Water and Environment Support
in the ENI Southern Neighbourhood region

Activity: WES N-E-DZ-1

Workshop on marine litter monitoring & mitigation

Marine litter monitoring in Algeria: results & outputs

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LDK CONSULTANTS S.A.

This Project is funded by the European Union

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE

Water and Environment Support
in the ENI Southern Neighbourhood region

LITERATURE REVIEW

SWIM-H2020 SM BEACH LITTER DATA

WES SEAFLOOR LITTER DATA

PLASTIC BUSTERS SEAFLOOR LITTER DATA

This Project is funded by the European Union

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – LITERATURE REVIEW & KEY FINDINGS

Assessment of microplastic abundance and impact on recreational beaches along the western Algerian coastline	Bentaallah et al., 2024
Occurrence and characterization of surface sediment microplastics and litter from North African coasts of Mediterranean Sea: Preliminary research and first evidence	Tata et al., 2020
First evidence of plastic pollution in beach sediments of the Skikda coast (northeast of Algeria)	Grini et al., 2022

Microlitter and/or mesolitter in beach sediments

- ✓ The characterization of MPs shape revealed that fragments (79.81 %) were dominant, followed by pellets (10.58 %), filaments (5.57 %), and foam (3.85 %). An assessment of the Microplastic Pollution Index, the Pellet Pollution Index, and the Coefficient of Microplastic Impact, revealed the presence of very low to moderate levels of MPs on the beaches.
- ✓ Five types of microplastics were identified; the most common were fibers (70%), fragments (21%), pellets (5%), films (2%) and foams (2%). The main polymers detected in the studied microplastics were polyethylene (48%), polypropylene (16%), polyethylene terephthalate (14%), polystyrene (9%), butyl branham (7%), ethylene propylene (3%) and cellulose tri acetate (3%)
- ✓ The predominant microlitter types were plastic fragments and pellets, white/transparent in color. The average concentrations of total plastic were 1067.19 ± 625.62 items/m^2 , 106.98 ± 62.39 items/kg, and 50.65 ± 9.82 g/m2 , showing variability between beaches and within sampling sites.

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – LITERATURE REVIEW & KEY FINDINGS

Seasonal variation of microplastics density in Algerian surface waters (South-Western Mediterranean Sea)	Setiti et al., 2021
Abundance of Plastic Debris in Intertidal Surface Sediments from Arzew Gulf (Western Algeria)	Bouchentouf and Aïnad Tabet, 2013
Microplastic ingestion in Sardinella aurita Valenciennes, 1847 and Lithognathus mormyrus (Linnaeus, 1758) along the Gulf of Bejaia, Algeria	Zeghdani et al., 2023

Microlitter and/or mesolitter in surface waters, seafloor sediments & biota

- ✓ **Microplastics in surface waters:** Microplastics were found in all collected samples, with highly variable concentrations and overall mean concentration of 0.86 ± 0.35 items/m^3. A classification based on the shape and appearance of microplastics indicated the predominance of fibers (32%), followed by fragments (27%), films (16%), foams (13%), and granules (12%).
- ✓ **Mesoplastics in seafloor sediments:** A high plastic fragments accumulation in sediments was detected with litter items being between 0.5 cm and 1 cm.
- ✓ **Microplastics in biota:** 74.30% of individuals ingested microplastics. The most common type of microplastics extracted from gastrointestinal tracts of samples were fibers (71.64%).

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – LITERATURE REVIEW & KEY FINDINGS

Benthic marine litter in the coastal zone of Bejaia (Algeria) as indicators of anthropogenic pollution	**Mankou-Haddadi et al., 2021**
Micro- and macro-plastics in beach sediment of the Algerian western coast: First data on distribution, characterization, and source	Taïbi **et al., 2021**

- ✓ **Macrolitter on the seafloor: A very** high concentration of 58,998 items/ha was recorded. Overall, plastic was the dominant component of the litter with 88% of the total amount, in weight. Most of the waste was of terrestrial origin, with rivers and beaches being the main sources due to population density, highly developed tourism during the summer season, and inadequate waste management.
- ✓ **Microplastics and macroplastics in beach sediments:** Mainly due to inadequate solid waste management and the inhabitants' behavior. The plastics density varied between 7.6 ± 18.8 and 66 ± 107.28 items/m^2 . With 83.27%, fragments were the predominant items as micro- and macro-plastics, whereas pellets were mainly present as microplastics (14.93%).

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA

Vlachogianni,Th., Scoullos, M., 2024. Baseline assessment of macrolitter on the coastline of Algeria: fit-for-purpose data for tailor-made measures to navigate the Plasticene Age. Marine Pollution Bulletin, 205, 116646.

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – LITTER DENSITY

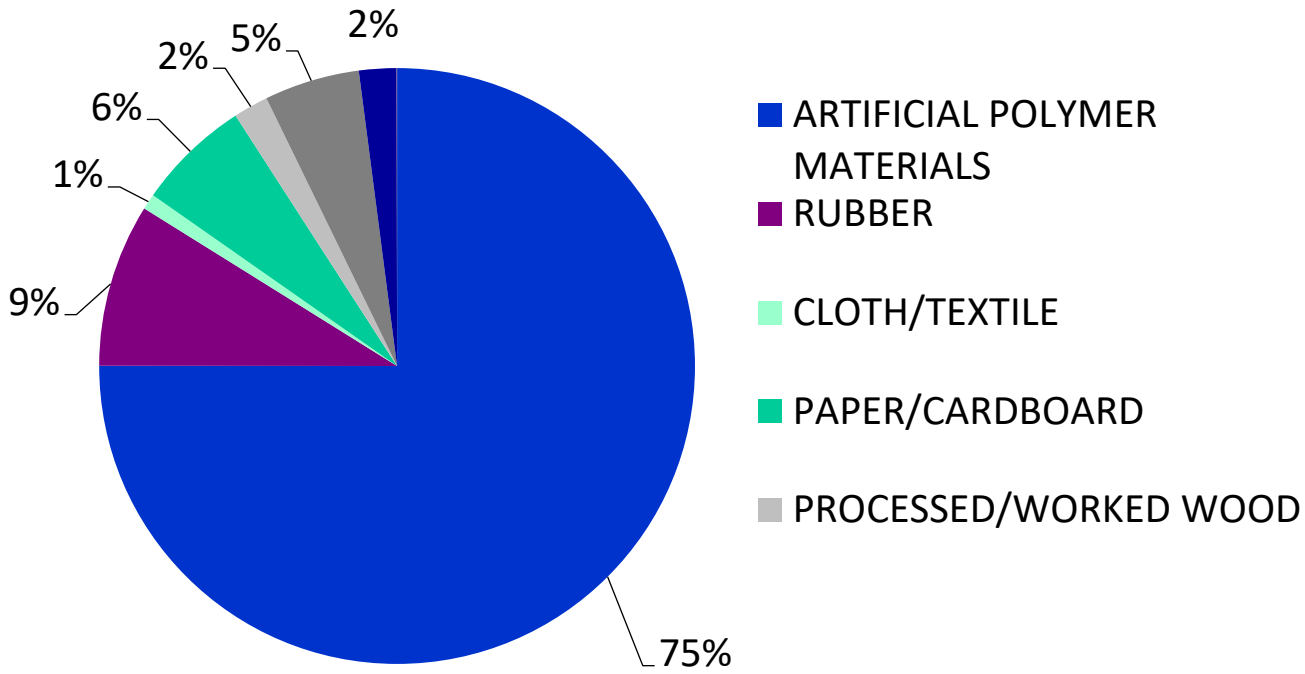
Site Code	Site Name	Province	Litter Density per 100m	(E) LCR	(M) LCR
BS7	Sghiret	Boumerdes	2684	134	21
BS6	ElAzrek	Boumerdes	1556	78	12
BS4	Khaloufi II	Algiers	1223	61	9
BS1	Agla	Tlemcen	1217	61	9
BS15	Djenen El Bey	Annaba	1069	53	8
BS2	Les Andalouses	Oran	740	37	6
BS5	Deca	Algiers	728	36	6
BS14	Sable d'Or	Annaba	685	34	5
BS13	Kef Fatma	Skikda	680	34	5
BS17	Messida	El Taref	632	32	5
BS10	Grand Phare	Jijel	587	29	5
BS16	Laouinette	El Taref	578	29	4
BS3	Grande – Oran	Oran	545	27	4
BS8	Sidi Khelifa	Tizi Ouzou	447	22	3
BS12	Grande – Skikda	Skikda	341	17	3
BS9	Petit Paradis	Tizi Ouzou	338	17	3
BS11	El M'Zair	Jijel	317	16	2

