2014 - 2020 Interreg V-A
Italy - Croatia CBC Programme
Call for proposal 2019 Strategic

MARLESS (MARine Litter cross-border awarenESS and innovation actions)

Priority Axis: Environment and cultural heritage; Specific objective: 3.3 - Improve the environmental quality conditions of the sea and coastal area by use of sustainable and innovative technologies and approaches

D4.2.3: Assessment of the quantity and composition of marine litter on at least 2 beaches for the 5 regions included in this activity

Activity 4.2

WP4

Version: FINAL
Distribution: PUBLIC
Date: 30/06/2023

PROJECT MARLESS

Work Package:	**WP4 Awareness raising and governance**
Activity:	**Activity 4.2 Sensitising the touristic sector**
WP Leader:	**PP10 REGIONE PUGLIA**
Deliverable:	D4.2.3: Assessment of the quantity and composition of marine litter on at least 2 beaches for the 5 regions included in this activity

Version:	**Final**	**Date:**	**30/06/2023**
Type:	**Report**		
Availability:	Public		
Responsible Partner:	Autonomous Region Friuli Venezia Giulia		
Involved Partner	ARPA FVG		
Editor:	ARPA FVG		
Contributors:	/		

If needed:

DISCLAIMER : PP2 reflects the project MARLESS views; the IT-HR Programme authorities are not liable for any use that may be made of the information contained therein.

Sensitizing the Touristic Sector

Activity Deliverable (4.2)

Assessment of the quantity and composition of marine litter on at least 2 beaches for each one of the 6 region

WP4
Activity 4.2

Deliverable: D.4.2
Version: draft
Confidential level: Partnership
Date of release: 30/06/2023

1

1. Introduction

This deliverable contributes in achieving the objectives of WP4, in particular those define in the frame of Activity 4.2, which aim is to sensitize the touristic sector by actively involving concessionaires of beaches (e.g. hotel companies) in the marine litter assessment and by applying preservation measures proposed according data analysis results deriving from WP3 Monitoring activities

It is well known that beaches under concession are cleaned daily which is allowing a considerable amount of data concerning quantity and composition of marine litter to be collected.

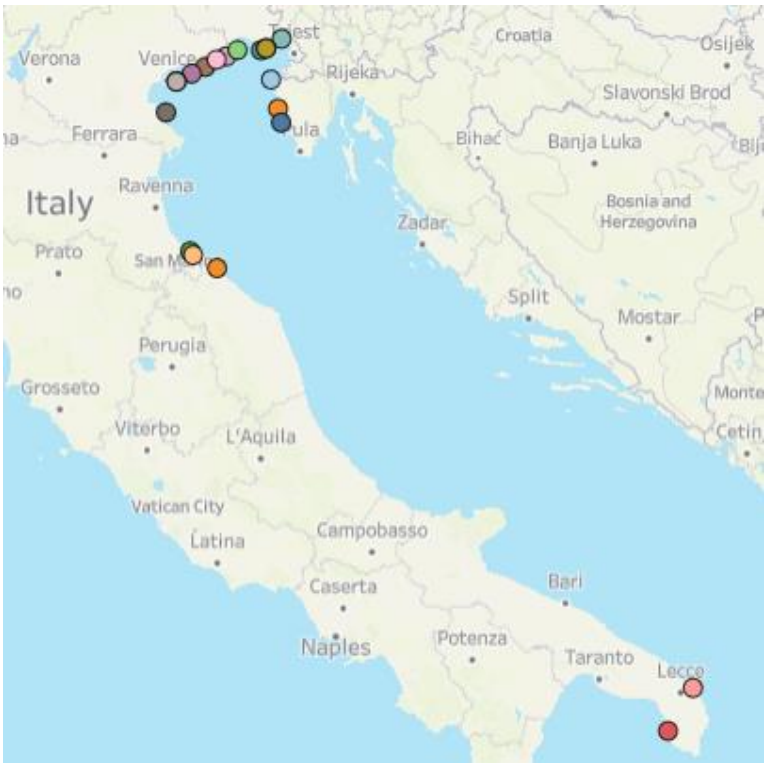
MARLESS project foresees the collection of beached Marine Litter in each project region on at least 2 beaches, randomly once a week per 1 year. To assure the comparison of this supplemental monitoring activity with the project campaigns the concessionaires of beaches have been trained by Project partners in collecting the beached material according the prescribed methodology.

This deliverable presents the analyses of the data collected by concessionaires of beaches The quantity, composition and distribution of Marine Litter is presented, furthermore an interactive tool is let available for digging deeply in the details of each beach and Marine Litter class.

It is expected that the results of this data analysis, stimulates active measures in touristic sector for the conservation of the marine environment. Those measures will be proposed with the support of the Technical Group that manages WP3.

2. Monitored beaches

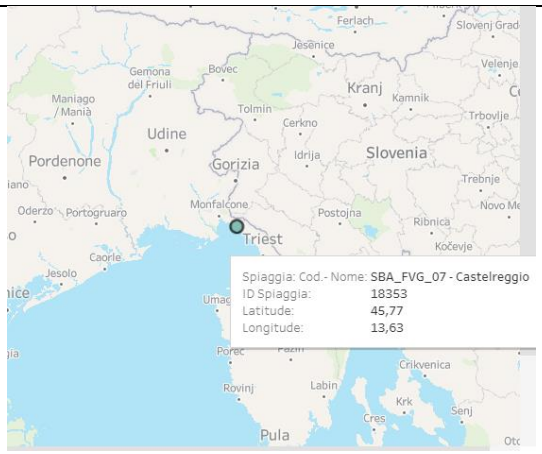
The number of monitored beaches is 20 and they are located mainly in the Northern Adriatic, but one in the southern Italian coast. The database includes also a beach facing the Ionia sea; it is reported for comparison with the other sampling areas and in particular that of the Southern Adriatic sector. The monitoring refers to summer seasons 2021 and 2022.

