

# Who Are the Stakeholders in Ras Beirut's Seafront Pollution Management?

Research Report

**The AUB Neighborhood Initiative**

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# Summary

Ras Beirut's northern seafront has for decades been the victim of massive solid waste pollution, mostly due to litter thrown by passers-by. This ecosystem is a victim of the 'Tragedy of the Commons,'<sup>2</sup> as people freely littering the seafront will end up destroying one of Beirut's unique natural parks. A growing body of recent research into the management of common pool resources<sup>3</sup> has shown that there are ways to escape this gloomy situation, especially when resource users are directly communicated to and are allowed to create and sustain effective resource management institutions. This project intends to explore who the stakeholders in managing Ras Beirut's seafront resource are, by conducting a new research study on the litter problem in this area. The outcome of the proposed research is to explore the feasibility of a set of incentives that local stakeholders can adopt to reduce solid waste pollution on the seafront.

The project seeks to answer the following questions:

- What organizations are concerned about the sustainable management of the seafront? What are their mandates and actions?
- How many persons are using the seafront as a recreational area?
- How severe is the litter problem on the seafront? What are the main components and origins of this litter?
- What is the profile of the seafront users? What are their attitudes towards the litter problem?

The project's findings were numerous. First, it was observed that many stakeholders have different mandates concerning pollution prevention on the seafront. These include among others the Municipality of Beirut, the Ministry of Transport and Public Works, and Sukleen (the private solid waste collection company). It was also determined that the total number of visitors to the Corniche reached approximately 30,000 per week. Joggers and walkers constitute more than 50% of these visitors. The second highest groups of visitors are people who use the Corniche as a hangout zone, whereas swimmers and fishermen make up the lowest percentage. The number of cars parked at the Corniche ranged between a minimum of 134 and a maximum of 613 cars.

Second, concerning litter pollution, the total abundance of litter on the seaside below the Corniche was equal to 10,489 units, almost 1 item/m<sup>2</sup>, indicating that the seafront is quite polluted. The main litter items collected were cigarette ends, plastic coffee cups and glass bottles; all mostly originating from the nearby coffee shops.

As for the profile and attitudes of visitors, the project's findings indicated that most visitors to the Corniche are middle class Lebanese males living in Beirut, aged between 20 and 50, and are employees who hold a post-secondary degree. The Corniche visitors mostly travel by car to come to the area, traveling around 20 minutes to reach it then jogging or walking on the Corniche for almost 1.5 hours. Most of the people who were surveyed blame the youth and families on the Corniche for littering the area, and most people think the Municipality of Beirut is the main institution in charge of reducing the litter pollution. 95% of the visitors think that the litter pollution problem is important on the seaside.

<sup>2</sup> For more on this important concept explaining environmental degradation, see Hardin, Garret. (1969) "The Tragedy of the Commons", Science, 162: 1243-8.

<sup>3</sup> See Ostrom et al. (2002), The Drama of the Commons, Commission on Behavioral and Social Sciences and Education; and Bardhan, Pranab. (1993) "Symposium on Management of Local Commons", Journal of Economic Perspectives Vol. 7, No. 4., pp. 87-92.

A major finding in the study was that more than 50 percent of the visitors of the Corniche are willing to pay a certain amount of money as a contribution to an effort to treat the litter problem. The amount people are willing to pay per visit is almost 3000 LBP / visit, and most visitors prefer paying this contribution to a Non Governmental Organization (NGO) who would take care of the Corniche.

A simple theoretical computation shows that if half of the visitors are willing to pay \$2 per visit, and assuming in winter the number of visitors is divided by two, then we can expect to generate almost \$1.6 million per year as an earmarked fund to contribute to reduce litter on the Corniche.

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# 1. Introduction: Defining the Local Commons, Ras Beirut's Northern Seafront

In October 2007 AUB launched its Neighborhood Initiative to understand the impact of the university on its neighborhood, and find ways – within the limits of the university's resources and mission, to make Ras Beirut a better neighborhood for all its inhabitants.

In his opening speech of the 2007/2008 academic year, President Waterbury said: "I have always marveled at the Corniche just outside our gates. Here we find Beirutis, men and women, children and grandparents, all income levels, the religiously conservative to the religiously indifferent, sharing the sea, the air and one another. That is or was the spirit of Ras Beirut, and AUB has an obligation to nurture that spirit. It is an obligation we should accept willingly and gladly."

This research project focuses on the seafront facing AUB. The physical spaces that were covered by the study were: the on-street parking along Avenue de Paris, the paved promenade (Corniche), and the rocky sea coast beneath. This area is characterized by several factors that render it close to a common resource:

- a. Unlike the rest of the waterfront in the Beirut peninsula, the northern seafront has virtually no construction below the 'Corniche' (except for the AUB beach and the newly reconstructed Riviera swimming complex and yacht club). This renders pollution management entirely in the hands of public institutions, as opposed to private beach owners who are (or should be) in charge of their controlled beach spot.
- b. Because of the absence of privately owned beaches, anyone can enjoy fishing or swimming on the northern seafront, yet these activities remain largely unregulated. People can also have an unobstructed walk over a

long distance, which is very rare in Beirut. The 'Corniche' has therefore become one of Beirut's only parks.

- c. While the avenue along the northern seafront is cleaned on a regular basis by Sukleen (the private company in charge of solid waste collection in Beirut), the seafront beneath the 'Corniche' is heavily polluted by litter, with sporadic interventions by environmental NGOs to clean the shore once every year. Litter is mostly generated by passers-by who use the 'Corniche' as a recreational area.

The 'Corniche' seems to suffer from the 'Tragedy of the Commons' problem, and this project intends to elucidate the various determinants of pollution on this seafront and possible ways to reduce it. Figure 1 below illustrates in yellow the seafront to be studied. It extends from Jamal Abdel Nasser Square in Ain El Mreisseh to the Riviera Hotel. This area covers part of the Minet El-Hosn Street and Paris Avenue, for a length of approximately 2 Km.

**Figure 1: Ras Beirut's northern seafront**

*Source: Google Earth*



## 2. Study Design and Methodology

The research methodology involved four key tasks. These included preliminary interviews with key informants from the identified stakeholders; two field surveys on the pollution of the seafront; and a participatory workshop among stakeholders intended to bring about key policy recommendations based on the findings of the field surveys.

### **a. Interviews with key informants**

These interviews helped identify and guide the main research questions to provide a preliminary framework for developing the field surveys. Interviews with stakeholders aimed to answer the following main questions:

- How severe is the problem of solid waste pollution on Ras Beirut's northern seafront?
- What are the institutional arrangements responsible for managing the seafront?
- Are there initiatives being implemented to reduce pollution on the seafront?
- What are the reasons for success or failure of these initiatives?

### **b. Field survey: Quantifying seafront solid waste pollution**

The first field survey intended to quantify the amounts and severity of solid waste pollution on Ras Beirut's northern seafront. This was done by gathering samples of litter, analyzing their composition and their likely origin. The field survey also provided information on the patterns of solid waste pollution, littering frequency and potential effects on the marine ecology of the seafront.

### **c. Field survey: Who are the polluters? Who are the users?**

The second field survey sought to establish a profile of the users of Ras Beirut's northern seafront; especially pedestrians who litter the sea. Random surveys were administered to 'visitors',

including questions on their socio-economic background. The survey also asked about their attitudes towards solid waste pollution in detail. Answers to these surveys helped establish whether there are incentives for the users to reduce pollution.

