

TACKLING MARINE LITTER IN TUNISIA ACTIONS AND RECOMMENDATIONS



**NATIONAL REPORT
2019-2023**

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COastal MManagement and MOnitoring NNetwork

for tackling marine litter in Mediterranean sea



The COMMON (Coastal Management and Monitoring Network for tackling marine litter in Mediterranean sea) project, funded by the European Union under the ENI CBC MED cross-border cooperation programme and coordinated by the Italian NGO Legambiente, has a budget of €2.2 million and aims to create a platform for integrated management of marine litter in the Mediterranean.

The consortium of the COMMON project brings together 3 countries, Italy, Lebanon and Tunisia.

The main objective of the project is to strengthen the capacity of public authorities in the field of monitoring and management of the waste chain, focusing on land-sea relations and improving environmental performance in the 5 coastal areas concerned: Tyre Coast Nature Reserve (Lebanon), Maremma and Salento (Italy) and Monastir and Kuriats Islands (Tunisia), while applying the integrated and multi-partner approach promoted by the project framework in order to enhance citizen participation in marine waste management activities, as well as the exchange of good practices and experiences between local institutions at Mediterranean level. To this end, four reports will be produced, including 3 national reports for each country of the consortium and a Mediterranean report, which will collect legal recommendations and good practices to improve marine waste management and governance issues.

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With the help of Mahmoud Banaoues (Municipality of Monastir- Tunisia)

Acknowledgements

Dear friends,

I am pleased to share with you the Tunisian National Report, which summarises the work and results of the COMMON project over the last three years. I would like to begin by reviewing some of the challenges we have faced and continue to face as a society. Few events have changed our daily lives as quickly and as radically as Covid-19. Along with the rest of the world, we have witnessed the many ways in which the pandemic has affected our professional and personal lives. On behalf of the project leader at the Institut National des Sciences et Technologies de la Mer, I would like to express our solidarity with all those directly affected by the virus. But we must remain optimistic. The pandemic has taught us valuable lessons for the future, particularly about our inseparable relationship with nature and the need for a healthy planet. On the other hand, we have learnt that there is strength in numbers and that it is important to keep trying despite the difficulties. In recent years, the COMMON team at the INSTM has achieved many firsts. A huge fieldwork to understand and evaluate for the first time the amount of waste on the tourist coasts of Monastir and the Kuriat Islands. Establishing an integral participatory approach by promoting the leadership role of local people and communities, with all actions carried out in the pilot area and in full consultation with the local working group. This approach has enabled us to reach out to a wide range of local stakeholders and to provide training on institutional capacity building in the fight against marine litter, with broad stakeholder involvement. This report highlights the need to continue working on the issue of marine litter on the Tunisian coast and presents recommendations from the research on best practices to be implemented on our coasts.

This work would not have been possible without the financial support of the ENI CBC MED programme, for which we are grateful. In general, the resources provided have contributed to the consolidation of the work of the INSTM with its teams and partners in the pilot area and have allowed the adoption of measures that have had a great impact. The COMMON project is also very grateful for the vital support provided by the INSTM project team, our associated partner CNVZ, the local working group (Our Big Blue Association, Regional Tourism Commission (CRT), CRDA, Regional Education Commission, schools, tourism operators, municipalities) and all the participants and volunteers in the beach monitoring campaigns, in particular those carried out during the CLEAN UP THE MED days.

The COMMON project was able to meet these challenges thanks to our professionals' dedication, expertise and skills: communication officers, scientific assistants and post-doctoral fellows. I would like to thank them for their cooperation and commitment to the success of the project and for helping me to overcome all the challenges we faced. It is with great pleasure that I share with you, through this annual report, the important work and events carried out by the INSTM in the framework of the COMMON project.

We hope that this report will inspire decision-makers to improve legislation and waste management to meet Tunisia's challenges, and that it will have a greater impact in the future.

Sana Ben Ismail
COMMON Project Coordinator at INSTM

Photo location: Marina Monastir, Tunisia
On the occasion of the Clean Up The Med 2020 campaign
INSTM COMMON project - Hamdi Ben Boubaker



On the occasion of the celebration of the Day of the Mediterranean, this photo has been selected to represent the COMMON project at the ENI CBC MED photo exhibition "Faces and places of the Mediterranean", which took place in Valencia (Spain) on 29 November 2022.

Highlight

The COMMON project in Tunisia developed 16 spatio-temporal marine litter monitoring campaigns on three beaches in the city of Monastir (Palmier, Marina and Karaia) in addition to the Kuriat beach which led to collect a total of 5,527 pieces of marine litter. The largest amount of debris was found on Marina beach.

Faced with the catastrophic situation caused by the increasing pollution of our beaches with microplastics. There was a need to strengthen the institutional capacity of local and regional authorities and to promote an effective participatory approach involving stakeholders and local communities in the monitoring and management of marine litter, on the one hand, and in the improvement of environmental performance, on the other. To this end, the COMMON project organised six training workshops in Monastir, bringing in total 143 participants from various administrations, local and regional authorities, namely APAL, ANPE, ANGED, ONAS, CRT Monastir, CRE de Monastir, CFPP, AVFA, Monastir's Municipality, as well as fishermen, researchers, students, plastic recycling entrepreneurs, representatives of URAP, representatives of tourism operators and local associations.

In addition, the project aimed to organise 26 awareness-raising activities, mainly in the two pilot areas (the city of Monastir and the Kuriat Islands). These awareness-raising activities reached more than 500 people directly and thousands more indirectly through various media. It should be noted that the awareness-raising activities in universities and schools benefited 70 students, in addition to 35 fishermen and fisherwomen. Similarly, the organisation of the "Beach Clean" awareness campaign was dedicated to tourism operators and beach users, while four "Clean Up The Med" campaigns were organized to involve civil society.

Within the framework of the COMMON project, we have managed to acquire a Jellyfishbot, a robot capable of cleaning up harbours and water areas that are more or less extensive or difficult to access, from all types of floating waste.

Similarly, we have managed to create a local working group bringing together various local actors (representatives of local waste management agencies, regional authorities, municipalities, NGOs and other relevant stakeholders with regulatory capacity or influence) and to establish contacts with several centres for the creation of a Mediterranean network of sea turtle centres.

Finally, two training sessions were organized to create networking of coastal towns against marine pollution by transfer experience in the fight against marine pollution for the mayors and municipal councillors of seven coastal towns (Sousse, Akouda, Monastir, Sayada, Bouhjar, Mahdia and Réjich), as well as representatives of the Ministry of the Environment, ONAS, APIP, APAL, ANGED, CNVZ, URAP, CRDA, NGOs (WWF, Tunsea) and researchers from the INSTM.

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State of the art

According to the United Nations Environment Programme, marine litter is defined as "solid, manufactured or processed materials discarded or abandoned in the marine environment". Several studies have shown that the dominant fraction is plastic, which accounts for between 60 and 90% of anthropogenic marine litter in the marine environment (beaches, water surface and seabed) [Barnes et al., 2009 ; Derraik, 2002 ; Expéditions MED, 2016 ; UNEP, 2009].

The significant increase in consumption and therefore production of plastic products has led to a growth in global production from 1.7 to 311 million tonnes in half a century with 4.8 to 12.7 million tonnes of plastic being released into the marine environment each year [Jambeck et al., 2015].

The Mediterranean Sea is reported to have the highest concentrations of floating plastics in the world [Eriksen et al., 2013; Martin et al., 2020]. It is considered the sixth largest area of marine litter accumulation with approximately 229 thousand tonnes of plastic litter being dumped into the Mediterranean Sea each year of which 216 thousand tonnes is macroplastic and 13 thousand tonnes is microplastic, representing 7% of all microplastic on the planet, with a concentration rate of 1.25 million fragments per km² [Alessi et al., 2018].

