
# Marine Resources & Coastal Zone Management Program

Institute of the Environment
University of Balamand

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# Collection and Identification of Solid Waste Caught off the Coasts of El-Mina and Tripoli-Lebanon

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# Abstract

Under the context of MAP/MEDPOL activities to protect the Mediterranean Sea, the Marine Resources and Coastal Zone Management Program at the Institute of the Environment, University of Balamand, and in cooperation with the RAMOGE Agreement, received funding to carry-out a pilot study to assess marine litter off the coasts of Tripoli and El-Mina, Lebanon. The project aimed at validating a methodology to identify the quality and quantity of solid waste accidentally caught in the nets of fishermen. Ten fishermen were selected to collect all marine litter caught in their nets on a daily basis, store them in plastic bags and record date, name of the fishing vessel and the location of fishing activities. Marine litter was divided in six categories: 1) Cloth; 2) Fishing material; 3) Glass; 4) Metal; 5) Paper; and 6) Plastic, volume estimated, data entered and processed in a specially designed Geographical Information System, percentages calculated and maps identifying the location of marine litter generated. All six categories were present in the waters of El-Mina/Tripoli in the following percentages: 1) Cloth: 1.74%; 2) Fishing material: 1.74%; 3) Glass: 1.16%; 4) Metal: 16.81%; 5) Paper: 0.87%; and 6) Plastic: 77.68%. Litter was mostly found in areas of high anthropological stress, mainly at the mouth of the Abou Ali River, the fishing and commercial ports, the conglomeration of rocks off the El-Mina headland and around the Palm Island Reserve. The results revealed the influence of anthropic activities and river inputs. Temporal trends indicated the presence of plastic and metal over the whole period of collection, while all other categories were collected sporadically. This passive method for monitoring marine litter at minimal costs has been validated and can be applied to other areas around the Mediterranean. The human error component can be offset by the long periods of collection by the participating fishermen.

# 1. Introduction

Marine litter is found in seas and oceans all around the world. It travels over long distances with ocean currents and winds and emerges even in remote areas far away from obvious sources [1]. Marine litter includes all objects that do not naturally occur in the marine and coastal environments but are found there [2] [3]. Once in the sea, the pathways through which marine litter circulates depend upon the nature of the litter item. The influences of wind, tide and currents have, for example, different effects upon the circulation of floating litter in comparison to items that sink [2] [3]. Accordingly, marine litter has a truly global distribution and is categorized as a global marine and coastal problem. Considering the very slow rate of degradation of marine litter items, a continuous input of large quantities of marine litter will result in a gradual increase of litter in the coastal marine environment [1] [3]. Despite efforts made internationally, regionally and nationally, there are indications that the marine litter problem keeps growing worse [1] [2]. The main reasons attributed to the growing marine litter problem are many folds with the main ones including deficiencies in the implementation and enforcement of existing international, regional and national regulations and standards, lack of awareness among main stakeholders and the general public [1], and absence of appropriate solid waste management plans in many countries.

## 1.1 Sources of marine litter

Marine litter originates from marine as well as land-based sources. The main sea-based sources are merchant shipping; ferries and cruise liners; fishing vessels; pleasure crafts; military fleets and research vessels; offshore oil and gas platforms; and aquaculture installations. On the other hand, the main land-based sources of marine litter are coastal municipal landfills; riverine transport of solid waste, discharges of untreated municipal sewage and storm water; industrial facilities; medical waste; and tourism activities [1] [2]. The sources are therefore quite diffuse and lie outside the control of any one agency [2]. At a global scale, nearly 80% to 90% of the world marine debris is thought to have originated from land sources [3] [4] [5]. In recent years, tourism, fishing and sewage related debris have consistently been identified as contributing the greatest proportion of litter, regardless of geographical location [2] [5].

## 1.2 Impacts of marine litter

Solid waste in marine environments poses environmental, economic, health and aesthetic risks. Adverse ecological impacts include entanglement [6] [7], ingestion [8], smothering [9], disturbance, and removal of habitat through beach cleaning activities [10], transport of exotic species [2] [11], and poisoning through the breakdown of products [1] [2]. It also appears that not much knowledge is available on how marine litter affects populations or whole ecosystems, nor on the economic damages associated with the impact of litter on ecological function [2]. Damage to people, property and livelihoods are grouped into general categories including damage to [1] [2]:

- fisheries, fishing boats and gear
- human health
- cooling water intakes of power stations and industry
- recreational beaches
- commercial harbors and marinas
- navigation
- coastal grazing land

Nevertheless, only few economic studies have been published on the costs and financial damage of marine litter on municipalities and on specific activities such as fisheries [1] [2]. For an extensive review of such impacts please refer to the KIMO report published in 2000 on the impacts of marine debris [10].

## 1.3 Marine litter in the Mediterranean

For thousands of years, the Mediterranean Sea has served the civilizations of the three surrounding continents in various ways, be it for transportation, a source of marine life, and/or leisure. It is well accepted that Mediterranean coastlines are highly stressed from anthropogenic activities. The population of the riparian countries of the Mediterranean basin boosts 450 million inhabitants including 150 million coastal residents. In addition, Mediterranean coastlines receive more than 200 million tourists concentrated during a very short period of the year: the summer season [12]. The Mediterranean Action Plan (MAP: http://www.unepmap.gr/) states that solid wastes entering the Mediterranean from coastal residents average 254 kg/person/year with plastic alone representing around 75% of debris found in the marine environment [12] [13] [14].