### **d. Participatory workshops among stakeholders**

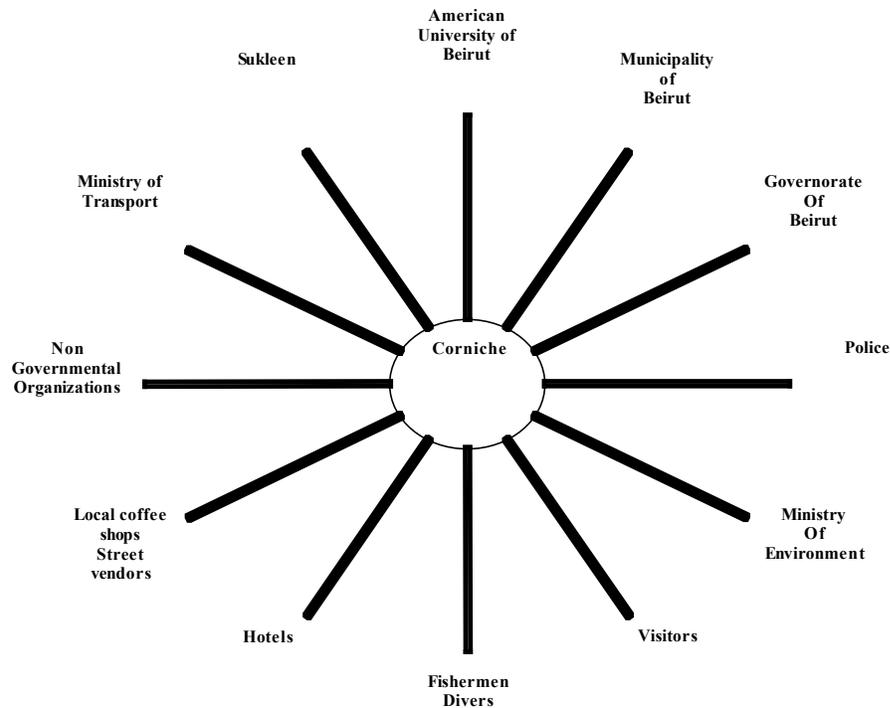
The workshops were directed at stocktaking from various key informants on the extent and nature of pollution on the seafront, and they also aimed at discussing the findings of the field surveys and formulating a collective action plan among stakeholders for reducing solid waste pollution on the seafront.

The main methodological tools used in this research were:

1. Visitor counting (recreational monitoring), using manual counting devices;
2. Coastal litter quantification and classification, using collection and analysis of litter in specified sources;
3. Profile and attitudes of seafront visitors' survey, using face to face surveys with the users of the seafront.

### 3. The Stakeholders of the Ras Beirut Northern Seafront

Many stakeholders are directly or indirectly concerned by litter pollution on the Ras Beirut northern seafront. The following diagram summarizes the main ones.



The stakeholders can be divided into two main groups: the public sector agencies, and the private and civil society groups.

#### **Public sector agencies:**

##### *- Municipality of Beirut/Governorate of Beirut:*

The Municipality of Beirut is the local executive body in charge of implementing decentralized decisions enacted by the Governorate of Beirut. The Municipality has, strangely, jurisdiction on the upper Corniche area only, and therefore can receive cleanliness complaints related solely to the Corniche pedestrian area and not to the seafront beneath it. Jurisdiction over the seafront is with the Ministry of Transport and Public Works. Moreover, the Municipality does not have direct control over public works projects on the Corniche, which are assigned to the Council of Development and Reconstruction (CDR). The Municipality, through its Hygiene and Health Office, has control over the local coffee shops and street sellers to prevent them from throwing litter in the sea. Yet any decision to counter this litter has to also be issued by the Governorate of Beirut.

##### *- Ministry of Transport and Public Works:*

The ministry is in charge of all the seafront in Lebanon, as it is believed that seafronts serve a transport purpose. However, the ministry, although involved in regulating pollution originating from ships, has

not implemented any moves to counter litter pollution.

*- Police (Internal Security Forces):*

The police department has a mandate to issue fines up to USD 50 on any person caught littering in a public space. However, this fine is rarely implemented, and any police intervention requires orders from the Governorate of Beirut (the legislative authority) and not from the Municipality (the executive authority). The police sporadically prevent narguileh smokers sitting on the Corniche. There are no municipal personnel who serve the role as environmental police.

*- Ministry of Environment:*

The ministry has no role or mandate in implementing actual cleanup operations of litter pollution. Its role is limited to awareness raising and contributing to legislative decrees that are implemented by other centralized agencies (e.g. CDR).

**Private sector and civil society groups:**

*- American University of Beirut (AUB):*

AUB's beach is located on the Ras Beirut northern seafront, and many AUBites use the Corniche as a recreational area. AUB's recently launched Neighborhood Initiative is committed to making the Ras Beirut area, including the Corniche, a better place.

*- Non Governmental Organizations (NGOs):*

Environmental NGOs such as Greenline were involved on several occasions in cleanup operations of the seafront and awareness campaigns regarding it. However, these activities remain sporadic with a maximum of one cleanup operation per year.

*- Sukleen:*

The private litter collection company has an exclusive contract to clean the greater Beirut area. This contract is awarded and managed by CDR on behalf of the Municipality. Sukleen does not have a mandate to clean the rocky sea coast below the Corniche, but is in charge of removing rubbish from the rubbish bins and sweeping Avenue de Paris and the Corniche Pavement.

*- Local coffee shops and street sellers:*

These vendors mainly sell coffee and cigarette packs, along with snacks and drinks, to visitors of the Corniche. Street food sellers also include movable carts that sell corn and boiled beans, bicycle-based Kaak sellers, and roving coffee sellers with thermoses. Items sold by these groups are the main source of solid waste litter pollution on the seafront below the Corniche.

*- Hotels:*

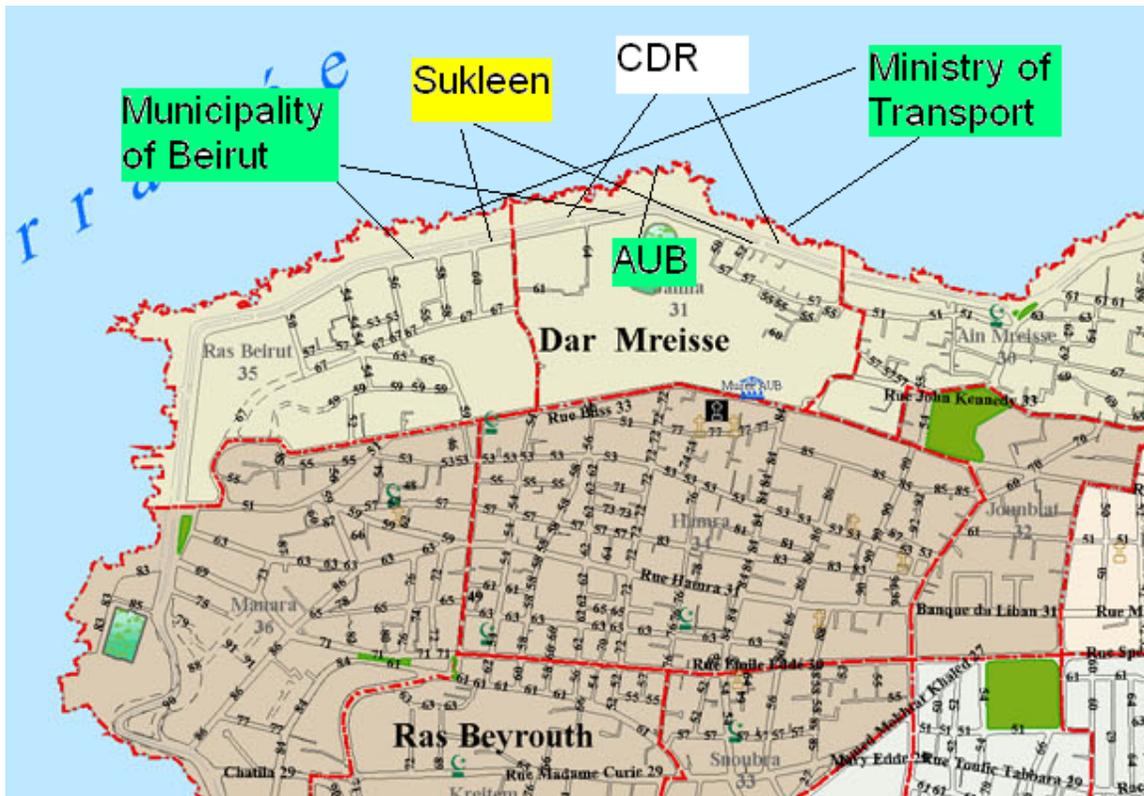
There is only one hotel on the Ras Beirut northern seafront, the Riviera hotel. Most seaside hotels and resorts in Lebanon have controversial ownership over the beach they control. The Riviera hotel has on several occasions complained of litter being washed onto its shore.

