

TouMaLi :Activities and results of the TouMali Project in Morocco

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TouMaLi – Tourism Marine Litter

Objectives of the project

Develop and implement sustainable waste management solutions for the tourism sector in MENA countries.

Promoting circular economy solutions (reduction and reuse of unavoidable waste)

Significantly reduce marine litter through the following measures:

- Assessing the basics of marine litter pollution.
- Drawing up a global waste management strategy.
- Raising awareness and building capacity, as well as transferring knowledge to key stakeholders/hotels, restaurants and communities....

The project is financed by **German Federal Ministry for the Environment and Nuclear Safety (BMU)** and managed by Rostock University and **Leibniz Institute of Baltic Sea Research Warnemünde (IOW)** (2021-2025)

TouMaLi project partners

Leibniz-Institute for Baltic Sea Research Warnemuende , Coastal and Marine Management workgroup

University of Rostock, Professor of Waste and Resource Management

Project co-leaders and managers of **beach-related topics**

Project manager responsible for **waste management**

BlackForest Solutions GmbH

Adelphi

Landbell Ag

Project manager responsible for waste management issues

Project manager and responsible for waste management issues

Project manager responsible for waste management issues

Consulting connections

International Center for Environmental Technologies /Tunisia

University of Marrakech Cadi Ayyad / Faculty of Science Semlalia/ Morocco

Arab Academy of Science and Technology /and Maritime Transport/ Egypt

Ministry of Environment

Ministry of Energy and Sustainable Development

Ministry of Environment

Tunisia

Morocco

Egypt

- Ministry of Tourism.
- Ministry of Economic Affairs.
- Ministry of Municipal Affairs.
- Ministry of Finance.

- **Ministry of Tourism (Tourism Delegations..)**
- **Regional Environment Directorates.**
- **Hotel industry associations.**
- **NGO ...**

Research/national institutes in the field of marine and waste management.

- Local and international NGOs.
- Private sector in marine waste management.

Steering Committee

| Stakeholders | Quality | Establishment |
|-------------------------|----------------------|---|
| Pr.Mohamed HAFIDI | National coordinator | FSSM-UCA |
| Pr. Loubna EL FELS | Co-coordinator | FSSM-UCA |
| Pr. El Hassan EL MOUDEN | Project member | FSSM-UCA |
| Mr. Karam AMZIL | Representative | Ministry of Energy and Sustainable Development. |
| Ms.Kaltoum SOUSSI | Representative | Ministry of Tourism, Crafts, Social and Solidarity Economy. |
| Dr. Mohamed AIT TEJAN | Representative | Marrakech-Safi Regional Hotel Industry Association. |
| Mr. Mohamed Ikanban | Representative | Essaouira Territorial Commune. |
| Dr .Bouchra EL HAYANY | Post-Doctorate | FSSM-UCA |
| Ms .Assala LOUKILI | PhD student | FSSM-UCA |



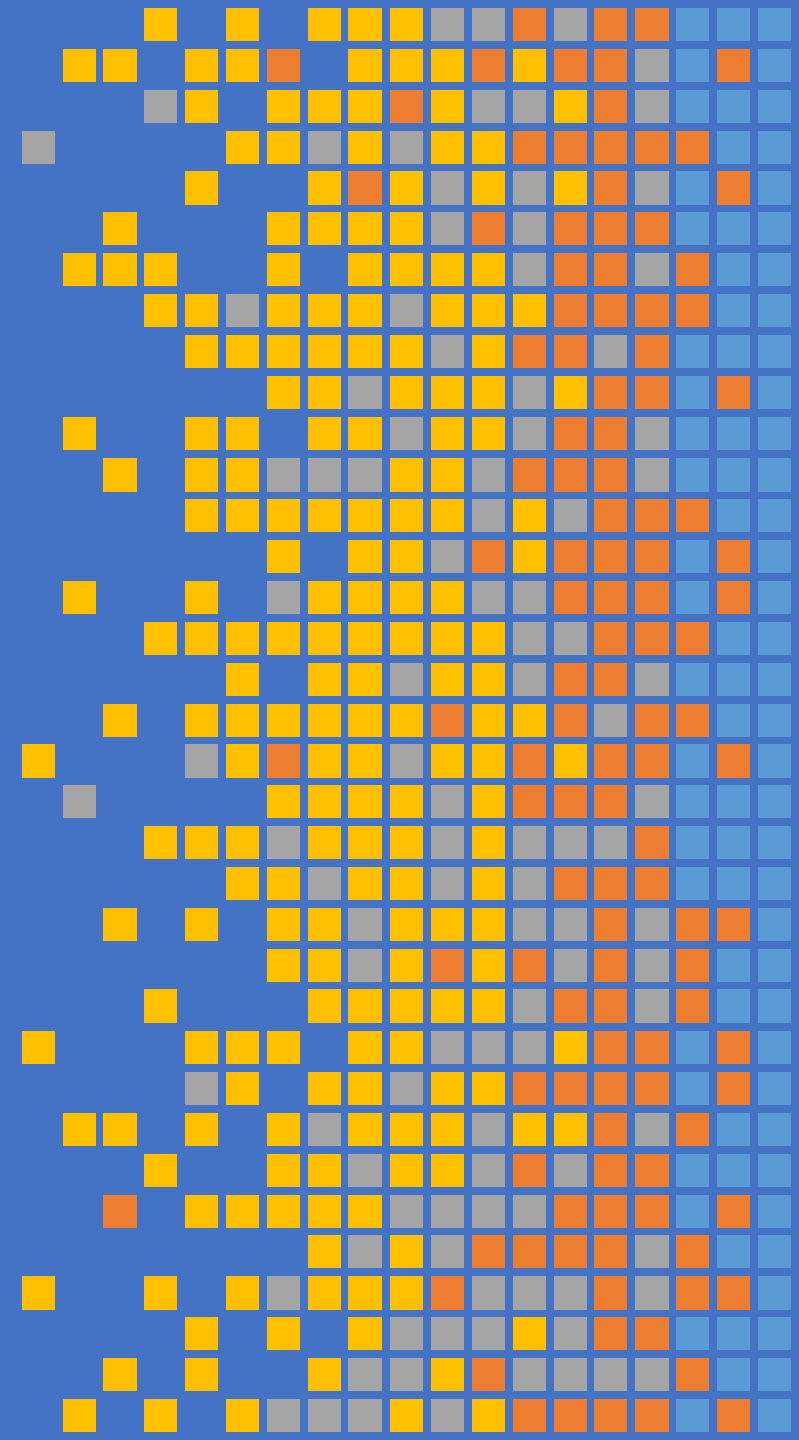
**Work carried out as part of the
project**

**Waste management in the tourism
industry**

-Team Morocco-

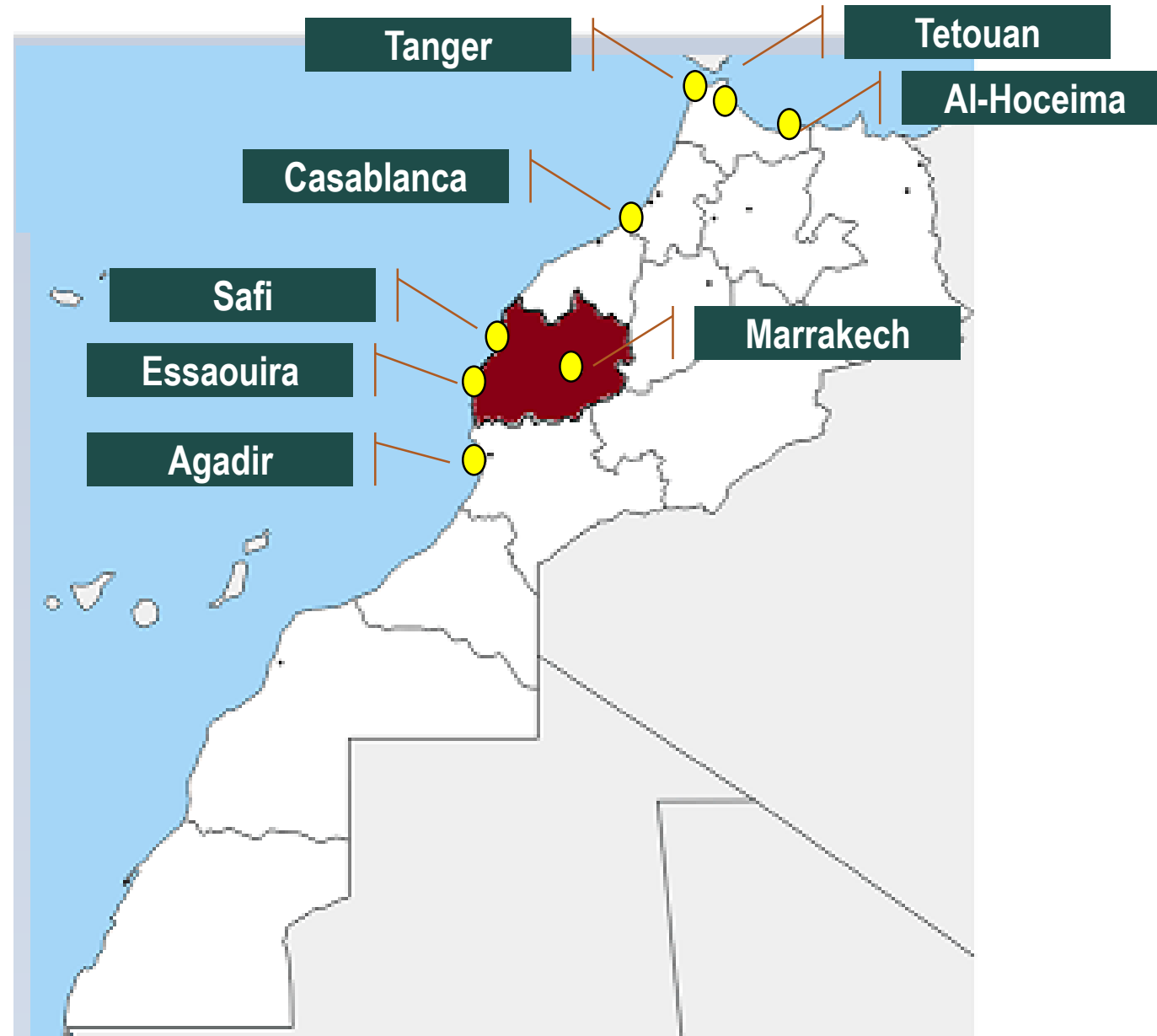
Monitoring of waste production in hotels