The median litter density documented in this report, amounting to 578 items/100m

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – LITTER DENSITY

Country	European Regional Sea	Number of surveyed beaches	Litter density (items/100m)	Reference
Turkey	Black Sea	9	3,297*	Bat et al., 2022
Croatia	Mediterranean	4	2,915	Vlachogianni et al., 2018
Algeria	Mediterranean	17	578	Present study
Slovenia	Mediterranean	3	495	Vlachogianni et al., 2018
Italy	Mediterranean	64	477	Fortibuoni et al., 2021
Croatia, Cyprus, France, Greece, Italy	Mediterranean	23	451	Vlachogianni et al., 2020
Spain	Mediterranean	6	440	Compa et al., 2022
Montenegro	Mediterranean	2	374	Vlachogianni et al., 2018
Albania	Mediterranean	5	333	Gjyli et al., 2020
Germany	Baltic	4	304	Hengstmann et al., 2017
Morocco	Mediterranean	12	269	Nachite et al., 2019
Greece	Mediterranean	10	201	Vlachogianni et al., 2018
Spain	Mediterranean	56	186	Asensio-Montesinos et al., 2019
Greece	Mediterranean	9	125	Vlachogianni and Scoullos, 2023
Germany	Baltic	10	90	Lenz et al., 2023
Spain	North-East Atlantic	40	61	Asensio-Montesinos et al., 2020
Denmark	Baltic	1	43	Strand et al., 2016

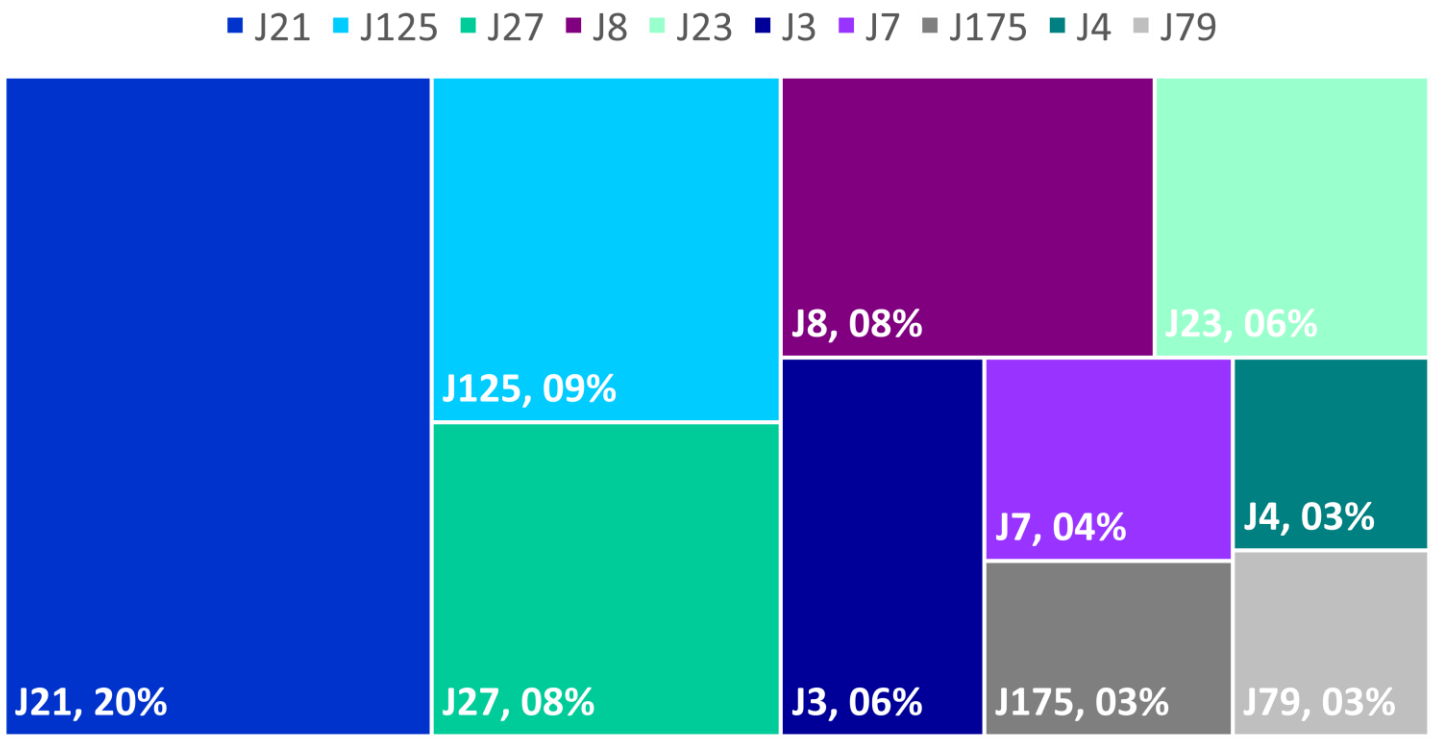
ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – COMPOSITION



ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – COMPOSITION

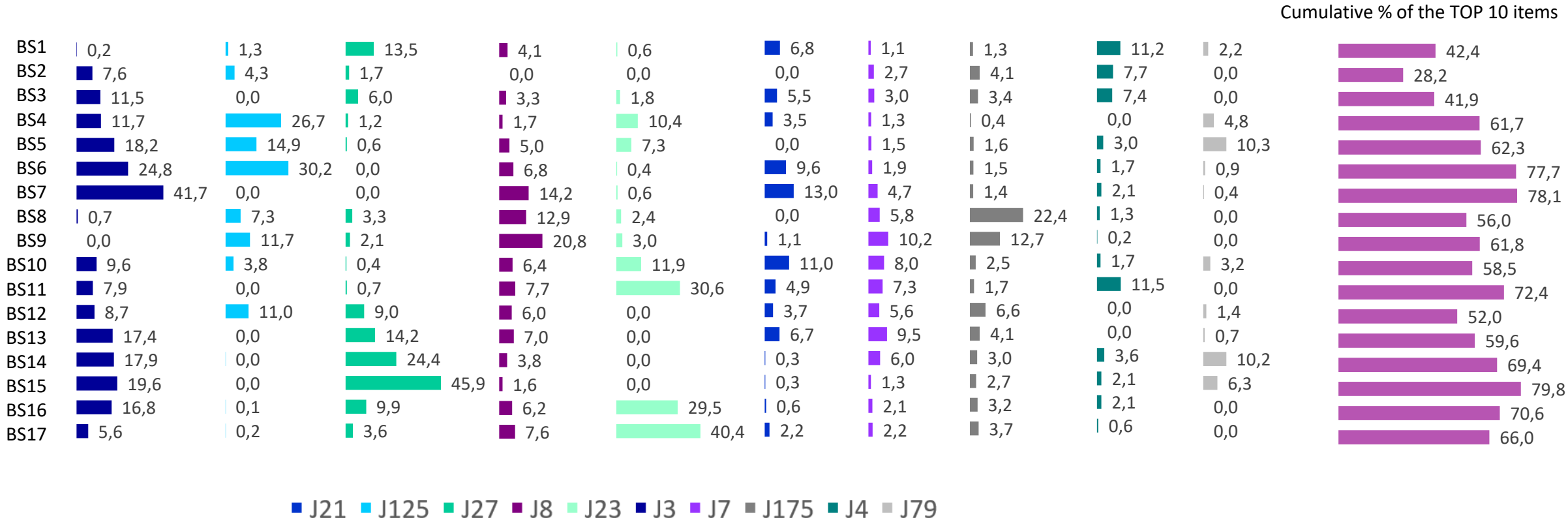
	Item code	Item name	Items count (n)	%
1	J21	Plastic caps/lids drinks	19,426	20.1
2	J125	Rubber balloons	8,304	8.6
3	J27	Tobacco products with filters (cigarette butts)	7,557	7.8
4	J8	Plastic drink bottles >0.5 l	7,253	7.5
5	J23	Plastic caps/lids unidentified	5,335	5.5
6	J3	Plastic shopping/carrier/grocery bags	5,281	5.5
7	J7	Plastic drink bottles ≤ 0.5 l	3,496	3.6
8	J175	Metal drinks cans	3,012	3.1
9	J4	Small plastic bags	2,638	2.7
10	J79	Fragments of non-foamed plastic 2.5cm ≥ ≤ 50cm	2,545	2.6
11	J30	Plastic crisps packets/sweets wrappers	2,392	2.5
12	J22	Plastic caps/lids chemicals, detergents (non-food)	1,595	1.6
13	J152	Paper cigarette packets	1,529	1.6
14	J224/225	Plastic food containers made of foamed polystyrene and of hard non-foamed plastic	1,254	1.3
15	J240/J241	Other identifiable foamed plastic items and non-foamed plastic items	1,235	1.3
16	J200	Glass bottles	1,198	1.2
17	J230/231	Plastic stirrers and plastic straws	1,076	1.1
18	J9	Plastic bottles and containers of cleaning products	970	1.0
19	J82	Fragments of foamed polystyrene 2.5 cm ≥ ≤ 50 cm	917	0.9
20	J177	Metal foil wrappers, aluminium foil	898	0.9

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – COMPOSITION



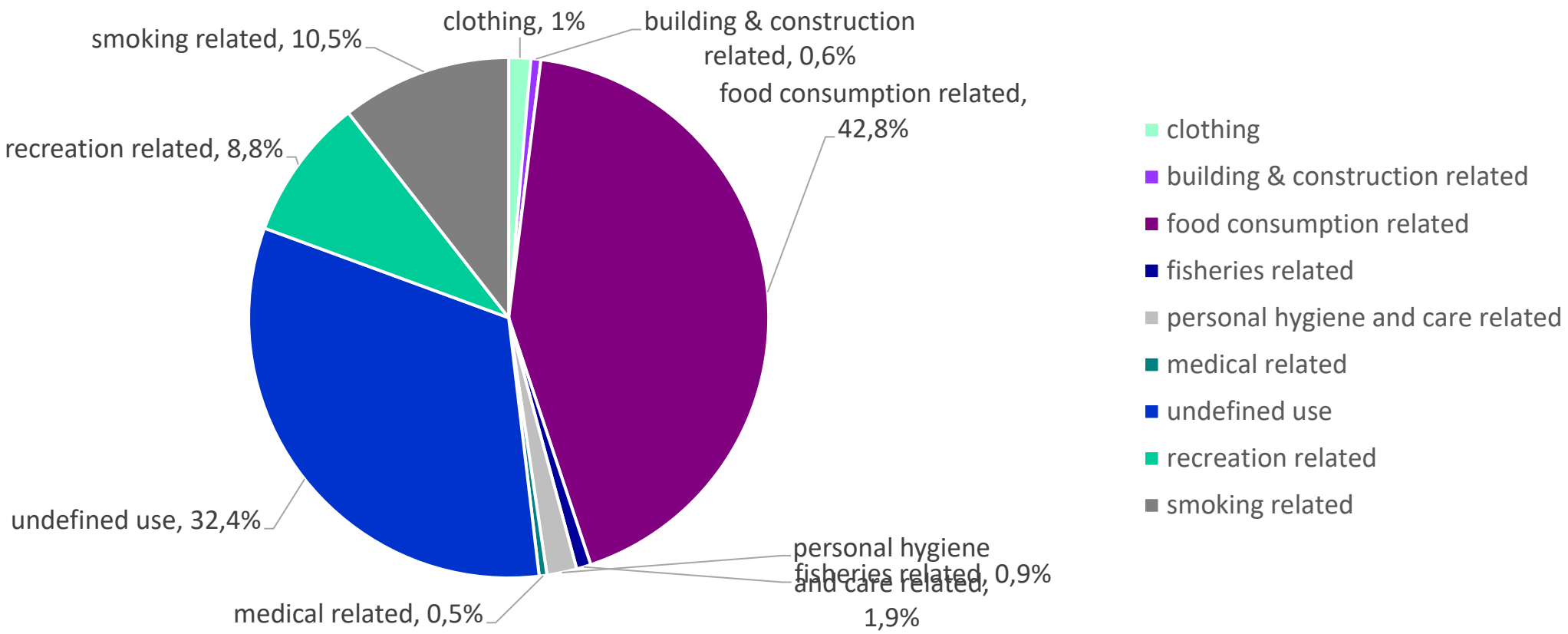
Aggregated results of the percentage (%) of the top 10 items across the 17 surveyed sites in Algeria (J21: Plastic caps/lids drinks, J125: Rubber balloons, J27: Tobacco products with filters, J8: Plastic drink bottles >0.5 l, J23: Plastic caps/lids unidentified, J3: Plastic shopping/carrier/grocery bags, J7: Plastic drink bottles ≤ 0.5 l, J175: Metal drinks cans, J4: Small plastic bags, J79: Fragments of non-foamed plastic 2.5cm ≥ ≤ 50cm).

