

SWIM and Horizon 2020 Support Mechanism

Working for a Sustainable Mediterranean, Caring for our Future

MONITORING MARINE LITTER ON BEACHES – DATA ANALYSIS

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ASSESSMENT OF MARINE LITTER IN THE EGYPTIAN MEDITERRANEAN COASTLINE

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Macro-debris density is calculated as follows (Lippiatt et al., 2013):

$$C_M = n / (w \times l),$$

where C_M is the density of litter items per m^2 , w and l are the width and length of the sampling unit respectively.



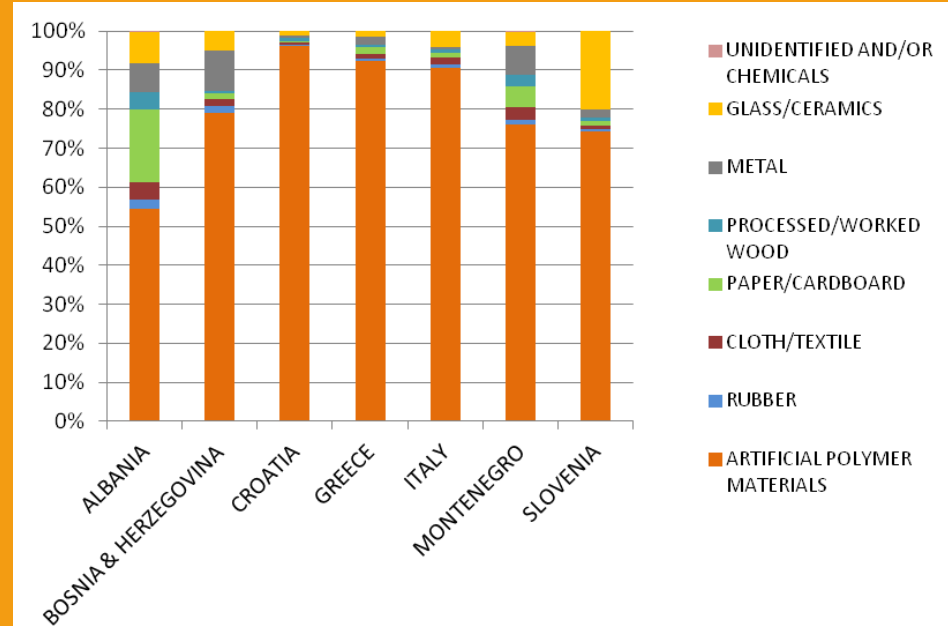
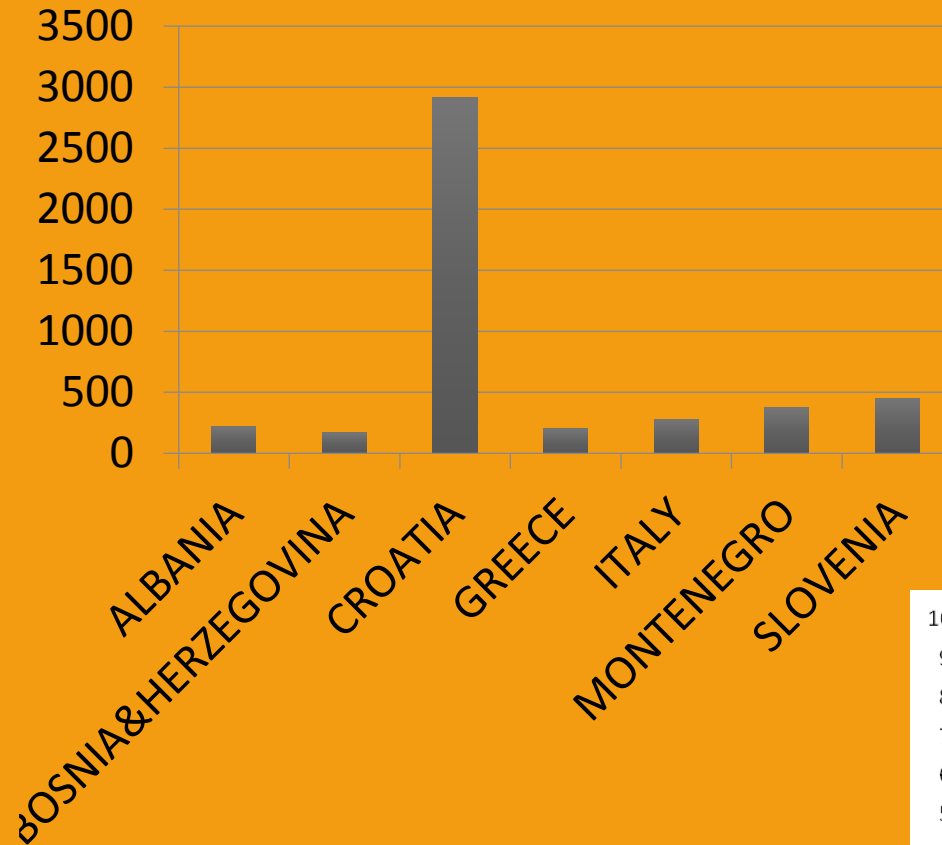
Beach cleanliness can be assessed through the Clean Coast Index (Alkalay et al., 2007):

