

# Supplementary material

*Review*

## Towards risk assessments of microplastics in bivalve mollusks globally

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**Table S1.** Abundance of microplastics in bivalves from 22 countries reviewed from the fifty-two studies.

Country	Species	Sample size	Mean number of microplastics per gram (items/g)	Mean number of microplastics per gram (items/g) in each country
Argentina [1]	<i>Brachidontes rodriguezii</i>	90	0.17	0.25
	<i>Amarilladesma mactroides</i>	30	0.33	
Belgium [2]	<i>Mytilus edulis</i>	NA <sup>1</sup>	0.28	0.28
Chile [3]	<i>Zygochlamys patagonica</i>	10	0.32	0.32
China [4]	<i>Mytilus galloprovincialis</i>	50	5.68	2.56
	<i>Mytilus galloprovincialis</i>	15	2	
	<i>Chlamys farreri</i>	50	5.43	
China [5]	<i>Macraa veneriformis</i>	10	0.31	
	<i>Ruditapes philippinarum</i>	10	0.74	
	<i>Mytilus galloprovincialis</i>	10	0.16	
	<i>Mytilus galloprovincialis</i>	10	0.42	
China [6]	<i>Meretrix lusoria</i>	10	1.29	
	<i>Meretrix lusoria</i>	10	2.23	
	<i>Ruditapes philippinarum</i>	10	3.81	
	<i>Ruditapes philippinarum</i>	10	2.22	
	<i>Scapharca subcrenata</i>	10	4.39	
	<i>Scapharca subcrenata</i>	10	4	
	<i>Sinonovacula constricta</i>	10	2.83	
	<i>Sinonovacula constricta</i>	10	1.83	
	<i>Mytilus galloprovincialis</i>	10	1.8	
	<i>Perna viridis</i>	10	3.19	

	<i>Crassostrea gigas</i>	10	1.99
	<i>Crassostrea gigas</i>	10	2.1
China [7]	<i>Ruditapes philippinarum</i>	20	8.94
	<i>Mytilus galloprovincialis</i>	20	2.32
	<i>Crassostrea gigas</i>	20	1.91
	<i>Chlamys farreri</i>	20	2.59
	<i>Ruditapes philippinarum</i>	20	12.3
	<i>Ruditapes philippinarum</i>	20	6.97
	<i>Ruditapes philippinarum</i>	20	10.85
	<i>Mytilus galloprovincialis</i>	20	2.06
	<i>Mytilus galloprovincialis</i>	10	2.56
	<i>Crassostrea gigas</i>	20	1.03
	<i>Crassostrea gigas</i>	20	0.93
	<i>Crassostrea gigas</i>	20	1.16
	<i>Chlamys farreri</i>	20	1.66
	<i>Chlamys farreri</i>	20	0.85
	<i>Chlamys farreri</i>	20	0.83
China [8]	<i>Meretrix meretrix</i>	15	0.12
	<i>Meretrix meretrix</i>	15	0.31
	<i>Mytilus edulis</i>	15	0.11
	<i>Perna viridis</i>	15	0.28
China [9]	<i>Cyclina sinensis</i>	30	3.98
	<i>Meretrix lusoria</i>	18	4.19
	<i>Ruditapes philippinarum</i>	24	2.52
	<i>Scapharca subcrenata</i>	6	10.45

	<i>Sinonovacula constricta</i>	6	2.08
	<i>Tegillarca granosa</i>	18	4.13
	<i>Mytilus galloprovincialis</i>	18	2.39
	<i>Alectryonella plicatula</i>	18	5.77
	<i>Patinopecten yessoensis</i>	6	2.34
China [10]	<i>Mytilus edulis</i>	168	1.6
	<i>Mytilus edulis</i>	222	2.7
China [11]	<i>Saccostrea cucullata</i>	330	4
China [12]	<i>Mytilus edulis</i>	420	1.64
	<i>Mytilus edulis</i>		1.96
	<i>Mytilus edulis</i>		2.97
	<i>Mytilus edulis</i>		2.57
	<i>Mytilus edulis</i>		2.78
	<i>Mytilus edulis</i>		2.85
	<i>Mytilus edulis</i>		3.14
	<i>Mytilus edulis</i>		2.42
	<i>Mytilus edulis</i>		1.26
	<i>Mytilus edulis</i>		3.31
	<i>Mytilus edulis</i>		3.05
	<i>Mytilus edulis</i>		3.31
	<i>Mytilus edulis</i>		5.36
	<i>Mytilus edulis</i>		1.52
	<i>Perna viridis</i>	330	1.52
	<i>Perna viridis</i>		2.49
	<i>Perna viridis</i>		2.67
	<i>Perna viridis</i>		3.25
	<i>Perna viridis</i>		3.07
	<i>Perna viridis</i>		1.87
	<i>Perna viridis</i>		3.67
	<i>Perna viridis</i>		2.47
	<i>Perna viridis</i>		4.89
	<i>Perna viridis</i>		2.53
	<i>Perna viridis</i>		3.63
China [13]	<i>Corbicula fluminea</i>	27 – 180	4.78
	<i>Corbicula fluminea</i>	65 – 650	2.18