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – COMPOSITION

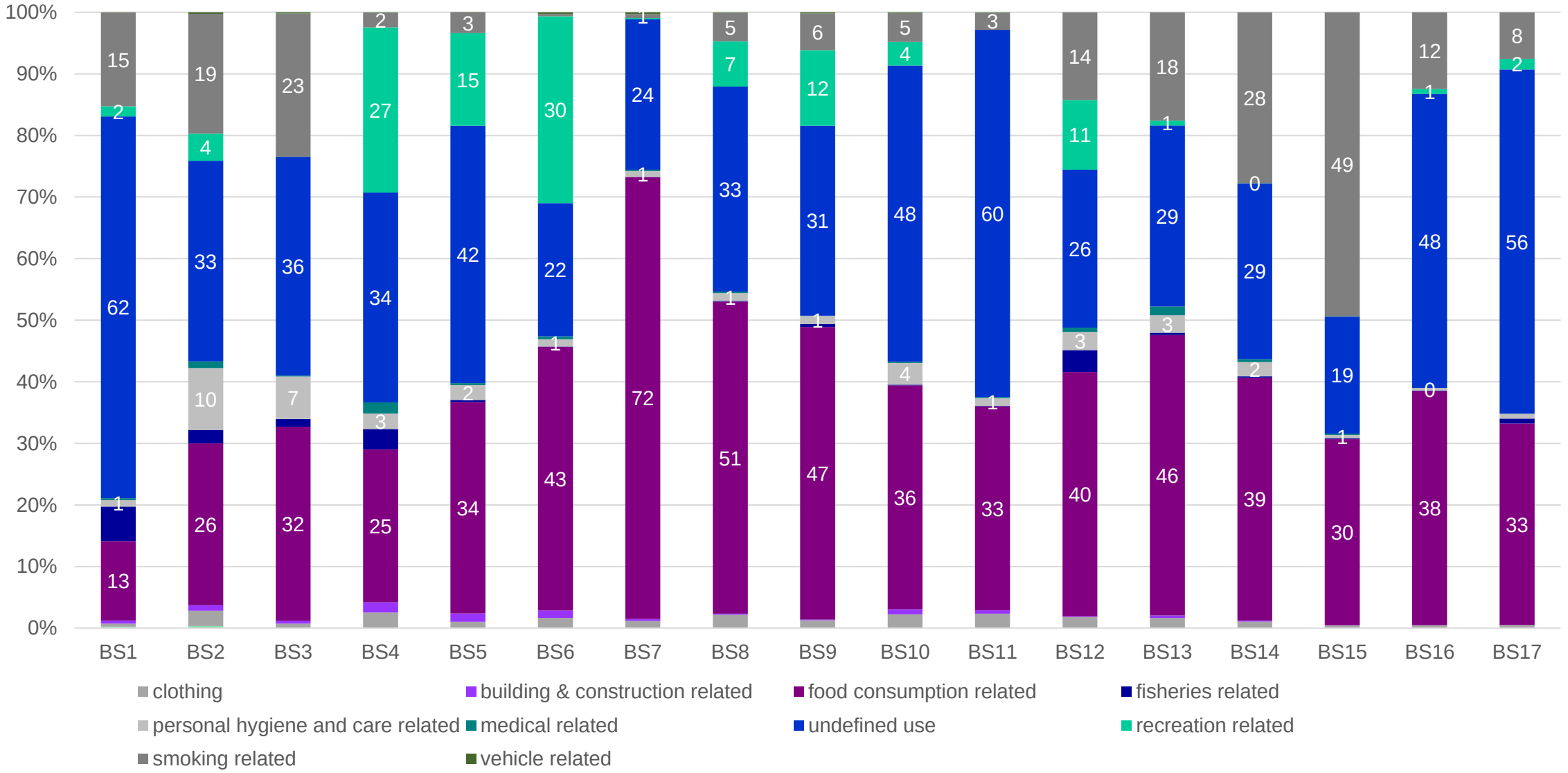


J21: Plastic caps/lids drinks, J125: Rubber balloons, J27: Tobacco products with filters, J8: Plastic drink bottles >0.5 l, J23: Plastic caps/lids unidentified, J3: Plastic shopping/carrier/grocery bags, J7: Plastic drink bottles ≤ 0.5 l, J175: Metal drinks cans, J4: Small plastic bags, J79: Fragments of non-foamed plastic 2.5cm ≥ ≤ 50cm.

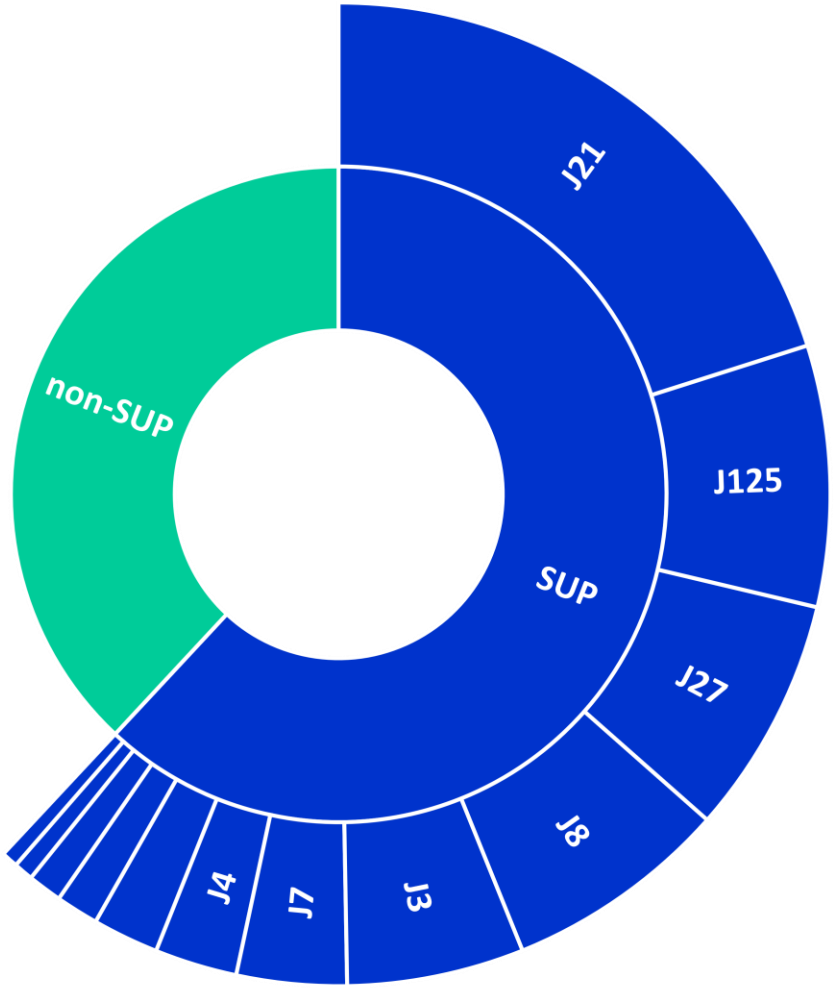
ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – SOURCES



ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – SOURCES



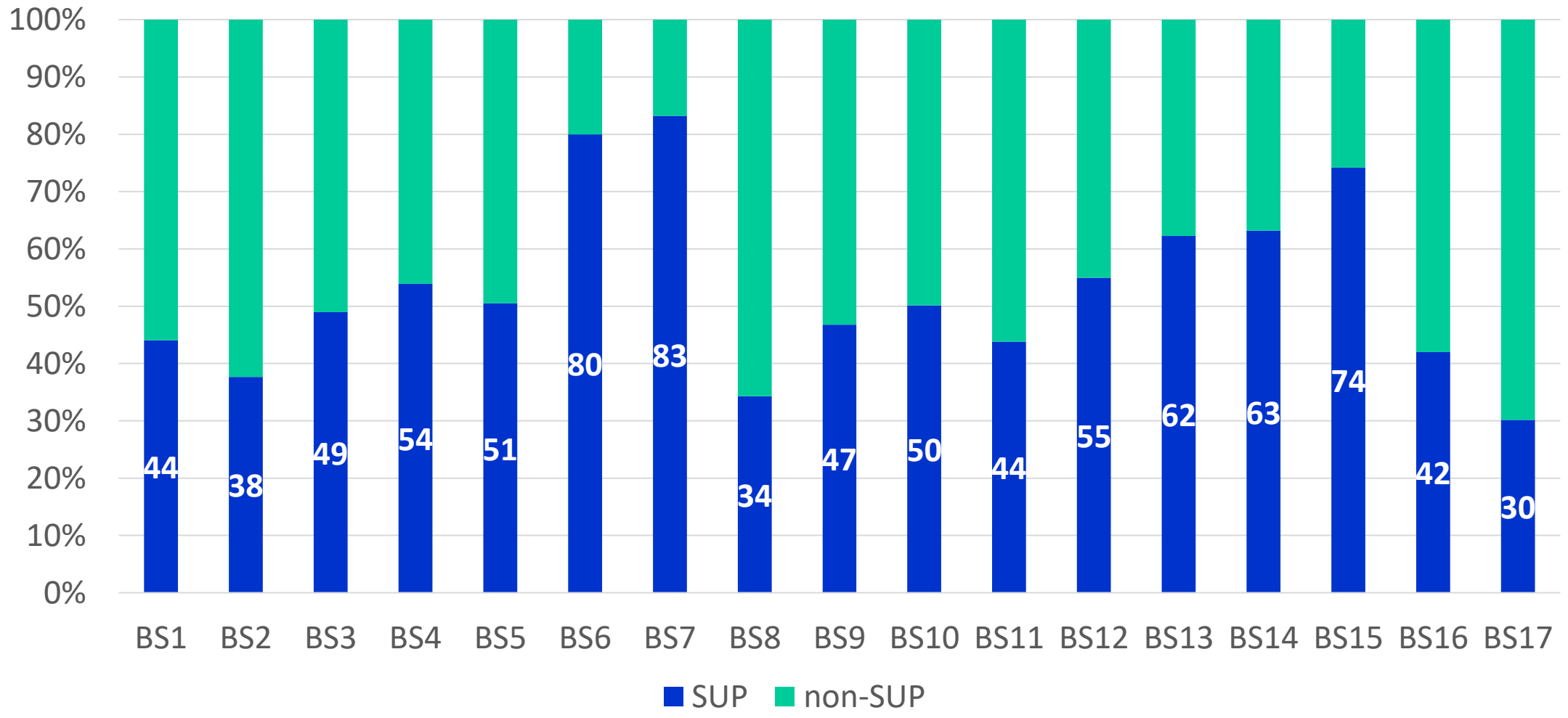
ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – SUPs



J21: plastic caps/lids drinks;
J125: rubber balloons
J27: tobacco products with filters
J8: plastic drink bottles >0.5 l
J3: plastic shopping/carrier/grocery bags
J7: plastic drink bottles ≤ 0.5 l
J4: small plastic bags
J30: plastic crisps packets/sweets wrappers

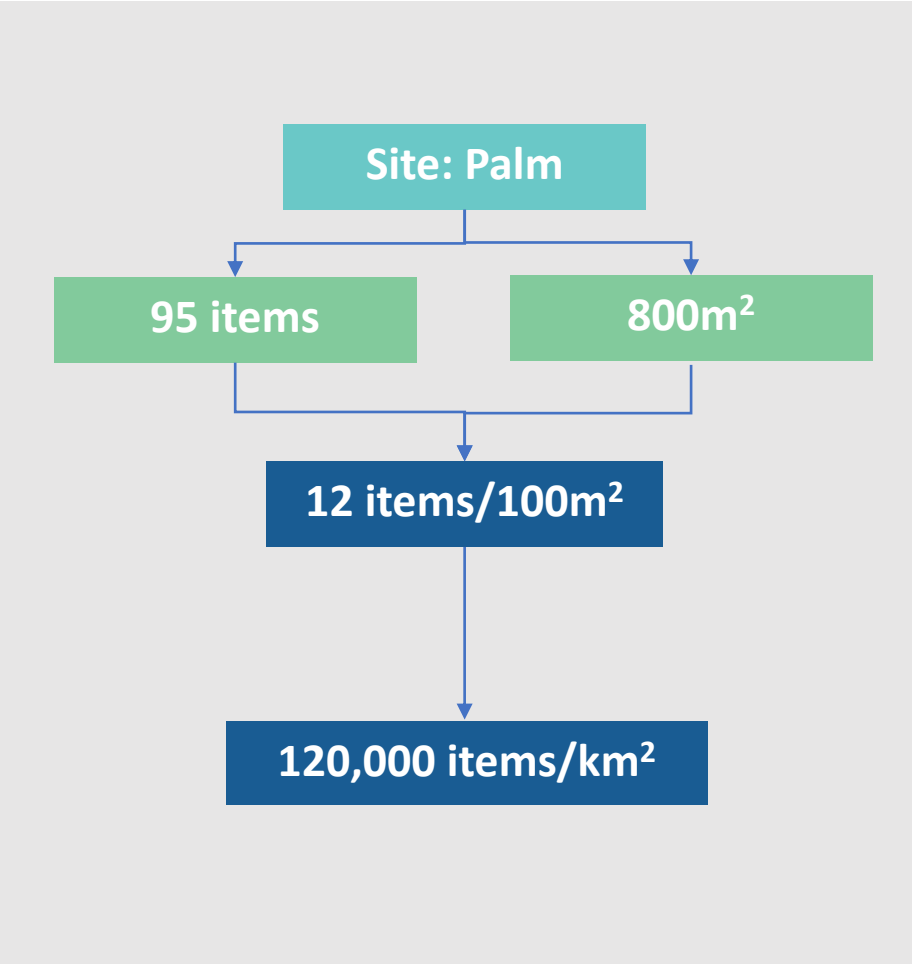
SUPs accounted for 63% of the total litter items collected

ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – SWIM-H2020 SM BEACH LITTER DATA – SUPs



53% of the investigated beaches had more than 50% of SUP

ASSESSING MARINE LITTER ON THE ALGERIAN SEAFLOOR – PLASTIC BUSTERS CAP SEAFLOOR LITTER DATA - DENSITY

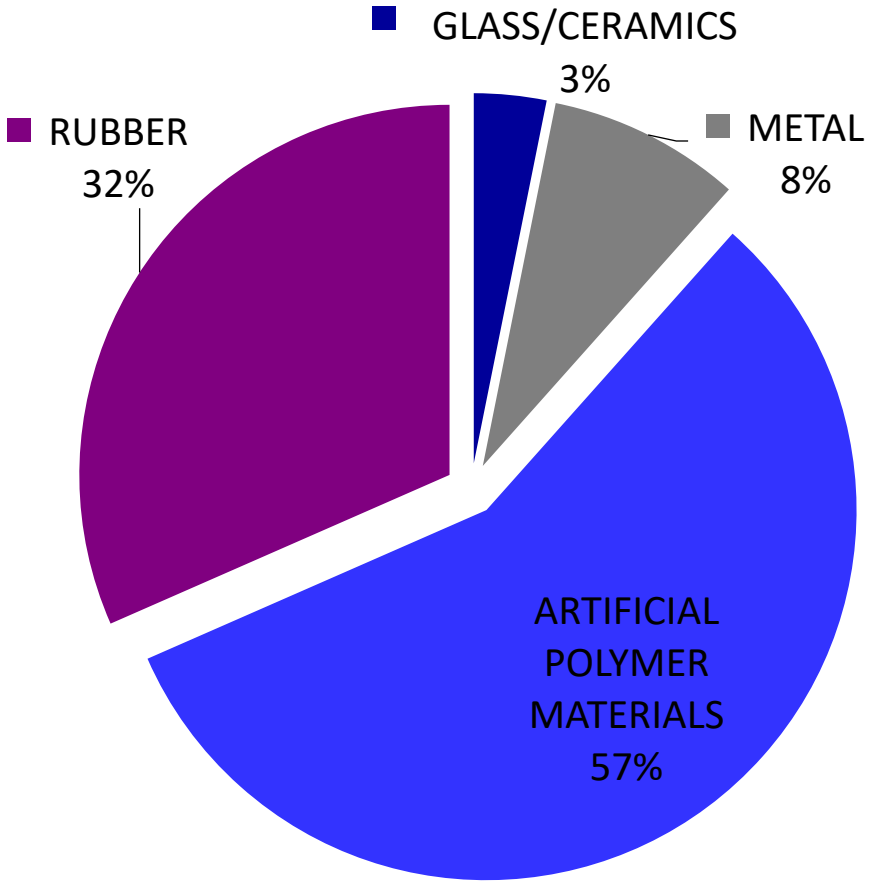


IMAP CI23
THRESHOLD VALUE

38 items/km²

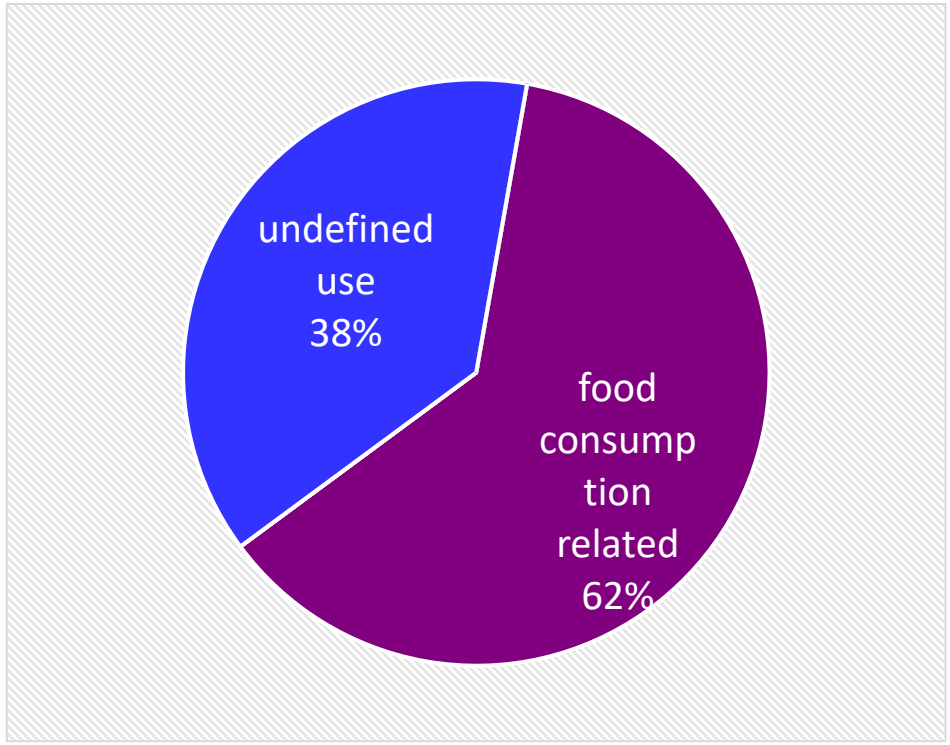
Mediterranean TV: 38 items/km²

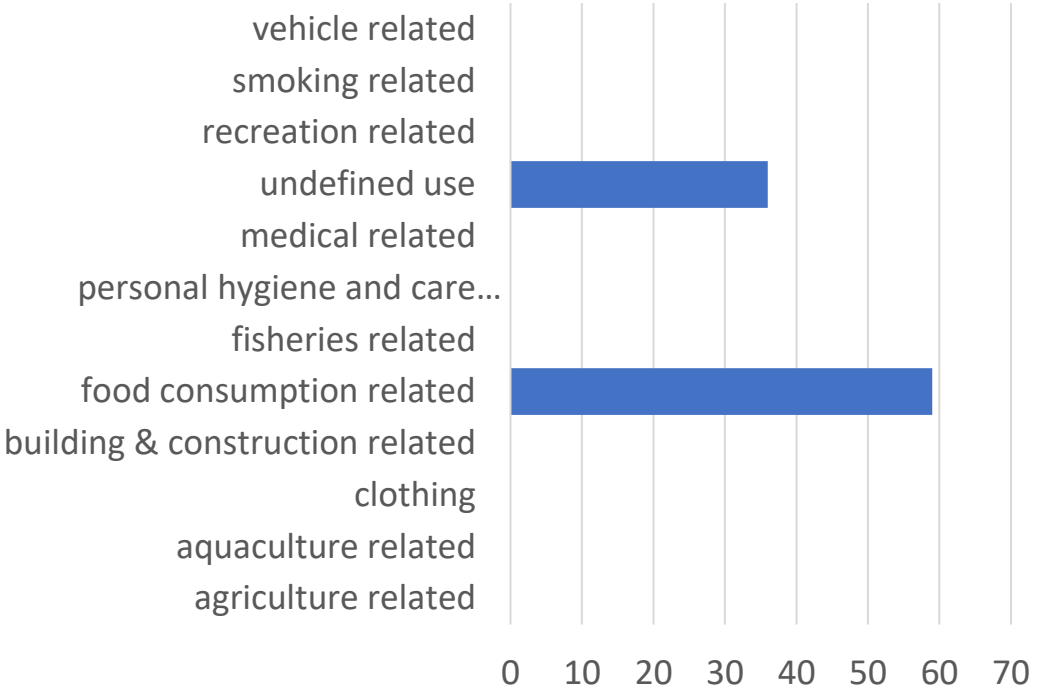
ASSESSING MARINE LITTER ON THE ALGERIAN SEAFLOOR – PLASTIC BUSTERS CAP SEAFLOOR LITTER DATA - COMPOSITION