*- The 'users': visitors, fishermen, divers:*

Joggers and walkers constitute more than 50% of the paved promenade. The second highest groups of visitors are people who use the Corniche as a hangout zone, whereas swimmers and fishermen make up the lowest percentage, mostly using the rocky coast beneath the Corniche. Most litter pollution originates from families and groups hanging out on the Corniche especially in the evening and at night, where they litter the seaside below it without any control.

The map below shows the extent of overlap in the mandates of stakeholders along the seafront. The Ministry of Transport ‘owns’ the coast, including the rocky area beneath the Corniche. The Municipality of Beirut ‘owns’ the public areas of the Corniche, yet it is not directly in charge of cleaning the promenade. This is under the mandate of Sukleen. Maintenance and rehabilitation of the Corniche is under the control of CDR, as it has a mandate to oversee all foreign-funded reconstruction and rehabilitation projects.

Figure 3.1: Map of the Main Stakeholders & their Jurisdiction



## 4. Counting the Users of the Ras Beirut Northern Seafront

### 4.1. Background

There are many management uses of visitor count data (Hornback & Eagles 1998; AALC 1994; Watson et al. 2000; DOC 1992; AALC 2000). Cessford and Muhar (2003) list several of them that reveal the importance of visitor counting; of these are efficient resources allocation, customization of some visitor facilities and services, visitor service provision assessment, etc. Cope et al. (1999) highlight that the most common explanation of visitor counting, as stated by park managers, is resource allocation. Reynolds and Elson (1996) argue that “Without effective monitoring and review it is difficult to see how managers can make informed decisions.”

Different approaches to visitor counting are generally used and range from simple manual counting to advanced technological mechanisms (Cope et al. 1999, Raoul et al. 2004) where each method has its own advantages and disadvantages. Cessfor and Muhar (2003) divided these techniques into four categories: direct observation, on-site counters, visit registrations, and inferred counts. Accuracy and the practical capacity to measure are the variables that determine the choice of the adopted counting method (Cessfor and Muhar, 2003).

Along with revealing the public benefits of this area, obtaining a count for the visitors of Ras Beirut’s seafront is necessary for determining the feasibility of certain public environmental actions that the stakeholders of the seafront can adapt.

Many visitors’ counting parallel studies have been performed in developed countries for different purposes. For example, data has been collected for visitor management in the Eastern Lake Ontario Dune in Canada and Wetland Area in New York State from 1988 to 1990, and 1995 to 2002 respectively; visitors of this area affect the wellness and the stability of the sand dunes significantly (Kuehn and Habig, 2005). Long term data collection was also done in the Meijendel Dunes in the Netherlands for similar uses. All these studies were relied upon to conceive a scientific design for the counting of recreational users of the Ras Beirut northern seafront.

### 4.2. Counting Methodology

Beirut’s northern seafront was divided into two areas: Zone 1 and Zone 2. Zone 1 extends from Jamal Abdel Nasser Square to AUB Beach while Zone 2 starts at AUB Beach and ends at the Riviera Hotel (figure 1). The area was divided in this way because Zone 2 includes more coffee shops. In each area there are two ‘entry’ points; A and B in zone 1 and C and D in Zone 2 (figures 2 and 3).

**Figure 4.1: Ras Beirut’s northern seafront zones**

Source: Google Earth



**Figure 4.2**

Source: Google Earth



**Figure 4.3**

Source: Google Earth

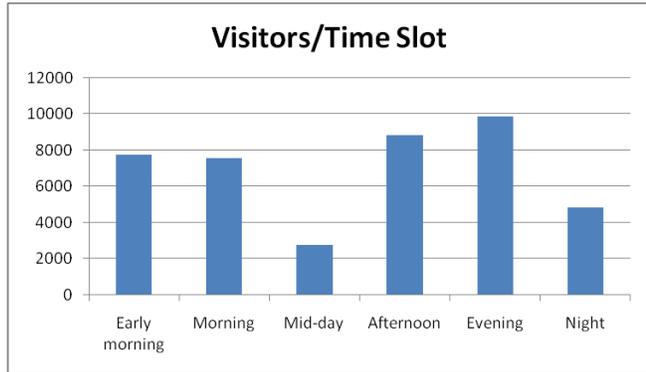


The counting method includes two monitoring techniques. An observer carries out the spot counts by walking from one point to another. While walking, he/she counts people who are jogging, sitting, swimming/fishing and the cars parked on the Corniche. Observation point counts are done by standing at one point and counting visitors who enter the zone.

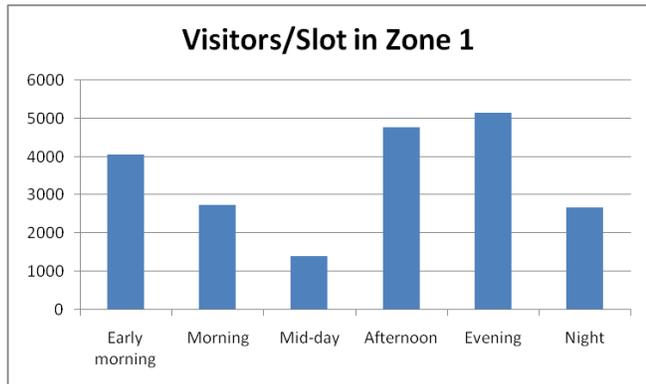
The counting process took place at different timings from Thursday, May 1, 2008, till Tuesday, May 6, 2008, inclusive where May 1 was Labour Day, an official holiday in Lebanon. Time Slots were divided into 6 sessions according to the following criteria:

- (1) Early morning 6 a.m. to 9 a.m. or 10 a.m.
- (2) Morning 9 a.m. or 10 a.m. to 12 p.m.
- (3) Midday 12 p.m. to 2 p.m. or 3 p.m.
- (4) Afternoon 2 p.m. or 3 p.m. to 6 p.m.
- (5) Evening 6 p.m. to 8 p.m. or 9 p.m.
- (6) Night 8 p.m. or 9 p.m. to 12 a.m.

