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Data Article

Plastic debris dataset on the Seine river banks: Plastic pellets, unidentified plastic fragments and plastic sticks are the Top 3 items in a historical accumulation of plastics



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ABSTRACT

Plastic pollution in oceans and rivers is of high concern because of its persistence in the environment and its potential impact on ecosystems. However, there is a specific lack of data in rivers. Here we present data from the Seine river banks in a historical polluted shore. Data were classified using international MSFD and OSPAR classifications. The sampled site is a quadrat of 1 m² located downstream in the estuary in a visual maximum along a 1 km shore covered by plastics. A total of 20,259 plastic debris were individually counted, classified and weighted by category for a total mass higher than 4 kg. Half of the plastic debris in number are represented by preproduction pellets.

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Specifications table

Subject area	<i>Environment</i>
More specific subject area	<i>Plastic pollution</i>
Type of data	<i>Table, figure</i>
How data was acquired	<i>Hand collection, visual and chemical identification</i>
Data format	<i>analyzed</i>
Experimental factors	<i>Air-dried and sorted with the naked eye</i>
Experimental features	<i>Sampling and sorting</i>
Data source location	<i>Seine estuary, Petiville, France, Lat. 49.4339; Long. 0.6160</i>
Data accessibility	<i>Data in this article</i>
Related research article	<i>A. Bruge C. Barreau, J. Carlot, H. Collin, C. Moreno and P. Maison, Monitoring Litter Inputs from the Adour River (Southwest France) to the Marine Environment, J. Mar. Sci. Eng., 6 (2018) 24–36. 10.3390/jmse6010024</i>

Value of the Data

- Identified plastic items in river banks according to litter international classifications (MSFD and OSPAR) for comparisons with marine data.
- Reporting items in number, mass and volume for conversions between units in other studies dealing with plastic litter in rivers.
- The amount of plastic preproduction pellets is reported at levels never reported before.
- New types of items identified: fibers from toilet brushes, plastic tag ties, plastic fragments from road brushes.
- Need to adapt the OSPAR/MSFD classifications used for the marine environment to rivers.

1. Data

In this report, an inventory of plastic items is presented (Table 1). Plastic items were collected in a quadrat of 1 m² in a historical polluted shore in the Seine river (downstream of the estuary; Lat. 49.4339; Long. 0.6160). Data are representative of the historical plastic pollution occurring in this river with few items dated from 1965, 1974, 1983, 1992 or 2010. Plastic items were classified according to OSPAR and MSFD classifications, which give insights about the origin of the items and their chemical composition.

A total of 20,259 plastic debris were individually counted, classified and weighted by category. Those plastic debris are more than 150% heavier in mass (> 4 kg) than organic debris, i.e. dead vegetation and gastropod shells, found in this kind of dry march surrounded by reedbeds.

The Top 3 categories of items collected are plastic preproduction pellets [2], unidentified plastic fragments and plastic sticks (cotton bud and lollipop sticks; [1]. Plastic preproduction pellets are 15 times more numerous than gastropod shells. High concentration of pellets could be linked to the vicinity of plastic manufacturers near the sampled site. They represent 50% of the items collected during this campaign but only 5.6% of the mass (Fig. 1). In contrast, around 30% of the mass is carried by the unidentified fragments of macroplastics > 2.5 cm, which only represent 7% of the total items. Hundreds of caps, lids, and rings were also found without their associated bottles, which are often prompt to sink. Furthermore, the dataset refers to specific activities in the estuary with for example 100 g/m² of polyethylene from shotgun plastic wads related to intense hunting activities. Those items have to be mentioned because they are very common in the estuary and their origin is clearly identified, while alternatives such as biodegradable wads do exist.

Reporting number of items, associated mass and volumes will improve conversions of unit for other studies related to river pollution when only one of the units are available. To facilitate

Table 1

Inventory of plastic items collected in 1 m² on a river bank in the Seine river at Petiville. In yellow, items of special interest for their high recurrence or their novelty.