## 1.4 The Lebanese coastline

Due to its geographical location facing the Mediterranean, the Lebanese coastal zone is consumed for human settlement, agriculture, industry, amenity and various maritime activities such as shipping, fishing, and sea mining. Moreover, the coastal stretch of Lebanon has been suffering from the destructive years of civil unrest and their resulting effects, including the deterioration of infrastructure and public services, unplanned urban development, degradation of environmental conditions, overexploitation of natural resources, deficiency in regulatory and institutional frameworks, and significant economic difficulties. The main sources of marine pollution along the Lebanese coastline include contaminated surface waters, raw domestic and industrial wastewater discharges, agricultural runoff, un-engineered solid waste dumps, and accidental oil spills. Solid waste management and planning in Lebanon has been one of the ignored subjects for years, both on the public and the private levels. Needless to say, much of the municipal waste is finding its way to the marine environment polluting coastal ecosystems and beaches and negatively impacting sectors dependent on marine and coastal resources. Direct action is still missing due to the lack of coordination among the various initiatives and the absence of a clear management plan. It has been reported that 30% of all fish caught along the Lebanese coast had plastic in their stomachs and recreational divers have been complaining about the presence of plastic in the water column and on the sea floor [15]. It is therefore essential to develop a monitoring technique for marine litter in order to address the current lack of understanding of litter in the marine environment that hinders the development of solutions to this pressing problem on the Lebanese coast in particular and the Mediterranean in general.

## 1.5 Fishing industry and Fishing techniques

Lebanese fisheries are artisanal or traditional. The Lebanese fishing fleet is made of a total of 2700 fishing boats spread all over the Lebanese coast with approximately 1700 in North Lebanon of which 700 are based in Tripoli fishing port (personal communication with the Ministry of Agriculture; Fig.1). Trawling is prohibited by the 1929 law #2775, while the most commonly used gear includes trammels and long-lines, roundhaul nets and beach seines. Fishing nets with illegal mesh sizes are widely available on the black market increasing the by-catch of immature organisms and leading to negative impacts on recruitment rates [16] [17]. No information is currently available on fishing effort or quantities of marine products caught off the Lebanese coast, nor on the impact of marine litter on the fisheries sector in the country. The Marine Resources and Coastal Zone Management Program (MRCZM) at the Institute of the Environment (IOE), University of Balamand (UOB; (http://www.balamand.edu.lb) is currently carrying-out a study on commercial fish species in North Lebanon that will hopefully contribute to closing the information gap in this field. In addition, the current study on marine litter will also establish a baseline from which further studies can be carried-out to elucidate the impact of waste in marine ecosystems on the livelihood of fishermen.

## 2. Objectives

This project is one component of a larger MAP initiative to launch the process of tackling marine litter around the Mediterranean and specifically in Lebanon. Since very few studies have tackled the problem of marine litter in Lebanese waters, the MAP, through the RAMOGE agreement (http://www.ramoge.org/), provided funds of a total of //5000// EURO to the MRCZM to launch a pilot study to assess marine litter and to validate a methodology that will:

- identify the quantity of litter accidentally caught in the nets of fishermen
- identify the category of litter caught
- generate Geographical Information System maps to identify the location of the highest concentration of litter by category
- try to track the primary sources of marine litter
- reduce input of solid waste into the marine environment from the primary sources
- allow constant monitoring of marine litter in order to establish a database
- Raise the awareness of fishermen and the citizens of the region on the problem of solid waste in the marine environment

Upon validation of the methodology, activities can be expanded to cover other regions around the Mediterranean basin.

## 3. Study area

Lebanon, situated on the eastern side of the Mediterranean basin, has a coastline of 225 km with a narrow strip extending along the Mediterranean Sea and bounded to the east by the Mount Lebanon mountain chain. Based on the World Bank/ERM report (1995), the coastal zone which covers 16% of the Lebanese territory, shelters about 67% of the total population with an average density of 1549 individuals/km$^2$ compared to an average national population density of 364 individuals/km$^2$. This high urbanization level along the coast exerts great pressure on the coastal marine ecosystem and is a primary source of solid waste entering the marine environment. In addition, Lebanon is blessed with high annual rainfall that feed 17 perennial and 23 seasonal rivers. Given the absence of solid waste management plans, those rivers are becoming point sources of all types of pollution including solid waste, sewage, and chemicals from industry and agriculture.

The MAP and the RAMOGE agreement chose as a study area the region covered by the Union of Municipalities of Fayhaa in North Lebanon and includes the Municipalities of Tripoli (34.31°N - 35.50°E), El Mina (34.24°N - 35.49°E) and Fayhaa with a total population of around 500,000 individuals to launch their initiative to tackle marine litter (Fig. 1). The area encloses the Abou Ali River (34.25°N - 35.50°E) that separates Tripoli into Abou Samra District in the South and El Qobbeh District in the North, a commercial port, a fishing port servicing approximately 700 fishing boats, a landfill on the mouth of the Abou Ali River, the Palm Island Marine Reserve (Palm, Ramkin and Sanini Islands) as well as a growing population making it the ideal place to establish a methodology to monitor marine litter.