China [14]	<i>Corbicula fluminea</i>	208	1.22	0.59
China [15]	<i>Crassostrea</i> sp.	306	0.62	
China [16]	<i>Sinonovacula constricta</i>	10	0.27	
	<i>Macra chinensis</i>	10	0.69	
	<i>Scapharca subcrenata</i>	10	0.79	
	<i>Mytilus galloprovincialis</i>	10	1.17	
	<i>Ruditapes philippinarum</i>	10	1.76	
	<i>Chlamys farreri</i>	10	0.27	
	<i>Saxidomus purpurata</i>	10	0.19	
China [17]	<i>Meretrix meretrix</i>	126	0.47	
	<i>Ruditapes philippinarum</i>	147	0.25	
	<i>Sinonovacula constricta</i>	93	0.59	
China [18]	<i>Saccostrea cucullata</i>	9	1.84	
China [19]	<i>Sinonovacula constricta</i>	10 – 20	0.21	
	<i>Ostrea denselamellosa</i>	10 – 20	0.31	
China [20]	<i>Crassostrea gigas</i>	20	0.8	
China [21]	<i>Crassostrea</i> sp.	110	2.44	
	<i>Crassostrea</i> sp.	110	0.91	
	<i>Crassostrea</i> sp.	110	0.91	
	<i>Crassostrea</i> sp.	100	0.43	
China [22]	<i>Acila mirabilis</i>	20	6.9	
France [23]	<i>Cerastoderma edule</i>	50	0.74	
	<i>Cerastoderma edule</i>	50	0.19	
	<i>Mytilus edulis</i>	50	0.15	
	<i>Mytilus edulis</i>	50	0.25	
France [24]	<i>Mytilus edulis</i>	10	0.51	
	<i>Mytilus edulis</i>	10	0.44	

	<i>Mytilus edulis</i>	10	0.84	
	<i>Mytilus edulis</i>	10	1.03	
	<i>Mytilus edulis</i>	10	2.76	
France [25]	<i>Mytilus edulis</i>	120	0.23	
	<i>Crassostrea gigas</i>	60	0.18	
France [26]	<i>Mytilus edulis</i>	15	0.23	
France [27]	<i>Crassostrea gigas</i>	10	0.47	
France [2]	<i>Mytilus edulis</i>	NA <sup>1</sup>	0.2	0.36
Germany [27]	<i>Mytilus edulis</i>	36	0.36	
Greece [28]	<i>Mytilus galloprovincialis</i>	40	2.5	3.9
	<i>Mytilus galloprovincialis</i>	40	5.3	
India [29]	<i>Meretrix meretrix</i>	110	0.18	1.98
	<i>Perna viridis</i>	90	1.8	
India [30]	<i>Paphia malbarica</i>	15	0.7	
	<i>Perna viridis</i>	10	3.2	
	<i>Crassostrea</i> sp.	14	4	
Iran [31]	<i>Amiantis purpuratus</i>	30	12.7	10.97
	<i>Amiantis umbonella</i>	30	20	
	<i>Pinctada radiata</i>	33	0.2	
Italy [32]	<i>Mytilus edulis</i>	380	0.15	0.27
	<i>Mytilus galloprovincialis</i>	370	0.39	
Mexico [33]	<i>Magallana gigas</i>	360	0.06	0.06
Netherlands [2]	<i>Mytilus edulis</i>	NA	0.13	0.13
New Zealand [34]	<i>Perna canaliculus</i>	96	0.041	0.041
Norway [35]	<i>Mytilus</i> sp.	332	0.97	0.97
Portugal [36]	<i>Mytilus</i> sp.	NA	1.175	0.56
Portugal [37]	<i>Scrobicularia plana</i>	140	0.07	
	<i>Mytilus galloprovincialis</i>	140	0.18	
Portugal [38]	<i>Mytilus galloprovincialis</i>	30	0.83	