This situation has been exacerbated by the semi-enclosed nature of the Mediterranean Sea, its reduced surface water flow, as well as the heavy anthropisation along its coasts and the resulting huge amounts of waste that end up in coastal environments.

In Tunisia, data shows that the country generates 2.8 million tonnes of household waste per year, 71% of which is generated in the coastal governorates. The plastic waste fraction represents 9.4% of waste. The rate of poorly managed plastic waste in Tunisia is very high, estimated at 55.5 thousand tonnes per year. This reflects the shortcomings of the waste management system related to the limited capacity of waste treatment, the poorly developed and poorly mastered technology, the legislation which is not always adapted to the needs of protection and sustainable development, the strategies and the quality of the initiatives are not very ambitious and often insufficient in this field [World Bank, 2022].

Tunisia's coastal areas are home to more than two thirds of the country's population. They are subject to multiple pressures related to multiple uses, namely tourism, industrial and port activities, fishing and the strong seasonal increase in the population. These pressures are likely to cause environmental and economic damage.

Indeed, the Tunisian economy loses about US\$24.6 million annually due to plastic pollution, considering its negative economic impacts on tourism (US\$16.6 million), fisheries (US\$1.7 million), maritime traffic (US\$1.6 million) and management and clean-up costs (US\$4.7 million) [Dalberg, 2019]. The Tunisian coast has an estimated daily flow of 9.5 kg of plastic per km of coastline. Approximately 8034 tonnes/year of macro-plastic and 154 tonnes/year of microplastic end up in the sea.

According to Dalberg (2019), coastal activities are responsible for 78% of plastic discharges to the sea, i.e. 6.7 kT, resulting from poor waste management in cities, tourism and recreational activities, while fishing, aquaculture and shipping are responsible for 15% of plastic debris at sea, i.e. 1.3 kT. World Bank estimates (2022) show that aquaculture in Tunisia generates about 275 tonnes/year.

Monastir City :

Monastir is a coastal city, it benefits from a privileged central position within the large region of the Tunisian Sahel. It has an area of 46.32 km² and a coastline stretching over 15km, where there are several sebkhas and several wadis crossing the city. With more than 115 thousand inhabitants, 47 hotel units, 71 industrial units, 10 universities, 3 fishing ports and a marina, the city of Monastir is one of the most urbanised regions in Tunisia.

The city of Monastir is considered as a fragile and vulnerable area because of the intense coastal development, which is the result of a concentration of the population and economic activities along the coastline, which has led to the evacuation of waste near the coast, thus causing real environmental damage. The main environmental problems of the city of Monastir are the pollution of the beaches, the collection and treatment of household waste, the discharge of waste water into the wadis and sebkhas and the insufficient quality of treatment of the ONAS.

The World Bank studies (2022) have shown that the quantity of poorly managed Wastes is higher than 60,000 t/year while the quantity of uncollected plastic waste varies between 1000 and 4000 t/year, while the quantity of plastic waste put in a wild dump is higher than 10,000 t/year. On the other hand, these studies have shown that the total abundance of marine waste per 100 m of beach is 1200 pieces of debris, of which 50 to 80% is plastic waste, all these indicators identify the city of Monastir as a "priority hotspot".

The Kuriat Islands :

The Kuriat Islands are located 18 km off the coast of Monastir, they are composed of two islands, the large Kuriat covers about 2.7 km² and the small Kuriat about 1 km². These islands are endowed with an invaluable wealth of biodiversity, but their ecosystems are vulnerable. They are home to a characteristic fauna and flora, many of which are rare or threatened and therefore require special attention in view of the pressures exerted on this environment by various stakeholders or "users" [Gassab et al., 2011].

The intense fishing activity around the Kuriat islands as well as the strong tourist activity on the small Kuriat, especially during the summer period, together constitute a form of pressure on these islands through the different types of pollutants generated by the discharges of boats, fishermen and tourists (fuel, motor oil, traps, nets, packaging, etc.).

ABBREVIATIONS

ANGED: National Waste Management Agency.

ANPE: National Environmental Protection Agency.

APAL: Coastal Protection and Development Agency.

APIP: Agency for Ports and Fishing Facilities.

AVFA: Agricultural Extension and Training Agency.

CFPP: Mahdia Professional Fisheries Training Centre

CNVZ: National Centre for Zoo Sanitary Surveillance.

CRDA: Regional Commissariat for Agricultural Development.

CRE: Regional Commissariat of Education.

CRT: Regional Commissariat of Tourism.

ONAS: National Sanitation Office.

URAP: Regional Union of Agriculture and Fishing.



Legislative framework for the management of plastic waste

Since the 1980s, Tunisia has signed and ratified international and regional agreements and treaties relating to the environment and dealing more particularly with the issue of pollution. On the one hand, the European Community and 16 Mediterranean countries adopted the Barcelona Convention for the Protection of the Mediterranean Sea against Pollution in 1976. Seven additional Protocols relating to specific aspects of the conservation of the Mediterranean environment.

On the other hand, the sub-regional agreement between the government of the Republic of Tunisia, the government of the People's Democratic Republic of Algeria and the government of the Kingdom of Morocco, concerning the sub-regional contingency plan for the preparation and the fight against accidental marine pollution in the south-western Mediterranean area, concluded in Algiers on 20 June 2005.

These international conventions ratified by Tunisia have largely influenced the legislative and regulatory arsenal relating to environmental aspects. A specific legal framework that has focused on packaging, particularly plastics, through Decree No. 97-1102 of 2 June 1997 which organised the ECOLEF system.

In fact, the legal framework for waste management, particularly plastics, is mainly made up of laws and decrees, the most important of which are the following:

- Organic law of the communes N°75-33 of 14 May 1975: it is particularly at the level of its article 118, modified by the organic law n° 95-68 of 24 July 1995, ensured the first organization of the management of waste in general including plastic, by indicating that the service of roadway and communal works includes, and particularly in the field of waste, the collection, the sorting, the treatment, the removal, the burial of waste in the controlled dumpsites
- Decree N°85-56 of 2 January 1985 on the regulation of discharges into the receiving environment.
- Order of 20 July 1989 approving the Tunisian standard relating to effluent discharge into the water environment.
- Law N°95-72 of 24 July 1995 creating an agency for the protection and development of the coastline.
- Law 96-41 of 10 June 1996: establishes the appropriate framework in the field of waste and its management, specifically for packaging, especially plastic packaging. As stipulated in Article 10 of this law, packaging is manufactured as far as possible from materials that make it suitable for reuse or transformation compatible with the requirements of public health and environmental protection. The proliferation of packaging waste is to be prevented, where technically possible, by designing packaging that can be reused in a manner compatible with the standards for content and by taking back packaging and reusing or recycling it. Article 12 of the Act encourages professionals to set up, on their own initiative or on the initiative of the competent authorities, systems for the return of packaging waste, its recovery or reuse. Producers and importers are obliged to join any system set up for the collection, processing or recovery of specific categories of packaging waste. According to Article 13 of the same law, the use of recycled products in the manufacture of packaging intended to contain food products directly is strictly prohibited, except with the prior authorisation of the Minister of Public Health after consultation with the Minister of the Environment.
- Decree No. 97-1102 of 2 June 1997: this organised the ECOLEF system, which is mainly oriented towards plastic packaging and sets the conditions and modalities for the take-back and management of packaging bags and used packaging as amended by Decree No. 2001-843 of 10 April 2001. According to this decree, any producer and any distributor who markets bags or packaged products and any person responsible for their first placing on the market, if the producer and distributor are unknown, is obliged to provide for the take-back of their used bags and packaging with a view to reusing or recovering them in accordance with the conditions laid down by the legislation and regulations in force. ANGED is the body responsible for the ECOLEF system.