First method: Survey based on the questionnaire



Waste management in the tourism sector: **Cities concerned**

| Cities | Number of hotel establishments (HE) surveyed | Total HE surveyed |
|------------|--|-------------------|
| Tanger | 15 | 123 |
| Tetouan | 11 | |
| AL-Hoceima | 14 | |
| Casablanca | 18 | |
| Safi | 9 | |
| Essaouira | 15 | |
| Agadir | 15 | |
| Marrakech | 26 | |



Schedule of field trips

1. Survey of Atlantic and Mediterranean hotels from May 2022 to end of July 2022.

2. Weighing of waste from 6 hotels in Marrakech between November 10 and December 2022.

3. Weighing for Essaouira hotel and Al Hoceima hotel January 2023 period

TouMali survey for the tourism sector (Hotels)

1. General Questions

- ✓ Type of Hotel
- ✓ Number of rooms ?
- ✓ Number of beds ?
- ✓ Type of arrivals
- ✓ Certification/standars

2. Waste collection

Public and stuff Areas

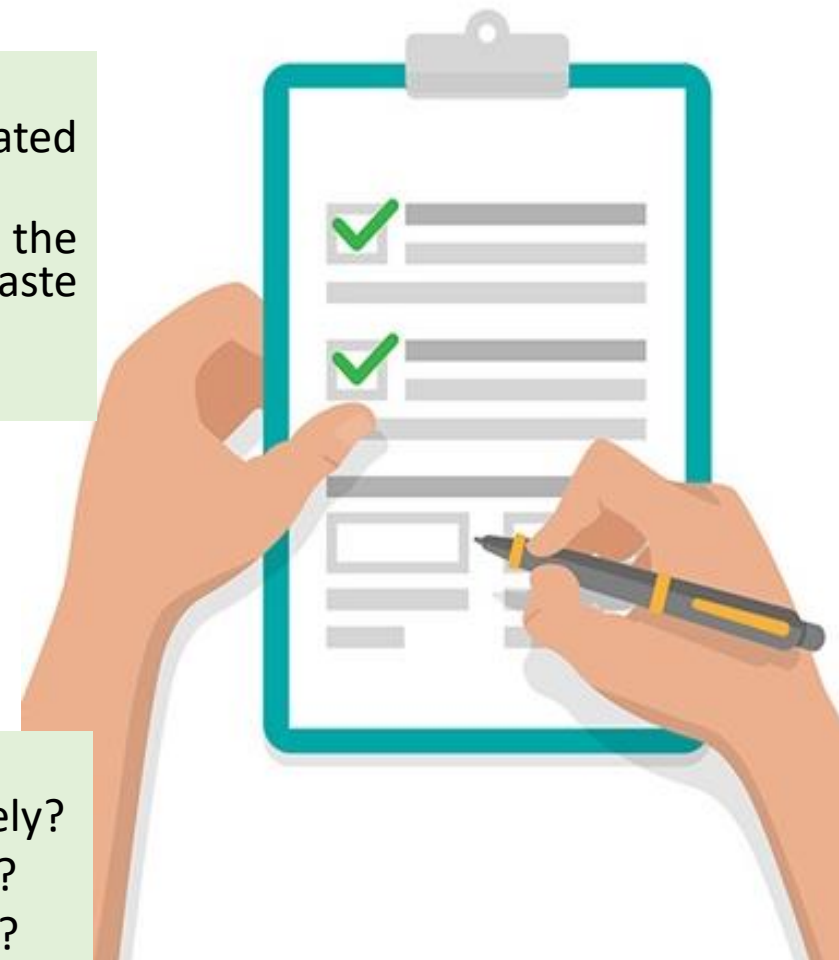
- Is waste separation is carried out?
- What type of waste is highly generated from this area??
- Do you have an estimation of the percentage of the different waste compositions?
- Are the bins located in ?

3. Waste collection in Rooms

- Is waste separation is carried out?
- What type of waste is highly generated from this area??
- Do you have an estimation of the percentage of the different waste compositions?
- Are the bins located in ?

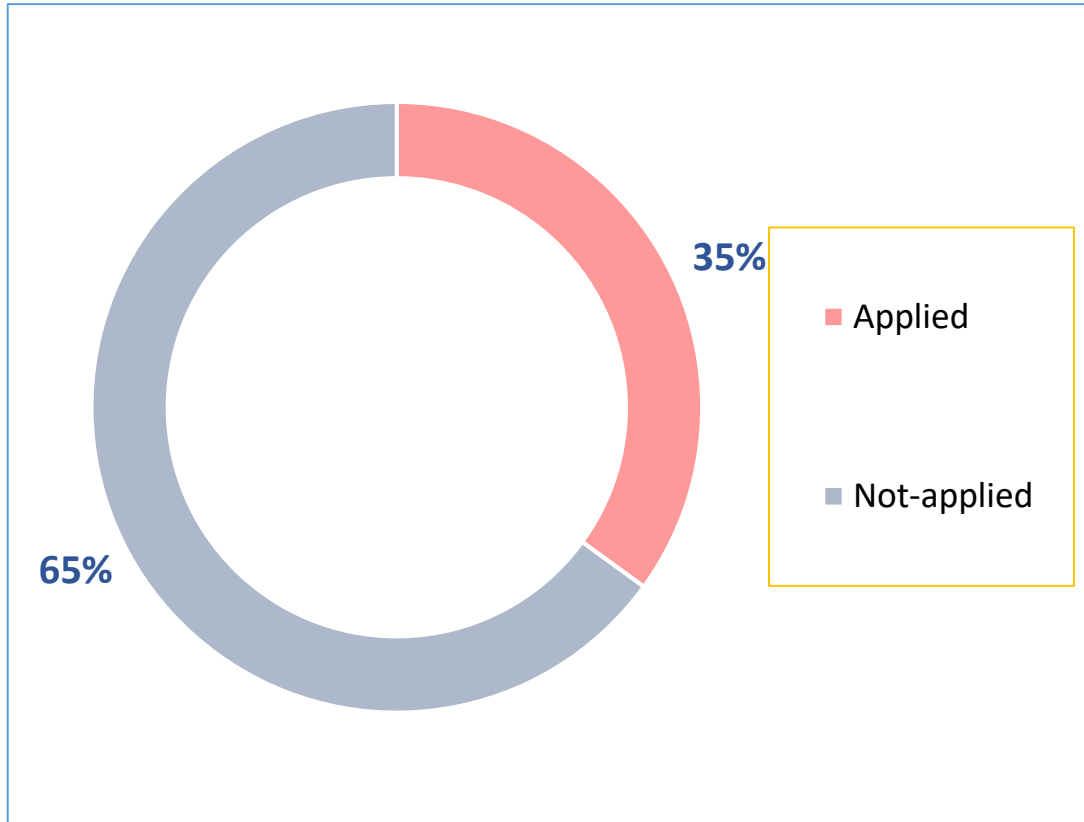
4. SPECIFIC MONITORING OF INORGANIC WASTE

- ✓ Are you collecting glass separately ?
- ✓ Are you collecting batteries separately?
- ✓ Are you collecting Metal separately ?
- ✓ Are you collecting Platic separately ?
- ✓ Are you collecting Paper separately ?
- ✓