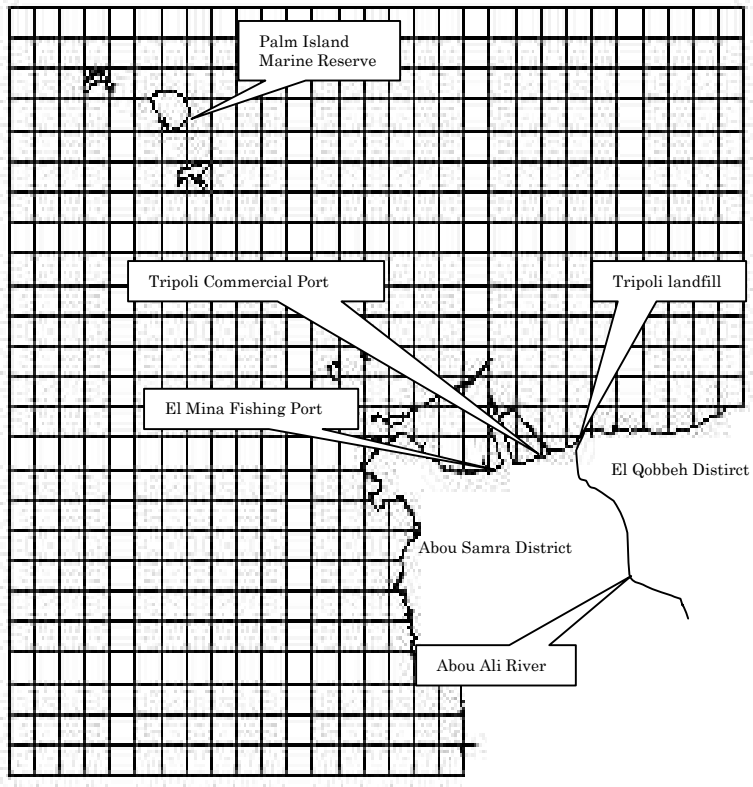



Figure 1: Map of the study area

# 4. Methodology

A monitoring method for marine litter caught in the nets of fishermen was forwarded by the RAMOGE agreement and adapted to the Lebanese context. The area of study was divided into 300 x 300 m quadrants in order to record the location of fishing pressure and the occurrence of the different litter categories. In short, litter was sorted into six different categories: 1) Cloth; 2) Fishing material; 3) Glass; 4) Metal; 5) Paper; and 6) Plastic, and volume of each category recorded per fishing trip. Accordingly, two datasheets were developed for recording information: 1) Fishing Location Datasheet for recording boat name, date, fishing location and weather conditions (Appendix I); and 2) Litter Volume Datasheet for recording category and volume of litter collected (Appendix II).

Ten fishing boats using only nets as fishing gear were then selected from the database of cooperating fishermen available at the MRCZM to participate in the pilot study. In order to ensure cooperation from, and in complete coordination with the fishermen, incentives were provided for each boat in the form of: 1) one cooler/boat to keep catch fresh until landing for a value of //40//USD per boat; 2) free choice of fishing gear for a value of //80//USD per boat; 3) engine oil for a value of //45//USD per boat; and 4) rain gear and waterproof flashlights for a total of //51//USD per boat. A focal point was also nominated by the fishermen to act as the contact person between the MRCZM and the fishermen. His main duties were to collect the litter from the fishermen, assist them in filling the Fishing Location Datasheet, and hand the completed sheets to the MRCZM.

### 4.1 Data collection and Analysis

It was agreed that given the limited fund available, a passive technique assessing the accidental catch of litter in the nets of the fishermen over a period of several months will yield the best results. Data collection and analysis was carried out as follows:

1. On a daily basis, the 10 fishermen collected in plastic bags the litter accidentally caught in their fishing nets
2. On daily basis, the fishermen focal point collected the waste bags, filled a Fishing Location Datasheet for each fisherman and marked the bags accordingly.
3. The MRCZM team collected all marked bags and the associated sheets twice a week.
4. Litter was then sorted per category at the MRCZM premises and volumes recorded on the Litter Volume Datasheet.
5. Collected data was entered into Access and queries linking date, location, and volume per category were generated.
6. Queries were exported to excel, and then into MapInfo to create statistical and cartographic presentations of fishing locations, litter categories and volumes.

## 5. Results

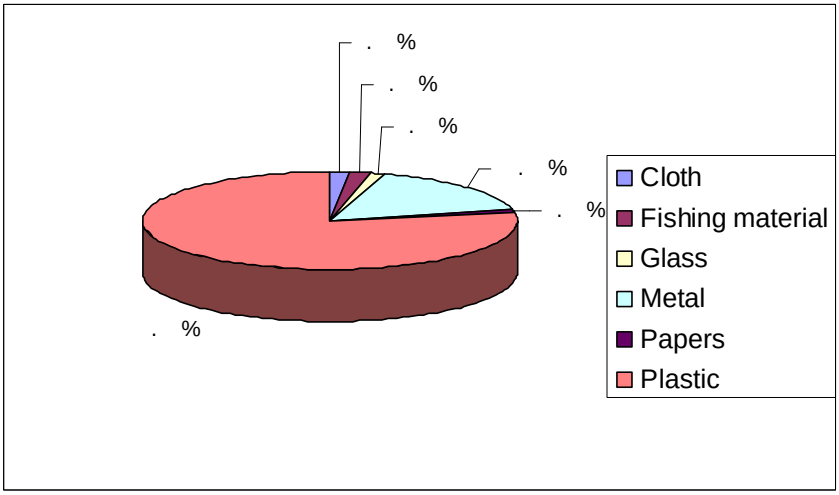
Over a period of 3746 boat-days, a total of 345 liters of litter were collected by the fishermen from August until the end of December 2005, and are divided as follows: 268 L of plastic, 58 L of metal, 6 L of fishing material, 6 L of cloth, 4 L of glass, and 3 L of paper (Table 1; Fig.2).

