0,17	0,09	0,05	0,17	0,01	0,01	0,04	0,08
total PAHs	51,97	39,42	30,49	25,63	23,69	17,82	24,89	14,37	42,99
Investigated PAH sources	**A1**	**B1**	**C1**	**Cesano1**	**Esino1**	**Metauro1**	**Misa1**	**Musone1**	**Potenza1**
LMW(2 and 3 rings)	37,86	27,58	16,31	14,69	13,51	12,80	16,42	10,01	19,01
HMW(4+ rings)	14,11	11,84	14,18	10,95	10,18	5,02	8,47	4,36	23,98
LMW/HMW	2,68	2,33	1,15	1,34	1,33	2,55	1,94	2,29	0,79
∑ comb/total PAHs	0,25	0,28	0,44	0,40	0,39	0,23	0,31	0,25	0,53
ant/(ant+phe)	0,26	0,24	0,24	0,19	0,18	0,16	0,13	0,25	0,38
flt/(flt+pyr)	0,84	0,89	0,97	0,95	0,73	0,78	0,94	0,79	0,98
phe/ant	2,87	3,19	3,22	4,28	4,45	5,37	6,80	2,99	1,66
flt/pyr	5,18	8,46	30,48	17,83	2,66	3,58	17,16	3,71	55,96
BaA/(BaA+CHR)	0,35	0,42	0,50	0,47	0,49	0,50	0,50	0,49	0,47

Table S2. *Concentration (ng/g dw) of individual and total PAHs and investigated PAH sources in the offshore sediments of the study area*

PAH compounds	A3	B3	C3	Cesano3	Esino3	Metauro3	Misa3	Musone3	Potenza3
naphthalene	0,81	8,38	0,79	17,11	3,57	7,04	23,78	0,77	0,60
acenaphtylene	6,09	19,14	8,28	14,76	2,79	6,79	77,57	7,77	3,83
acenaphthene	2,49	1,99	2,61	3,49	2,52	1,85	4,71	2,47	1,93
fluorene	0,30	0,58	1,68	1,02	0,21	0,08	0,66	0,11	0,26
phenanthrene	13,90	11,97	3,04	10,07	3,65	10,29	8,78	3,85	1,59
anthracene	1,45	2,36	5,88	2,59	6,63	2,91	11,45	0,65	1,64
fluoranthene	6,33	5,99	1,77	10,83	6,79	7,75	3,99	2,41	1,16
pyrene	5,16	2,60	0,75	2,17	0,83	1,86	1,77	1,56	0,45
benzo(a)anthracene	1,75	0,98	0,47	0,65	0,56	0,44	0,59	0,75	0,32
chrysene	1,75	1,51	0,60	0,85	0,66	0,95	0,86	0,74	0,34
benzo(b)fluoranth	2,20	2,64	1,54	1,81	1,67	3,24	2,12	1,11	0,70
benzo(k)fluoranth	0,99	1,01	0,68	0,66	0,73	1,10	0,81	0,64	0,42
benzo(a)pyrene	1,00	0,93	0,40	0,54	0,71	1,70	0,91	0,32	0,20
dibenz(a,h)anthracene	1,11	1,07	1,16	1,00	1,10	1,05	1,11	0,98	0,76
benzo(ghi)perylene	1,20	1,67	0,89	1,27	1,09	1,58	1,40	0,49	0,33
indeno(1,2,3cd)pyrene	0,49	0,74	0,36	0,59	0,51	0,91	0,62	0,11	0,08
total PAHs	47,03	63,55	30,90	69,41	34,01	49,56	141,13	24,76	14,61
Investigated PAH sources	**A3**	**B3**	**C3**	**Cesano3**	**Esino3**	**Metauro3**	**Misa3**	**Musone3**	**Potenza3**
LMW(2 and 3 rings)	25,04	44,42	22,29	49,03	19,37	28,97	126,95	15,63	9,86
HMW(4+ rings)	21,99	19,13	8,61	20,37	14,64	20,59	14,18	9,13	4,75
LMW/HMW	1,14	2,32	2,59	2,41	1,32	1,41	8,96	1,71	2,07
∑ comb/total PAHs	0,44	0,28	0,24	0,28	0,40	0,39	0,09	0,33	0,27
ant/(ant+phe)	0,09	0,16	0,66	0,20	0,64	0,22	0,57	0,15	0,51
flt/(flt+pyr)	0,55	0,70	0,70	0,83	0,89	0,81	0,69	0,61	0,72
phe/ant	9,61	5,07	0,52	3,89	0,55	3,53	0,77	5,88	0,97
flt/pyr	1,23	2,31	2,38	4,98	8,18	4,18	2,25	1,54	2,57
BaA/(BaA+CHR)	0,50	0,39	0,44	0,43	0,46	0,31	0,41	0,50	0,48