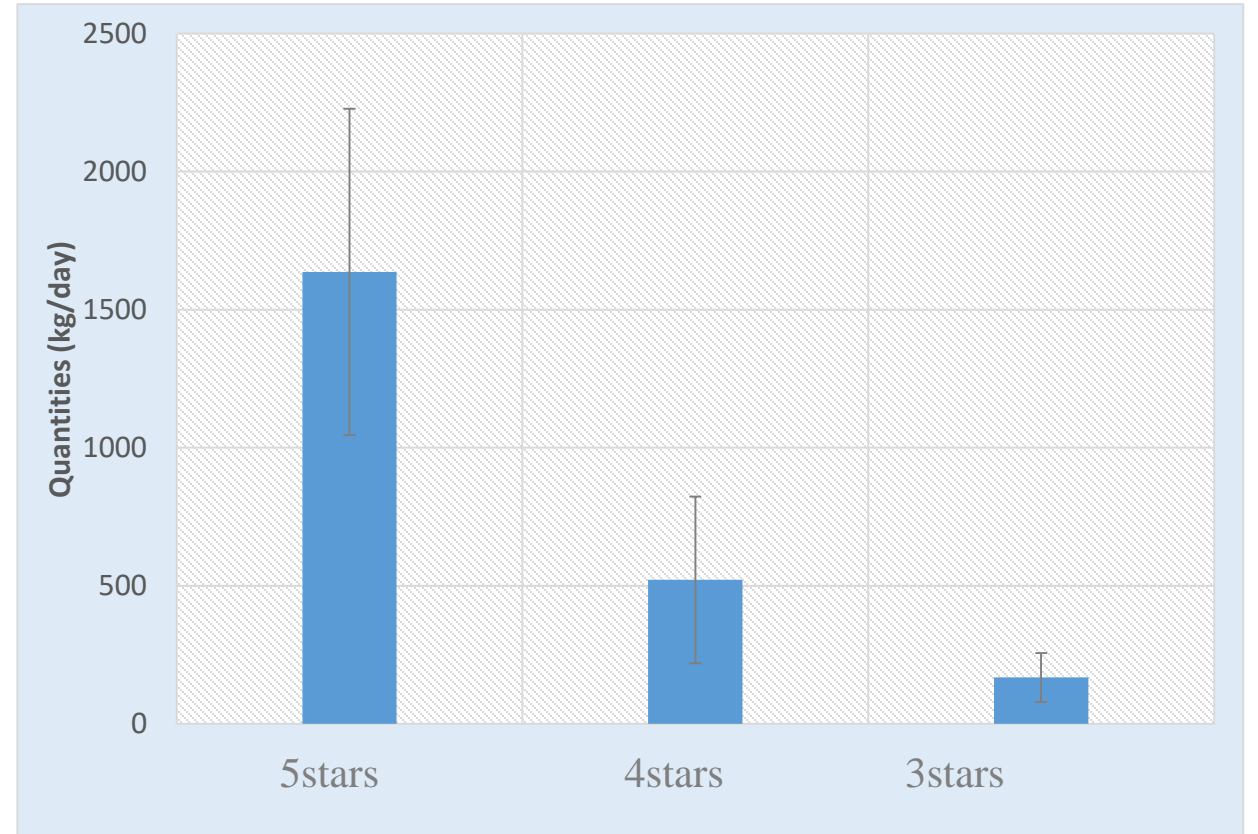


Marrakech-Safi region : Waste management in the tourism sector

MARRAKECH



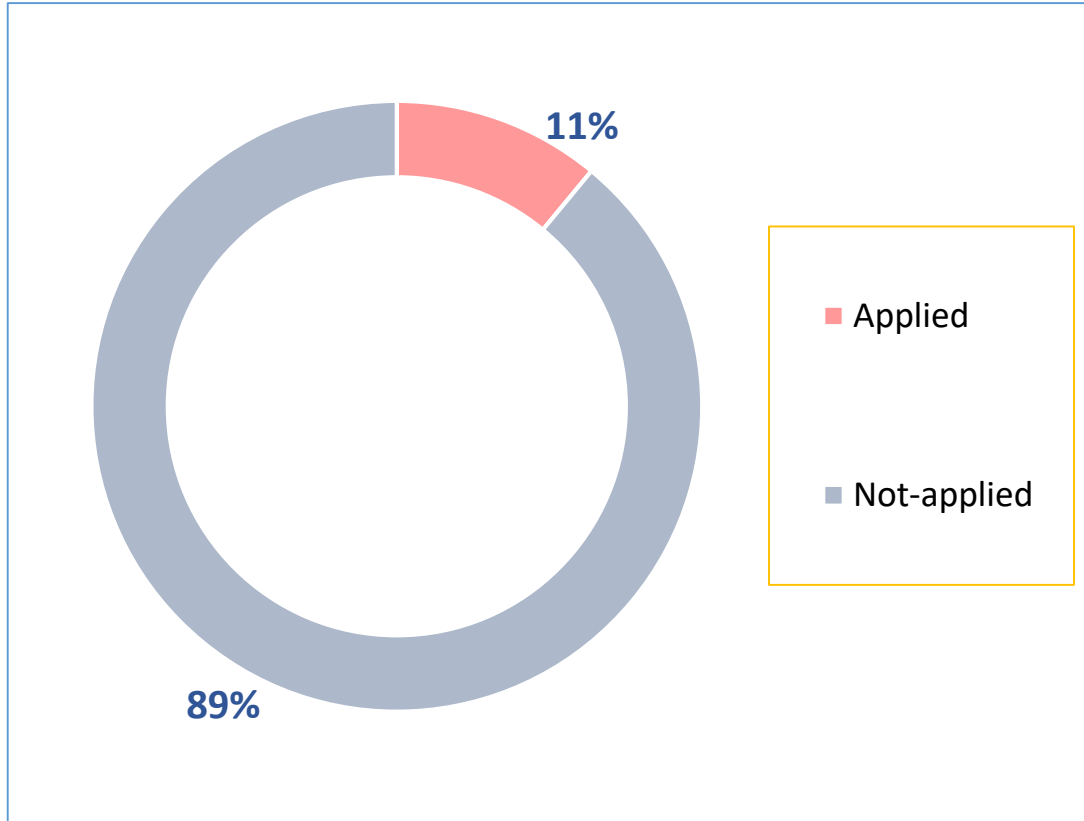
Percentage of hotels in Marrakech implementing waste sorting at final stage



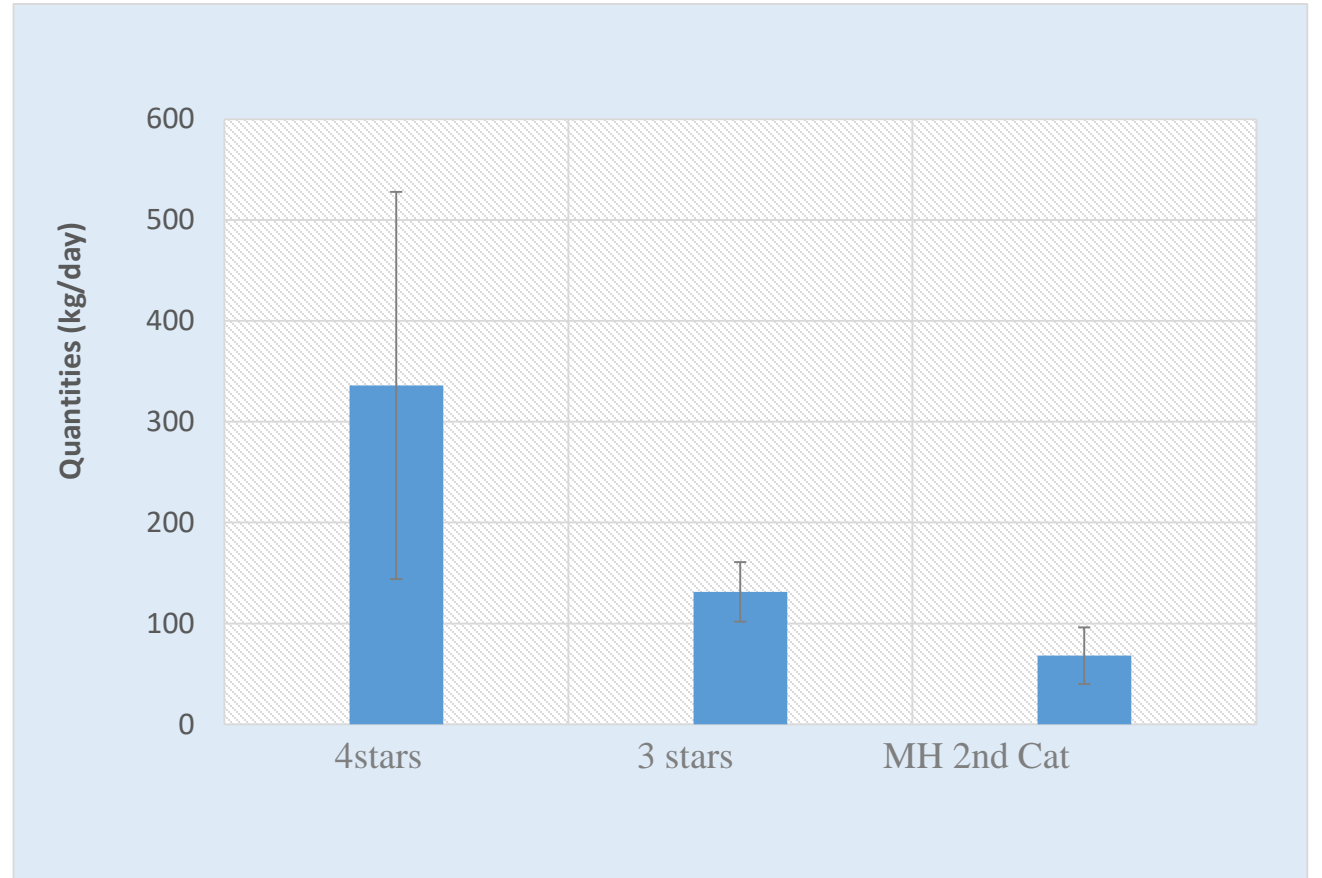
Average waste quantities (kg/day)

Marrakech-Safi region : Waste management in the tourism sector

SAFI



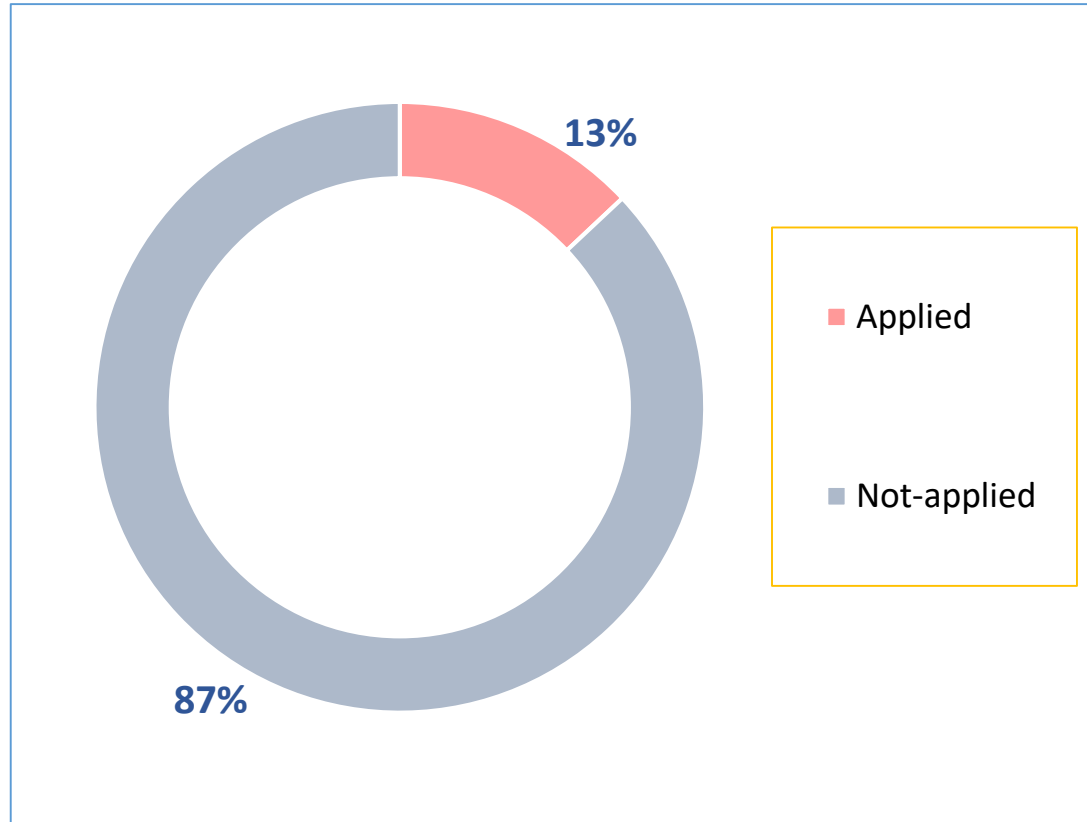
Percentage of hotels in Safi implementing waste sorting at final stage