| Category | Liters |
|---|---|
| Cloth | 6 |
| Fishing material | 6 |
| Glass | 4 |
| Metal | 58 |
| Paper | 3 |
| Plastic | 268 |
| Total | 345 |

Table 1: Volume of the different litter categories in liters

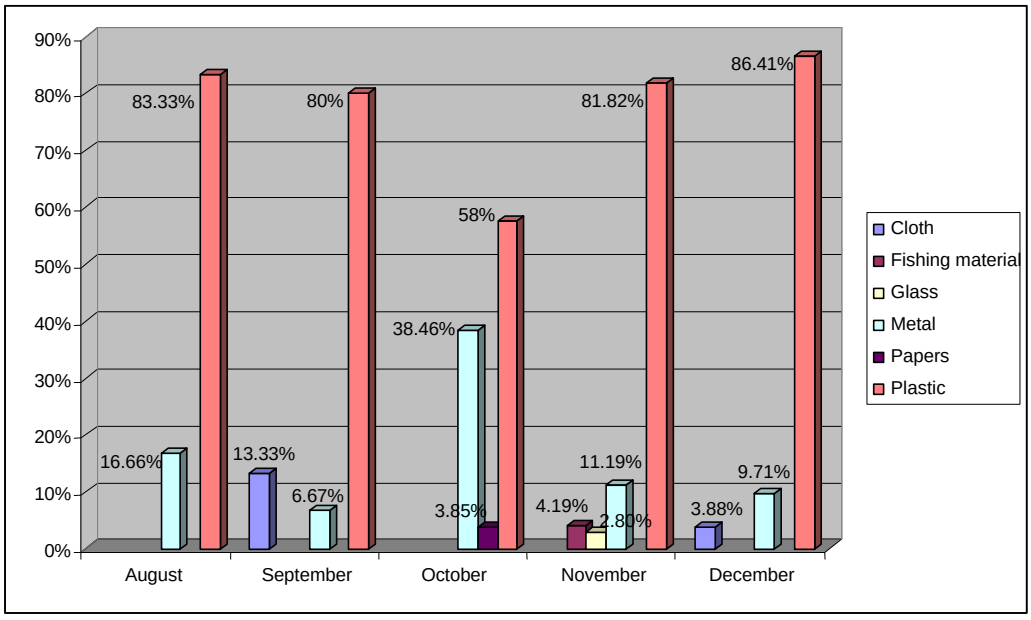
Figure 2: Sample of all litter categories caught in the nets of fishermen

As it can be clearly seen in Graph 1, plastic represented the highest percentage of 77.68%, followed by metal at 16.81%, fishing material and cloth at 1.74% each, glass at 1.16%, and finally paper at 0.87%. Plastic litter consisted mainly of bags and miscellaneous items, metal mainly of soda cans, glass of small and big glass bottles, fishing material of miscellaneous items (lines, nets, etc…), cloth of clothes and diapers, and paper of cigarette boxes.




Graph 1: Total percent distribution of litter by category

Analysis of the data also revealed that the occurrence of the different litter categories occurred at different frequencies according to the month of sampling (Graph 2). Plastic and metal were present over the five month while the other litter categories occurred in some months and not others. The lowest percentages were recorded in the month of October, coinciding with the end of the tourism season and dry weather. August and September experience high tourism activities, while the first rains start at the end of October and intensify in November and December. This might explain the difference in percent waste collected during the five month period.




Graph 2: Percent distribution of litter categories per month

## 5.1 Fishing locations

As it can be clearly seen from Fig.3, fishing activity was mostly concentrated on the northern coastline of Tripoli and El Mina, more specifically north of the mouth of the Abou Ali River and the ports as well as north of and outside the protected perimeter of the Palm Island Reserve. Since prevailing winds blow from the South West to the North East, fishermen tend to concentrate their activity in areas protected from their effect. The collected data also shows that very little fishing takes place in open water, further demonstrating the artisanal state of the sector.

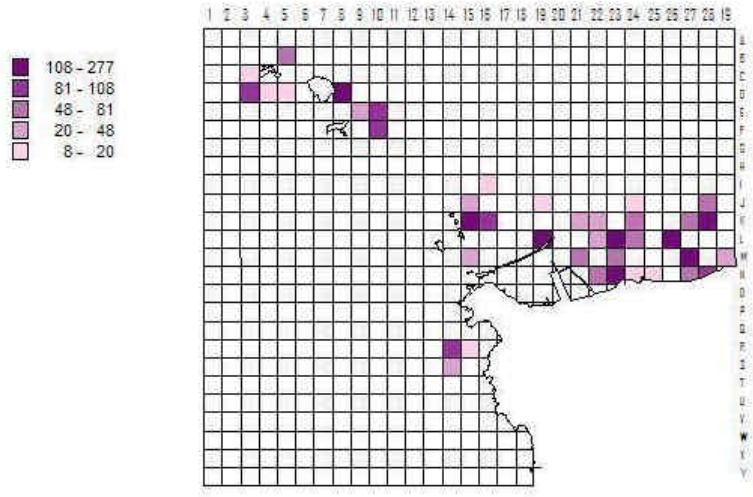



Figure 3: Fishing intensity according to location

## 5.2 Plastic litter

Plastic litter, and in line with all the reviewed literature, is the most frequent litter encountered by the fishermen as it is present in all fishing location (Fig. 4) and comprised 77.68% of all litter collected (Graph 1). The highest concentrations were collected north of the Abou Ali River, around the Palm Island Reserve, and the conglomeration of large rocks off the ports. Human activities are intensive in those locations ranging from shipping, to fishing to tourism. In addition, the location north of the port coincides with the mouth of the Abou Ali River that serves at the same time as the location of the Tripoli landfill.