Table S3. *Concentrations (in ng g-1 dry weight) of Poly- and Perfluorinated alkyl substances (PFASs) in the sediment aliquots (Top and Bottom refer to the 2022 river flood and pre-flood deposits, respectively) of the nine coast-to-offshore studied transects. MQL: Method Quantification Limit*

Transect	Sampling site	Aliquot	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnA	PFDoA	PFBS	PFHxS	PFOS	GenX	ADONA	6:2FTS	8:2FTS	PFOSA	*Me-* FOSAA	*Et-* FOSAA
A	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**10.45**	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**58.60**	**0.345**	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.127**	< MQL	< MQL	< MQL	< MQL
Metauro River	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**85.70**	**0.387**	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	**0.120**	< MQL	**0.127**	< MQL	< MQL	**0.208**	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**65.34**	**0.254**	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.286**	< MQL	< MQL	< MQL	< MQL
B	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**86.10**	**0.439**	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**38.60**	**0.210**	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.188**	< MQL	< MQL	< MQL	< MQL
Cesano River	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.790**	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.355**	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.880**	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.142**	< MQL	< MQL	< MQL	< MQL
Misa River	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**45.18**	**0.251**	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.625**	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
C	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.412**	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.341**	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
Esino River	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.500**	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	**0.052**	< MQL	< MQL	**0.203**	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
Musone River	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
Potenza River	Nearshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
	Offshore	*Top*	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
		Bottom	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL	< MQL
MQLs (ng abs)			0,456	0,414	0,121	0,060	0,290	0,629	0,365	3,861	1,074	0,624	2,276	0,570	1,100	0,968	0,007	0,349	0,910

PFHxA: Perfluorohexanoic acid; PFHpA: Perfluoroheptanoic acid; PFOA: Perfluorooctanoic acid; PFNA: Perfluorononanoic acid; PFDA: Perfluorodecanoic acid; PFUnA: Perfluoroundecanoic acid; PFDoA: Perfluorododecanoic acid; PFBS: Perfluorobutanesulfonic acid; PFHxS: Perfluorohexanesulfonic acid; PFOS: Perfluorooctanesulfonic acid; GenX: Hexafluoropropylene oxide dimer acid (HFPO-DA); ADONA: 3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid]; 6:2FTS: 6:2-fluorotelomersulfonate; 8:2FTS: 8:2-fluorotelomersulfonate; PFOSA: Perfluorooctanesulfonamide; Me-FOSAA: Methylperfluorooctanesulfonamidoacetic acid; Et-FOSAA: Ethylperfluorooctanesulfonamidoacetic acid.

Figure S1. *Distribution patterns PAHs in sampled sediments*

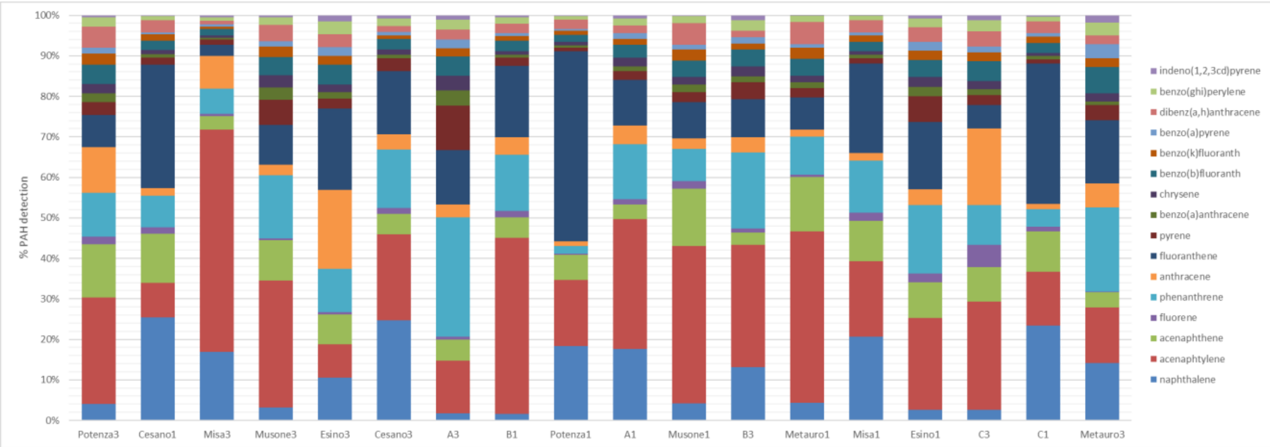

Figure S2. *Barplot showing the prokaryotic community composition (as relative abundance) at the class and family levels separated according to transects. Only the 10 most abundant taxa were showed.*