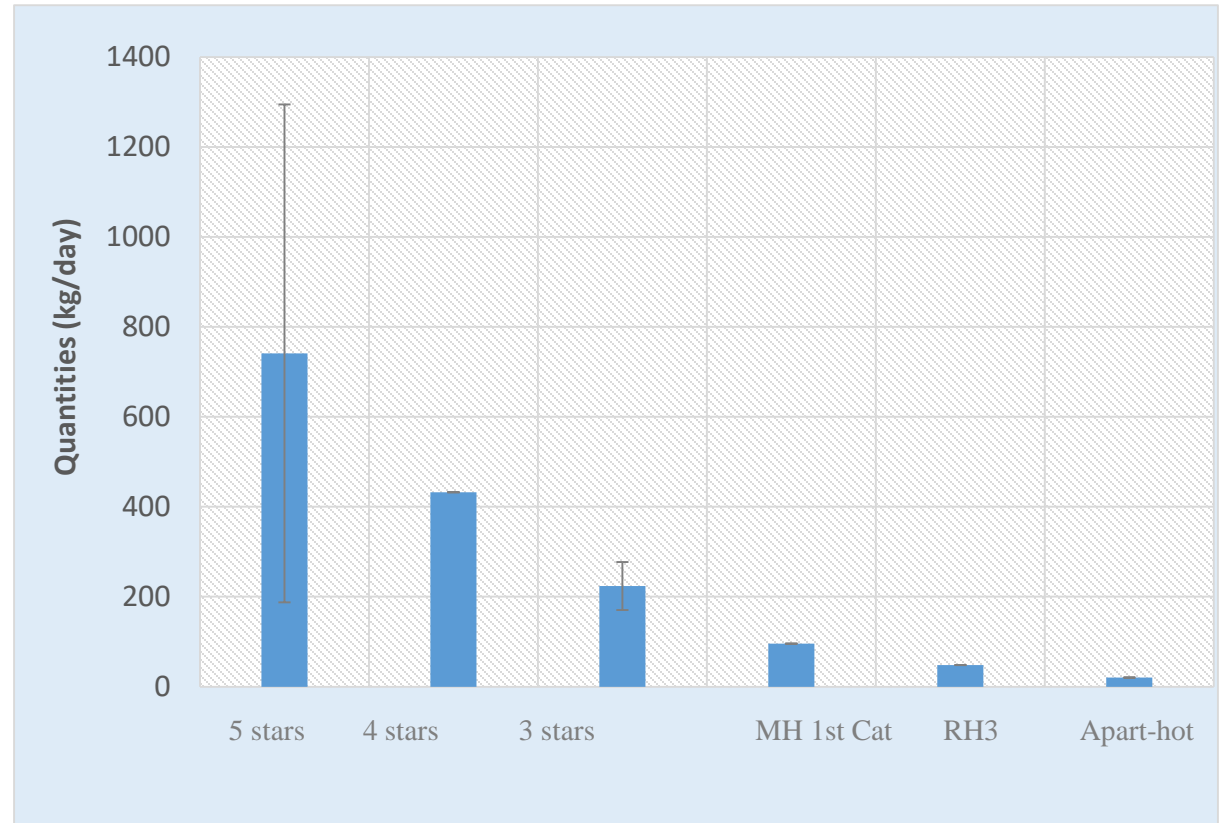
Average waste quantities (kg/day)

Marrakech-Safi region : Waste management in the tourism sector

ESSAOUIRA

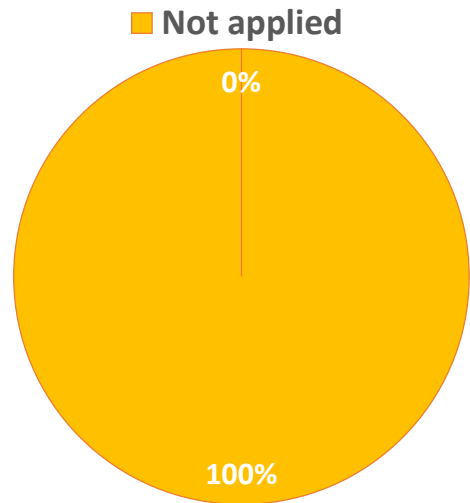


Percentage of hotels in Essaouira implementing waste sorting at final stage

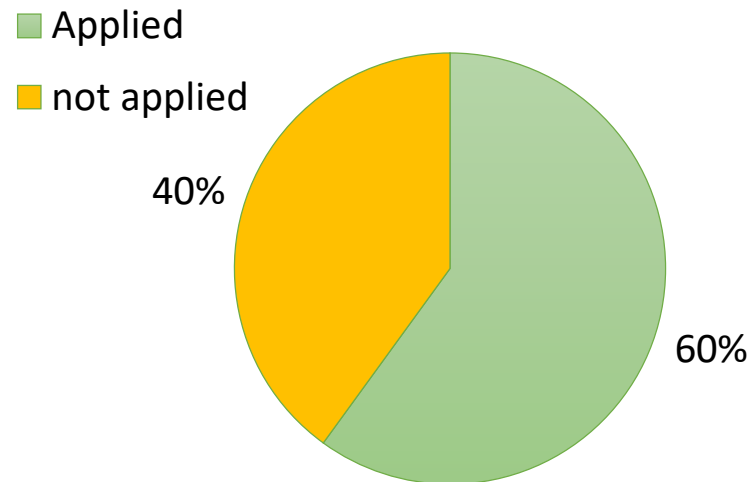
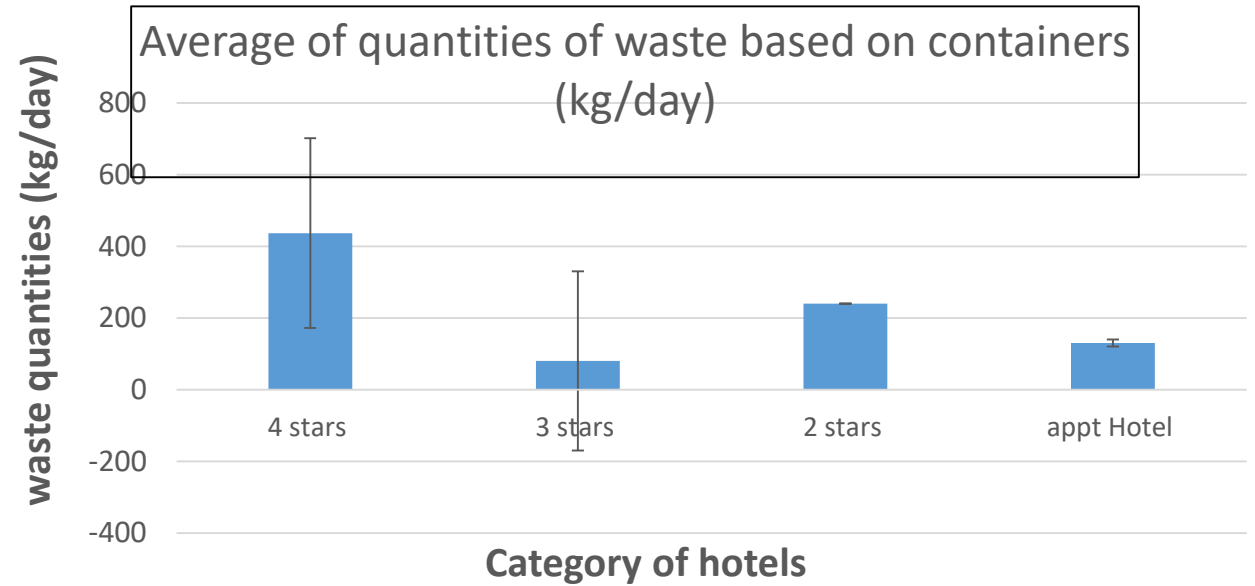


Average waste quantities (kg/day)