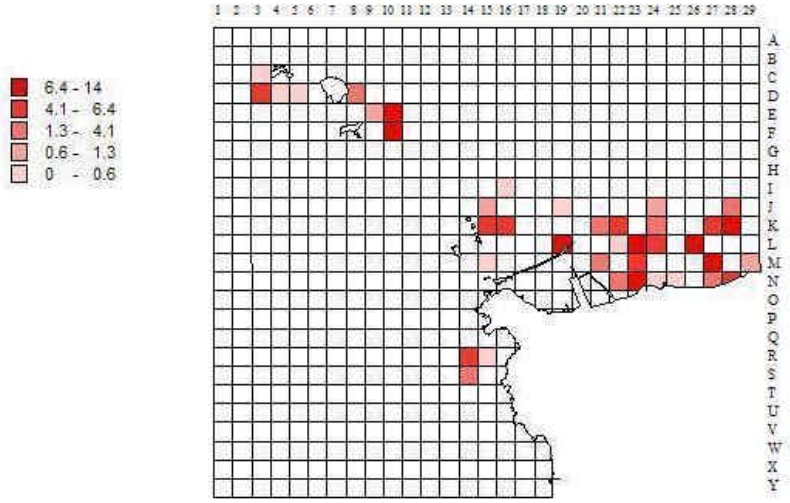



Figure 4: Concentration of plastic litter according to location

The litter was comprised of all kinds of plastic products ranging from bottles, to bags, to cups etc. (Fig. 5). In some cases it was difficult to identify plastics indicating that the collected items have been drifting in the marine environment for long periods of time.

**Figure** 5: Sample of plastic litter caught in the nets of fishermen

## 5.3 Metal litter

The extracted metal items included mostly soda and food cans (Fig. 2) and comprised 16.81% of all waste collected (Graph 1). Metal was mostly collected around the Palm Island Reserve, seaward in front of the fishing and commercial ports, as well as around the conglomeration of rocks right off the headland (Fig. 6). These areas experience intensive human activities ranging from tourism, to recreation, to fishing. It is important to note at this stage that very little concentrations of metal were extracted in front of the mouth of the Abou Ali River and its surroundings, but are encountered again further north of the city of Tripoli, albeit at lower concentrations.

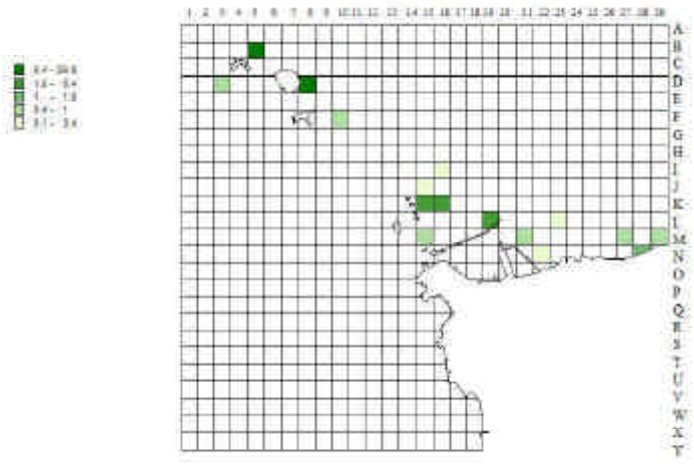


Figure 6: Concentration of metal litter according to location

## 5.4 Cloth litter

Cloth does not appear to pose as large a problem as plastic and glass since a small volume was collected by the fishermen and comprised 1.74% of all waste collected (Graph 1). It was encountered in two main locations: 1) in front of the fishing and commercial ports; and 2) further north of the city of Tripoli. This scattering of cloth material presents a challenge in validating the impacts of this waste category on the fishing industry

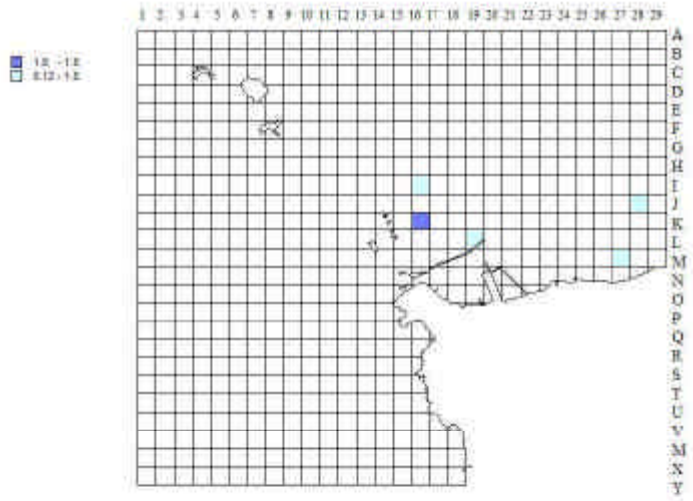


Figure 7: Concentration of cloth litter according to location

## 5.5 Fishing material litter

Very small concentrations of fishing material waste was collected by the fishermen during the sampling period (Graph 1), and specifically close to the conglomeration of rocks facing the headland (Fig. 8, cell K15). Given the large number of fishing activity in the area, it was expected that the percent collected will be higher. Oddly enough, fishing material litter is absent even from the areas experiencing the highest intensity of fishing activity (Fig. 3).