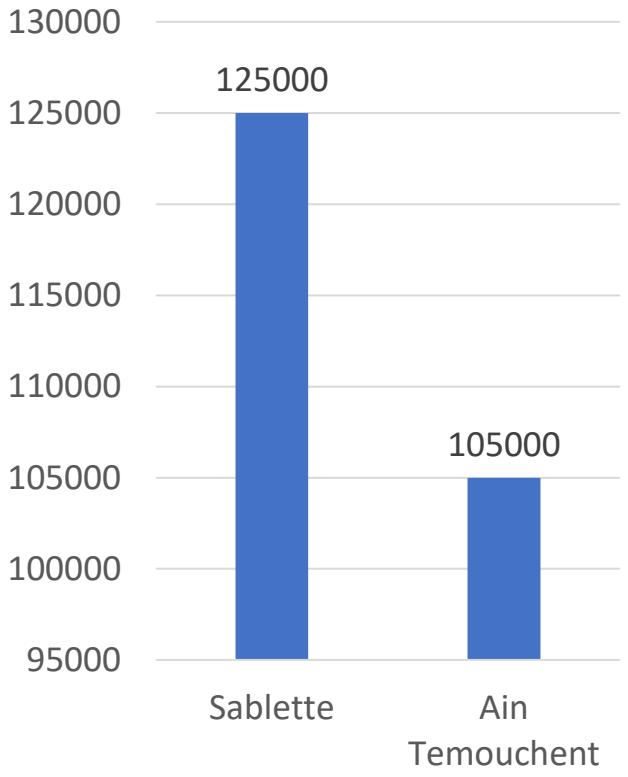
J226	cups and cup lids of foamed polystyrene	SUP	30
J248	rubber sheet		30
J8	plastic drink bottles >0.5 l	SUP	13
J225	plastic food containers made of hard non-foamed plastic	SUP	7
J176	metal food cans		5
J7	plastic drink bottles ≤ 0.5 l	SUP	4
J200	glass bottles		3
J198	other metal pieces 2.5cm ≥ ≤ 50cm		3

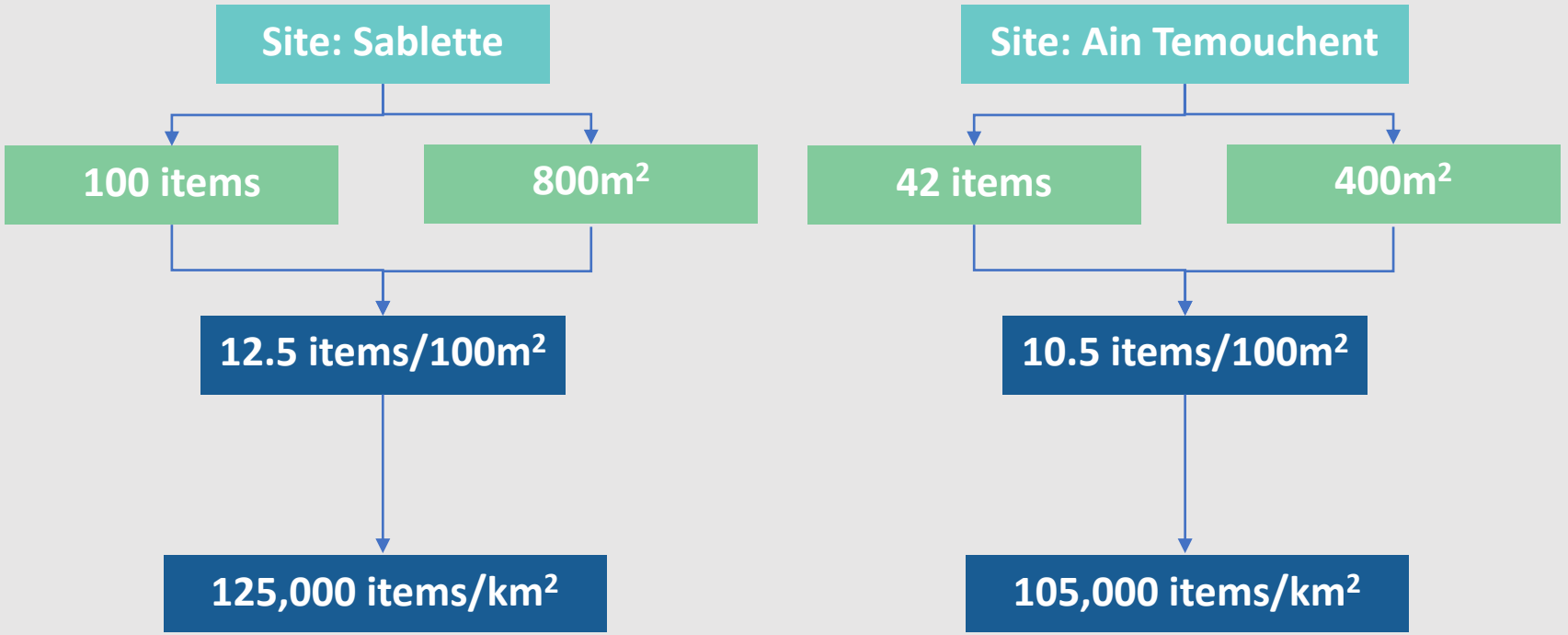
ASSESSING MARINE LITTER ON THE ALGERIAN SEAFLOOR – PLASTIC BUSTERS CAP SEAFLOOR LITTER DATA - SOURCES