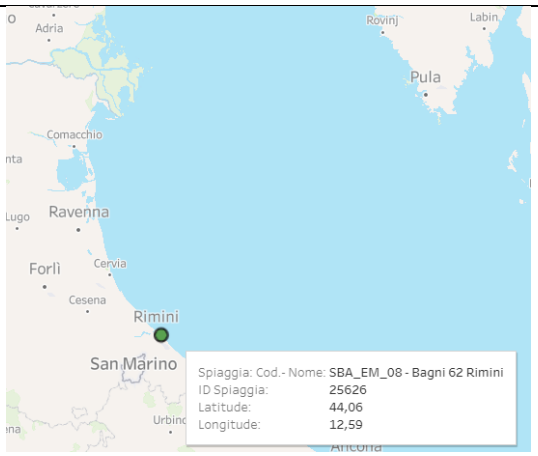


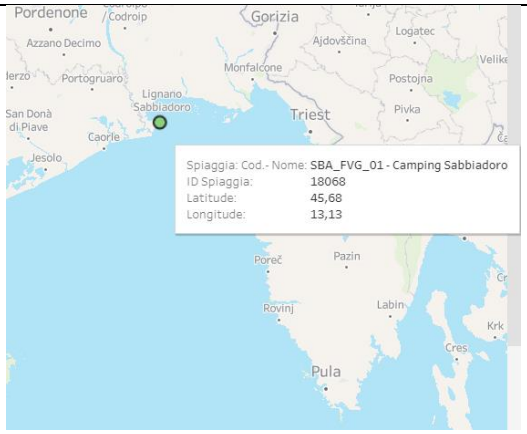
3

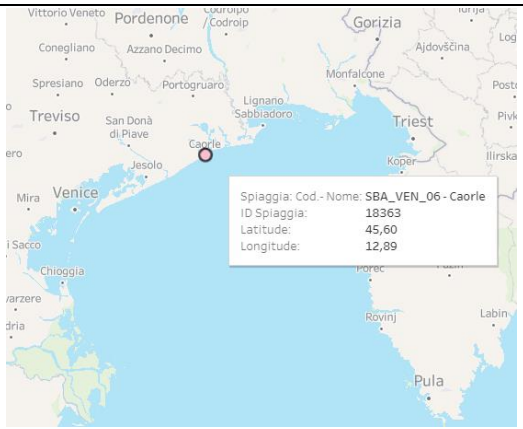
3. Spatial distribution of Marine Litter Italian coast

The number of collected items top very close to 18.000, in the Castelreggio beach (SBA_FVG_07), in the northeastern Adriatic sector, followed by a beach in the central Adriatic, Bagni 62 Romagna (SBA_EM_08), with more than 15.000 items. This beach reveals also the largest number of pieces collected during a seasonal campaign, namely the August 2022 (11.268 collected items).









Other two beaches complete the view of the geographical areas where the Marine Litter have been found in large numbers; they are Camping Sabbiadoro (SBA_FVG_01) and Caorle (SBA_VEN_06).

In the table reported here below the number of items collected in each of the monitored beach is presented with largest figure highlighted in color.

	2021			2022		
Spiaggia: Cod.-Nome	*Luglio*	*Agosto*	*Settembre*	*Luglio*	*Agosto*	*Settembre*
SBA_FVG07-Castelreggio	4931	2966		5000	4535	552
SBA_EM_08-Bagni 62 Rimini				3101	11268	2424
SBA _VEN_06-Caorle	410	6958	765		4805	1383
SBA_FVG_01-Camping Sabbiadoro	2543	3581		1574	1180	
SBA_EM_07-Bagni 149 Miramare				2076	3303	1293
SBA_EM_06-Bagni Bahia Pesaro				1378	3879	764
SBA _FVG_05-GIT				2236	2182	
SBA_VEN_10-Bibione	41	1026	256	565	1043	208
SBA_VEN_11-Eraclea		1156	828			
SBA_VEN_09-Jesolo		1817	101			
SBA_PUG_01-ECO RESORT LE SIRENE				565	924	306
SBA_FVG_04-Camping Europa	69	324	85			
SBA_PUG_02-SOLELUNA				128	129	84
SBA _VEN_05-Cavallino	79	159	10	12		
SBA_FVG_03-Camping Punta Spin				53	48	
SBA _VEN_03-Verde						3
SBA _VEN_04-Punta						1