South Africa [39]	<i>Mytilus</i> sp.	30	0.04	0.04
South Korea [40]	<i>Tapes philippinarum</i>	25	0.34	0.49
	<i>Mytilus edulis</i>	25	0.12	
	<i>Crassostrea gigas</i>	25	0.07	
	<i>Patinopecten yessoensis</i>	25	0.08	
South Korea [41]	<i>Mytilus edulis</i>	42	1.43	
	<i>Crassostrea gigas</i>	30	1.13	
South Korea [42]	<i>Mytilus edulis</i> / <i>Crassostrea gigas</i>	300	0.33	0.41
	<i>Ruditapes philippinarum</i>	150	0.43	
Thailand [43]	<i>Meretrix lyrata</i>	60	0.155	
	<i>Perna viridis</i>	60	0.5	
Thailand [44]	<i>Saccostrea forskalii</i>	15	0.43	
	<i>Saccostrea forskalii</i>	15	0.57	
	<i>Saccostrea forskalii</i>	15	0.37	
Tunisia [45]	<i>Ruditapes decussatus</i>	24	1.44	1.24
	<i>Mytilus galloprovincialis</i>	15	0.79	
	<i>Crassostrea gigas</i>	3	1.48	
UK [3]	<i>Pecten maximus</i>	10	0.17	1.94
UK [46]	<i>Mytilus edulis</i>	NA	2.5	
UK [47]	<i>Modiolus modiolus</i>	6	0.086	
	<i>Mytilus</i> spp.	36	3	
UK [48]	<i>Mytilus edulis</i>	NA	1.3	
	<i>Mytilus edulis</i>	NA	3.52	
	<i>Mytilus edulis</i>	NA	4.44	
	<i>Mytilus edulis</i>	NA	3.05	
UK [49]	<i>Mytilus edulis</i>	36	0.9	

	<i>Mytilus edulis</i>	12	1.23	
	<i>Mytilus edulis</i>	18	2.55	
	<i>Mytilus edulis</i>	30	1.59	
	<i>Mytilus edulis</i>	18	2.37	
	<i>Mytilus edulis</i>	18	0.95	
	<i>Mytilus edulis</i>	24	0.72	
	<i>Mytilus edulis</i>	30	2.89	
	<i>Mytilus edulis</i>	12	1.65	
USA [50]	<i>Siliqua patula</i>	142	0.16	0.20
	<i>Crassostrea gigas</i>	141	0.35	
USA [51]	<i>Crassostrea gigas</i>	30	0.097	
Vietnam [52]	<i>Perna viridis</i>	5	0.29	0.29

<sup>1</sup> NA means the information is not available in the study.



**Table S2.** Risk level criteria for microplastic pollution load index.

Value of the pollution load index <sup>1</sup>	< 10	10–20	20–30	> 30
Risk category	I	II	III	IV

<sup>1</sup> The rank partition of risk was referenced from Xu et al. (2018).

**Table S3.** The hazard score for the dominant microplastic polymers in bivalves globally.

Polymer	Abbreviation	Monomer	Score <sup>1</sup>
Polyvinyl chloride	PVC	Vinyl chloride	10551
Polyethylene terephthalate	PET	Ethanediol	4
Polyethylene	PE	Ethylene	11
Polystyrene	PS	Styrene	30
Polymethyl methacrylate (Acrylic)	PMMA	Methyl methacrylate	1021
Polyamide (Nylon)	PA	Adipic acid	47
Polypropylene	PP	Propylene	1
Polyester	–	–	–
Cellophane	–	–	–
Rayon	–	–	–

<sup>1</sup> The value for the score of each polymer is taken from Lithner et al. (2011).

– represents that its hazard score cannot be determined.

**Table S4.** Risk level criteria for microplastic polymer risk index.

Value of polymer risk index <sup>1</sup>	<10	10–100	100–1000	1000–10000	>10000
Risk category	I	II	III	IV	V

<sup>1</sup> The rank partition of risk was referenced from Lithner et al. (2011).

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