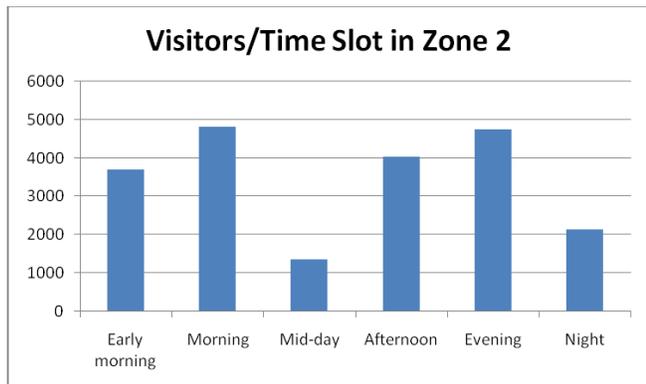
**Figure 4.4 Total Visitors/Time Slot**



**Figure 4.5 Visitors per Time Slot in Zone 1**



**Figure 4.6 Visitors per Time Slot in Zone 2**



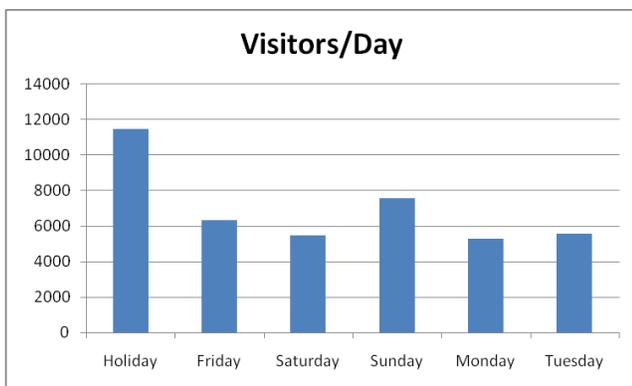
In addition to visitors' numbers, information concerning cars parked, sun, wind, and sea level was also collected. The number of cars parked at the border of the seafront is another indicator of its level of usage by people. All the collected information was entered on a customized sheet that ensured the survey's efficiency and flexibility (see sheet 1 in the appendix).

### 4.3. Results and Discussion

The following figure (4.4) shows the aggregate number of visitors to the Beirut Northern seafront at each different time slot. The approximate total number of visitors in the early morning was 7753 (19%) and underwent a sharp decline at midday in which the visitors' number equaled 2773 (7%). However, it then increased to reach 9899 (24%) in the evening (refer to table 1 in the appendix). As expected, temperature increase at noon repels visitors whereas lower temperatures in the morning and afternoon provide them with the required pleasant environment. Figures 4.5 and 4.6 show the distribution of visitors in zones 1 and 2 separately; both figures decrease at midday and increase in the evening.

As for the distribution of visitors per different days, we can see that on holidays the Corniche enjoys the highest number of visitors, followed by a weekend day and then by a weekday (Figure 4.7 and table 4.1 in Appendix). These findings are consistent with what we expect; it is logical for usage level to increase on holidays since certain groups of people need a place that matches their income and preference to enjoy their free time.

**Figure 4.7 Total Visitors per Day**



Joggers and walkers constitute 54%, 44% and 50% of the Corniche’s visitors on weekdays, weekends, and holidays respectively in which they represent the highest percentage of visitors at all times. The second highest groups of visitors are people who use the Corniche as a hangout zone, whereas swimmers and fishers make up the lowest percentage. These facts can be seen in table 4.2 in the appendix and in Figure 4.8. The number of cars parked at the corniche, during the time of the study, ranged between 134 and 613 cars (table 4.2).

**Figure 4.8 Distribution of Visitors’ Activities on a Weekday, Weekend and a Holiday**

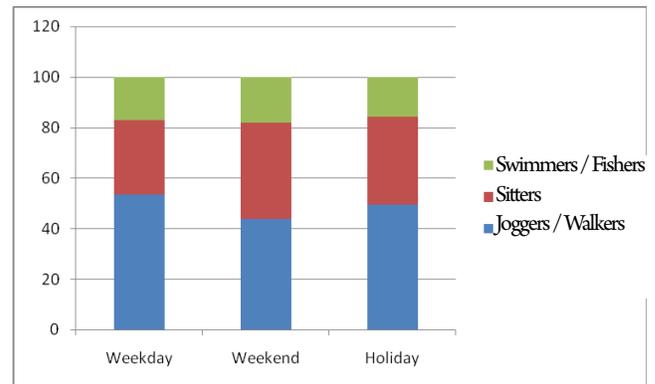
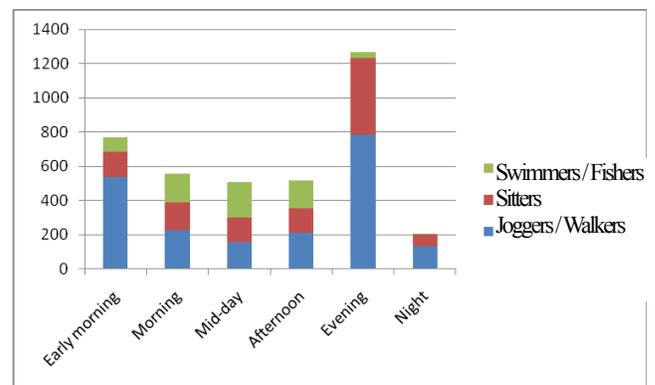


Chart 4.9 shows that, on a weekday, joggers are mostly present in the morning and evening. The number of ‘sitters’ reaches its maximum in the evening. These results are also consistent with our expectations where visitors are mostly comfortable in the evening regarding climate and time. Fishers and swimmers pursue their activities mostly at day time.

**Figure 4.9 Category of Visitors per Time Slot on a Weekday**



#### 4.4. Summary of Findings

This section presented the first attempt of counting visitors in recreational areas, in Lebanon. The study describes the distribution of the Corniche's visitors among days of the weeks, different day times and various activities. Additionally, it provides an approximation of the usage level of Beirut's Northern seafront and consequently supports future policy assessment with the necessary information.

#### 4.5. Appendix

Table (4.1)

Zones 1 and 2								
	Early morning	Morning	Midday	Afternoon	Evening	Night	Total	Percentages
Holiday	1883	2970	0	2066	4534	0	11453	<b>28</b>
Friday	1448	925	552	992	2397	0	6314	<b>15</b>
Saturday	1258	1185	0	998	0	2026	5467	<b>13</b>
Sunday	0	1853	0	3645	0	2064	7562	<b>18</b>
Monday	1058	634	912	1123	1033	536	5296	<b>13</b>
Tuesday	2106	0	1309	0	1935	208	5558	<b>13</b>
<b>Total</b>	<b>7753</b>	<b>7567</b>	<b>2773</b>	<b>8824</b>	<b>9899</b>	<b>4834</b>	<b>41650</b>	<b>100</b>
<b>Percentages</b>	<b>19</b>	<b>18</b>	<b>7</b>	<b>21</b>	<b>24</b>	<b>12</b>	<b>100</b>	

Table (4.2)

Visitors count (totals by category)								
	Early morning	Morning	Midday	Afternoon	Evening	Night	Total	Percentages
<b>Weekday</b>								
Jogging/Walking	535.5	224.5	156.67	211.83	782.5	133	2044	54
Sitting	147.5	165.25	144.33	144.83	448.33	70	1120.25	29
Fishing/Swimming	85.5	165.25	209	158.5	35	3.5	656.75	17
Cars parked	402.83	492	508.33	370.33	429.17	134	2336.67	
							3821	
<b>Weekend</b>								
Jogging/Walking	505	475.75		801.75		802.5	2585	44
Sitting	198	166.75		650.75		1229.5	2245	38
Fishing/Swimming	110	385.75		562.75		13	1071.5	18
Cars parked	429	291.25		383.75		612.5	1716.5	
							5901.5	
<b>Holiday</b>								
Jogging/Walking	718	956		694	1836		4204	50
Sitting	295	422		879	1340		2936	34
Fishing/Swimming	202	610		493	30		1335	16
Cars parked	423	519		413	585		1940	

Sheet (4.1)

Seaside Visitors Monitoring Sheet

Date:	Surveyor Name:
Time Slot:	Zone(s):      1      2      Both

Sun:	3=Full sun	2=Partly Cloudy	1=Cloudy/rainy
Wind:	3=Light	2=Medium	1=Strong
Sea:	3=Calm	2=Moderate	1=Rough

<b>Observation Point Count</b>				
Map Point (circle one):	A	B	C	D
Time:				
Visitor Count:	Observations:			

<b>Spot Counts</b>		
Spot Count number 1		Spot Count number 2
Time:		Time:
Area covered (circle one)		Area covered (circle one)
A-B                  B-A		A-B                  B-A
D-C                  C-D		D-C                  C-D
A-D                  D-A		A-D                  D-A
Count:		Count:
Jogging / Walking		Jogging / Walking
Sitting		Sitting
Fishing/Swimming		Fishing/Swimming
Cars parked		Cars parked
Observations:		

## 4.6. Section References

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(7)

## 5. Quantification and Classification of Litter on the Ras Beirut Seafront

### 5.1. Background

Governments and individuals worldwide are becoming more aware of the gravity of ecological problems such as global warming and pollution. Efforts are put together, locally or via the United Nations, to present action plans for resolving these issues. However, only a few studies have been done to meet this growing concern in the Middle East. This lack of research hardens the task of policy makers who are short on reliable scientific assessments. Marine debris is one example of these environmental concerns.