Waste management in the tourism sector



El Houceima



Agadir

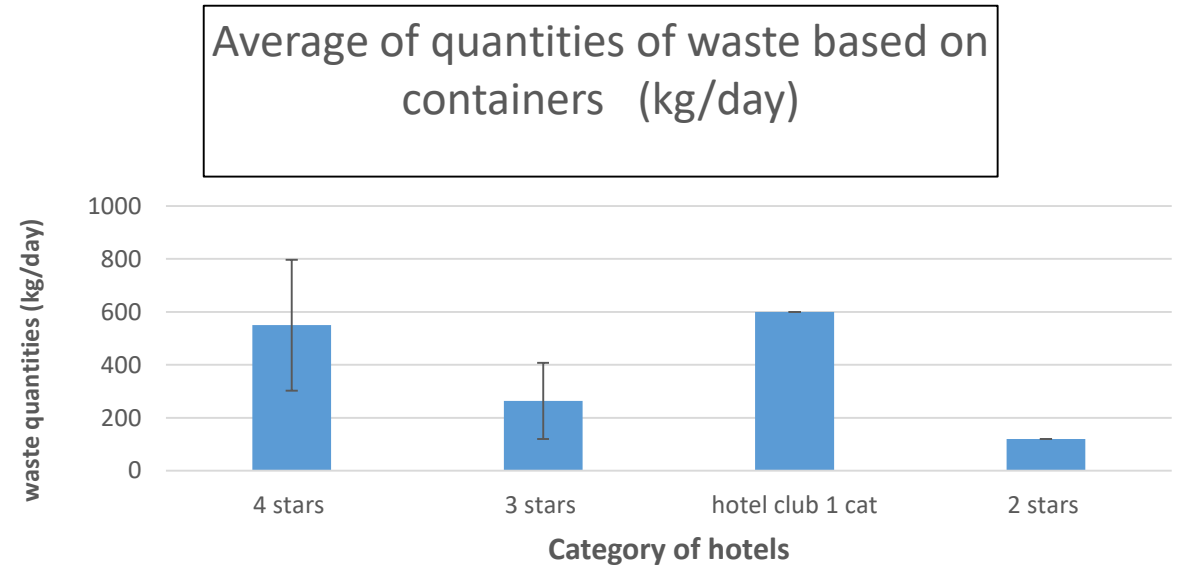
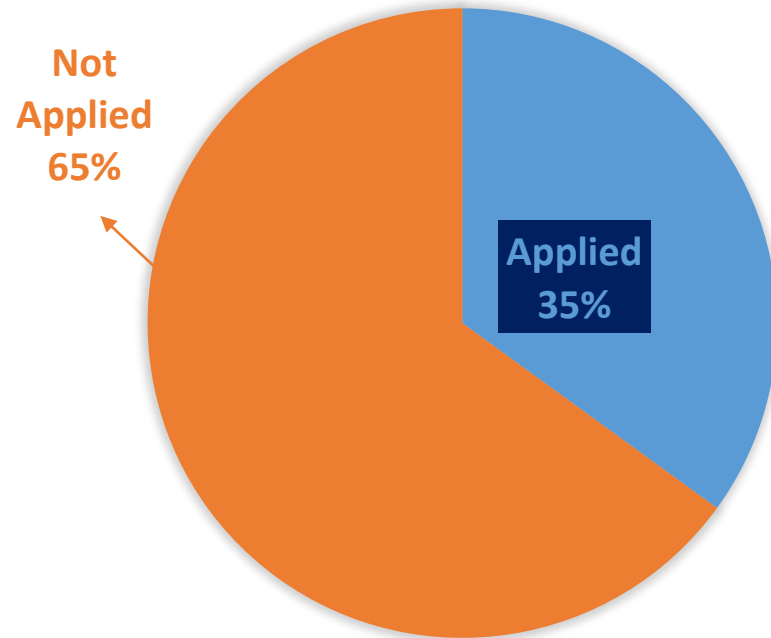


Table :table representing the different categories of hotels and their final waste management systems in Marrakech city

Marrakech city



| Type of Hotel | Name of the Hotel | Estimated quantities based on containers (Kg) | Waste sorting |
|---------------|-------------------------------------|---|---------------|
| 5 stars | Hotel radisson Blu hotel carre Eden | 1320 | NA |
| 5 stars | Hotel Barcelo | 1056 | Applied |
| 5 stars | Es Saadi Marrakech Resort | 1056 | Applied |
| 5 stars | Movenpick Mansour Eddahbi | 2112 | Applied |
| 5 stars | Kenzi Rose Garden | 2640 | Applied |
| 4 stars | Iberostar | 1056 | Applied |
| 4 stars | Diwane | 792 | NA |
| 4 stars | hotel ayoub | 360 | Applied |
| 4 stars | El Andalous | 924 | Applied |
| 4 stars | Hotel Marrakech le semiramis | 240 | NA |
| 4 stars | Imperial Plasa et spa | 240 | NA |
| 4 stars | hotel farah | 240 | Applied |
| 4 stars | les Ambassadeurs | 320 | NA |
| 3 stars | Le grand Imilchil | 40 | NA |
| 3 stars | Al MAS | 240 | NA |
| 3 stars | Ibis Mousafir | 360 | Applied |
| 3 stars | hotel Amani | 100 | NA |
| 3 stars | hotel Oudaya | 280 | NA |
| 3 stars | hotel tachfine | 280 | NA |
| 3 stars | Hotel Gomasine | 180 | NA |
| 3 stars | Hotel Mon gueliz | 80 | NA |
| 3 Stars | Hotel Management solution | 18 | NA |
| 3 stars | Hotel Racine | 240 | NA |
| 3 stars | Hotel Residence Selwane | 120 | NA |
| 3 stars | Hotel Amalou | 120 | NA |
| 3 stars | Appt hotel Bellouni | 120 | NA |

Figure : Percentage of hotels using the waste sorting at the final stage in Marrakech city.

Monitoring of waste production in the hotels of Morocco

Case study of Marrakech city

Second method: Monitoring based weighing

| City | Number of hotels |
|-------------|------------------|
| • Marrakech | • 26 |