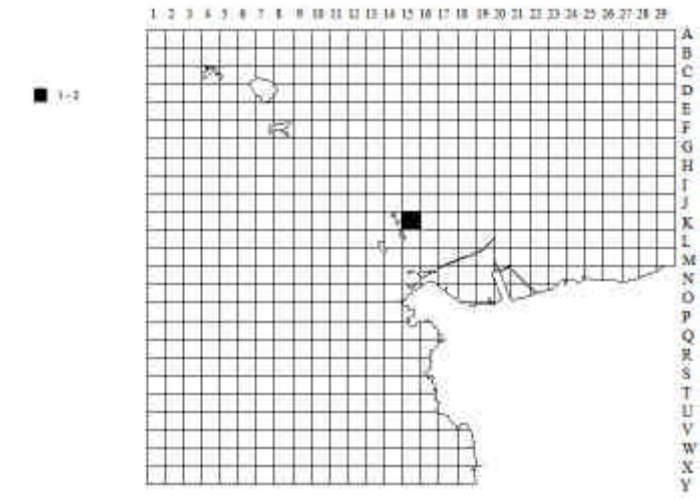


Figure 8: Concentration of fishing material litter according to location

## 5.6 Glass litter

Very little amount of glass litter was collected during the sampling period (Graph 1) and more specifically in one location at the exit of the fishing and commercial ports (Fig.9; cell M20). It was expected that glass will represent a large percentage of the litter collected due to the large human activities that take place off the coast of El-Mina and Tripoli. This might be due to several reasons, one of which is that trawling is prohibited by Lebanese law and glass sinks to the bottom.

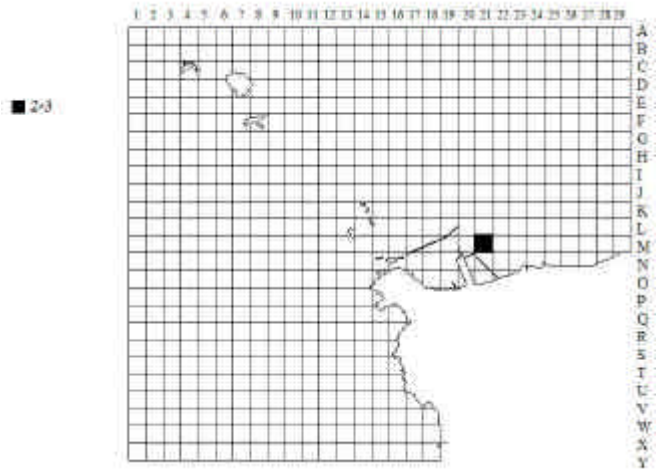



Figure 9: Concentration of glass litter according to location

## 5.7 Paper litter

As expected, paper represented the least quantity collected, amounting for 0.87% of total litter (Graph 1). The waste was made mostly of cigarette boxes that were most likely disposed of by either recreationists or fishermen. Specifically, paper was mostly collected in the perimeter of the Palm Island Reserve (Fig. 10; cell E9) with very small amounts collected North of the fishing and commercial ports (Fig. 10; cell N23).