- Decree No. 98-2409 of 30 November 1998 on the organisation of the National Institute of Marine Sciences and Technologies; Law No. 96-25 of 25 March 1996, on the creation of the International Centre for Marine Environmental Technologies of Tunis.
- Decree N°2005-2317 of 22 August 2005. ANGED is endowed with civil personality and financial autonomy, under the supervision of the Ministry of the Environment and Sustainable Development. ANGED started by rehabilitating unauthorised dumps, creating controlled dumps and treating the gases emitted and the leachate, ANGED intervenes in the management of waste in general and in programmes specifically dedicated to plastics.
- Law 2007-1866: Implementing hygiene regulations for waste management areas managed by local authorities and imposing fines. The Local Authorities Code of 9 May 2018 and more precisely article 240 which stipulates that "the collection, sorting and transport of household and similar waste to controlled landfills are attributions proper to the communes". In terms of household waste management (collection, sorting and transport) in Tunisia, the main actor is the commune.
- Government Decree No. 2020-32 of 16 January 2020, establishing the types of plastic bags whose production, import, distribution and possession are prohibited on the domestic market (Jort 21 January 2020). The decree was preceded by a series of measures that paved the way for it. Indeed, given the seriousness of the situation and the environmental problems caused by single-use plastic bags (SPUU), a ministerial council held on 18 December 2015, approved the reduction of the use of SPUU and their replacement by other more environmentally friendly bags. The decree sets out the types of plastic bags whose production, import, marketing, possession and distribution are prohibited on the domestic market, whether free of charge or for a fee. Specifically, the decree bans SPUUs with a thickness of less than 40 microns or a capacity of less than 30 litres and primary packaging bags with a thickness of more than 15 microns. Similarly, oxo-degradable plastic bags will be banned.
- Law N°2020-30 of 30 June 2020, relating to the social and solidarity economy (Jort 3 July 2020). Indeed, the objectives of the social and solidarity economy are: (i) to achieve a balance between the demands of economic profitability and the values of voluntary work and social solidarity; (ii) to achieve social justice and the fair distribution of wealth; (iii) to formalise the informal economy; (iv) to achieve economic and social comfort and improve the quality of life. The activities of the social and solidarity economy must also open up to new promising areas such as the circular economy, where social structures can develop sustainable solutions capable of addressing socio-economic challenges, while preserving the environment. Waste recycling, one of the pillars of the circular economy, is indeed a wealth and value creating activity, offering solutions to environmental problems, such as the reduction of air, soil and water pollution, the reduction of pressures on biodiversity and the achievement of energy savings, but also offering solutions to social problems through the creation of jobs and the improvement of the quality of life. In Tunisia, the issue of informal collectors requires a real reflection on the principle of social and solidarity economy (SSE) and its importance to integrate many precarious activities into a less discriminating and more secure economic cycle.

Since 1 August 2022, single-use plastic has been banned on the island of Djerba following the promulgation of a joint decision by the three municipalities of Midoune, Ajime and Houmt souk. This decision consists in banning the production, distribution and use of plastic bags on the island. This initiative should be emulated by several other municipalities in the coming years.



State of marine pollution (macro & micro waste) at the level of the two pilot areas (Kuriat Islands and Monastir city)

I-1. State of knowledge on sources of litter and its impacts on marine ecosystems (Results of the scientific actions of the COMMON project) :

I-1-1. Spatial and temporal distribution of waste on the beaches studied

Monitoring of the spatio-temporal repair of debris was carried out on three beaches in the city of Monastir (Palmier, Marina and Karaia) and on the beach of the small Kuriat. This monitoring is carried out during the four seasons of the year according to a protocol predefined by the COMMON project.

During this project, 16 monitoring campaigns were carried out in collaboration with the association Notre Grand Bleu (NGB). This work has shown that the composition and number of marine litter items vary considerably depending on the season and the beach.

The highest amount of marine debris is recorded at La Marina beach with a four season average of 5425 debris/100m, followed by Palmier and Karaia beaches with 4142 and 3908 debris/100m, respectively.

These beaches have a high accessibility and are located near tourist facilities such as the Marina, restaurants, cafes etc. However, the lowest amount of marine litter is recorded on the beach of Little Kuriat with an average of 562 pieces of debris/100m, which is a relatively isolated beach, less frequented and far from urban areas.



Figure 1. Location of beaches surveyed

A total of 5,527 pieces of marine debris were collected during these campaigns. The highest density of marine debris is recorded in spring on the beach of La Marina with 8.49 debris/m², while the lowest density is recorded during the same season on the beach of Petite Kuriat with 0.04 debris/10m².

On the other hand, a seasonal variation of collected marine debris was recorded in favour of the spring season, with an average number on the four beaches of 5929 debris/100m or 43.1%, against a lower abundance of marine debris recorded during the summer season with 2219 debris/100m or 16.13%. The low number of marine debris collected in summer compared to other seasons could be attributed to the study period which was conducted at the beginning of the summer season when beach cleaning operations by the authorities have already started.

Beach	Spring		Summer		Autumn		Winter	
	Number	Density (m ²)	Number	Density (m ²)	Number	Density (m ²)	Number	Density (m ²)
La Marina	13540	8,49	3403	5,35	1916	2,80	2841	2,37
Palmier	3230	1,16	1621	0,53	6205	2,00	5514	3,55
Karaia	6842	6,11	2832	1,67	2933	1,72	3025	1,32
Kuriat	103	0,04	1022	0,34	*	*	*	*

Table 1. Number and density of marine litter per beach and season.

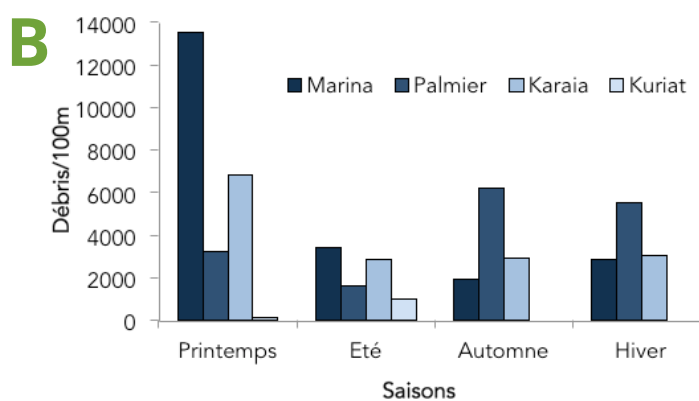
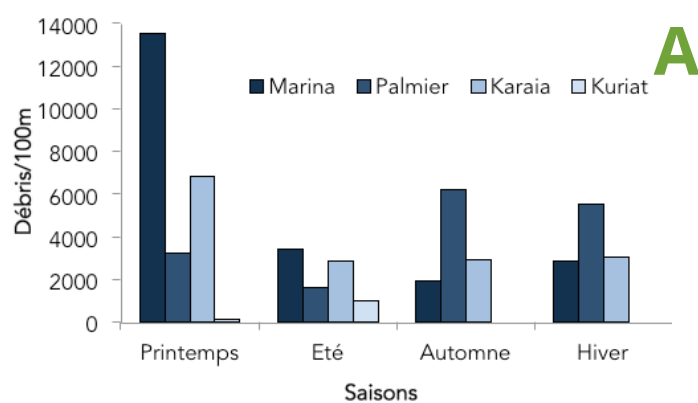


Figure 2. Seasonal variation in the abundance (A) and density (B) of litter by beach.