MFD	OSPAR	Items	Full	Micro (<0.5 cm)	Meso (0.5-2.5 cm)	Macro (>2.5 cm)	Total	Dry mass (g)	Vol. (L)	Comment
Synthetic polymers										
G3	2	Bags (e.g. shopping)				7	7	19.7		Handles in hard plastic. Bags were probably fragmented
G10	6	Food incl. fast food containers in expanded polystyrene				106	106	22.0	0.3	By decreasing order : kebab, Mac Donald, meat
		Food incl. fast food containers in other plastics				3	3	7.8		
G12	7	Cosmetics (bottles & containers e.g. sun lotion, shampoo, shower gel, deodorant)	8				8	15.5		4 mini-parfume, 2 lipsticks, 2 nail polish
G13	12	Other containing in plastics other than polystyrene				20	20	14.2		
G17	11	Injection gun containers				3	3	3.1		
G18	13	Crates (except fishing activities)				1	1	6.5		
G19	14	Car parts	12			7	19	98.5	0.2	Include wheel arch screw
G21		Caps/lids: drinks	187		1	13	201	89.9	2	
G22		Caps/lids: non-food product (chemical, cosmetic)	25				25	69.2	0.3	e.g 4 dishwashing liquid, 3 oil, 2 toothpastes
G23		Caps/lids: unidentified	145		2	25	172	205.6	1.1	
G24		Caps/lids: rings and associated seal	231		27	127	385	139.7	1.1	
G25		Tobacco: packaging and associated plastic films				1	1	1.3		
G26		Tobacco: lighter	3				3	33.8	0.1	
G27	64	Tobacco: cigarette butts	41				41	22.3	0.1	Plastic tips
G28	17	Pens and related	65				65	69.9	0.2	Include 34 caps, 12 cartridge, 4 pens
G30	19	Crisp/sweet packets	5			83	88	57	0.5	49 packaging, 29 pieces of Kinder
G31		Lollipop sticks	86		30	117	159	73	0.3	159 adding reconstituted pieces with 233 fragments
G32	20	Toys & party poppers	47			19	66	65.4	0.2	Including a plastic coin of 1/2 Franc from 1965!?
G33	21	Cups in expanded polystyrene				2	2			
G34	22	Tableware: cutlery and dishes	2			1	3	14.1		
G35		Tableware: straws and blender			2	2	4	0.5		
G66	39	Strapping bands	5		11	17	33	24.4		Include 5 corner reinforcements
G67	40	Plastic sheeting: agricultural				1	1	55	0.1	
		Industrial packaging	1		106	86	193	28.5	0.1	2400 cm ²
G70	43	Shotgun cartridges (plastic wad)	48				48	97.1	0.3	Include 42 plastic wads and 6 plastic washers
		Foam sponge: flexible			19	15	34	4.2	0.1	Polyethylene foam
G73	45	Foam sponge: hard yellow/brown (isolation)			39	24	63	18.2	0.2	Polyurethane foam in aerosol
		Foam sponge: hard blue/white/grey (isolation)			18	8	26	2		Polystyrene extruded foam
G78	117	Unidentified fragment: plastic (0-2.5 cm)			3612		3612	333	0.9	
G79	46	Unidentified fragment: plastic (2.5-50 cm)				1503	1503	1263.3	5	
G81	117	Unidentified fragment: expanded polystyrene (0 - 2.5 cm)			1114		1114	35.6	0.5	
		Unidentified fragment: no molded and flat in expanded polystyrene (2.5-50cm)				107	107	12.6	0.2	
G82	46	Unidentified fragment: molded and not flat in expanded polystyrene (2.5-50cm)				278	278	71	1.5	
G89	48	Construction: flat plastic (PVC, tiled crosspiece)	38			25	63	143.1	0.3	e.g. 34 fragments of PVC? 21 tile spacers
		Construction: tubes (incl. electric sheath)			5	24	29	9.5		e.g. 8 macro, 16 electric sheath
G90	48	Flower pot				11	11	14.2		
G91	48	Biomedica from water treatment plant	11			1	12	1.9		Leaks from EVRY station in 2010?
G93	48	Cable ties				3	3			
G95	98	Sanitary: cotton bud	326		566	380	693	131.2	0.6	Include reconstituted items with 1272 fragments
G96	99	Sanitary: sanitary napkin, party liners	10		4		14	32.9	0.2	Include 10 tampon applicators ≠ G144!
G97	101	Sanitary: bloc WC				6	6	11.1		
G99	104	Medical: syringe, needle	7		2	6	15	19.7	0.1	(majority of insulin syringe)
G100	103	Medical: medicines	17		14	1	32	51	0.2	Include 10 single doses
		Sanitary: ear plug	1				1	0.6		
		Sanitary: toothbrush				1	1	2.6		
		Sanitary: razor				8	8	13.6		Wilkinson
		Child's pacifier				2	2	6.2		
		Celphespa			1	9	10	12.2		
G124	48	Packaging: thin packaging/other film (incl. cellophane, tissue pack...)				23	23	2.9		
		Packaging: chips and spaghetti padding in expanded polystyrene	2				2	0.2		