Clean Coast Index (CCI) = (Total litter on sampling unit/total area of sampling unit) x K,

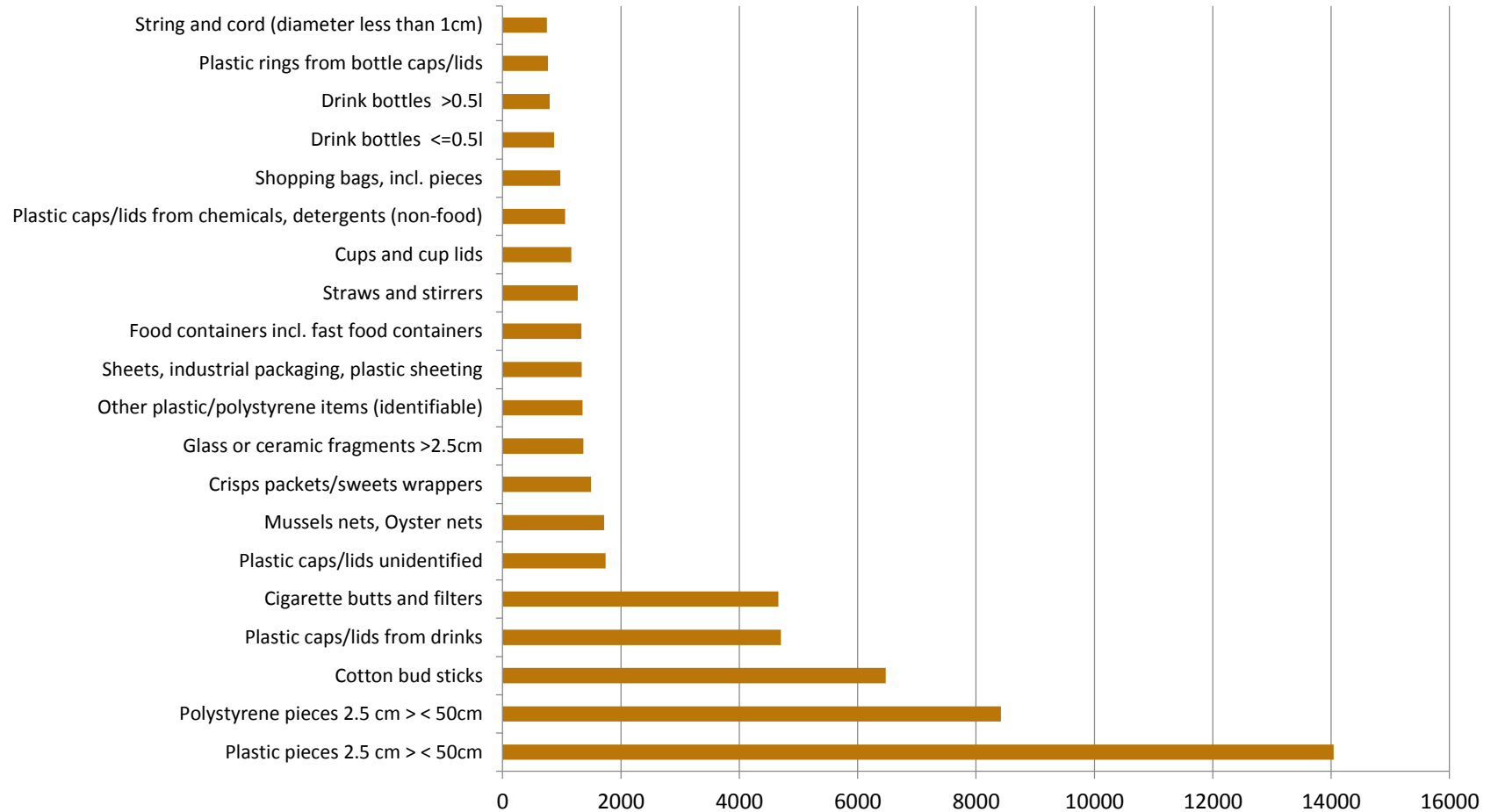
where CCI is the number of litter items per m², the total area of the sampling unit is generated by multiplying the sampling unit's length with the width and K is a constant that equals to 20.