5

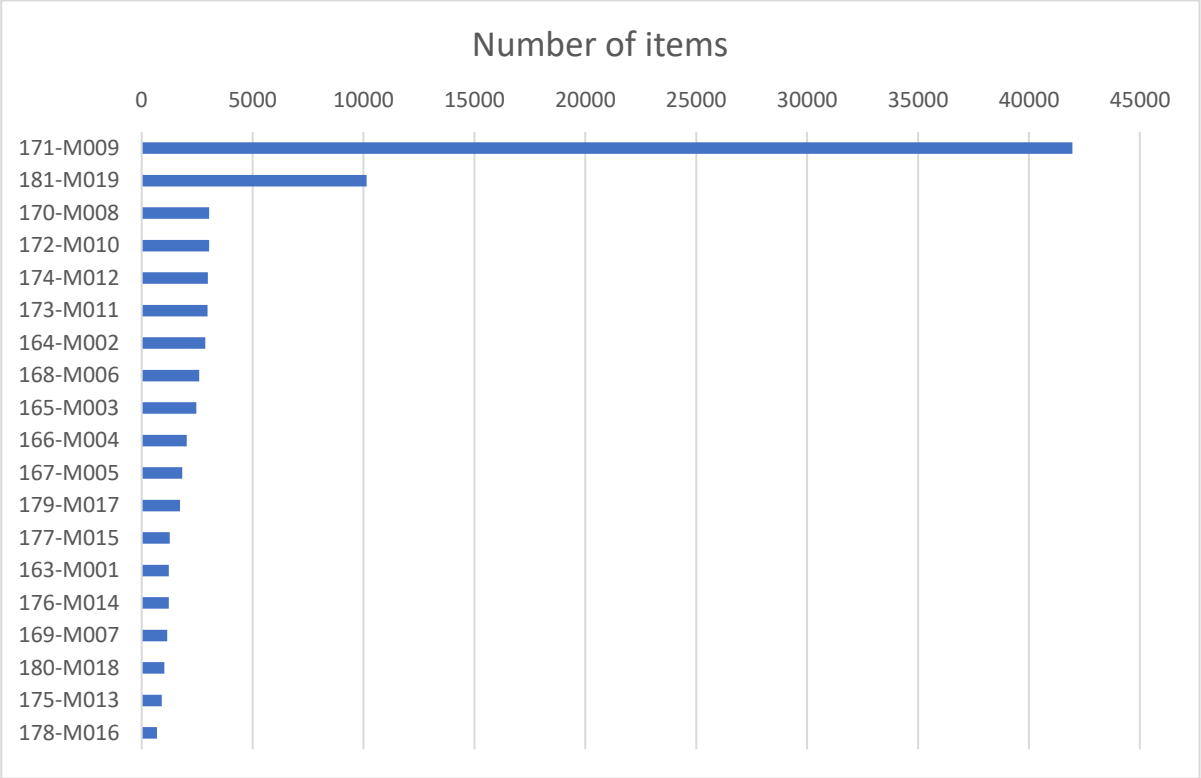
4. Marine litter type and abundance

In analyzing each piece of material found during the monitoring campaigns, the operators have classified the collected object according to a classes that are those reported in the following table

- ☑ 163 - M001 - CLOTH/TEXTILES
- ☑ 164 - M002 - FOOD WASTE
- ☑ 165 - M003 - GLASS BOTTLES
- ☑ 166 - M004 - metal drink cans
- ☑ 167 - M005 - plastic drink bottles >0.5l
- ☑ 168 - M006 - plastic drink bottles <=0.5l
- ☑ 169 - M007 - plastic cigarette lighters
- ☑ 170 - M008 - beach related items
- ☑ 171 - M009 - tobacco products with filters (cigarette butts with filters)
- ☑ 172 - M010 - plastic crisps packets/sweets wrappers
- ☑ 173 - M011 - plastic caps
- ☑ 174 - M012 - plastic straws
- ☑ 175 - M013 - plastic beach use related body care and cosmetic bottles and containers
- ☑ 176 - M014 - plastic plates and trays
- ☑ 177 - M015 - plastic mussels/oyster mesh bag
- ☑ 178 - M016 - RUBBER
- ☑ 179 - M017 - paper cigarette packets
- ☑ 180 - M018 - DPI face mask, gloves
- ☑ 181 - M019 - other items

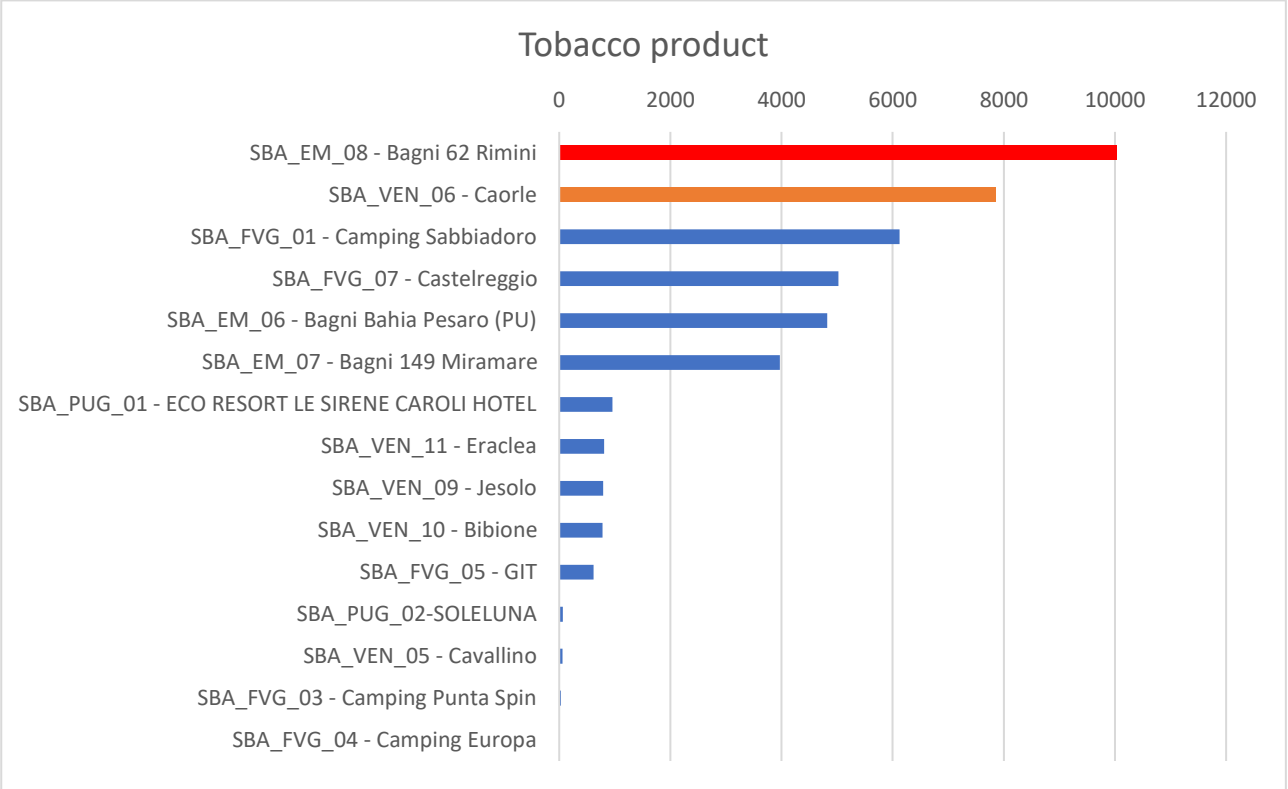
The most frequent type of waste is filtered tobacco products (171-M009) followed by the category of other waste (181-M019). Only in third place we find plastic food packaging followed by objects related to recreational activities on the beach. The amount of tobacco products with filter is equal to the sum of all other waste.