Table 1 (continued)

		Stamp (plastic): (drinks)			1	1	0.5			
		Stamp (plastic): other	1			1	0.5			
		Sealed			19	19	23.7	0.1	Tampon	
		Maintenance/bricolage: various equipment (broom, shovel, brush, etc...)	47			47	74	0.1	e.g. 13 security seals, 1 EDF seal from 1974	
		Plastic flowers	5		4	15	24	11.3	e.g. 10 screw cover, 10 washers, 6 plastic welding sticks	
		Melted plastic			60	42	102	176.4	0.3	Include 2 feke cakes
		Plastic fibers Ø<1 mm				132	132	1		From toilet brushes?
		Plastic tag ties	13			192	205	24.7		
		Synthetic road broom			26	95	121	24.4		Different colors. Recurrent in the Seine river
		Key ring	2			2	6.6			Including a phone number used between 1963 and 1985
		Condenser-like item	1			1	66.6			
		Berlingots for liquids	3			12	15	9.3		
		Geogrids and grids				17	17	6.2		
		Adhesive tape				8	8	8.6		
		Filter pump from water treatment plant	1			1	45	0.1		
		Plastic wheel	4			4	19.4			
		Preproduction pellets		10240			10240	256.0	0.5	Plastic manufacturers close to the sample site
TOTAL OF SYNTHETIC POLYMERS (PLASTICS)			1400	10240	5663	3609	20259	4181	17.5	
Rubber										
G125	49	Balloon of bladder: incl. plastic valve, ribbon, string, stick,...				9	9	3.5		
G126	53	Other balloons	3			2	5	62.7		Yellowish and blackish
G134	53	Unidentified rubber fragments				11	11	17.7		
		Other items	1			1	2	68.9		1 sole and 1 strap
Manufactured wood										
G159	68	Cork cap	2			2	2	8.3		
G171	74	Unidentified wood fragments < 50cm			2	1	3	13		Corkwood
Metals										
G177	81	Packaging: aluminum foil				3	3	16		
G178	77	Cap: incl. bobbin pull, wirehood	2				2	4.4		
Other										
G211	105	Medics : injectable dose	1				1	5.6		Used dose
G213	109	Paraffin / wax (1-10 cm)			1	2	3	8.9		
		Wax : candle			2		2	5.2		
/	111	Red/brown Pouzollane			230	36	266	292	0.8	Density <1. Historical foundry waste?
/	111	White pumice stone			3	4	7	60.8	0.1	Unknown origin
/	111	Red/brown clay beads	83				83	58.2	0.1	Gardening
/	111	Lightweight concrete			1	1	2	7.8	0.1	Construction
BIODIVERSITY										
		Earth worms (alive)					21			
		Gastropod shells	655				655	261	1.2	
		Dead wood						2400	23	

conversions, mass per item were also reported for the Top 10 items (Fig. 1). In addition, specific items such as plastic tag ties (e.g. textile), or plastic fibers from toilet brushes were unusually reported and should be considered as additional categories in OSPAR/MSFD classifications for rivers.