Quality	Value	Definition
Very clean	0-2	No litter is seen
Clean	2-5	No litter is seen over a large area
Moderate	5-10	A few pieces of litter can be detected
Dirty	10-20	A lot of litter on shore
Very dirty	20+	Most of the beach is covered with litter

Abundance and composition of beach litter



TOP 20 ITEMS

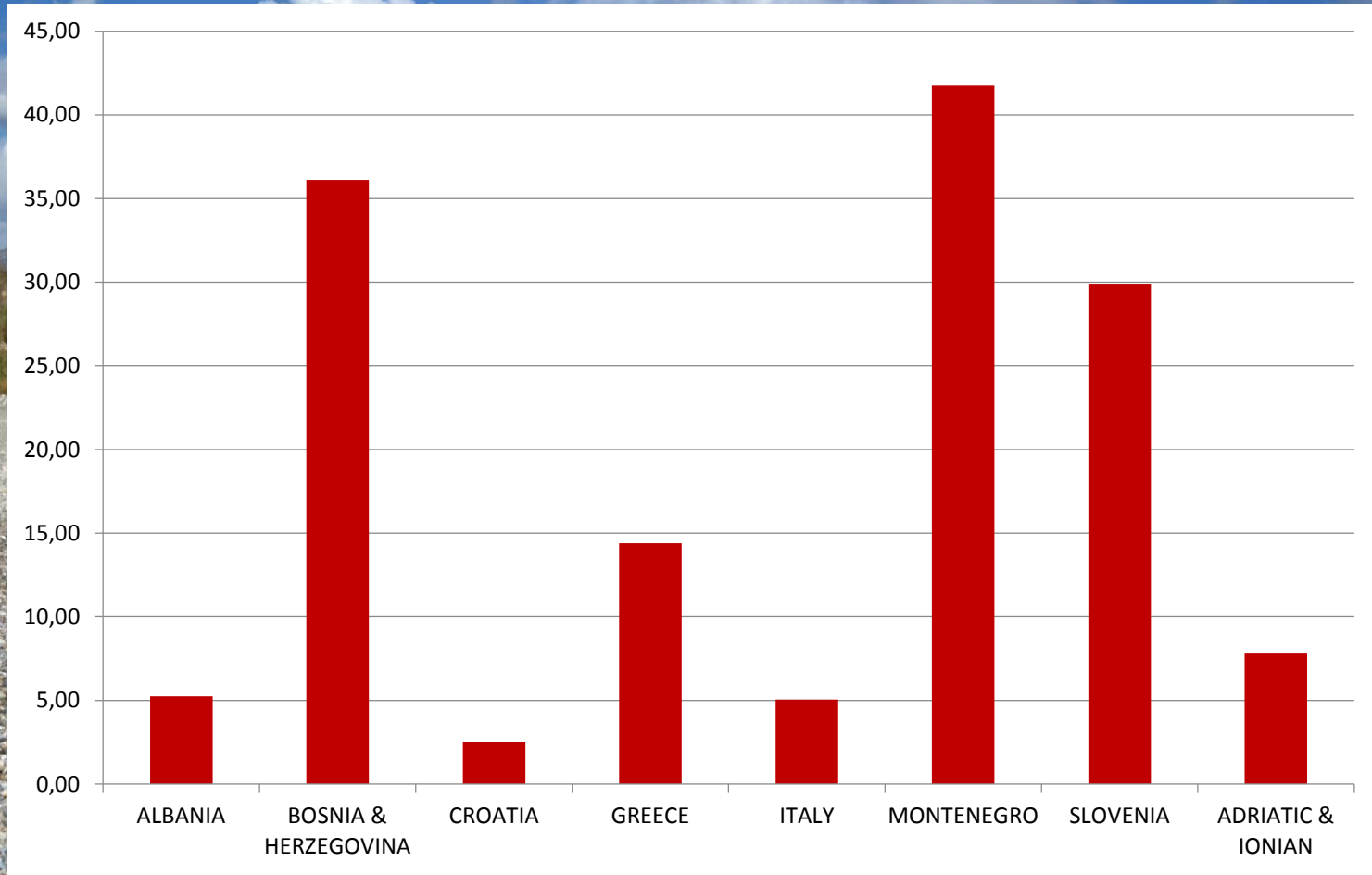


- ✓ **Shoreline, tourism and recreational activities.** Litter items that are attributed to this source include those generated by land-based activities, such as tourism and recreation (beachgoers, sports and recreation businesses, beach bars, hotels, festivals, mismanaged waste at the beaches, etc.) as well as litter produced inland and carried by winds, storms and rivers as a result of poor waste management by municipalities. Indicative items are shopping bags, drink bottles, food containers, straws and stirrers, etc.
- ✓ **Fisheries and aquaculture.** Litter items that are attributed to this source include those items that are exclusively generated from commercial and recreational fishing and aquaculture farms. Indicative items are crab and lobster pots, octopus pots, mussel nets and oyster nets, fishing nets, fish boxes, etc.

- ✓ **Shipping.** Litter items that are attributed to this source include those items that have been generated by any kind of vessel such as recreational boats, fishing boats, cruise ships, ferries, etc. Indicative items are engine oil bottles and containers, jerry cans, gloves (industrial/professional rubber gloves), oil drums, etc.
- ✓ **Fly-tipping.** Litter items that are attributed to this source include those items that have been disposed illegally. Indicative items are car parts, traffic cones, construction waste, appliances (refrigerators, washing machines, etc.), etc.
- ✓ **Sanitary and sewage related.** Litter items that are attributed to this source include sanitary, personal hygiene and care items that have been disposed improperly. These items may come from consumers who dispose them on the coast or flash them down the toilet, thus reaching the coastal and marine environment through the sewage outlets and systems. They may also come from mismanaged waste on the coast or at sea. Indicative items are cotton bud sticks, diapers and nappies, condoms (incl. packaging), tampons and tampon applicators, etc.

- ✓ **Medical related.** Litter items that are attributed to this source include items that come from improper disposal of pharmaceuticals and medical products, either by individuals or medical units and mismanaged hospital waste. Indicative items are syringes and needles, medical and pharmaceuticals containers, etc.