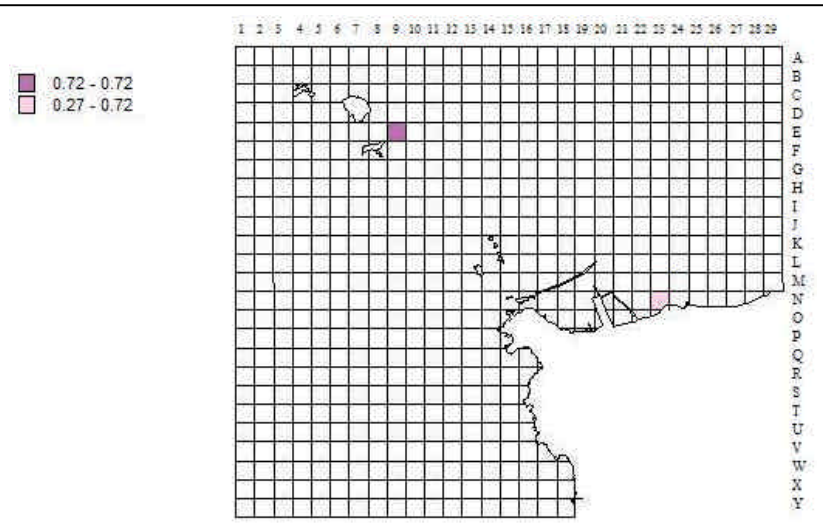



Figure 10: Concentration of paper litter according to location

# 6. Discussion

The results of this study have shown that all investigated litter categories were present at different concentrations in the marine environment off the coast of Tripoli and El Mina. The percentages obtained are consistent with other studies that found that plastic and metal are the major litter types collected in marine ecosystems [12] [13] [14] [18] [19] [20]. This is mostly due to several factors. The study area experiences high levels of anthropological stresses ranging from tourism and recreation to fishing as well as being the recipient for the highly polluted waters of the Abou Ali River. The Abou Ali River is recognized as a major municipal solid waste recipient due to littering from the population around the river. During rain storms much of this waste is carried directly to the sea where it is transported by currents and becomes entangled in the nets of the fishermen. In addition, the presence of the landfill at the mouth of the Abou Ali River may well act as another point source of municipal solid waste. A further indication that the wastes collected are from anthropological sources is their occurrence around the Palm Island Reserve and the conglomeration of rocks off the ports (Figs 3, 4, 6, 7, 8, 9, 10). At a global scale it has been reported that nearly 80% of the world's marine debris is thought to have originated from land sources [4]. Temporally, trends indicated the presence of plastic and metal over the whole period of collection, while all other categories were collected sporadically (Graph 2). Even though the data sheets included a section on weather patterns, this was seldom filled by the fishermen focal point, thus not allowing the correlation between climatic events and marine litter. This matter will have to be addressed in any future activity on marine litter to better understand the seasonality of marine waste and its impact on the well being of the communities of El-Mina and Tripoli. In addition, what could not be established in this study is the exact source of the waste caught in the nets of the fishermen due to the limited resources available.

Plastic accounted for the highest percentage of total debris (Graph 1; 77.68%) falling within the same brackets of 70%-80% reported in the literature [5] [18] [21]. The bulk of municipal waste is made of plastic that floats, is non-biodegradable, and tends to be carried by water currents and river outflows. Plastic litter is known to be highly persistent and therefore will travel long distances through marine pathways and accumulate in sinks [2]. UNEP (1990) estimated that a plastic bottle will persist in the marine environment for approximately 450 years [22]. In addition, plastics are broken down into smaller pieces due to the harsh mechanical environment of the oceans where they are ingested by marine organisms or degraded into alternative substances that may prove toxic [1] [23] [24]. It has been reported that 30% of all fish caught off the coast of Lebanon had plastic in their stomachs [15]. Effort should therefore be invested in determining the source of plastic waste entering the El/Mina-Tripoli coastal area including its mechanical breakdown and its impact on the fishing industry.

The second largest volume collected was metal (Graph 1; 16.81%), mostly in the form of soda cans confirming the anthropological source of this litter category and in agreement with the available literature [19] [20]. The collected items displayed different ages, with some being newly disposed off cans while others were clearly showing the effects of weathering by sea water (Fig.2). The low percentage shown is due, like all other litter items, to the properties of the waste itself. Metal items tend to be heavy and readily sink to the bottom allowing only the capture of the "lighter" items in the nets. This is exacerbated with the absence of trawling activities that, if practiced, will ultimately reveal that much more metal is present off the El Mina/Tripoli coasts than this study shows. It is important to recall at this stage that the fisheries sector in Lebanon remains artisanal with fishermen mostly using gillnets that are easily ripped if entangled with heavy metal debris. The fishermen tend to dive and release the heavy metal items from their nets therefore avoiding net destruction (personal communication with fishermen). This has surely excluded heavy metal debris being reported by the partner fishermen.

Given the fact that physical parameters affect the circulation of the different litter types, it was expected that glass items that sink will only represent a small percentage of the total collected. This hypothesis has been proven correct as glass only represented 1.16% of the total. The collection of such low amounts of glass is most likely due to the prohibition of trawling in

Lebanese waters, the fact that glass sinks, and that glass items being disposed of at sea are heavier than their collected metal counterparts. Except for the accidental catch of glass while the nets are being hauled, the probability of hauling out such items is very remote. In order to get a better perspective about metal and glass litter, a special permit should be obtained from the concerned authorities to bottom-trawl for waste in the target area for a specific period of time in order to evaluate the type and percentages of the wastes that sink.

Equal values were obtained for fishing material and cloth debris (Graph 1; 1.74%). Cloth was expected to represent one of the smallest amounts collected due to its degradable qualities and the mechanical effects of the marine environment. Within this category, one of the landed items was a fresh diaper that most likely skewed the volume to a higher value. On the other hand, the authors were expecting to report high amounts of fishing material debris given the large numbers of fishermen in the target area in conformity with studies carried-out in other locations [20]. This litter item needs to be better defined as fishing material is mostly manufactured either from plastic or from metal and creates difficulties in terms of categorization when looking primarily on litter type. Nevertheless, and when researching the source of the waste, a list of items to include under this category needs to be included.

Lastly, and as expected, paper accounted for the least amount of the total (Graph 1; 0.87%). Paper tends to degrade very quickly in water and does not persist in marine environments for any lengthy period of time. As previously stated, paper items consisted of cigarette boxes proving the anthropological source of this waste category. The fact that even such a value was obtained reveals the fresh input of paper litter in the target area.

This pilot study has clearly shown that municipal waste is a problem in the El Mina/Tripoli region, and that the debris is found mostly around areas of human agglomeration. The results obtained should act a base for future, more extensive studies that will determine the source of the waste, the economic impact of such input on the users of marine resources as well as recommend measures to reduce such impacts on the marine ecosystem of the region.