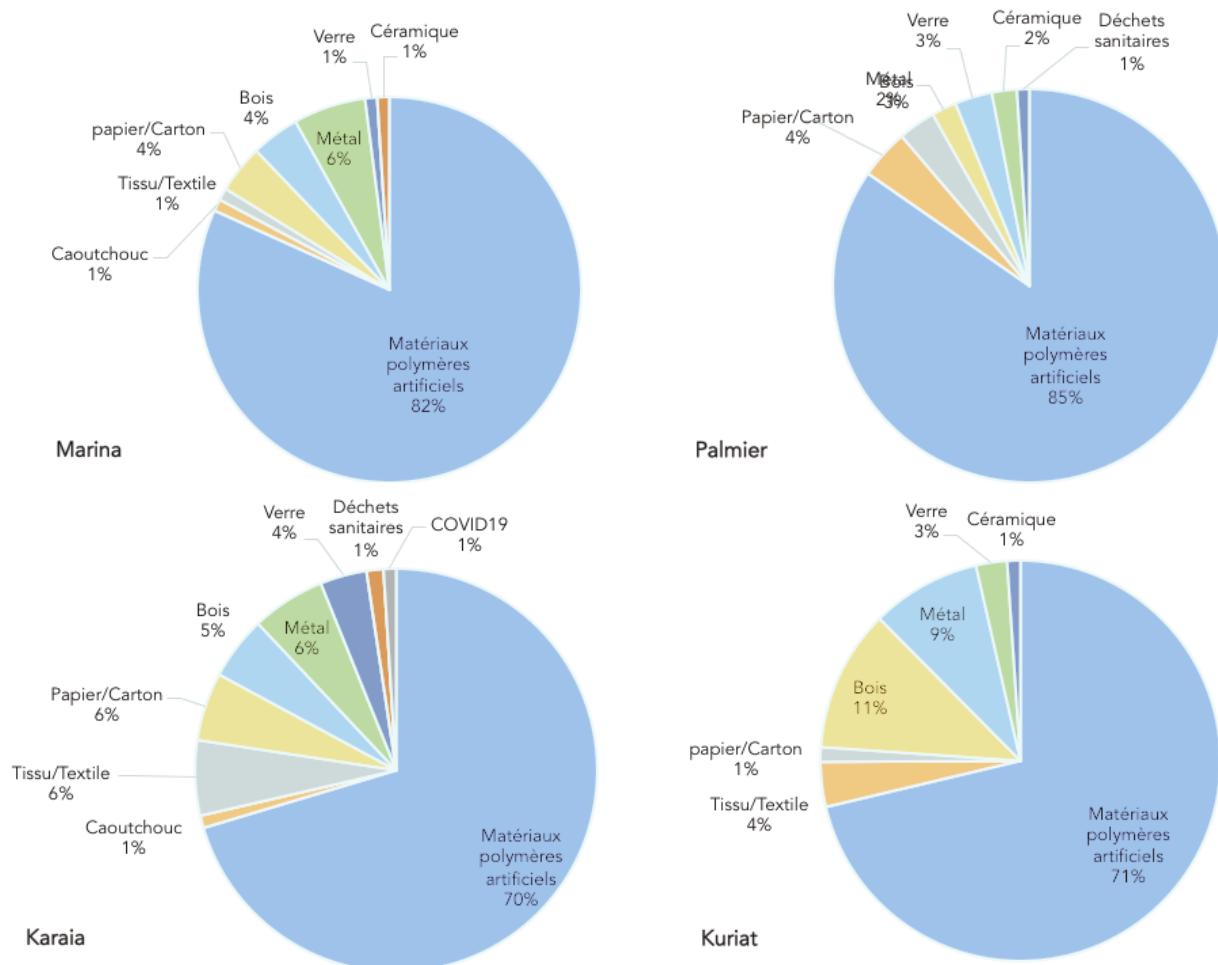


Figure 3. Composition of waste according to the beaches and seasons studied.

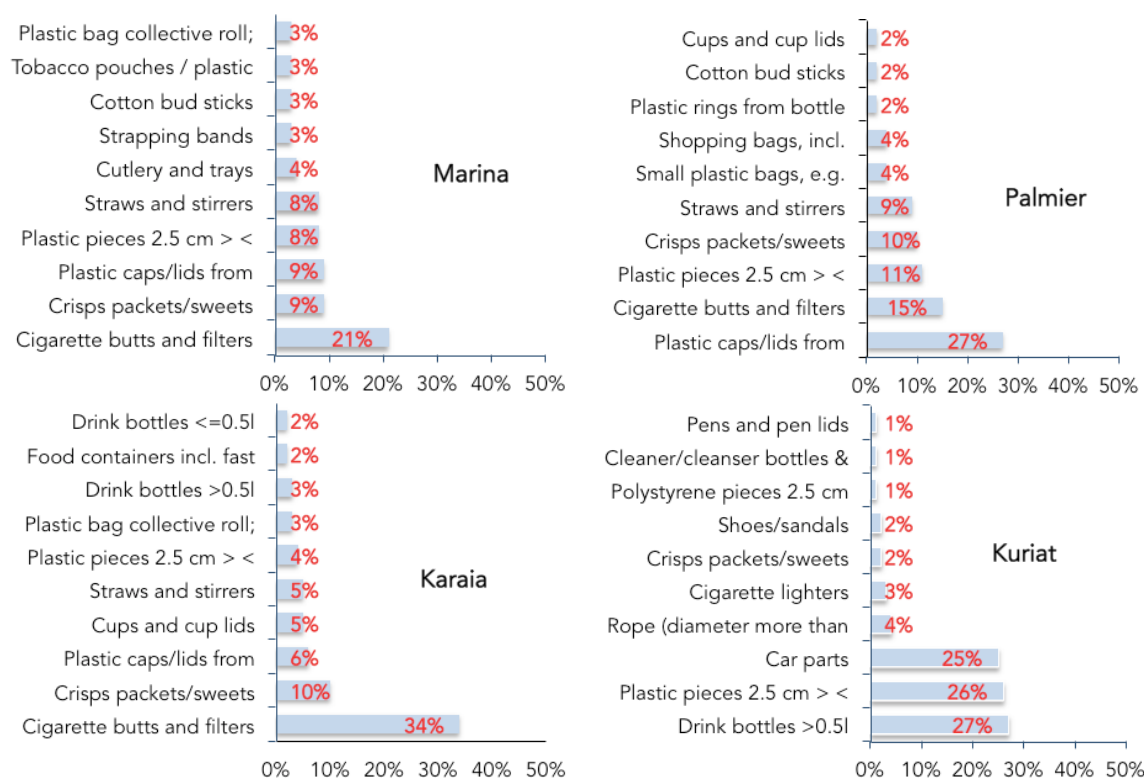


Figure 4. Ranking of 10 major plastic items in (%) according to the ranges studied

The categorisation of the waste collected shows a large dominance of plastic waste, which accounts for between 70 and 83% of the total debris collected, followed by wood (3-11%), metal (2-9%), textiles (1-6%), paper and cardboard (1-5%), glass (1-4%), ceramics (1-2%), rubber and sanitary waste (1%).

The dominant items of plastic waste vary between beaches. On the beaches of La Marina and Karaia, cigarette butts dominate all plastic debris with 21% and 34%, respectively. Bottle caps are the most common on Palm Beach with 27% of the plastic debris. On the beach of the small Kuriat, three types of plastic waste are the most abundant which are respectively, drink bottles >0.5L (27%), plastic pieces (26%) and ropes (25%).

This large difference in plastic litter composition can be explained not only by natural factors such as coastal current dynamics and coastal topography but also by the nature of tourism and economic activities near the beaches.

The result of the calculation of the Clean Coast Index (CCI) shows that the beaches studied are generally considered extremely dirty in all seasons of the year, with the exception of the small Kuriat beach which is classified as clean in summer to very clean in spring and the Palmier beach classified as moderately salty in summer (Fig. 5).