Study area

Al-Hoceima



Hotel la perla



Essaouira



Heure bleu
First class guest house

Marrakech



Barcelo



Diwane



Imilchil



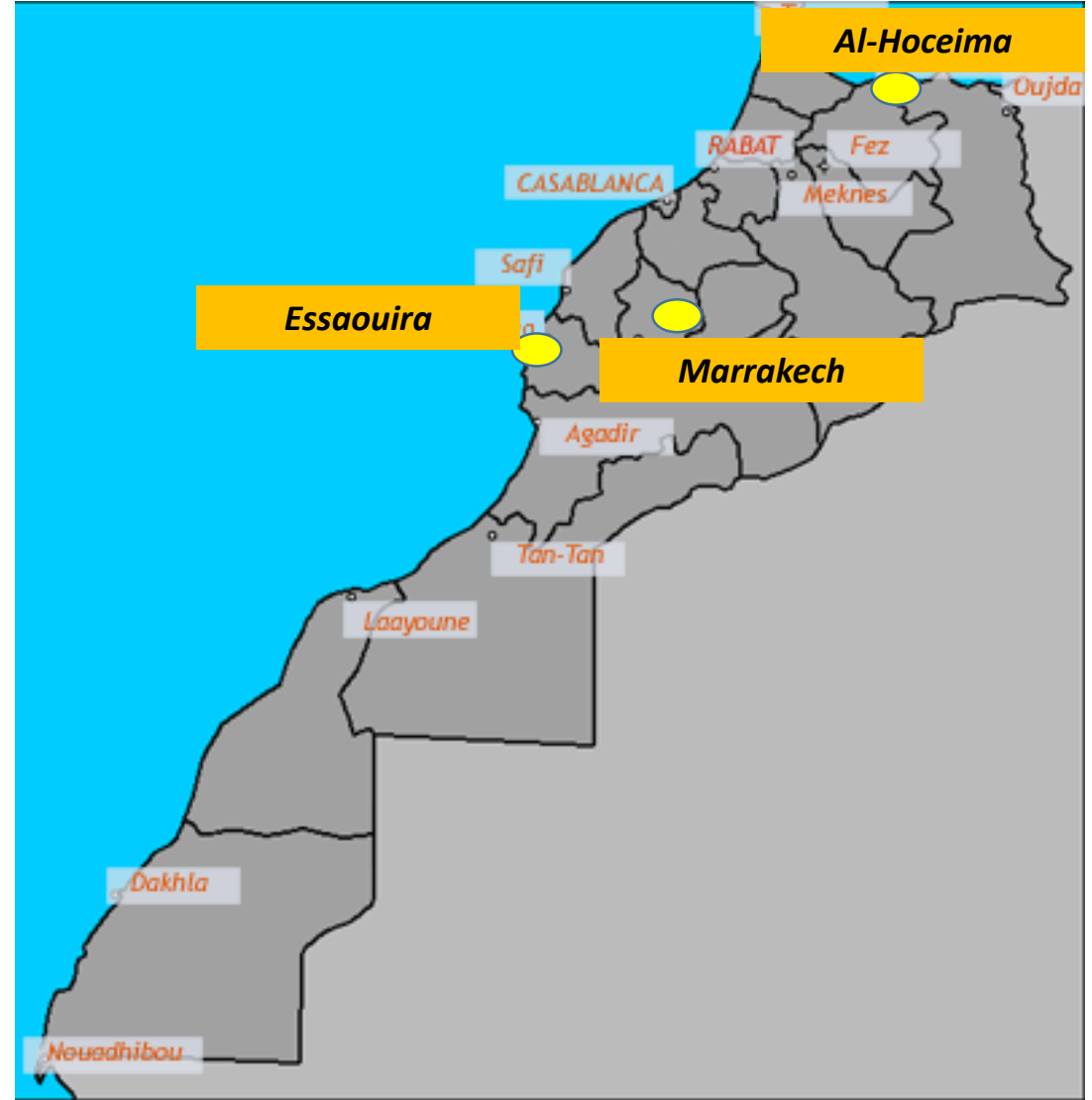
Radissonne



Iberostar



Almass





Hotel waste

1st Sorting according to the area



2nd Sorting according to the fractions



weighing waste using a scale



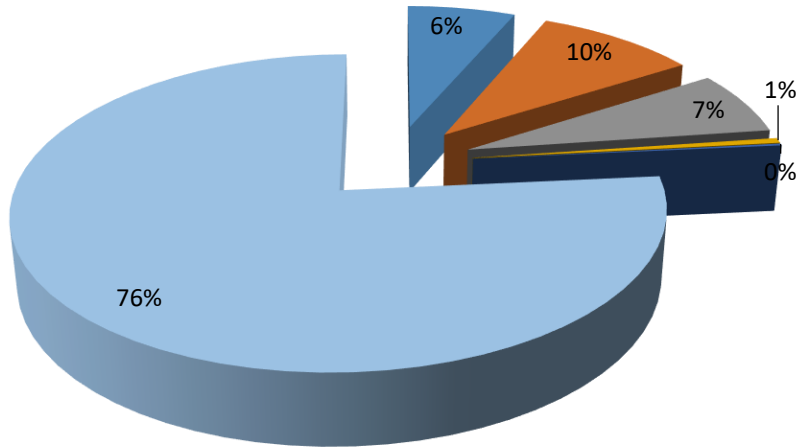
Data analysis



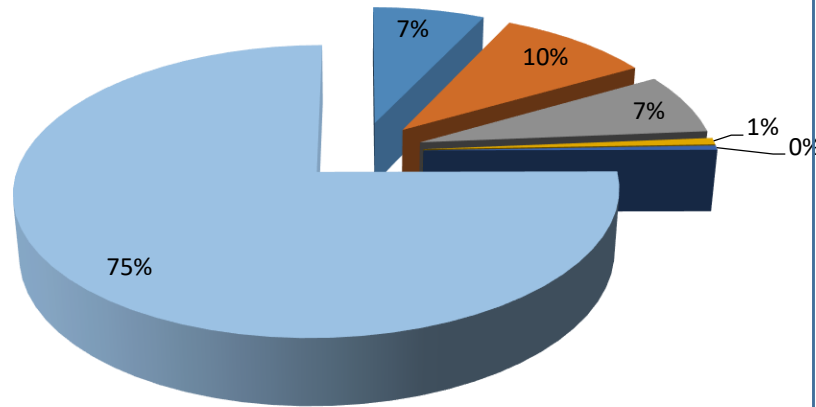
III. Distribution of waste fractions in hotels in Morocco

Distribution of waste fractions in hotels in Morocco has been determined based on ratios in term of kg/customer/day for each fraction (already presented in table 4)

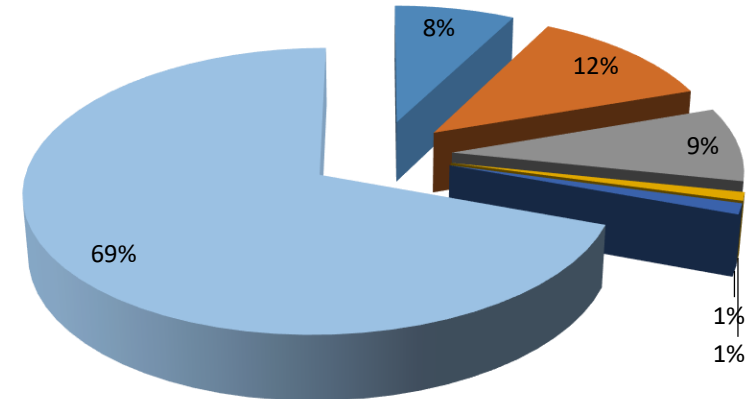
5 stars



4 stars



3 stars



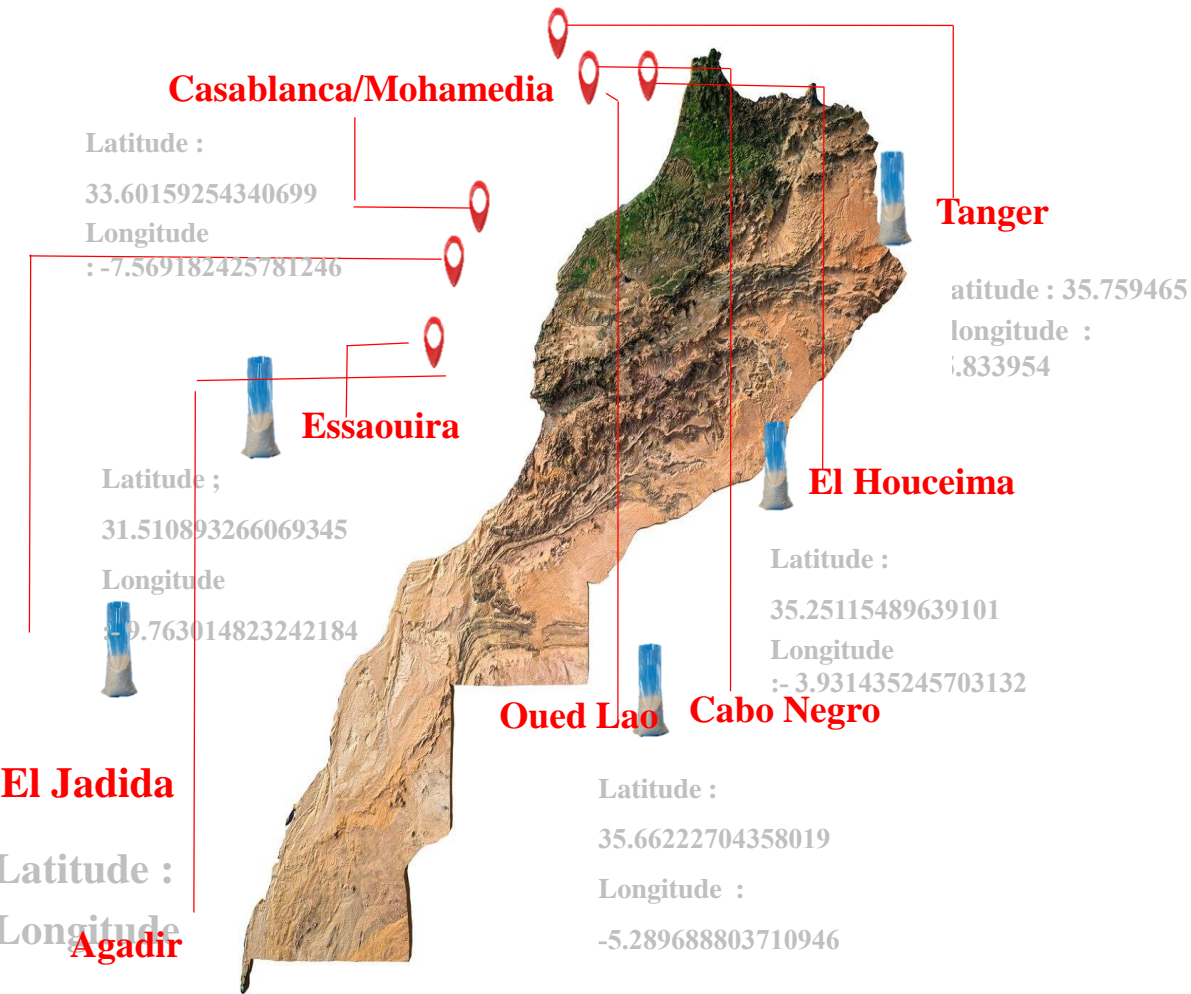
■ Plastic ■ Paper and packaging ■ Glass ■ Metal ■ Textil ■ Organic matter

Beach monitoring and waste sorting analysis

Sorting Analysis –2023

Univeristy Cadi Ayad UCA FSSM

Beaches surveyed



According to a report by the World Tourism Organisation (WTO), Morocco is ranked :
3rd most visited Arab country in 2022 with : 11 million tourists
- Ranked among the world's top 10

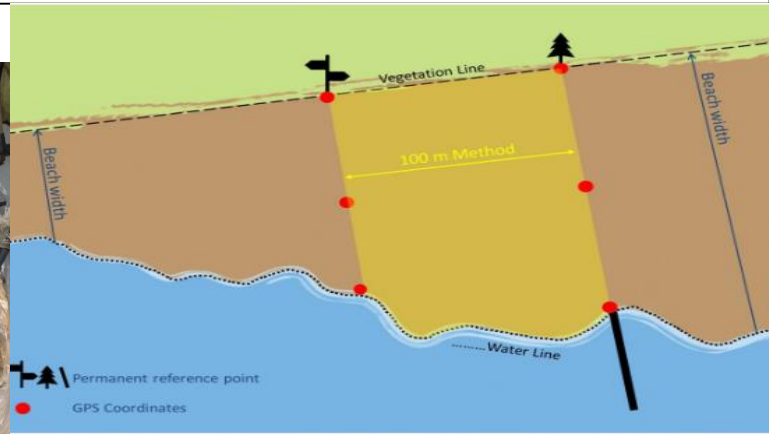
| Cities | Names of the beaches | Number of beaches / city | Total |
|------------------|------------------------|--------------------------|------------------|
| Casablanca | Nehla beach | 1 | 7 beaches |
| El jadida | El jadida beach | 1 | |
| Mohemadia | Sablette beach | 1 | |
| Essauira | Beach Essaouira Center | 1 | |
| Around Essaouira | Beach Sidi kaouki | 1 | |
| Agadir | Beach Agadir Center | 1 | |
| Taghazout | Taghazout Beach | 1 | |

| Cities | Name of the beaches | Total |
|-----------------------|---------------------|-------------------|
| Tanger | Playa beach | 14 beaches |
| | Malabata Beach | |
| Oued Alian | Oued Aliane Beach | |
| Oued El Marsa | Oued el Marsa Beach | |
| Mdiq and Fnidy | Mdiq center Beach | |
| | Rifiyine Beach | |
| | Marina Beach | |
| Cabo Negro | Cabo Negro 2 beach | |
| Oued Laou | Oued Laou Beach | |
| Kaa Asreas | Kaa Asreas Beach | |
| Stehat | Stehat | |
| Hoceima | Isly | |
| | Quemado | |
| | Sabadila | |

Methodology



- **OSPAR**
- Delimit the section using the OSPAR technique. Take the GPS position of the 4 points. Collect waste from the vegetation line to the water line..
- **Sand Rack**



Survey area. In yellow, the zone for the 100 m macro-waste method is indicated. The red circles indicate where the GPS coordinates were taken.