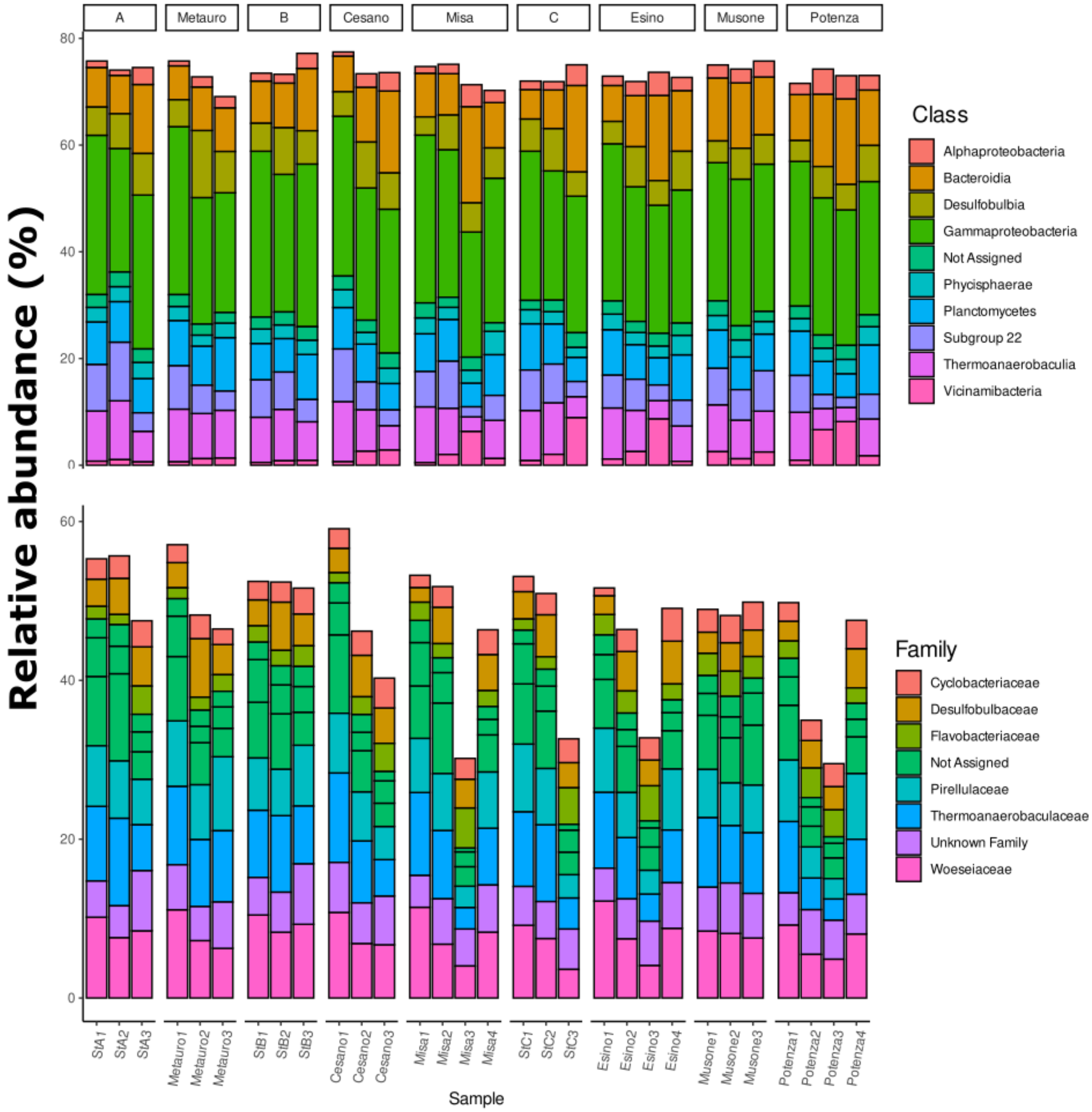

Figure S3. *Relative abundance (%) of dominant bacterial genera across river and coastal samples from the study area.*