2. Experimental design, materials, and methods

2.1. Experimental design

2.1.1. Site description

Plastic litter were collected in the estuary of the Seine river close to Petiville, 80 km downstream of Rouen and 30 km upstream the river mouth (Fig. 2). Here is the beginning of the muddy plug of the estuary under high tidal influence. The sampled site belongs to a 1 km shore covered by plastic litter and corresponds to a visual maximum of plastic accumulation on a gentle slope dipping to the river. The depositional environment is a dried marsh annually flooded by the river and entrapped by a road on north-side (ancient towpath) and reedbeds on south-side. In this environment, woody debris and gastropod shells are very common. However, plastic debris also accumulate. They are not easily removed by flood events because reedbeds act as a barrier living floating items go in but not out. Very large items are less frequent thanks to this natural barrier and because of punctual cleanings by NGO's.

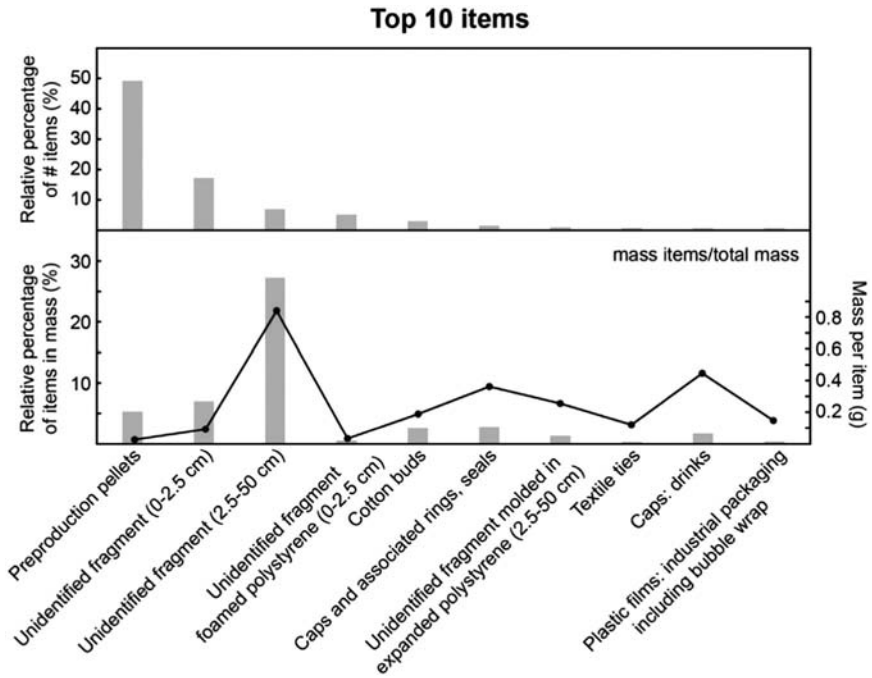


Fig. 1. Top 10 plastic items collected in 1 m² on a river bank in the Seine river at Petiville. The black line refers to the mass per unit



Fig. 2. Geographical localization of the sampled site. Notice that plastic producers from Notre-Dame-de-Gravenchon are close to the targeted site. Lat. 49.4339; Long. 0.6160. The red stars point to the major plastic manufacturers, i.e. main sources of preproduction pellets.

2.1.2. Sampling method

Plastic litter and organics (wood and organisms, mostly dead gastropod shells) were exhaustively collected by hands in a quadrat of 1 m² in a visual maximum of plastic accumulation until the soil was reached (see pictures in sup. data). Samples were stored in plastic bags of 50 L. They were dried at ambient air for days, then sorted and counted one by one in the lab, classified by size and category, and weighted.

2.1.3. Classification method

Plastic items were classified according to OSPAR and MSFD classifications usually applied to marine environment and to macroplastics > 2.5 cm. Here, when possible, those classifications were also applied to items 0.5 cm < mesoplastics < 2.5 cm. They were separately numbered in the table but weighted together with macro-items. Only industrial pellets were numbered as microplastics (< 0.5 cm). Size class were determined based on at least one dimension.

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Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at <https://doi.org/10.1016/j.dib.2019.01.045>.

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