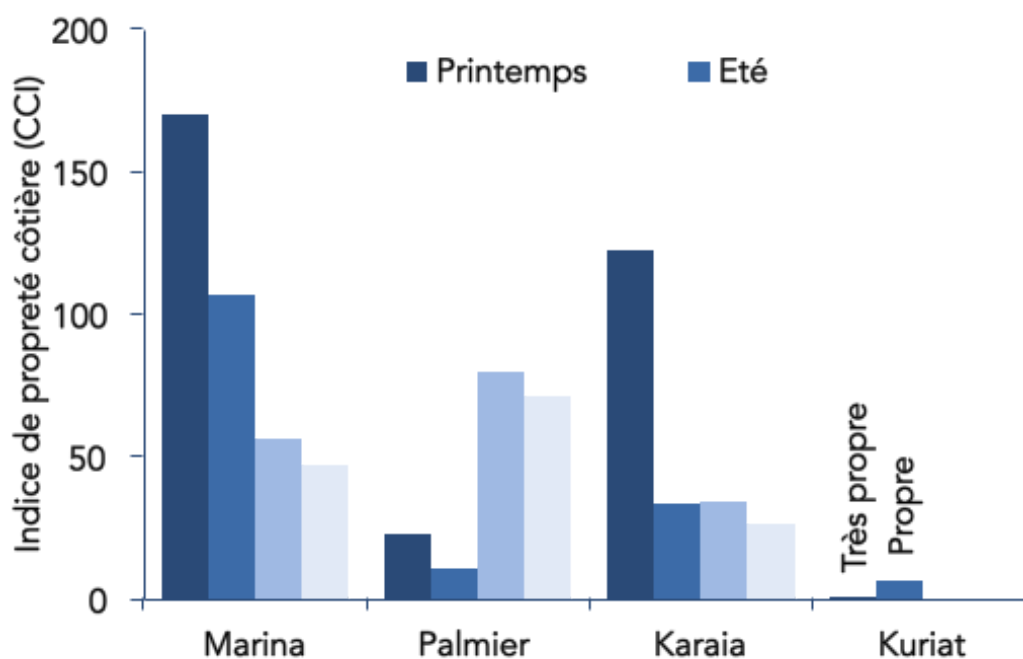


Figure 5. Clean Coast Index (CCI) by beach and season

I-1-2. Spatial and temporal distribution of surface micro and macro-waste

Due to its high persistence and buoyancy, plastic, through a combination of chemical, mechanical and biological processes, tends to break down into smaller micrometric debris (less than 5 mm in size) to form microplastics.

Microplastic pollution has become an increasing environmental problem, particularly in coastal, marine systems [Martin, 2020]. Due to their small size, the pathways and exposure levels of microplastics are different and may enter the first links of the marine food chain and they may also end up being consumed by humans.

To determine the composition, distribution and abundance of this pollutant, four monitoring campaigns of microplastics in surface waters were carried out.

In each campaign 22 stations spread over 8 radials were sampled. These radials were selected in front of the beaches identified for beach monitoring (Karaia, Marina, the palm tree and the small Kuriat), and in front of the stress zones: Oued Khniss, Monastir fishing port and aquaculture farm.

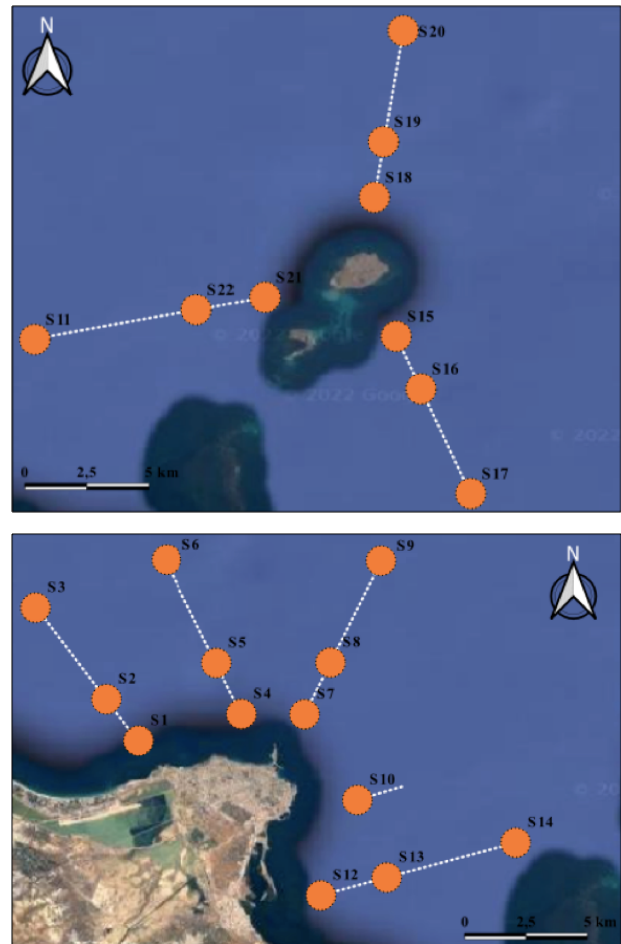


Figure 6. Location maps of microplastic sampling stations

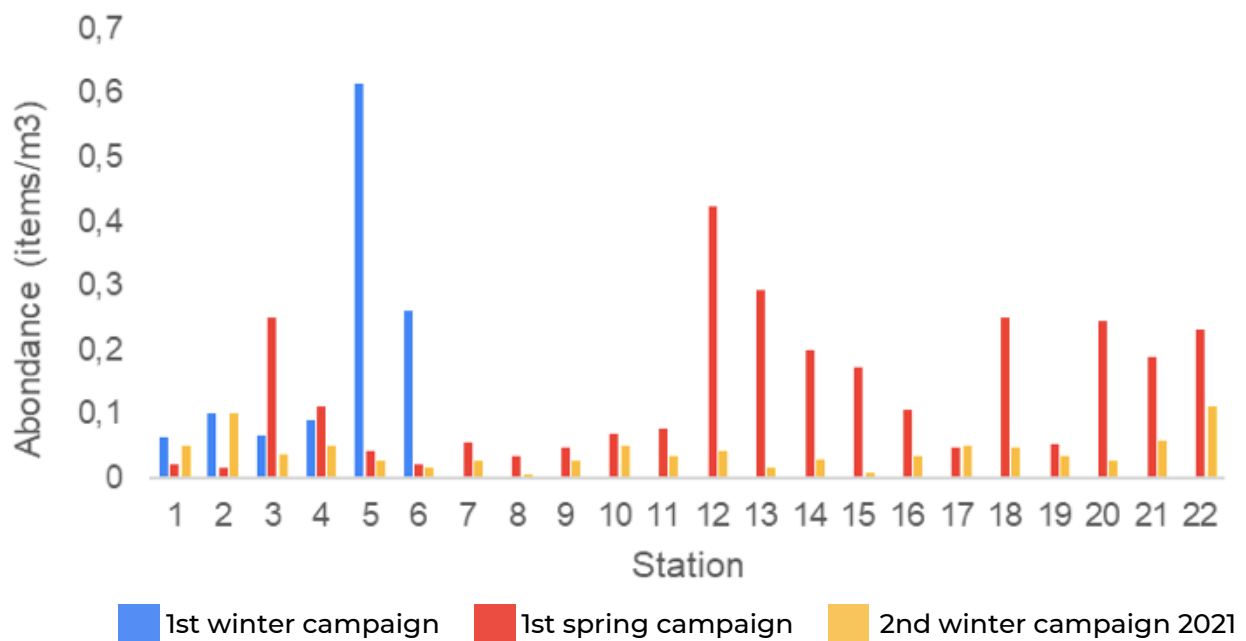


Figure 7. Abundance of microplastic (>1mm) per station and campaign

The results showed that microplastic is present at all the sampled stations with concentrations ranging from 899.92 to 166486.681 particles/m³. The highest concentrations are recorded in front of Karaia beach and opposite Oued Khniss. These two zones are known by an intense anthropic contribution, but without neglecting the important role of the circulation of the water masses and the current in this spatial distribution.

The characterisation of the microparticles shows that the average particle size is larger in spring than in winter.