Marine debris is a result of inappropriate riddance of solid waste that ends up contaminating the seashore. This debris may either come from individual visitors who directly deposit their wastes, mainly plastic, into seawater, or may be brought up from the sea through marine currents, winds, and sewage flows. Litter surveys are a simple, yet effective, tool to study this widely spread phenomena. In general, litter surveys help assess the severeness of marine pollution in the target area. Also, they allow policy makers to identify the key sources of waste and hence help present the most effective solutions.

This section examines marine pollution on the Ras Beirut Northern Seafront's rocky sea coast, by specifically focusing on litter originating from the users of the paved promenade above it. For that purpose, a litter survey was conducted by collecting samples of waste and recording the findings. After identifying the key sources of pollution, we will offer some policy recommendations that would hopefully be adopted to preserve this unique natural space.

The assessment of litter pollution on the Northern Seafront is an utmost need for reasons related to aesthetic appeal, public health and ecological concerns. On a national level, the seafront is considered to be an important site for tourists

especially for its aesthetic features. It is known that the Lebanese economy relies heavily on tourism and the services sector in general<sup>4</sup>. However, the presence of waste on beaches threatens their role as tourist sites. Tourists may prefer not to visit these sites or head to other destinations endowed with cleaner and more hygienic seashores. Another reason to raise public interest in marine litter is the potential harm it holds for local inhabitants. Any person who visits the seashore for swimming or fishing may be subject to diseases. One example is that of HIV, Hepatitis and infections which may be transferred to swimmers through inappropriately discarded needles, glass or metal (The Marine Debris Research, 2005).

The environmental aspect of this problem should equally be highlighted as the increasing level of marine pollution threatens marine life. Many marine species are victims of marine debris be it through entanglement, especially seabirds and marine mammals, or through ingestion, namely sea turtles who now suffer from starvation due to ingestion of plastic bags being mistaken for jellyfish. On the other hand, certain species are indirectly endangered by the destruction of the habitats by such debris as plastic sheeting covers (The Marine Debris Research, 2005).

Only few similar studies have been conducted in various locations in the world. One such study was done along the municipal beach of Ensenada, Baja California, Mexico in August 2000. In this survey, the approximately 4 km long seashore was divided into three areas to determine the spatial distribution of litter. Also, six strips were taken from each area, all of which were parallel to the sea, and one meter in width each. The litter was categorized into ten groups according to their nature. The key results of the survey were summarized as follows: wood was the most abundant type of litter as it accounted for 34.73% of the total abundance. The spatial distribution showed that the larger amount of

<sup>4</sup> The services sector constituted up to 76.4% of Lebanese GDP, and tourism constituted around 10% of GDP in 2007.

litter was concentrated in the last level i.e. the most far away from seashore. It was noticed that the amount of litter declined as the level gets nearer to the sea. As for the three main areas, the central area was the most polluted with a total of 6587 items, compared to 5427 for the south area, and 4460 for the north area (Silva-Iniguez and Fischer, 2003).

Another study was performed along a 50 km seafront in the central region of Transkei on the southeast coast of South Africa in 2004. This paper aimed at studying both the spatial and temporal distribution of litter. The survey covered two groups of three beaches each. Both groups were sandy beaches but they differed in certain characteristics such as proximity to human settlements and morphology. Three transects were randomly selected in these areas. After collecting the samples of visible and buried debris, they were sorted into different groups. The results showed that in this location plastic was the main form of litter, as it constituted up to 83.4% of total litter. Litter items density was as high as 164 items per meter squared (Madzema and Lasiak, 1997).

## **5.2. Litter Survey Methodology**

The survey methodology involved a total of 10 surveyors, divided into two teams. Litter monitoring took place over a period of one week from June 19 till June 25, 2008. One may suspect that the number of visitors and the activities performed vary between weekdays and weekends. This was reflected in the litter left behind afterwards. As previously mentioned, the aim of litter monitoring is to get a clear overview of the nature and rate of recurrence of solid waste on the Ras Beirut Northern Seafront. For that purpose, each team was responsible for conducting litter surveys according to a time and place schedule. Their task was to collect litter and record its type on specified sheets. Although the study theoretically covers the whole northern

seafront, it was physically challenging to monitor litter throughout all the shore due to the inaccessibility of certain points.

The solid waste was divided, according to its nature, into different categories with each having different subcategories. The main eight groups were plastic, foam, glass, wood, paper/cardboard, metal, natural garbage and other articles. Plastic included six pack rings, household cosmetic and medical bottles, bottles, cups, cup covers, kitchen utensils, sticks, toys and diapers. Foam included only egg holders whereas glass included beer and wine bottles, other bottles and broken glass. Wood was divided into small sticks, boards and trunks. The paper/cardboard group was divided into seven subgroups: cups, bags, paper, cigarette ends, cigarette packets, juice cartons and fast food containers. Metals included needles, rings, beverage cans, spray cans, containers, and can lids. Natural garbage consists of both animal and human feces. Finally, any other form of litter that does not fit into any of the mentioned groups was included in other articles. After all the teams recorded their findings, the data was aggregated for the week under study. To control for different variables of interest, the data was aggregated according to both different groups and subgroups.

To determine the spatial distribution of litter, it was made sure that both zone 1 (Ain Mreisseh section) and zone 2 (Riviera section) were equally covered by the survey. It was suspected that at certain observation points the litter would be more concentrated than others especially points facing coffee shops situated on the seafront. For that reason, the location schedule was chosen accordingly.

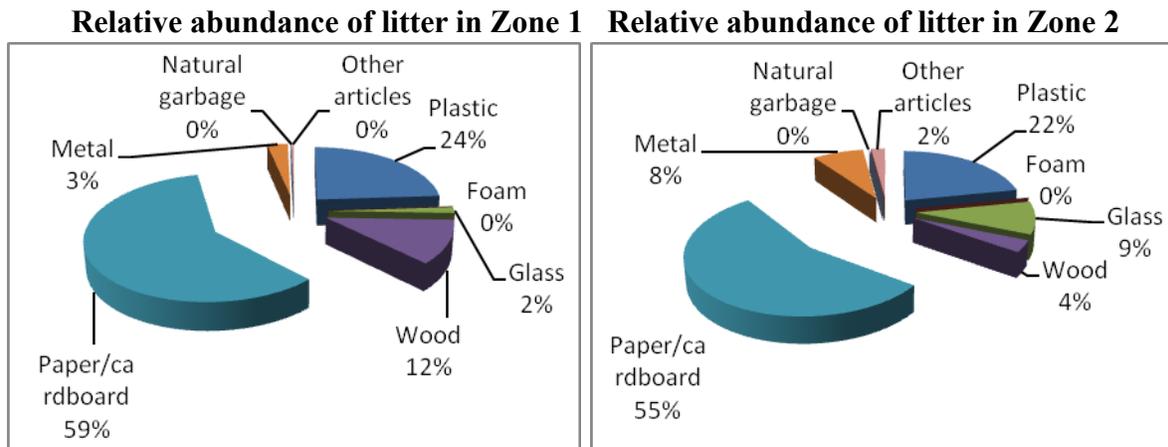
## **5.3. Results and Discussion**

As we explained in our methodology, all the data was aggregated first to compute the total

abundance of litter and contribution of groups. The results are summarized in the following tables:

**Table 5.1: Total Abundance of Litter and Contribution of Groups**

Group	Area 1		Area 2		Total	%
	# Items	%	# Items	%		
Plastic	1730	23.94	712	21.81	2442	23.28
Foam	2	0.03	0	0	2	0.02
Glass	115	1.59	308	9.44	423	4.03
Wood	854	11.82	113	3.46	967	9.22
Paper/cardboard	4283	59.28	1810	55.45	6093	58.09
Metal	213	2.95	252	7.72	465	4.43
Natural garbage	8	0.11	0	0	8	0.08
Other articles	20	0.28	69	2.11	89	0.85
<b>Total</b>	<b>7225</b>	<b>100</b>	<b>3264</b>	<b>100</b>	<b>10489</b>	<b>100</b>



The total abundance of litter in both areas was equal to 10,489 items, i.e. almost 1 item/m<sup>2</sup>, indicating that the seafront is quite polluted. In fact, Silva-Iniguez and Fischer have found that the density of litter in the Municipal Beach of Ensenada was equal to 1.5 items/m<sup>2</sup> (Silva-Iniguez and Fischer, 2003). Taking into account that both areas were equally surveyed, we notice that zone 1 is much more polluted than zone 2. The total number of items collected in zone 1 was 7225 compared to 3264 for zone 2. This result may be due to the presence of neighboring local coffee shops in zone 1. Many visitors, mainly those who view the seafront as a hangout zone, purchase certain products such as coffee and juice, and end up throwing the litter in the sea rather than throwing them in the nearest trash container.

When considering the different categories of litter, we notice that in both areas paper made products were the dominant source of litter. This mainly takes the form of cigarette ends. The paper category constituted up to 59.2% of total litter in zone 1, and 55.45% in zone 2. The next most abundant form of litter is plastic, followed by wood and then metal and finally glass. Plastics group mainly contains coffee cups. One can notice that in zone 2, contrary to zone 1, glass is more abundant than wood, where glass constituted 9.44% compared to 3.46% for wood. The percentages of the main categories can be better interpreted by looking at the detailed composition of litter according to subcategories of the eight main groups which are presented in the following table:

**Table 5.2 - Litter Items Distribution**

Group	Area 1		Area 2		Total Percentage	
	# Items	%	# Items	%		
<b>Plastic</b>	<b>1730</b>	<b>23.94</b>	<b>712</b>	<b>21.81</b>	<b>2442</b>	<b>23.28</b>
Six pack ring/yokes	0	0.00	1	0.03	1	0.01
Household, cosmetic, and medical bottles	2	0.03	0	0.00	2	0.02
BOTTLES	58	0.80	141	4.32	199	1.90
CUPS	1522	21.07	398	12.19	1920	18.30
CUP COVERS	17	0.24	12	0.37	29	0.28
Kitchen utensils	76	1.05	112	3.43	188	1.79
STICKS	46	0.64	18	0.55	64	0.61
Toys	5	0.07	0	0.00	5	0.05
Diapers	0	0.00	0	0.00	0	0.00
ALUMINUM FOIL	4	0.06	30	0.92	34	0.32
<b>Foam</b>	<b>2</b>	<b>0.03</b>	<b>0</b>	<b>0.00</b>	<b>2</b>	<b>0.02</b>
Egg holders	2	0.03	0	0.00	2	0.02
<b>Glass</b>	<b>115</b>	<b>1.59</b>	<b>308</b>	<b>9.44</b>	<b>423</b>	<b>4.03</b>
Beer and wine bottles	39	0.54	61	1.87	100	0.95
Other bottles	1	0.01	5	0.15	6	0.06
Broken glass	75	1.04	242	7.41	317	3.02
<b>Wood</b>	<b>854</b>	<b>11.82</b>	<b>113</b>	<b>3.46</b>	<b>967</b>	<b>9.22</b>
Small sticks	852	11.79	111	3.40	963	9.18
Boards	2	0.03	2	0.06	4	0.04
<b>Paper/cardboard</b>	<b>4283</b>	<b>59.28</b>	<b>1810</b>	<b>55.45</b>	<b>6093</b>	<b>58.09</b>
CUP	15	0.21	7	0.21	22	0.21
Bags	33	0.46	34	1.04	67	0.64
Paper	444	6.15	456	13.97	900	8.58
Cigarette ends	3595	49.76	1193	36.55	4788	45.65
CIGARETTE PACKETS	116	1.61	76	2.33	192	1.83
Juice Cartons	62	0.86	41	1.26	103	0.98
Fast food containers	18	0.25	3	0.09	21	0.20
<b>Metal</b>	<b>213</b>	<b>2.95</b>	<b>252</b>	<b>7.72</b>	<b>465</b>	<b>4.43</b>
Needles	14	0.19	2	0.06	16	0.15
Rings	0	0.00	0	0.00	0	0.00
Beverage cans	39	0.54	31	0.95	70	0.67
Spray	0	0.00	2	0.06	2	0.02
Containers	3	0.04	56	1.72	59	0.56
Can caps/lids	157	2.17	161	4.93	318	3.03
<b>Natural garbage</b>	<b>8</b>	<b>0.11</b>	<b>0</b>	<b>0.00</b>	<b>8</b>	<b>0.08</b>
Animal feces	0	0.00	0	0.00	0	0.00
Human feces	8	0.11	0	0.00	8	0.08
<b>Other articles</b>	<b>20</b>	<b>0.28</b>	<b>69</b>	<b>2.11</b>	<b>89</b>	<b>0.85</b>

For the most abundant group which is plastic, cigarette ends contributed the most, where this subgroup constituted 49.75% of total litter in zone 1 and 36.55% in zone 2. In this group, paper comes next with a total percentage of 8.58 for both zones. Regarding plastic, cups were the most abundant with a total of 18.3%. However, cups are obviously more abundant in zone 1 with a total of 1522 items compared to 398 in zone 2. In the wood group, the main source of litter was sticks with a total of 963 items for both zones. Broken glass constituted the highest percentage of glass in both zones, with a percentage of 7.4% in zone 2 and 1.03% in zone 1. Finally, the can lids were most abundant in the metal group constituting a total of 3.03% of total litter.

#### 5.4. Conclusion

This research was an attempt to quantify and categorize the different forms of litter found on the Northern Beirut Seafront in a scientific manner. The results showed that the seafront is relatively heavily polluted with cigarette ends and coffee cups as the main source of litter. The users of the Corniche who smoke cigarettes and drink coffee there produce the main litter on the Corniche itself and on the rocky seafront below the Corniche. They leave their traces with cigarette packets, cigarette ends, and plastic coffee cups. For this reason, the primary issue to be addressed by policy makers is proper disposal of ends and cups in well-designed rubbish bins.

In fact, guidelines for improving litter management were discussed in depth in regional seminars such as the Mediterranean Action Plan from the United Nations Environment Program (2004). For example, there should be an exchange of experience and research between the government and independent NGO's working on this issue. Although the government must take action to reduce litter such as employing strict police officers to enforce the law at the beach, these measures are insufficient without any

public participation. Efforts should also be made on a personal level, where people must act more responsibly towards their public spaces. Consequently, many personal values should be altered to influence this behavior. This is a hard task but can be done gradually and over the long term through increasing awareness campaigns and civic education at schools and in the media.

Finally, this research is the first to address marine litter but this field needs to be further pursued. Due to limited resources at our disposal, the study was not extended to include other equally polluted beaches in Beirut and other coastal cities. Moreover, to have a better idea of the temporal distribution of litter, the study needs to be carried over a longer time frame.