6



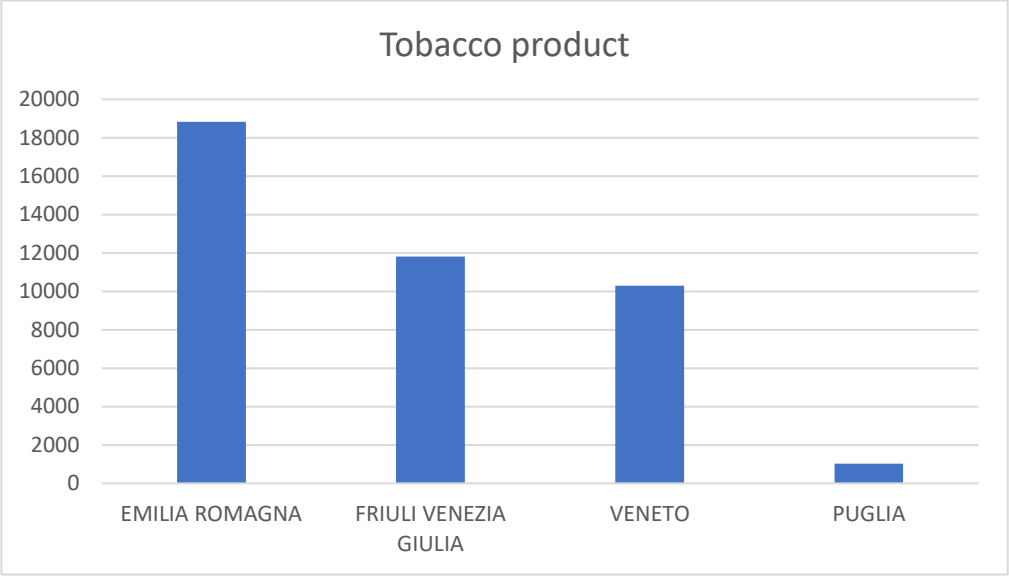
Analyzing the presence of this kind of Marine litter for each sampled beach, se figure here below, it is clear that almost all the areas are affected. It is worth to note that the most frequent type does not rank beaches as the quantity does. In fact, the tobacco products are more abundant in Bagni 62 Rimini (SBA_EM_08) and Caorle beach (SBA_VEN_06), while Castelreggio beach (SBA_FVG_07) reports about half of items belonging to that type.

7



The geographical analysis of the distribution of tobacco waste shows that this waste is mainly found in the Emilia Romagna region.

8

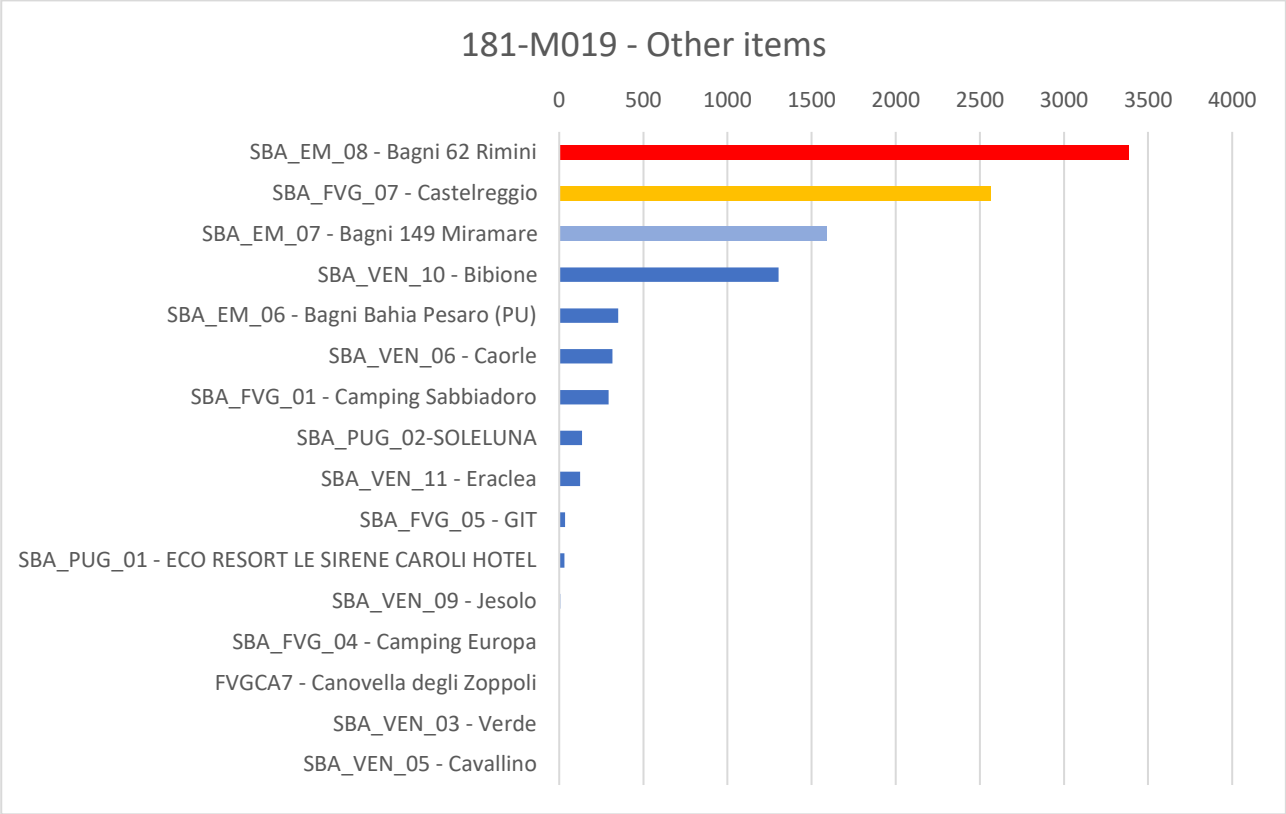


The second most frequent type of beached marine litter, fall in the category other items (181-M019), that is items not classified. This results reveals details on the monitoring carried out in the beaches where the collected Marine Litter has reached top quantities.