On the other hand, fragment-type microplastics are dominant in winter, whereas in spring, film-type microplastics dominate. Also, we found a predominance of white microplastic. While the most identified polymers are high density polyethylene (HDPE), Polypropylene and Polypropylene.

Observations of floating macro-waste showed that the majority of the waste observed was food packaging followed by fish feed packaging used in aquaculture farms and single-use bags.

Campaign	Average size (mm)	Color	Type	Polymer
1st Winter Campaign	1,95	White	Fragment	Polyethylene
1st Spring Campaign	3,2	White	Film	High Density Polyethylene Polypropylene
2nd winter campaign	1,45	White	Fragment	Polyethylene

Table 2. Characterisation of microplastics by size, colour, type, polymer and campaign



I-2- Institutional capacity building for waste management - focus on plastic waste and identification of existing gaps

In order to strengthen the institutional capacity of local and regional authorities and to promote an effective participatory approach involving stakeholders and local communities in the monitoring and management of marine litter on the one hand and the improvement of environmental performance on the other, six training workshops were organised during the COMMON project. These workshops reached 143 people from different local and regional administrations and authorities.

These included APAL, ANPE, ANGED, ONAS, CRT Monastir, CRE de Monastir, CFPP, AVFA and the Municipality of Monastir, as well as fishermen, researchers, students, plastic recycling entrepreneurs, representatives of URAP, and representatives of tourism operators and local associations.

At each workshop, the most relevant recommendations and proposals put forward by the participants to fight against marine litter were collected.



Workshop 1: Promotion of an eco-responsible school model

From 04 to 05 March 2021 in Monastir
Number of participants: 21

Target group :

School headmasters, administrative directors, teachers.

Contents :

- Promotion of an educational project on the reduction of marine litter and single-use plastics.
- Eco-friendly school management: case studies and local good practices (e.g. school catering).

Workshop 2: Integrated Coastal Zone Management

From 01 to 02 July 2021 in Monastir
Number of participants: 20

Target group :

Researchers, Municipality of Monastir, ANPE, URAP, ONAS, CRT Monastir, CFPP Teboulba, NGO's

Contents :

- Definition of ICZM
- Usefulness of ICZM
- Applicability of ICZM

Workshop 3: Circular economy approach to tackling marine litter

From 17 to 18 August 2021 in Monastir
Number of participants: 23

Target group :

Municipality of Monastir, young entrepreneurs (recycling), students and young graduates (ISBM, ISPAB), ANPE, AVFA, researchers, NGOs.

Contents :

- Definition of the circular economy
- The 4Rs of waste management (reduce, reuse, recycle and recover)
- How can the circular economy tackle marine litter at source?

Atelier 5: Conscious entrepreneurship for tourism operators

From 10 to 11 march 2022 in Monastir
Number of participants : 18

Target group :

Tourist operators, Researcher, CRT Monastir

Contents :

- Definition and benefits of bioplastics and recycled materials
- Eliminate single-use product in favour of bioplastics or recyclable materials (guidelines for transition and examples of good results)
- Improve and promote sustainable tourism.
- Examples of environmentally friendly tourism activities and guidelines for conservation and/or renovation.

Workshop 4: Marine waste: what danger for MPAs, RAMSAR areas and endangered species?

From 21 to 22 December 2021 in Monastir
Number of participants: 25

Target group :

Researchers, Municipality of Monastir, APAL, ANPE, NGOs, URA

Contents :

- Role and importance of MPAs and RAMSAR areas in conserving biodiversity and threatened species
- Marine litter in MPAs and RAMSAR areas

Atelier 6: Negative effects of marine litter on human health and biodiversity

22 February 2022 in Tébourba
Number of participants : 36

Target group :

Fishermen, researchers, fisheries administration

Contents :

- Source of plastic pollution at sea.
- Impact of plastic pollution on biodiversity.
- Impact of marine pollution on human health.



I-3- Good practices collected in pilot areas

What makes our coastal cities cleaner? Sometimes a few simple practices are enough: cleaning, respecting the environment and managing common problems together.

In this context, we started to look for good practices in the territories near the pilot areas to share and replicate later on.

As a result, bilateral meetings were held with the municipalities involved in this project to collect good practices to combat marine litter.

In total, four municipalities were involved (the municipalities of Monastir, Mahdia, Akouda and Sayada), and seven good practices were collected.

These good practices are published together with the other good practices collected from Italy and Lebanon on this project website

(<https://volontaripernatura.greenproject.info/common/site/coastal-cities-network/>)

to share innovative and participatory marine litter related strategies and solutions to improve the mitigation of the impacts of marine litter, as well as to establish common avenues for collaboration between all parties involved.

a- Management of waste collected during fishing activities:

Unfortunately, none of the municipalities contacted have developed actions or approaches regarding the management of waste from fishing activities.

b- Reduction of waste production and recycling (tourist operators, etc.):

Municipality of Mahdia

Good practice	Description of the activity	Objectives	Results
Valorisation of organic waste	To address environmental problems related to the poor management of organic waste in the municipality of Mahdia a composting station will be created within the framework of the CLIMA project.	Tackling organic waste through an integrated integrated municipal waste management plan and through innovative technical solutions, such as composting, to reduce the hazardous or illegal disposal of or illegal waste disposal.	The setting up of a composting station with an initial capacity of 5t/day to recover the organic waste of the city of Mahdia.
Towards selective sorting	A pilot action aims to invite the population of the "Djbel Ouaja" district of the municipality of Mahdia to join the dynamics of sorting and recycling of households.	To raise awareness of the importance of selective sorting and recycling to ensure good waste management.	In total, 500 new bins were distributed to 250 households (2 bins per household: one for organic waste and one for other waste). Awareness campaigns on selective sorting and waste recovery were conducted in 6 primary schools, at the Mahdia youth centre and in the pilot district.

Municipality of Akouda

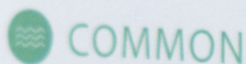
Good practice	Description of the activity	Objectives	Results
Ecological tent at the beach	Install awareness-raising tents on beaches each summer to raise public awareness, especially among children and students, of environmental protection through practical eco-actions on beaches.	This action aims to develop a participatory attitude on the part of citizens, the popularisation of scientific information, public awareness of the importance of the coastal environment.	Installation of a tent on the beach: the tent is animated by games, competitions and workshops on marine litter, plastic waste, in order to raise awareness of the impact of plastic pollution on marine ecosystems.
Ecological footprints	Awareness campaigns in primary schools were carried out through quizzes and practical workshops on the proper management of marine litter.	The main objective of these actions is to reduce waste by changing students' attitudes, increase knowledge to prevent waste and promote good waste management in schools.	More than seven primary schools are involved in this action, and many pupils and teachers have participated in numerous workshops on reducing plastic use, waste sorting, eco-consumption and composting.

Municipality of Monastir

Good practice	Description of the activity	Objectives	Results
Valorisation of organic waste	The Municipality of Monastir together with delegations from ten municipal partnerships met in Münster (Germany), in order to jointly address international challenges within the framework of the project "Municipal Climate Partnerships" and to develop joint action programmes for climate protection and adaptation	The aim is to create a common action plan on the following topics - Sustainable waste management. - Climate-friendly stormwater management. - Sustainable urban development.	This action aims to install a composting station with a capacity of 6 to 10t/day to recover organic waste.
Waste sorting and recycling	The municipal council has approved an environmental project, which consists of providing all primary schools in Monastir with waste bins. In addition, composting units are provided to three primary schools.	The project aims to learn how to sort waste, determine the nature of the waste, identify the different containers, know the contents of our bins and understand the concept of sustainable conservation of natural resources.	In total, 114 bins are provided to 17 primary schools and 9,000 people have been reached. In addition, thanks to the collaboration with ANGED (Agence Nationale de Gestion des Déchets) three composting units are provided to three schools.