The sorting stage

Meeting with association
Sealovers
31 january 2023



Municipalities & Harbours

Tourist surveys

Surfrider Association/ Essaouira
June 2022



Enter the data in Excel according to the OSPAR categories list

| |
|-------------------------------------|
| Materials |
| Artificial polymer materials |
| Rubber |
| Cloth/textile |
| Paper/Cardboard |
| Processed/worked wood |
| Metal |
| Glass/ceramics |
| Slack/Coal |
| Chemicals |
| Food waste |

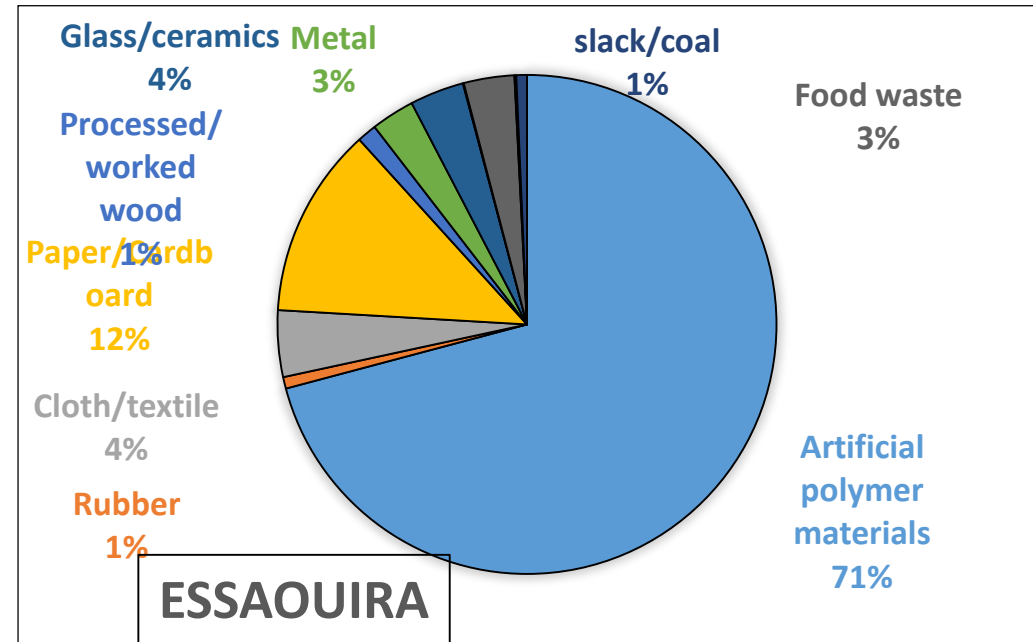
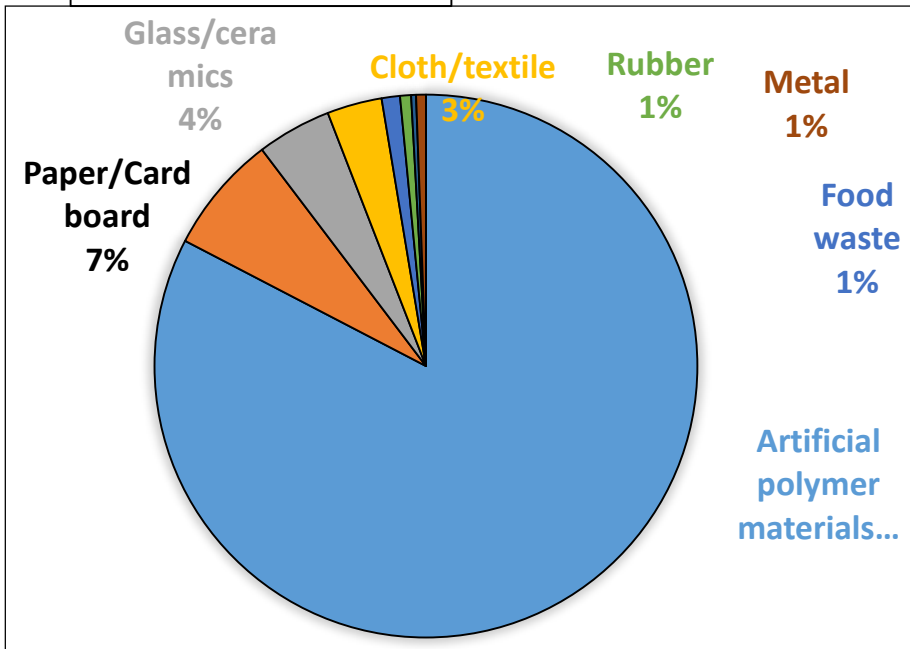
| | E | S | U | V | W | X | Y | AD |
|----|---|-----------------------|-------|--------|--------|--------|--------|----|
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | Master List of Categories of Litter Items | OSPAR | | | | | | |
| 12 | general name | OSPAR-categories | 0-10m | 11-20m | 21-30m | 31-40m | 41-50m | |
| 13 | | | T1 | T2 | T3 | T4 | T5 | |
| 14 | Small plastic bags, e.g. freezer bags incl. | Plastic • Polystyrene | 7 | 5 | 18 | 3 | 10 | |
| 15 | Bottles | Plastic • Polystyrene | | 1 | 6 | 26 | 36 | |
| 16 | Drink bottles > 0.5l | Plastic • Polystyrene | 1 | 2 | 3 | 5 | 33 | |
| 17 | Food containers incl. fast food containe | Plastic • Polystyrene | | | 14 | 3 | 2 | |
| 18 | Other cosmetics bottles & containers | Plastic • Polystyrene | | 1 | 1 | 4 | 4 | |
| 19 | Engine oil bottles & containers < 50 cm | Plastic • Polystyrene | | | | 1 | | |
| 20 | Plastic caps/lids drinks | Plastic • Polystyrene | 6 | 6 | 22 | 6 | 16 | |
| 21 | Plastic caps/lids chemicals, detergents (| Plastic • Polystyrene | | 1 | 1 | | | |
| 22 | Plastic rings from bottle caps/lids | Plastic • Polystyrene | 7 | 4 | 3 | 1 | | |
| 23 | Tobacco pouches/plastic cigarette box packaging | | 3 | 3 | 12 | 5 | 10 | |
| 24 | Cigarette lighters | Plastic • Polystyrene | | | | 2 | 4 | |
| 25 | Cigarette butts and filters | Plastic • Polystyrene | 19 | 33 | 97 | 68 | 62 | |
| 26 | Pens and pen lids | Plastic • Polystyrene | 1 | | 1 | 1 | 4 | |
| 27 | Crisp packets/sweet wrappers | Plastic • Polystyrene | 7 | 17 | 24 | 27 | 14 | |
| 28 | Lolly sticks | Plastic • Polystyrene | 5 | 10 | 15 | 12 | 3 | |
| 29 | Toys and party poppers | Plastic • Polystyrene | 1 | 1 | 2 | | 1 | |

A hand holding a white pen points to a document. The document is overlaid with various business charts and graphs, including a bar chart, a line graph, and a pie chart. The background is a blurred office setting with a laptop and a window. A blue rounded rectangle with the word "Results" is centered on the document.

