Is the loggerhead *Caretta caretta* a good indicator of plastic ingestion also at local scale?

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Introduction

The European Commission drafted the 2008/56/EC Marine Strategy Framework Directive with the aim to achieve a Good Environmental Status (GES) in 2020. In 2011 Italy promoted the loggerhead sea turtle (*Caretta caretta*, Linnaeus 1758) as target species for monitoring the amount and composition of litter ingested by marine animals and then it has been accepted among MSFD Indicators and under the UNEP/MAP Barcelona Convention ecological objective, at sub-regional level.

In this study we investigate the possibility to use the loggerhead turtle as indicator of plastic impact at local level

Materials and methods

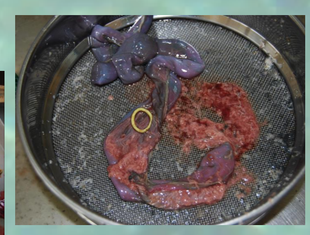
Sampling and analysis

From 2008 to 2017, 119 death loggerhead sea turtles have been collected stranded or by-catch along Latium (N=62, ●) and Sardinian (N=57, ●) coastal areas, Italy (Western Mediterranean sub-Regions)

Marine litter ingestion occurrence was investigated during necropsies and lab analysis. Plastic items were separated from other ingested residual and subdivided into 6 different subcategories established by "Monitoring Marine Litter Impacts on Sea Turtles — Protocol for the Collection of Data on Ingestion and Entanglement in the Loggerhead Turtle", within the INDICIT project (*https://indicit-europa.eu*)

QR Code (Protocol)

Analysis of loggerhead sea turtles and Marine Litter ingested



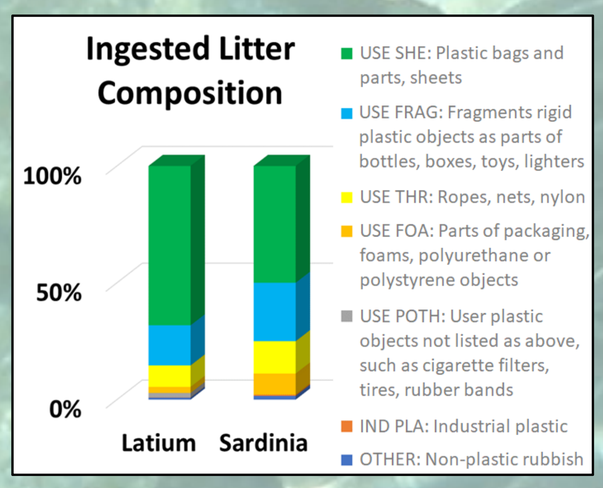
Data analysis

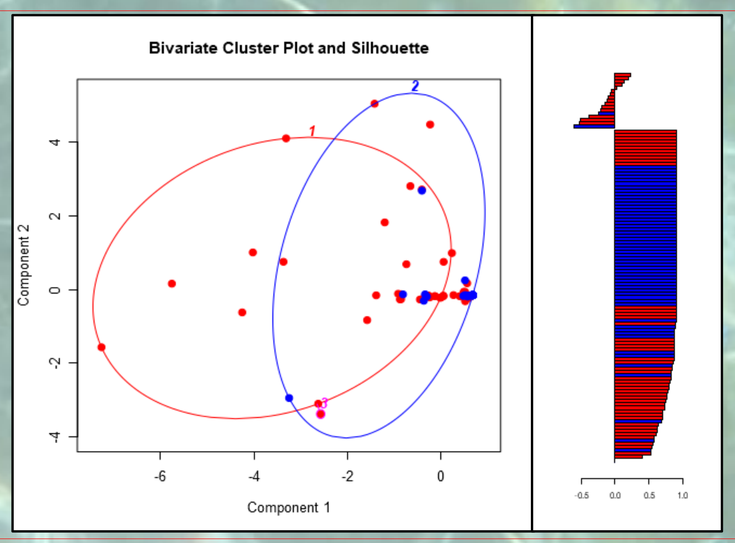
Plastic ingestion was evaluated in terms of Frequency of Occurrence (FO), number of items collected and of their dry mass. This data was primarily used in descriptive way to assess the possible existence of local differences. Considering data about dry mass of ingested types of plastic, multivariate cluster analysis was used to detect possible relations with the provenience area

Results

Plastic ingestion has been detected on the entire sample with a FO=54.2%. In total, 106.14 g (dry mass) and 1103 items (abundance) of marine litter were collected with an average value of 0.9 ± 0.2 g and 9 ± 2 items

Among the impacted turtles, parts of plastic bags and other sheet fragments (SHE) were the main categories in terms of abundance (17 ± 3 items) in both areas



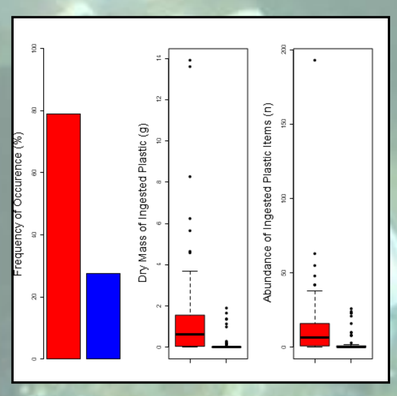


The two components of the bivariate cluster plot explain 47.91% of the point variability (Average Silhouette Width = 0.70). This analysis consider quantity and composition of ingested marine litter and shows how Sardinian samples (●) are closer to non impacted turtles of both areas than impacted turtles from Latium

"Partitioning Around Medoids" (PAM) algorithm is useful to identify representative samples (named as medoids) and confirming the geographical interpretability of the observed groups structure

Cluster	Medoids	Dry Mass of Ingested Marine Litter (g)					
		IND PLA	USE SHE	USE THR	USE FOA	USE FRAG	USE POTH
1	L41	0.000	1.560	0.021	0.000	0.440	0.000
2	S57	0.000	0.000	0.000	0.000	0.000	0.000
3	L44	0.000	0.030	13.57	0.000	0.000	0.000

At local level, FO, dry mass and number of items between the two areas showed significant differences



Area	FO	Ingested Marine Litter per sample	
		Abundance (N° of items)	Dry Mass (g)
Latium	79.0%	15 ± 4	1.55 ± 0.35
Sardinia	27.6%	3 ± 1	0.17 ± 0.06

Discussion

This study shows that, even if sea turtles are migratory species and marine litter move according to the current and tide, the loggerhead could give information on plastic impact also at local scale. Further studies and processing data from other areas are needed to give strength to what is described

References

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