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## 6. How Much is a Clean Recreational Seafront Worth? Investigating Willingness to Pay to Reduce Litter on the Ras Beirut Seafront

### 6.1. Introduction

The tragedy of the commons was a concept developed by Garrett Hardin in 1968. This concept is a description of a social or economic situation whereby people face a conflict of interest over finite resources between their own interests and the common good. This selfish behavior may cause these resources to be over exploited and end up destroying them. Many sites especially in developing countries are suffering from this tragedy. This is usually due to the absence of any management plan on behalf of governmental organizations. One example is the Ras Beirut Northern Seafront located in Lebanon's capital, Beirut. This seafront is perceived as a free access recreational area where local inhabitants and tourists from abroad come to enjoy its aesthetic features and perform different sorts of activities such as jogging and fishing. Beirut suffers from an almost total lack of natural parks, which emphasizes further the importance of this seafront as one of the rare open spaces in the city. This site, however, has been suffering from major littering problems. Many visitors consume certain goods and when done, throw away the litter directly into the water, which results in seashore contamination with marine debris. This sort of behavior will end up destroying this free access area if no plan is taken into action. This paper investigates the seafront visitors' attitudes towards litter and their willingness to pay to ameliorate the situation in Beirut's natural park.

Surveys are a reliable tool to help understand the differences among the site's visitors if a good, well-defined and unbiased sample is chosen. This survey will help construct the profile of visitors from a socio-economic aspect on one hand, and help investigate the visitors' willingness to pay on the other. This will

determine to what extent, if any, people are willing to be engaged in the process of reducing litter on the seashore. The survey results can be used as a basis for future organizational procedures. It is important to consider visitors' opinions since they constitute one of the primary stakeholders of this public site. It should be noted that there has not been any previous similar study on the region in a sense of assessing people's willingness to engage in resolving an environmental issue such as marine litter.

A very similar study was conducted in South Africa in 1996. South African beaches suffered from increased littering over the years. The main goal of the South African survey was to evaluate the impact of litter on visitors', especially foreigners', behaviors and the importance of beach cleanliness to the visitors. On a large scale, the study was concerned with the induced impact of litter on the economy as a whole through the South African tourism sector. The study was conducted at the Cape Peninsula where ten study beaches were selected. The questionnaire covered a random sample of 1000 visitors. The questions were designed to assess the importance of cleanliness for beach visitors while considering other variables such as income, length of activity and activity performed. Cleanliness was stated as the most important factor in influencing choice of beach, especially by foreign tourists. It also found that 85% of visitors would not visit if litter density were to increase to 2 items/m<sup>2</sup> (Ballace, Ryan and Turpie, 1996).

Another study was done by the United States Environmental Protection Agency in 2004 to estimate citizens' willingness to pay for improvements in water quality. In that study, a survey was conducted to determine how much

citizens were willing to pay in order for policy makers to make the matching adjustments in the current system. After gathering data and making the necessary computations, the model consisted of regressing the individual's utility on a suggested program's characteristics (Owens and Simon, 2006). Another similar study was performed in Australia in 1997. In Australia, a survey took place consisting basically of asking tourists to rate the overall state of the environment for different tourist sites. The data was then used to study the relationship between the environmental impact on tourism and the number of tourists (Hillery et al, 2001).

## **6.2. Study Area: The Ras Beirut Seafront**

As mentioned earlier, the target area in this paper is Ras Beirut's seafront, which is a commonly used space in the capital Beirut. The visitors vary in age, social class and educational background. This seafront is visited by almost 30,000 people every week (according to estimates by American University of Beirut). Activities performed at the seafront include jogging, walking, swimming, fishing, biking and rollerblading. Many visitors regard the seafront as their only affordable recreational space. This area has almost no construction on the seaside and hence with the absence of private institutions, the litter management is an entirely public concern. The upper avenue of the seafront is cleaned on a daily basis whereas the seafront beneath remains heavily polluted due to the lack of any litter management program.

## **6.3. Survey Methodology**

There was a team of twelve surveyors who underwent detailed training on surveying techniques. The surveying was carried out in June 2008. The surveyors were allocated according to a preset time schedule. Since it was suspected that visitors differ in number and their behavior during different time slots during the

day and during weekdays and weekends, the time schedule took those differences into account. There were a total of 990 questionnaires. Each one took approximately ten minutes. The questionnaire consisted of a face to face interview with a total of 22 questions. The interviews were conducted randomly regarding age, gender, nationality, and activity of the interviewee, to avoid any biases towards particular user groups.

The survey aimed at studying the visitors' perceptions of the importance of the marine litter problem as well as their willingness to engage in resolving this problem. The survey can be divided into four parts. The first one, revolving around their visiting habits, included questions about frequency of visits, traveling time, time spent, activity performed and transportation means. The second part was about their opinion on litter where they were asked about cleanliness of the seafront and the institution that should be in charge of reducing litter. The third part is about their willingness to pay along with the maximum amount they would pay and the method of payment. Finally, the fourth part was about personal information of the interviewee. It included questions about age, nationality, area of residence, educational attainment, employment, household size and surface area, and monthly expenditures.

## **6.4. Results**

32% of the surveyed visitors were females, 317 female out of a total of 991. The following table shows the summary statistics of the visitors' personal information. The average age of the sample is approximately 35 years in which visitors' ages range between 13 and 82. \$900 is the average expenditures per month which is a considerably realistic number. However, the standard deviation which is more than 900 shows the significant inequality in the Lebanese society for income.

**Table 6.1: Summary Statistics for Personal Information**

	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Age</b>	34.90771	14.4932	13	82
<b>Size of Household</b>	4.327902	2.08544	1	25
<b>Approximate area of house (in meter squared)</b>	159.2595	162.72	9	4500
<b>Expenditure per month (individual in USD)</b>	896.081	938.828	20	10000

Table 6.2 shows the distribution of Beirut's Northern seafront visitors among different nationalities and areas. Most of the visitors are Lebanese (88%) and Beirut residents (66%). Arabs other than Lebanese represent the second highest group of visitors.

**Table 6.2: Visitors' Nationalities and Residence**

<b>Frequency %</b>			<b>Frequency %</b>		
<b>Nationality</b>			<b>Residence</b>		
Lebanese	867	88.02	Ras Beirut	271	27.51
Arab Countries	89	9.04	Other areas in Beirut	375	38.07
Asia/Africa	8	0.81	Southern Beirut suburb	151	15.33
Europe/America	21	2.13	Northern Beirut suburb	29	2.94

Holders of a university degree and higher constitute 52% of the sample, whereas only 2% were illiterate (Table 6.3). The rate of the unemployed was equal to 11% that is closely equal to the unemployment rate in Lebanon.

**Table 6.3: Educational and Employment Status**

<b>Education attainment</b>	<b>Frequency</b>	<b>%</b>	<b>Employment Status</b>	<b>Frequency</b>	<b>%</b>
Illiterate	18	1.83	Unemployed (never worked)	28	2.84
Literate	18	1.83	Unemployed (previously worked)	79	8.01
Primary	160	16.24	Student	149	15.11
Secondary	213	21.62	Working, self employed	164	16.63
Vocational/technical	68	6.9	Working, employee	496	50.3
University	399	40.51	Retired	30	3.04
Postgraduate	109	11.07	Homemaker	40	4.06

The surveys showed that the average traveling time to get to the Corniche is 19 minutes. They also showed that visitors usually spend there around 1.65 hours, also on average, performing different activities that we have discussed before in the counting stage. (Refer to table 6.4.)

**Table 6.4: Traveling Time and Time Spent at the Corniche**

	Mean	Std. Dev.	Min	Max
<b>Traveling Time (minutes)</b>	19.04	16.86	1	180
<b>Time Spent (in hours)</b>	1.65	1.5	0.08	15

The transportation mean to the Corniche is mostly a visitor’s own car (50% of the time). Table 6.5 shows other means of transportation that are less frequent such as a friend’s car, walking, public transportation and bicycles/rollers. It also includes activities performed by visitors in which jogging/walking is the most frequent action. The results concerning visitors’ activities are consistent with what we have already concluded in the counting stage.