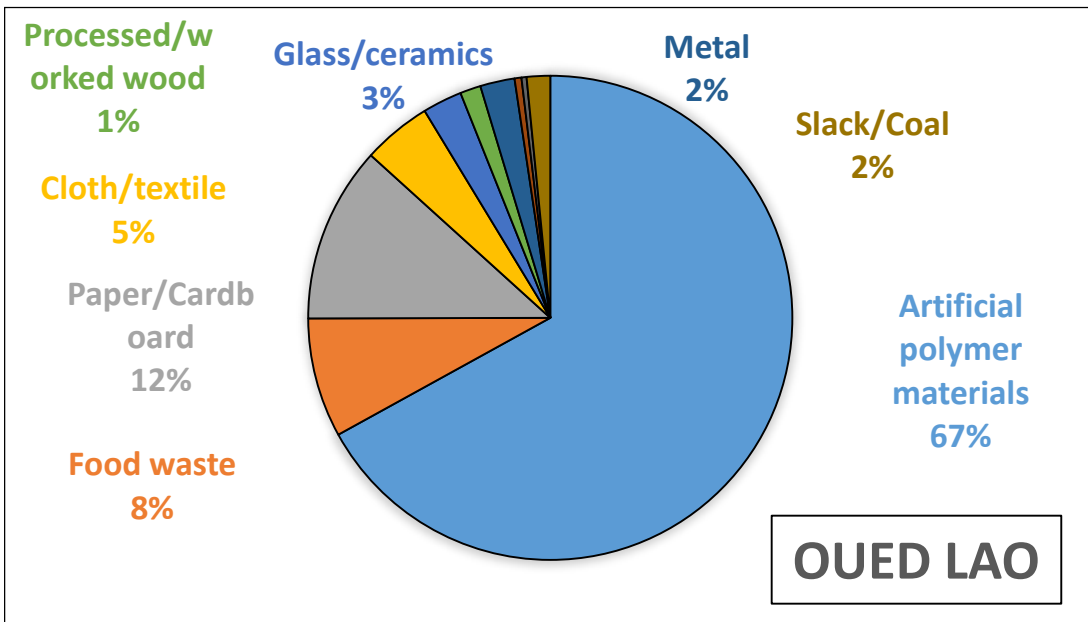
Results



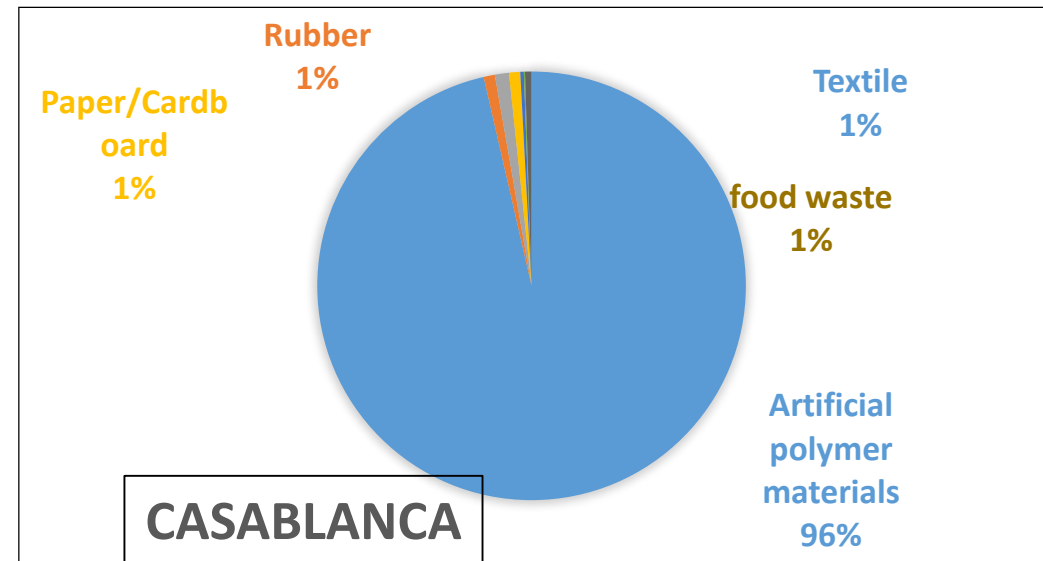
PLAYA BEACH



ESSAOUIRA



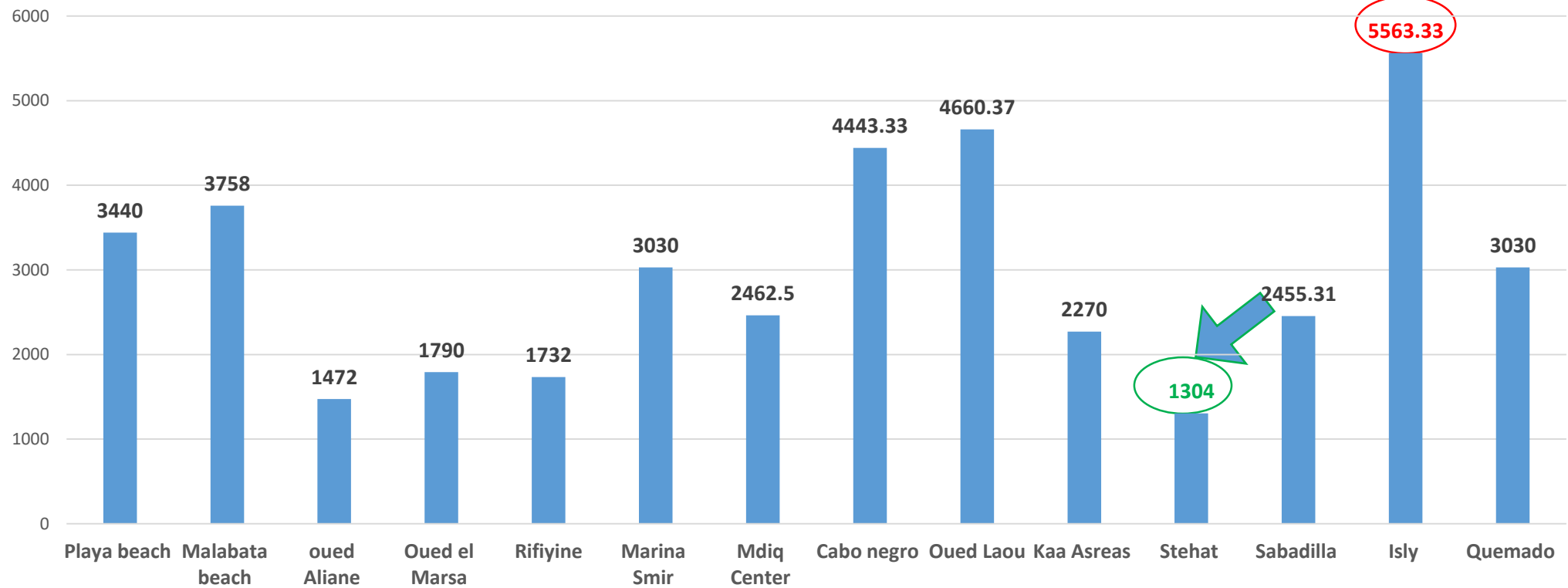
OUED LAO



CASABLANCA



Number of litter pieces -extrapolated to 100 m



International agricultural , Biological et life science conference



The scientific biology seminar on the themes ,water ,agriculture ,biotechnology and Health



كلية العلوم
السملالية - مراكش
FACULTÉ DES SCIENCES
SEMLALIA - MARRAKECH

CERTIFICATE OF ATTENDANCE

Scientific Biology Seminar on the the themes: Water, Agriculture, Biotechnology and Health (EABioS 2023)

FEBRUARY 15-16, 2023 MARRAKECH

Mme Assala Loukili

POSTER PRESENTATION

Seminar Coordinator
Pr. EL FELS Loubna



Head of Biology Department
Pr. OUDRA Brahim

Chief du Département
de Biologie
Brahim OUDRA

Waste sorting in the tourism sector: A case study of waste sorting and recycling in cities of Atlantic coast of Morocco

Assala LOUKILI¹, Brahim EL HAVANI², Mohamed HAJDIR^{3,4}, Abdellah Nassouf¹, Loubna El Fels¹

¹ Laboratory of Microbial Biotechnologies, Agronomy and Environment, (BioAgE) Labellé Research Unit-CIRAD INRA, Faculty of Sciences Semlalia, Sidi Agouti University, Marrakech, Morocco
² Agronomy and Forestry Program, University Mohammed VI Polytechnic (UM6P), Benguerdj, Morocco
³ Department of Waste and Resource Management, Trier University, 55511 Trier, Germany

SUMMARY

Waste management is one of the major environmental problems threatening the Mediterranean Kingdom of Morocco. Today, only less than 9% of waste in Morocco is recycled. This study aims to enhance the application of waste sorting in the tourism sector (hotels) to valorize the reusable waste, minimize the environmental impacts and to reduce the economic cost of waste disposal and maintain human health.

In order to diagnose the current situation, a survey based questionnaire about plastic pollution and waste management was developed and filled out with the hotel sector. Hotels in different Atlantic cities (Essaouira, Safi, Agadir and Marrakech) were interviewed. After data processing and analysis we recorded that the system of waste sorting at the level of hotels needs to be defined by an environmental regulation in order to achieve a 100% of waste sorting application.

OBJECTIVES

- Investigation of the current situation of waste management in the hotel sector.
- Reduce the abundance of solid waste in the hotel sector by implementing a sustainable waste management system.
- Reduce the amount of waste in the landfills.

MATERIAL AND METHODS

In order to collect the data, a numerous hotels were selected (Table 1) from Moroccan cities (Figure 1), then a survey about waste management in the hotels was carried out according to the following questionnaire:

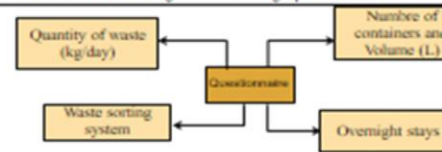


Table 1: the number of hotels by category in the different Atlantic cities investigated

| CITIES | Categories | Number of hotels/ Categories |
|-----------|-----------------|------------------------------|
| Essaouira | 5 stars | 1 |
| | 4 stars | 1 |
| | 3 stars | 2 |
| | MH1 | 1 |
| | MH2 | 1 |
| | RH1 | 1 |
| Safi | Hotel Apartment | 1 |
| | 4 stars | 2 |
| Agadir | 3 stars | 5 |
| | MH 2 stars | 2 |
| | 4 stars | 11 |
| Marrakech | 5 stars | 3 |
| | 4 stars | 1 |
| | 3 stars | 5 |
| | 4 stars | 8 |
| | 3 stars | 13 |



Figure 1: cities studied in Morocco

In order to minimize the amount of waste produced, the combination of the collection of **recyclable waste** by private companies and by the municipality may be a possible solution to reduce and recycle the higher quantity of waste produced by hotel sector.

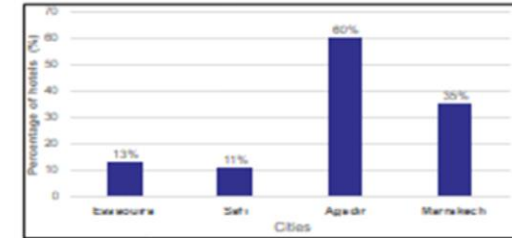


Figure 2: Percentage of hotels that applied the waste sorting at the first stage

CONCLUSION

We conclude that the waste sorting system in the tourism sector, more precisely the hotels, is not totally applied. As a perspective we suggest that the Ministry of Tourism and the Ministry of Environment can put in place a dual action plan (Figure 3) in conjunction with the municipality and the citizens for a waste recycling a sustainable environment.



Figure 3: Possible plan for waste collection system

RESULTS AND DISCUSSIONS

The results show that the proportion of hotels that use waste sorting is about 35%; 60%; 13% and only 11% respectively for Marrakech Agadir, Essaouira in Safi (Figure 2).

- The 35% of hotels include 4 "five-star" hotels, 4 "four-star" hotels and 1 "three-star" hotel.
- The 60% of hotels include 9 hotels of "four-star" hotels.
- The 13% of hotels include 1 "four-star" hotels and 1 "three-star" hotel.
- The 11% of hotels include 1 "four-star" hotels.

The results of this study put the light to make more efforts to improve the situation of waste sorting at the level of 2 cities Essaouira and Safi that having a low application of waste sorting comparing to Agadir and Marrakech.

World Environment Day 2023

Event Hosted by :La Fondation Mohammed VI pour la protection de l'Environnement célèbre la journée mondiale des océans(du 03 au 06 juin 2023, Rabat Sale-Maroc)

Discussion panel





Thank you for your
attention

Stop Ocean Plastic
Pollution