Municipality of Sayada

Good practice	Description of the activity	Objectives	Results
Awareness days for school children	Awareness-raising campaigns in primary schools in collaboration with the HOUTIYAT association were carried out to make the next generation aware of the challenges of sustainable development and the impact of marine pollution on marine life.	The main objectives of this action are to mobilise children to adopt sustainable eco-behaviour, reduce waste through good waste management practices.	Numerous awareness-raising days were held in different primary schools in Sayada, to sensitise pupils and teachers to the negative impacts of marine litter on marine ecosystems and vulnerable species, such as dolphins and sea turtles.



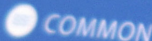
COastal Management and MOnitoring Network

for tackling marine litter in Mediterranean sea



We are all Med

est un bien commun. Une ressource précieuse.
ins nous affectent tous, nous devons les traités
u bassin d'une manière intégrée et coordonnée.



BEach CLEAN

*je suis le
plus cool!*



I-4- Awareness-raising activities

In order to raise awareness, mobilise and encourage the public and stakeholders to adopt good practices, encourage actions against marine litter, sustainable management and reduction of pollution factors, 26 awareness raising actions have been organised by the COMMON project team since the start of the project.

The majority of these actions were carried out in the two pilot areas (the city of Monastir and the Kuriat islands), while the rest were carried out in other coastal areas (Tunis, Bizerte, Sfax...).

During these events we involved associations, municipalities, public institutions, tourist operators, fishermen, schoolchildren and citizens of all ages. Indeed, more than 500 people were directly affected by these awareness-raising actions, while thousands of people were indirectly affected through the different types of media. We can classify the awareness-raising activities into four main categories:

I-4.1. Awareness-raising activities for schoolchildren

Based on the principle that "educating about the environment means guaranteeing an eco-responsible generation", the COMMON project team organised awareness-raising sessions for school and college students on the subject of marine plastic pollution and the time it takes for waste to decompose in the sea, as well as the appropriate solutions to combat this scourge.

About 70 students took advantage of the lectures and the QUIZ presented by the project team. The COMMON project also launched the "We Are All Med Schools Vs Marine Litter" competition in March 2021 in Monastir.



Several schools and colleges participated in this competition and several workshops and activities were presented by the schoolchildren such as a play about the threats to the sea, a recycled prototype to collect batteries, paintings, etc.

I-4.2. Awareness-raising activities for fishermen

In order to involve fishermen and future seafarers and to assess their level of awareness and knowledge of the problem of marine pollution by plastic waste, the COMMON project team visited the fishing ports of Mahdia, Téboulba and Monastir to carry out surveys and talk to local fishermen. In total, fishermen were involved in this action and surveys were completed.

Similarly, awareness-raising days were organised in Monastir and Teboulba for more than 35 fishermen and fishery students. These days were an opportunity to discuss and share with the fishermen the main causes of pollution, notably macro and micro marine waste, in the bay of Monastir and their negative effects on fishing, human health and the marine environment.

I-4.3. "BEach CLEAN" Campaign



The "Beach Clean" campaign is an awareness-raising campaign dedicated to tourism operators and beach users, to strengthen the fight against marine litter on beaches and to promote sustainable beach establishments.

This initiative stems from the need to protect the environmental heritage of beaches and to foster a productive dialogue between tourism operators and citizens, starting with the sharing of a decalogue of ten good practices to be followed for proper waste management and awareness of the consequences of abandoning waste on beaches.

The ten golden rules proposed in the decalogue are presented in the form of posters and will be displayed in the main tourist and seaside establishments.

In addition to displaying the decalogue, the owners and managers of the resorts that have taken part in this initiative are called upon to participate in a survey at the beginning and end of the summer season, in order to know and analyse the state of health of the beaches, and to strengthen the relationship between tourists and the marine ecosystem.

For the 2022 edition, the COMMON project shared numerous portable paper ashtrays with the establishments involved, to encourage the correct attitude of smokers, raise awareness of the dangers of cigarette butt pollution and encourage their proper disposal. A total of 23 tourism operators have joined the Beach Clean campaign in Tunisia.

1-4.4. "Clean Up The Med" Campaigns



Clean Up The Med", initiated in 1995 by the Italian NGO Legambiente, is one of the largest Mediterranean environmental initiatives, which aims to clean up beaches from waste and fight against marine pollution through collective actions. This campaign has involved, over the years, 21 Mediterranean countries, with more than 1500 sites, hundreds of associations and thousands of volunteers.

The COMMON project has joined the Clean Up The Med campaign, organising four clean-up actions; two in 2020, one in 2021 and one in 2022. These actions were carried out by involving civil societies in order to encourage collective action to tackle the problems of marine litter.

In chronological order, the first campaign took place at the Marina marina in Monastir in collaboration with the Club Pêche Sportive Ksar Hellal (CPSK). The second action took place at the beach of Kram with the involvement of the Association of Development and Environment of Kram (ADEK). The third action took place at the Kuriat islands with the participation of the association Notre Grand Bleu, while the last campaign took place at the Palmier beach in Monastir in collaboration with the Marinos Club of the Higher Institute of Biotechnology of Monastir.



1-4.5. Promotion of the "Jellyfishbot" floating waste collector

The Jellyfishbot, or jellyfish robot, is one of the main achievements of the COMMON project. This robot is capable of cleaning up harbours and aquatic areas, whether large or small or difficult to access, of all types of floating waste. This acquisition confirms the long-term commitment of the COMMON team to the fight against marine litter in Tunisia and the Mediterranean.



In order to present the jellyfish robot, the COMMON project team participated in two awareness days to demonstrate the use of this robot.

The first day was held on the occasion of the World Ocean Day at the marina of Sidi Bou Said, and was attended by representatives of the Ministries of Environment, Agriculture and Fisheries and Tourism, as well as representatives of civil society and citizens. The second day, it was at the fishing port of Zarzouna and it knew the participation of the representatives of the fishing district, of the APIP (Agency of Ports and Fishing Facilities) and of the UTAP (Tunisian Union of Agriculture and Fishing).



1-4.6. COMMON and Marine Turtles

To anchor and promote knowledge and respect for sea turtles among the public opinion and to encourage initiatives that aim to protect and conserve this species, the COMMON project team did not miss the opportunity by organising two events to celebrate the World Turtle Day. The first event took place on 23 May 2020 in Monastir, in collaboration with the sea turtle rescue centre of the INSTM (Institut National des Sciences et Technologies de la Mer) and the association Notre Grand Bleu. On this occasion, three loggerhead turtles *Caretta caretta* were released into their natural environment.



The second event took place on 23 May 2021 at the Salammbô Oceanographic Museum with the participation of Carthage NGOs, teachers, researchers, schoolchildren, children and their parents (over 80 participants). On the occasion of this day, the COMMON team animated awareness sessions and educational quizzes as well as a guided tour of the oceanographic museum before closing the day with the release of a loggerhead turtle. This day was very well covered by the media (Live radio Mosaïque Fm) and social networks.



1-4.7. Participation in other events

The COMMON project team has been invited, more than 6 times, to represent the project in national and local events:

30 October 2022: Celebration of the Sea Day at the Cité des Sciences, Tunis.

5 June 2022: Celebration of the World Environment Day at the Cité des Sciences, Tunis.

22 October 2021: Participation of the COMMON project team in the "Fête de la plaisance" at the Gammarth marina

14 October 2021: Participation in the Blue Panda event organised by WWF Tunisia in Bizerte.

7 November 2021: Awareness day for children on the subject of marine waste pollution in collaboration with JCI Carthage at the Oceanographic Museum-INSTM.

- 24 September 2021: Participation in the European night of researchers at the Cité des Sciences in Tunis.



I-5- Creation and support of networks

I-5-1. Local working group network

In order to promote the relationship between marine litter reduction and Integrated Coastal Zone Management (ICZM) and to build cross-border capacity of coastal institutional staff and all stakeholders, the COMMON project has created a Local Working Group bringing together different local actors (representatives of local waste management agencies, regional authorities, municipalities, NGOs and other relevant stakeholders with regulatory capacity or influence).