In those beaches, namely Castelreggio beach (SBA_FVG_07) and Bagni 62 Romagna (SBA_EM_08), the collection of the waste material was very fine, but a large part of marine litter does not fall in the expected categories. Maybe this is an observational bias.

Here is presented the histogram of the not classifiable collected items, with the topping beaches highlighted in red and orange.

9



5. The presence of plastic

Looking at the Marine Litter explicitly classified as plastic material, see the table reported here below, the analysis conducted for each monitored beach shows that the plastic is more frequent in

10

- [ ] 163 - M001 - CLOTH/TEXTILES
- [ ] 164 - M002 - FOOD WASTE
- [ ] 165 - M003 - GLASS BOTTLES
- [ ] 166 - M004 - metal drink cans
- [x] 167 - M005 - plastic drink bottles >0.5l
- [x] 168 - M006 - plastic drink bottles <=0.5l
- [x] 169 - M007 - plastic cigarette lighters
- [ ] 170 - M008 - beach related items
- [ ] 171 - M009 - tobacco products with filters (cigarette butts with filters)
- [x] 172 - M010 - plastic crisps packets/sweets wrappers
- [x] 173 - M011 - plastic caps
- [x] 174 - M012 - plastic straws
- [x] 175 - M013 - plastic beach use related body care and cosmetic bottles and containers
- [x] 176 - M014 - plastic plates and trays
- [x] 177 - M015 - plastic mussels/oyster mesh bag
- [ ] 178 - M016 - RUBBER
- [ ] 179 - M017 - paper cigarette packets
- [ ] 180 - M018 - DPI face mask, gloves
- [ ] 181 - M019 - other items

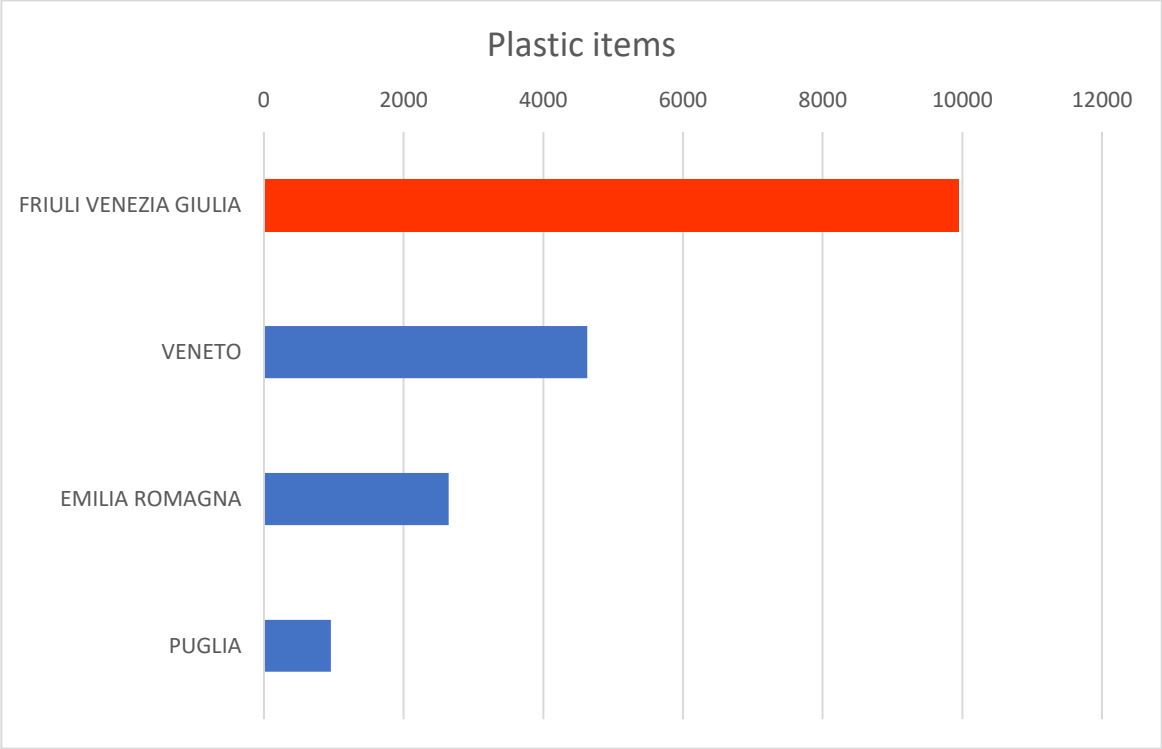
11

Spiaggia: Cod.-Nome	2021			2022		
	Luglio	*Agosto*	*Settembre*	*Luglio*	*Agosto*	*Settembre*
SBA_FVG07-Castelreggio	945	1070		1749	1627	193
SBA _VEN_06-Caorle	54	1531	123		896	174
SBA _FVG_05-GIT				1351	1214	
SBA_EM_08-Bagni 62 Rimini				357	853	270
SBA_FVG_01-Camping Sabbiadoro	302	451		435	201	
SBA_EM_07-Bagni 149 Miramare				245	211	178
SBA_PUG_01-ECO RESORT LE SIRENE				191	346	82
SBA_VEN_11-Eraclea		423	175			
SBA_VEN_09-Jesolo		546	27			
SBA_EM_06-Bagni Bahia Pesaro				178	271	80
SBA_VEN_10-Bibione	14	154	22	88	188	36
SBA_FVG_04-Camping Europa	46	246	70			
SBA_PUG_02-SOLELUNA				128	129	84
SBA _VEN_05-Cavallino	52	108	9	12		
SBA_FVG_03-Camping Punta Spin				22	22	
SBA _VEN_03-Verde						
SBA _VEN_04-Punta						

The beach reporting the high number of items, Castelreggio beach (SBA_FVG_07), but the second ranked beach, for plastic materials, is Caorle (SBA_VEN_06).