- ✓ **Agriculture.** Litter items that are attributed to this source are generated by agricultural activities. Indicative items are: fertilizer and animal feed bags, olive harvesting nets, greenhouse sheeting, flower pots from retailer plant nurseries, etc.
- ✓ **Non-sourced.** Within this category are classified all items that cannot be attributed to any of the aforementioned sources, either because they could have been generated by several sources, or they are too small or damaged/weathered to be identified. Indicative items are foam sponge, buckets, gloves, small plastic or polystyrene pieces, etc.

SMOKING RELATED ITEMS



Indicative beach litter densities reported worldwide ***(Munari et al., 2016).***

Study area	No of surveyed beaches	Averaged litter density (items/m ²)	Reference
Australia	6	0.1	Cunningham & Wilson, 2003
Brazil	10	0.14	Oigman-Pszczol & Creed, 2007
Chile	43	1.8	Bravo et al., 2009
Japan	18	3.4	Kusui & Noda, 2003
Jordan	3	4	Abu-Hilal & Al-Najjar, 2004
Russia	8	0.2	Kusui & Noda, 2003
South Korea	6	1	Lee et al., 2013
Taiwan	6	0.15	Kuo & Huang, 2014
Tasmania	9	0.28	Slavin et al., 2012
Turkey	10	0.88	Topçu et al., 2013



GROUP WORK

- ✓ Quantify the litter items per 100m stretch and per square meter of surveyed area. **Express results in litter counts/100m and litter counts/m²**, respectively.
- ✓ Quantify litter items per category type (artificial polymer materials, rubber, cloth/textile, paper/cardboard, processed/worked wood, metal, glass/ceramics, etc.). **Present results in a pie chart expressing item counts per litter category type in percentages.**
- ✓ **Identify the top 20 litter items based on counts of items.** Present results in a bar chart.
- ✓ **Try to identify the human induced activities (tourism and recreational activities, fishing, shipping, industrial activities, etc.) that generated the litter items in your top 20 list of items.** What do you observe? What conclusions can be drawn regarding the sources of litter in the surveyed area?
- ✓ **Identify and propose possible targeted actions/measures to tackle the sources of selected litter items from your top 20 list.** Assess and discuss the effectiveness and feasibility of the identified actions/measures. Select the most effective and implementable one.

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Thank you for your attention!

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