# 7. Evaluation of the Methodology

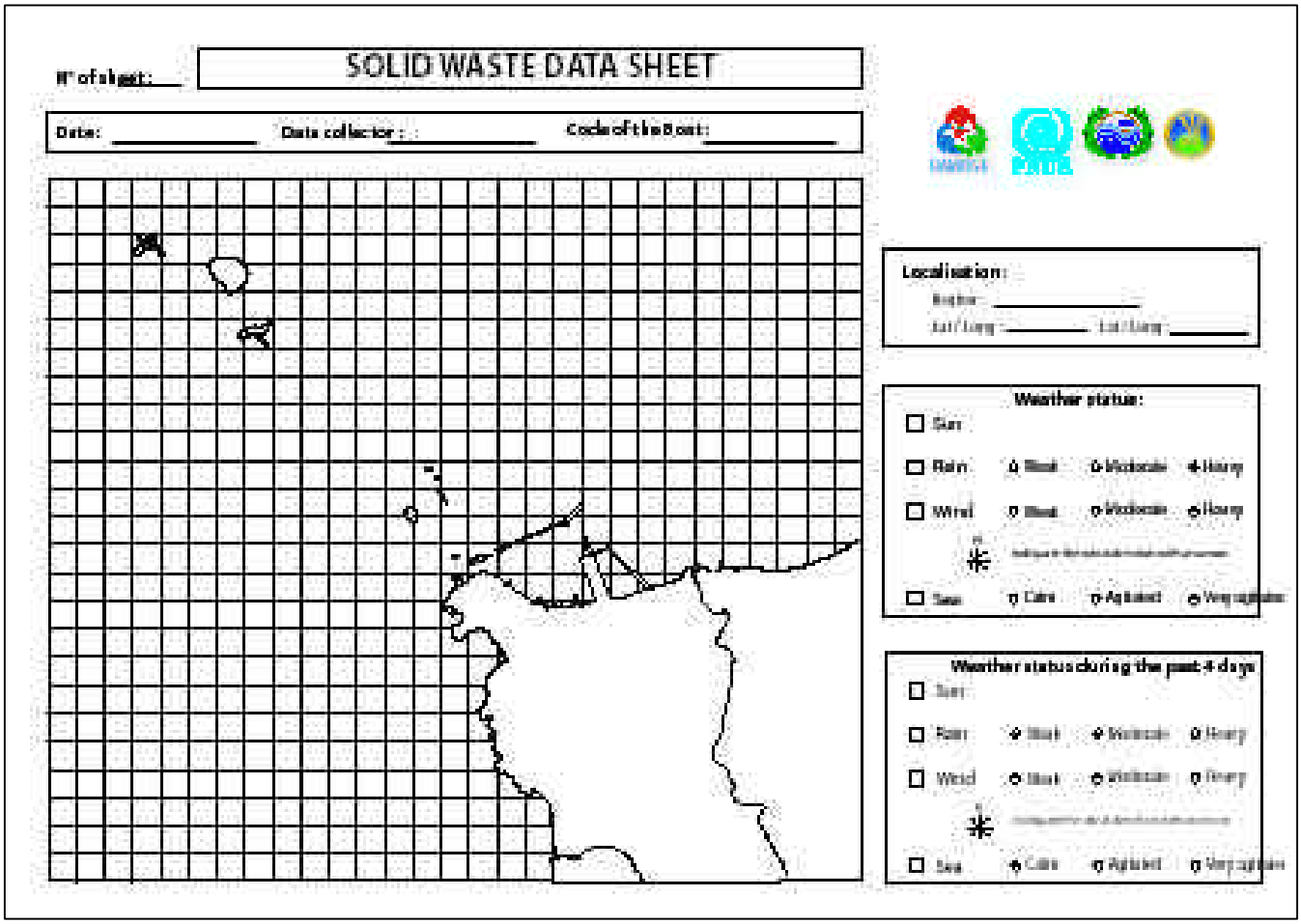
The team at the MRCZM has tested a passive method for the collection and evaluation of marine litter at minimal costs. The fact that fishermen are collecting the waste allows investigating marine litter over long period of time and across many seasons. Nevertheless, the fishermen have to be provided with incentives to cooperate. On the other hand, and during implementation, some gaps in the method were detected that need addressing in order to achieve better results in the future and are as follows:

- The collection of marine debris totally depended on the fishermen.
- Given the artisanal state of the Lebanese fishing industry, results depended on items caught in the nets of the fishermen while fishing meaning that that big sized and heavy items are rarely hauled in.
- The distribution of solid waste is relative to the distribution of fishing areas. This study could not report on litter in areas not frequented for fishing.
- Data collection was subject to weather conditions. In stormy weather, no waste was collected as the fishermen were anchored at port.
- Data collection was completely dependent on the fishermen increasing the possibility of human error. This can be offset by the passive collection of marine waste over long periods.
- For temporal variations, climatic data should be requested from weather observatories for accuracy and consistency of the information without depending on the focal point.

- Estimation of volumes was done visually making the results highly dependent on the estimator. It is recommended that dry weight be considered in future studies.
- The unit allowed to be entered into the system is 1 liter and above. Values below 1 were considered as 0 while values between 1 and 1.9 were considered as one. The system must allow fractions to be entered.
- The GIS system adopted should be more user friendly for all concerned to be able to benefit from it. More in depth training on the adopted software system must be included in any future activity regarding marine litter

# Appendix I: Fishing Location Datasheet

(This sheet has been translated to English for the purpose this report)



# Appendix II: Litter Volume Datasheet

- Volume de déchets récupérés : ☐ (l)
- Poids des déchets récupérés : ☐ (kg)
- Durée de la pêche : ☐ (h)

| Types de déchets | Verre | Carton | Plastique | Tissus | Métal | Matériel de pêche | Autres |
|---|---|---|---|---|---|---|---|
| % relatif | | | | | | | |

| Objets volumineux | Carcasse (autos...) | Batterie | Moteur | Pneu | Epave | Electro-ménager | Autres |
|---|---|---|---|---|---|---|---|
| Nombre | | | | | | | |

Origine(s) supposée(s) des macrodéchets :

☐ Bassin Versant ☐ Littoral ☐ Large

Observations complémentaires (mode opératoire ...) :

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