The spatial distribution shows that plastic waste is much more detected in Friuli Venezia Giulia region.

12



6. The contribution of aquaculture to Marine Litter

One of the questions that usually arise in evaluating the sources of marine litter asks for the contribution of aquaculture. Among all the Marine Litter collected in the beaches considered in the present analyses the Castelreggio (SBA_FVG_07) is the most affected, followed by GIT (SBA_FVG_05).

13

Data Campionamento	Rifiuti: Cod.- Cat.- Descrizione	Spiaggia: Cod.- Nome
Tutti	177 - M015 - plastic mussels/oyster mesh b..	Tutti

data selezionata: Tutti - spiaggia selezionata: Tutti

	2021			2022		
Spiaggia: Cod.-Nome	*Luglio*	*Agosto*	*Settembre*	*Luglio*	*Agosto*	*Settembre*
SBA_FVG07-Castelreggio	168	144		175	136	33
SBA _FVG_05-GIT				95	137	
SBA_EM_08-Bagni 62 Rimini				31	89	34
SBA_FVG_01-Camping Sabbiadoro	1	20		41	21	
SBA_VEN_10-Bibione	2	15	1		18	
SBA_EM_07-Bagni 149 Miramare				2	16	9
SBA_FVG_04-Camping Europa	1	14	1			
SBA_PUG_01-ECO RESORT LE SIRENE				3	10	
SBA _VEN_06-Caorle		11			1	
SBA_VEN_09-Jesolo		10				
SBA_PUG_02-SOLELUNA				4	5	
SBA_EM_06-Bagni Bahia Pesaro				2	3	2
SBA_VEN_11-Eraclea		3	1			
SBA_FVG_03-Camping Punta Spin					1	
SBA _VEN_05-Cavallino						
SBA _VEN_03-Verde						
SBA _VEN_04-Punta						

Looking carefully at the Gulf of Trieste area, the presence of residuals of plastic mesh bags employed characterizes the beached marine litter. Anyway there are differences of reports coming from very close areas that cannot be explained with transport and deposition anomalies. This is the case of

14

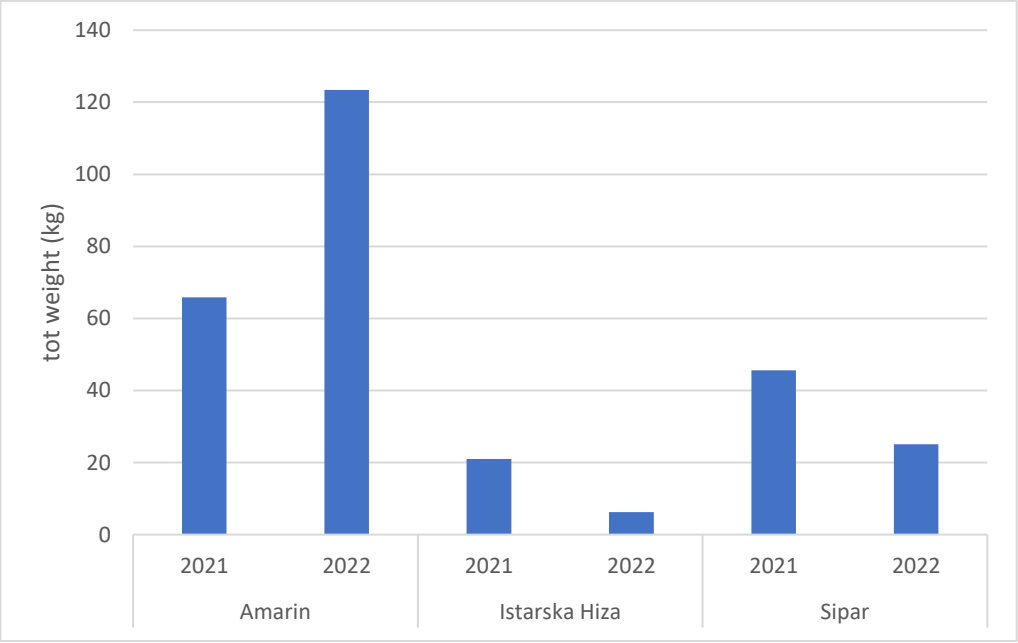
Camping Europa (SBA_FVG_04) and Camping Punta Spin (SBA_FVG_03). Those beaches are bordering but their reports are quite far. Also in this case the suspect of a monitoring bias is supported by data analysis.

15

7. Spatial distribution of Marine Litter croatian coast

The data sampled and analyzed along the Croatian beaches are not comparable with the Italian ones as the data collected is quantitative and not numerical.

Beach Name	City	Tot weight (kg)	
		2021	2022
Amarin	Rovinj	65,83	123,4
Istarska Hiza	Porec	20,968	6,273
Sipar	Umag	45,572	25,107



The beach with the highest number of objects collected is Amarin, located in the city of Rovinj, a figure in line with the number of tourist presences recorded.
In the table reported here below the quantity of items collected in each of the monitored beach is presented with largest figure highlighted in color.

The most frequent type of waste in all beaches is the category of plastics.