This group was created during a remote meeting on 09 October 2020. This meeting was a fruitful moment to exchange views and experiences and to design the training programme and institutional capacity building activities.

I-5-2. Network of Marine Turtle Centres in the Mediterranean

One of the objectives of the COMMON project was to strengthen the collaboration between the marine turtle centres around the Mediterranean. Being migratory animals, Mediterranean turtles belong to a single population, characterised by several nesting sites, which are mainly found in the eastern basin. The wintering and feeding grounds are spread throughout the Mediterranean. Therefore, turtle conservation is a joint effort of all Mediterranean countries, and the turtle centres play an important role in communication and exchange between the different stakeholders.

Figure 8 below shows the main turtle recovery centres that exist around the Mediterranean Sea.

The different colours in the figure allow different categories of centres to be distinguished according to their capacity and expertise. The red colour designates the marine turtle study and rehabilitation centres (STRCs), which are characterised by their relatively large capacity to receive turtles compared to other centres, and also to rehabilitate them during the necessary periods.

The marine turtle centre at the INSTM in Monastir falls into this category. It was created in 2004 as a result of a tripartite collaboration between INSTM, SPA/RAC and APAL. These activities are part of the activities of the marine biodiversity laboratory of the INSTM, under the supervision of the Ministry of Agriculture, Hydraulic Resources and Fisheries. Its main mission is to reduce turtle mortality through rescue and care of weakened individuals. It also carries out scientific research and awareness-raising activities.

In addition, the centre is involved in the work of the National Stranding Network, established since 2004 in Tunisia by the INSTM. Each year, the centre recovers around 40 dead turtles and carries out autopsies to determine the causes of death. On the other hand, it recovers about fifteen live turtles for care and rehabilitation, before releasing them into the sea.



Figure 8. Distribution of marine turtle reception structures in the Mediterranean (A) and photo of the turtle room at the INSTM in Monastir (B)

Within the framework of the COMMON project, contacts have been established with several centres for the creation of a Mediterranean network of marine turtle centres. To this end, a charter was prepared for the creation of collaborations between these centres and to reinforce the capacities of the personnel. The centres contacted were Manfredonia in Italy, Tyre in Lebanon, the INSTM in Monastir and the Faculty of Science in Sfax.

Within this framework, several training courses were provided for the members of the working teams, composed of researchers, technicians and staff. For example, a training course was held on 20 February 2020 at the INSTM centre in Monastir on sampling techniques for eco-toxicological studies. In December 2021, another training was provided for capacity building on autopsy techniques for marine debris ingestion study on a dead stranded turtle. Also, another training was conducted online for the benefit of COMMON project partners and provided by the University of Siena at the Marine Turtle Centre in Manfredonia (Italy), on 29 January 2020.

I-5-3. Network of Coastal Cities against Marine Litter

One of the main objectives of the COMMON project is the creation of a network of coastal cities to fight against marine litter. Therefore, the COMMON project team organised two training sessions with local stakeholders from the three coastal regions of the Sahel (Monastir, Sousse and Mahdia).

These meetings will contribute to transferring the experiences gained during the COMMON project activities on combating marine litter by applying the principle of integrated coastal zone management in the local decision-making process.

The first session took place on 11/08/2021 in Monastir, and it was an opportunity to network the different stakeholders of each region and to present the specific objectives of the network and the guidelines for its creation

The second session took place on 14/12/2022 in Monastir, where we presented the progress of the creation of this network, the difficulties encountered, the successes and failures. Also, this session was an opportunity to exchange experiences, discuss the possibilities of developing this network on a national and regional scale, and look for the possibility of signing cross-border cooperation agreements.

These two sessions were attended by mayors and councillors from seven coastal municipalities (Sousse, Akouda, Monastir, Sayada, Bouhjar, Mahdia and Réjich), as well as representatives from the Ministry of the Environment, ONAS, APIP, APAL, ANGED, CNVZ, URAP, CRDA, NGOs (WWF, Tunsea) and researchers from INSTM.





Recommendations for tackling marine litter

Below are all the recommendations to fight against plastic waste collected during the different training workshops.

Workshop 1 : Promotion of an eco-responsible school model

- Include environmental education in school curricula to raise awareness of environmental issues among the younger generation.
- Generalise environmental clubs in partnership with municipalities and civil society.
- Promotion of an eco-responsible school model (radio, awareness raising, plays, competition between schools).
- Increase the number of field visits for school children to observe and evaluate environmental issues.
- Signing agreements with environmental associations to further support awareness-raising actions and interventions in the field of environmental protection.

Workshop2 : Integrated Coastal Zone Management

- Strengthen coordination and institutional collaboration between the different national and regional actors (ANPE, ANGED, APAL, municipality ...) to improve the capacity to monitor and assess the impacts of plastic waste at sea.
- Further strengthen the role of the environmental police regarding the monitoring and control of waste pollution through a revision of the law n°2016 -30 of 5 April 2016 on the creation of the environmental police.
- Integrate the informal sector of ragpickers called "Berbecha" into the regulated waste collection and recycling systems.
- Establish a model to be adapted to the regional context of Extended Producer Responsibility (EPR). This implies that all producers responsible for the marketing of plastic products will be responsible for financing the prevention and management of end-of-life products. We can start with pilot actions with some producers.
- Strengthen the application of the polluter pays principle, by charging the costs associated with prevention, reduction and control measures. This means that the polluters (producer, distributor or consumer of this pollution) must bear the cost of the clean-up.

Workshop 3: Circular economy approach to tackling marine litter

- Reduce the use of single-use plastics in public facilities, through a decree or law to ban the use of unnecessary single-use plastic products.
- Encourage public facilities to use products made from recycled and/or reused materials or to re-use them.
- Encourage local authorities to apply selective sorting of plastic materials at the municipal level via financial and technical support from the state, donors, regional and international organisations etc.
- Integrate the polluter-pays principle more into environmental legislation.
- Encourage and support the creation of start-ups for the collection, recycling and recovery of plastic waste.
- Encourage the use of sustainable packaging and the reduction of over-packaging in the various product marketing and distribution chains.
- Install screening systems at the different wadi mouths (e.g. Oued Khniss) to reduce pollution by plastic macro-waste.

Workshop 4: Marine waste: what danger for MPAs, RAMSAR areas and endangered species?

- Promote and support scientific research to fill gaps in knowledge about the sources and impacts of marine litter.
- Particularly for the Kuriat Islands: develop communication and awareness tools for visitors and tourist operators to prohibit or reduce littering on the islands.
- Involve more fishermen, young people, students, other public institutions (APAL, AVFA...) and private institutions concerned by the problem of marine litter in training, awareness-raising and the fight against marine litter and its origins.

Workshop 5 : Conscious entrepreneurship for tourism operators

- Encourage tourism establishments to reduce or stop the use of single-use plastic items, through tax incentives and an eco-labelling programme.
- Improve the system of collection and sorting of plastic waste by tourism institutions.
- Implement a pilot project for single-use plastic-free hotels in the city of Monastir.

Workshop 6 : Negative effects of marine litter on human health and biodiversity

- Set technical standards for minimum standards for the establishment and operation of aquaculture facilities.
- Develop methods and techniques to ensure traceability of different materials used in aquaculture, such as feed bags, ropes, etc.
- Apply the principle of extended responsibility to aquaculture producers for the costs of recovery, recycling and disposal of end-of-life aquaculture materials.
- Encourage aquaculture operators to use biodegradable plastic products to minimise the risks and negative effects of losing materials at sea.
- Encourage aquaculture companies to increase the recovery rate of bags.
- Create an eco-label for environmentally friendly aquaculture companies.
- Establish financial benefits for fishermen to encourage them to report and recover lost gear (pots, nets, trawls etc.).



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