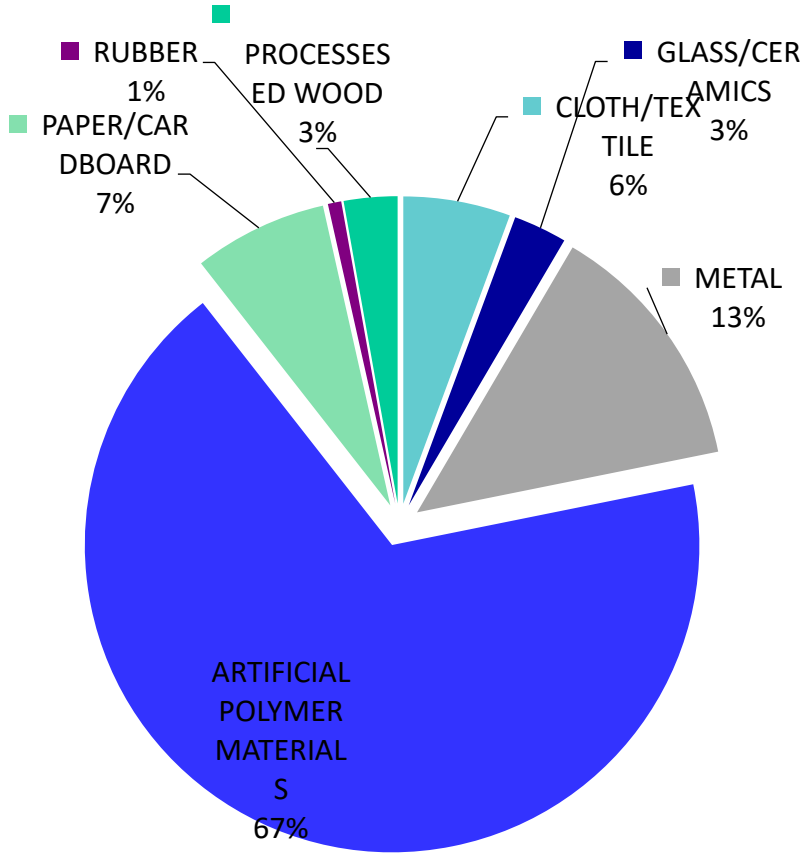
ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – WES SEAFLOOR LITTER DATA - DENSITY





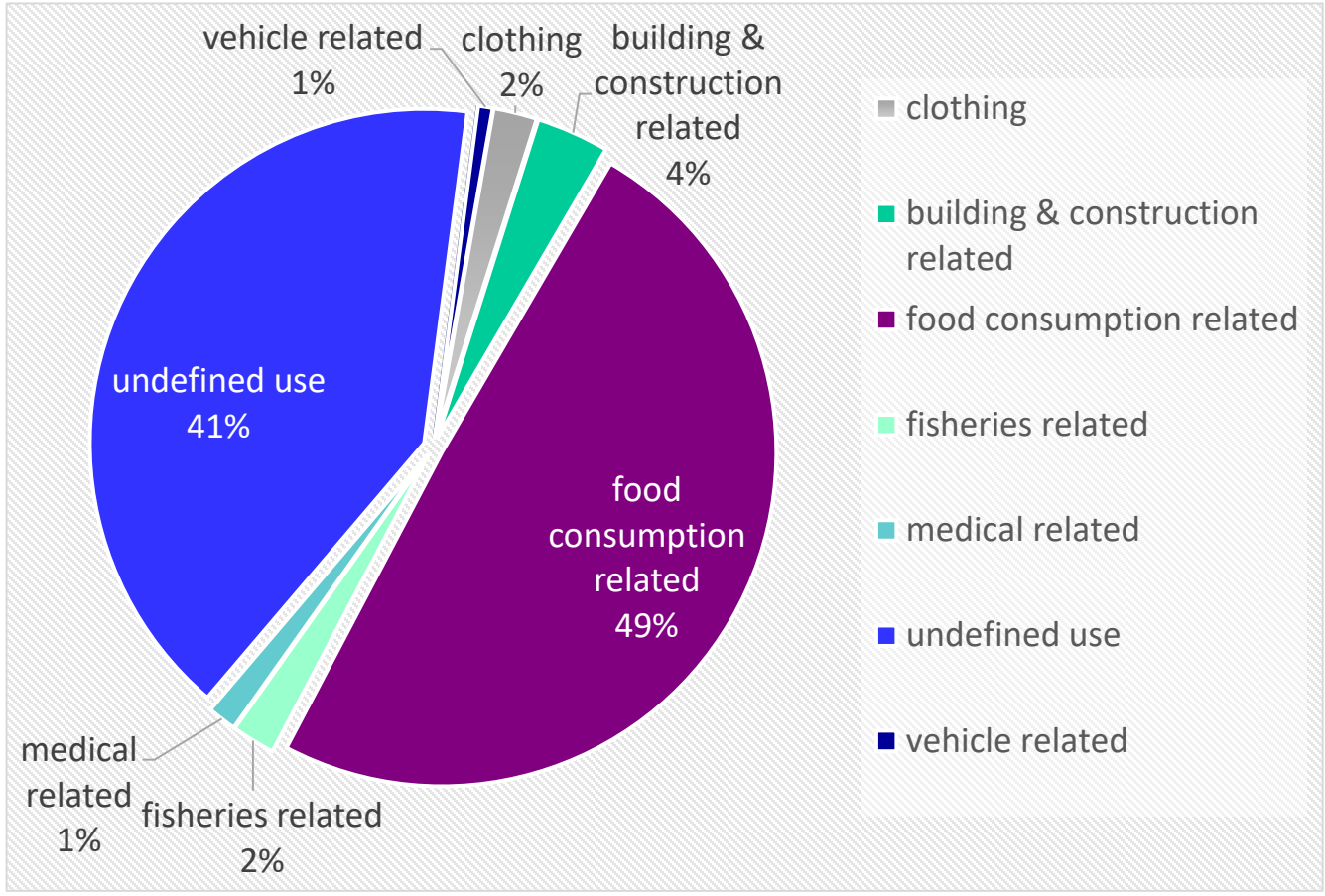
Mediterranean TV: 38 items/km²

ASSESSING MARINE LITTER ON THE ALGERIAN SEAFLOOR
WES SEAFLOOR LITTER DATA - COMPOSITION



TOP 1	J3	plastic shopping/carrier/grocery bags	32	31 %
TOP 2	J8	plastic drink bottles >0.5 l	23	23 %
TOP 3	J7	plastic drink bottles ≤ 0.5 l	16	16 %
TOP 4	J175	metal drinks cans	11	11 %
TOP 5	J141	cloth textile carpet & furnishing	7	7 %

ASSESSING MARINE LITTER ON THE ALGERIAN SEAFLOOR – WES SEAFLOOR LITTER DATA - SOURCES



ASSESSING MARINE LITTER ON THE ALGERIAN COASTLINE – PLASTIC BUSTERS CAP SEAFLOOR LITTER DATA - DENSITY

Area	Depth (m)	items/100 m^2	Plastic (%)	Source
Adriatic Sea	3-24	2.78 ± 3.35	36	Vlachogianni, et al., 2017
Gulf of Aqaba, Red Sea	0-10	280	42	Abu-Hilal and Al-Najjar, 2009
N. Hawaiian Island, Lisianski Island	10	$0.4*10^{-3} – 6.2*10^{-3}$	-	Donohue et al., 2001
Gray's Reef National Marine Sanctuary, USA	16-20	0.52 ± 0.11	-	Bauer et al., 2008
Eastern Mediterranean Sea, Greece	0-25	1.5	55.47	Katsanevakis and Katsarou, 2004

Thank you for your attention!

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