Beach Name	Year	Tot weight (kg)	CLOTHES / TEXTILES	FOOD WASTE	GLASS Glass bottles	METAL CANS	PLASTICS	Tobacco products	RUBBER	Paper packets for cigarettes	PROTECTIVE MASKS AND GLOVES	OTHER SUBJECTS
Amarin	2021	65,83	0,00%	0,47%	7,57%	16,55%	47,04%	15,84%	0,00%	11,58%	0,95%	0,00%
	2022	123,40	0,00%	3,13%	3,76%	7,52%	65,52%	9,72%	2,19%	8,15%	0,00%	0,00%
Istarska Hiza	2021	20,97	14,05%	6,92%	2,38%	1,72%	47,31%	4,67%	0,10%	0,26%	0,24%	22,34%
	2022	6,27	3,99%	9,09%	0,96%	4,78%	54,04%	5,23%	0,00%	3,35%	0,32%	18,25%
Sipar	2021	45,57	5,27%	0,00%	6,06%	2,63%	76,01%	0,37%	7,30%	1,16%	0,99%	0,22%
	2022	25,11	10,15%	0,00%	13,10%	5,40%	53,12%	0,71%	12,91%	2,84%	1,78%	0,00%

By analyzing the presence of this type of marine litter for each sampled beach it can be seen that almost all areas are affected. It is worth noting that the most frequent type is not the same on all beaches.

17

Beach Name	Year	Plastic bottles >0.5l	Plastic bottles <=0.5l	Cigarette lighters	Beach items	Tobacco products	Candy wrappers, bags of chips and snacks	Plastic caps	Plastic straws	Plastic cosmetic bottles	Plastic plates and trays	Plastic bag for collecting shells
Amarin	2021	3,31%	8,27%	3,07%	3,07%	15,84%	4,49%	19,39%	1,65%	1,89%	1,89%	0,00%
	2022	10,03%	9,72%	2,51%	9,09%	9,72%	10,97%	8,46%	11,60%	2,19%	0,63%	0,31%
Istarska Hiza	2021	0,67%	0,67%	0,29%	39,25%	4,67%	3,27%	2,55%	0,10%	0,19%	0,33%	0,00%
	2022	2,47%	4,54%	0,16%	39,85%	5,23%	1,83%	1,43%	0,08%	3,67%	0,00%	0,00%
Sipar	2021	4,98%	4,47%	0,67%	62,48%	0,37%	0,90%	1,11%	0,12%	1,02%	0,11%	0,16%
	2022	10,08%	9,42%	1,41%	25,69%	0,71%	1,80%	1,86%	0,31%	2,29%	0,00%	0,26%

The general analysis of the data indicates that the sampled objects are mostly of anthropic nature due to bathing activity and not coming from the sea.

18

8. The MARLESS app to dig in the dataset.

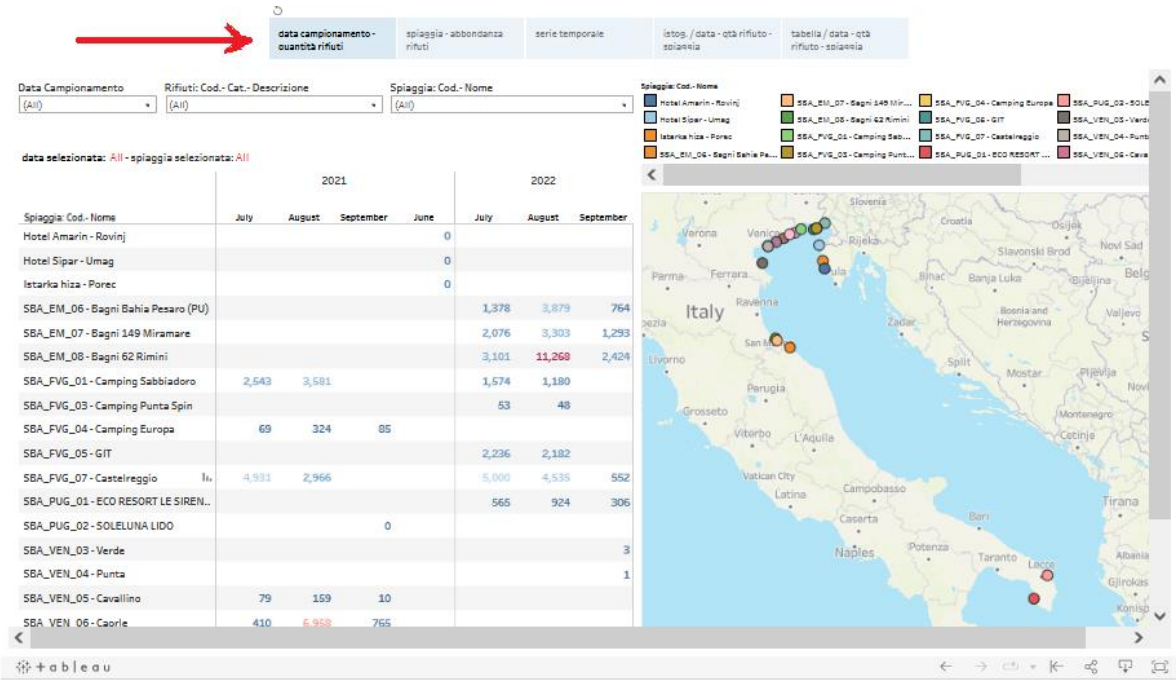
In the frame of the MARLESS project, the volume of data collected and the detail of the information harvested cannot be fully explored according to a static approach, that is with a report, even if in digital format. So, an interactive tool has been developed and let available to the whole community by way of a World Wide Web service.

To access the service, follow this link

https://public.tableau.com/app/profile/interregithr.arpafvg/viz/InterregIT-HRMARLESS-Balneari/MARLESS

The data are accessible according five main access points that aim to ease the exploration of the whole dataset. Entering each of those points, menus are available to select data collected in each location, according to campaign dates and type of marine Litter.