**Table 6.5: Visitors’ Means of Transportation and Activities**

<b>Transportation mean</b>	Frequency	%	Activity performed	Frequency	%
Own Car	490	49.75	Jogging or walking (Sports)	520	52.85
Friend's Car	53	5.38	Fishing or swimming	99	10.06
Walking	253	25.69	Sitting and eating with friends or family	77	7.83
Public transport	148	15.03	Smoking narguileh and passing time	36	3.66
Bicycle or rollers	41	4.16	Just relaxing	221	22.46
			Other activities	31	3.15

Visitors’ opinions varied concerning the cleanliness of the Corniche and the cleanliness of the coast underneath. 51% of the surveyed people said that the Corniche is clean/very clean whereas only 13% said the same about the coast underneath (table 6.6). These results were expected since our study had realized this fact that is obvious to the Corniche users too.

**Table 6.6: Summary Statistics for Opinion on Corniche Cleanliness**

<b>Cleanliness of the Corniche</b>	<b>Frequency</b>	<b>%</b>	<b>Cleanliness of the Coast beneath</b>	<b>Frequency</b>	<b>%</b>
Very Clean	89	9.03	Very Clean	14	1.44
Clean	447	45.33	Clean	108	11.13
Not so Clean	257	26.06	Not so Clean	185	19.07
Dirty	125	12.68	Dirty	329	33.92
Very Dirty	68	6.9	Very Dirty	334	34.43

Visitors thought that the groups of visitors that are primarily responsible for litter are families and youth, 34% and 30% respectively. Also, most of them (61%) thought that the Municipality of Beirut is the institution in charge for cleaning both the Corniche and the coast beneath (Refer to table 6.7). Nevertheless, our stakeholders' analysis showed that the Ministry of Public Works and Transportation was the legal responsible institution for the rocky coast beneath the Corniche. Additionally, 95% of the sample thought that the litter problem is important (table 6.8).

**Table 6.7: Main Responsibility for Litter and Institution in Charge**

<b>Main Responsible for Litter</b>	<b>Frequency</b>	<b>%</b>	<b>Institution in Charge</b>	<b>Frequency</b>	<b>%</b>
Youth	213	30.34	Municipality of Beirut	570	60.96
Families	237	33.76	Police	45	4.81
Joggers and walkers	11	1.57	Mohafazat of Beirut	12	1.28
Fishermen and swimmers	81	11.54	Ministry of Environment	304	32.51
Food sellers on the Corniche	9	1.28	Ministry of Transport	4	0.43
Other	151	21.51			

**Table 6.8: Importance of the Litter Problem**

<b>Importance of Litter Problem on Seaside</b>	<b>Frequency</b>	<b>%</b>
Yes	933	95.01
No	28	2.85
Indifferent	15	1.53
Refused to answer	6	0.61

When we asked the visitors about their willingness to pay in case a fee was imposed for each visit to the Corniche, 53% showed their interest in such a proposition (table 6.9). This is a considerably promising

number that shows citizens' care and involvement in the litter problem. Of those 50%, 40% were willing to pay a fee up to 1000 L.L. whereas 30% were willing to pay an amount between 1000 and 3000 L.L. (table 6.9).

**Table 6.9: Summary Statistics of Willingness to Pay**

Willingness to pay	Frequency	%	Amount willing to pay	Frequency	%
Yes	500	53.25	up to 1,000 LL	198	40.24
No	415	44.2	between 1,000 and 3,000 LL	149	30.28
Indifferent	20	2.13	between 3,000 and 5,000 LL	86	17.48
Refused to answer	4	0.43	between 5,000 and 10,000 LL	37	7.52

Concerning the payment method, visitors were mostly comfortable with paying this fee to a Non-Governmental Organization (NGO) (47%). This preference shows the citizens' lack of trust in official institutions. The proposition of a parking fee, through parking meters, was supported by 27% of visitors and 22% preferred to pay a fee as a direct tax to the municipality (table 6.10).

**Table 6.10: Method of Payment**

Method of Payment	Frequency	%
Parking fee (by way of a parking meter)	129	26.71
NGO	229	47.41
Direct tax to municipality	106	21.95
Local food and coffee shops	19	3.93

## **6.5. Conclusion**

Beirut's Northern seafront visitors are mostly Lebanese males aged between 20 and 50. The majority are middle class employees living in Beirut, holding a university degree. They travel to the Corniche mostly by car, for almost 20 minutes in which they spend on average 1.5 hours, mainly jogging or walking.

Most people think that the Corniche is clean, however, they believe the area beneath it on the seaside is very dirty. The majority of people blame the youth and families on the Corniche for littering the area and think that the Municipality of Beirut is the main institution in charge of reducing pollution.

More than 50 percent of Corniche visitors are willing to pay a certain amount of money as a contribution to an effort to treating the litter problem. The amount people are willing to pay per visit is almost 3000 LBP / visit. Most visitors prefer paying this contribution to a Non Governmental Organization (NGO) who would take care of the Corniche.

## **6.6. Section References**

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## 7. Policy Recommendations

As seen in the previous sections, the Ras Beirut northern seafront is clearly suffering from an acute litter pollution problem, threatening its appeal as a recreational attraction and possibly causing health concerns in the long run for the users of the rocky coast. While solutions to this ‘local commons’ problem might be within reach, the overlap between the mandates of the public sector stakeholders and lack of coordination between them seem to pose serious obstacles for the success of any reform.

To tackle this issue, the project team held a workshop at AUB on August 18 and 19, 2008, to present the main research findings to stakeholders of the northern seafront. The workshop attracted representatives from the Municipality of Beirut, the Ministry of Environment, Sukleen, and environmental NGO Greenline, as well as other representatives from the private sector and AUB. The team brainstormed with workshop participants on the best ways to encourage Corniche users to litter less and to create the physical conditions that enable them to dispose of their garbage properly.

The workshop’s suggestions included the following:

1. Follow-up with official stakeholders:
  - a. Sending an official letter from the Neighborhood Initiative to clarify with the Ministry of Transport and Public Works the extent of its mandate with regard to preventing litter on the rocky area beneath the Corniche.
  - b. Sending all project findings and recommendations to all stakeholders.
2. Technical solutions:
  - a. Installing trash bins that are equipped with ashtrays that could recuperate cigarette filters.
  - b. Making sure that more litter bins are installed all along the Corniche, and along the rocky area beneath it.
3. Awareness:
  - a. Putting signs on the Corniche designed by AUB graphic design students, with slogans urging visitors not to litter.
  - b. Organizing regular awareness events and seafront cleaning campaigns by AUB students on the Corniche, in collaboration with other stakeholders.
4. Funding and incentive schemes:
  - a. Setting up a Fund managed by AUB in collaboration with an environmental NGO, to manage seafront litter.
  - b. This Fund will take the form of a grant, where money would be raised through contributions by visitors in specially designed kiosks to be placed on the Corniche. These kiosks might sell drinks and food with the revenue earmarked for managing litter pollution on the Corniche.
  - c. The Fund should also seek sponsorship from the private sector, from companies such as Nescafe and Sanita which might be interested in sponsoring its activities (through potential in-kind or financial contributions).
  - d. The Fund will be in charge of monitoring seafront litter pollution, by hiring municipal personnel assigned to promote hygiene along the seafront.

e. Replacing plastic coffee cups with biodegradable ones that carry an anti-litter message.

5. Fines:

a. The current legislation makes provision for fines, but these are not applied and their values are quite low. Enforcement of fines should be made systematic, both on large and small polluters, in a coordinated action between the Municipality of Beirut and the various concerned ministries.