19



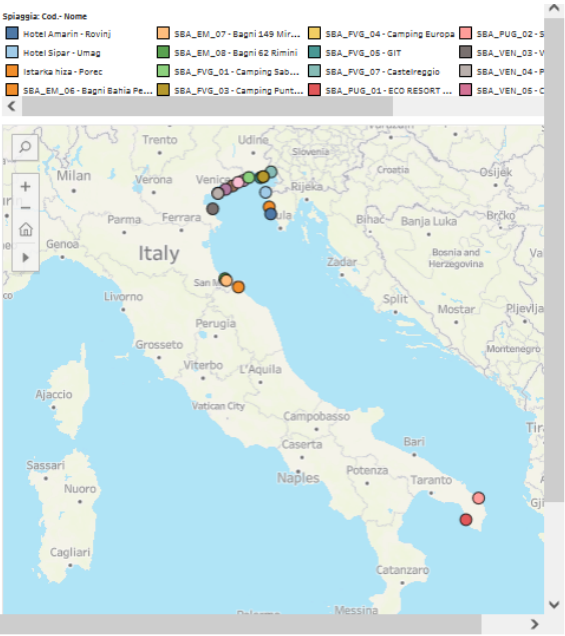
A map is always available to geographically locate the focus of the analysis and clicking on the beach position, on the map, tables and plots are presented for the specific location

20

Data Campionamento: (All)
Rifiuti: Cod.- Cat.- Descrizione: (All)
Spiaggia: Cod.- Nome: (All)

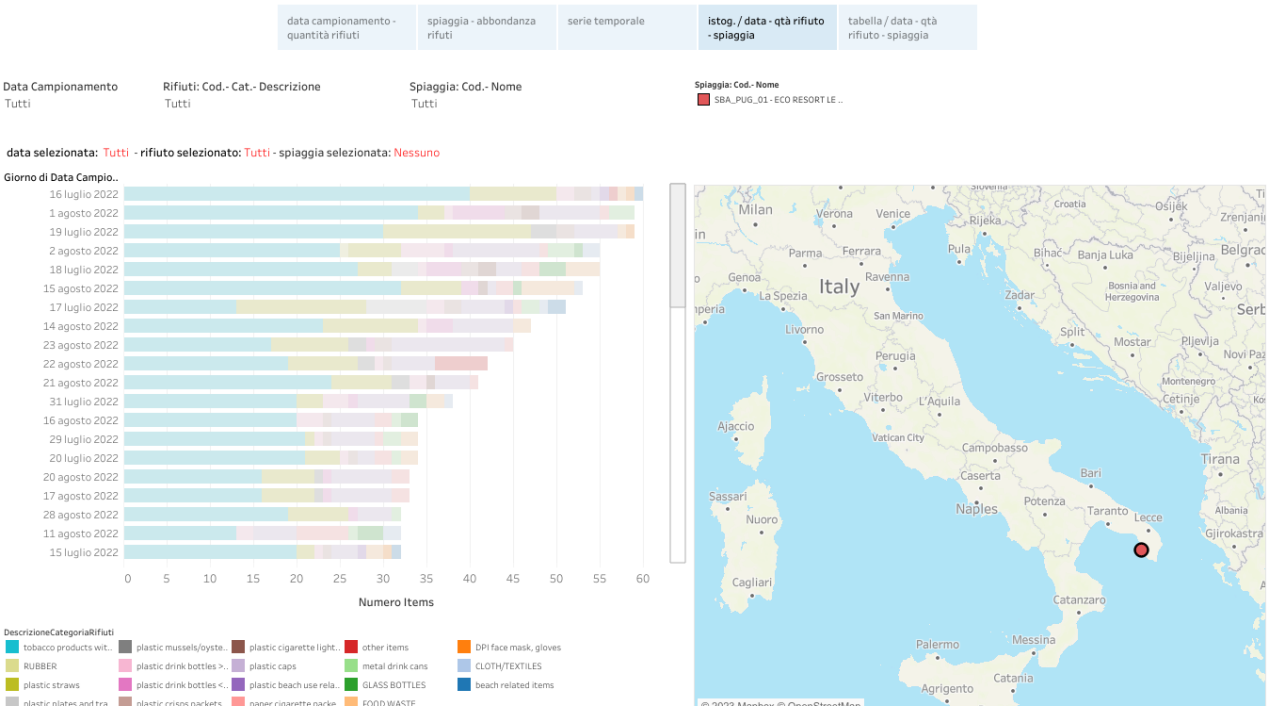
data selezionata: All - rifiuto selezionato: All - spiaggia selezionata: All

Rifiuti: Cod.- Cat.- Descrizione	30/Aug/2022	22/Jul/2021	04/Sep/2022	11/Aug/2022	08/Aug/2022	15/Aug/2022	17/Aug/2022	25/Jul/2022	10/Aug/2022	31/Aug/2022	12/Aug/2022	02/Au 2022
163 - M001 - CLOTH/TEXTILES	5	1	1	24	24	12	5	24	48	10	10	
164 - M002 - FOOD WASTE	15	4	35	41	52	61	28	57	38	21	27	
165 - M003 - GLASS BOTTLES	8	0	2	12	21	26	14	3	15	6	15	
166 - M004 - metal drink cans	11	4	3	9	44	25	12	7	20	21	4	
167 - M005 - plastic drink bottles >0.5l	13	6	7	27	19	21	27	6	24	19	30	
168 - M006 - plastic drink bottles <=0.5l	15	0	7	15	44	24	14	8	32	12	18	
169 - M007 - plastic cigarette lighters	2	2	2	13	23	12	14	5	10		3	
170 - M008 - beach related items	5	42	15	24	35	40	12	8	13	17	22	
171 - M009 - tobacco products with filter..	1,688	1,107	1,058	1,042	810	773	709	693	608	607	590	59
172 - M010 - plastic crisps packets/sweets..	9	7	16	35	24	38	16	79	34	21	26	
173 - M011 - plastic caps	9	17	21	25	55	30	30	34	34	22	28	
174 - M012 - plastic straws	12	17	17	22	56	49	20	32	15	13	23	
175 - M013 - plastic	6	7	2	7	15	11	2	16	2		5	



21

All the results are presented automatically as sum of the items found in the campaigns, since the total number of waste material is considered the piece of information permeating the analyses.



22