D3.1.1
Technical manual for the Waste Charaterization Study

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TECHNICAL MANUAL

Measurement of Waste Generation by Type (composition)
and assessment of its
Correlation to Tourist / Visitor Seasonal Presence
in
Selected, Defined Impact Zones
on participating Mediterranean Islands
(Cyprus, Rab, Crete, Rhodes, Mykonos, Sardinia, Sicily, Malta, Mallorca)

PROLOGUE

Europe is the most visited region in the world, the destination for half (49.8%) of the 1.24 billion international tourist arrivals in 2016. Almost half (47.4%) of European tourist visits occurred in coastal regions, defined "*on the basis of and consist of local administrative units or municipalities that border the sea, or have at least half of their total surface area within a distance of 10 km from the sea*." In 2015, 9 out of 10 nights spent at Tourist Accommodation Establishments (TAE) in Malta, Cyprus, Greece, Croatia and Denmark were located at coastal areas, while the overall flow of tourism in the EU is primarily concentrated on Mediterranean coastal regions.

To assess tourism sustainability levels, Eurostat uses **Tourism Intensity** (Nights spent in TAE in a year per 1.000 inhabitants – the EU-28 average was 5.292 in 2015) and **Tourism Density** (nights spent in TAE in a year per region km^2 – the EU-28 average was 597 in 2015), as "measures that may be used to analyse sustainability issues linked to Tourism Pressures." Even though only the Baleares are listed among the top twenty tourist destinations in the EU (measured by the number of nights spent in TAE in a year), "the highest regional tourism intensity ratios were predominantly recorded for island/coastal regions…." The highest ratio was recorded on the Greek islands in Notio Aigaio (Cyclades and Dodecanese) which include, among others, the islands of Paros, Santorini, Mykonos and Rodos, at 69.777, followed by the Baleares and the Ionian islands in Greece (which include Corfu) with a ratio averaging 56.000-58.000.

In contrast, only two Mediterranean island regions recorded Tourism Density levels above 5.000 nights spent at TEA per km^2, Malta at 28.267 and Baleares at over 10.000, whereas the highest Tourism Density level was recorded in the region of Brussels, Belgium at 40.020, followed by London, Wien and Berlin (Malta was fifth in line)[1].

A limitation of Eurostat measures to ascertain Tourism Pressures is that they do not take into account the seasonality of tourism flow manifest within the calendar year which significantly exacerbates its impact on the destination, i.e., the effect of 69.777 overnight stays per 1.000 resident population spread over a 12-month period in Mykonos or Rodos is very different from the same ratio befalling over a 7-month span. In addition, while the administrative impact of tourism's tide is felt first and will eventually be addressed at the local administrative unit level (EU, state and district level support notwithstanding), the immediate environmental consequences can be largely localized to the geographical area most directly affected. For example, while Malta was included in the regions bearing the greater number of tourist nights per km^2, specific geographical locations in Malta, developed to accommodate foreign and domestic visitors alike, would most probably experience far greater ratios. The European Commission, in a Communication dated 30 June 2010, put forth a new political framework for tourism in Europe (in fact reacting to the sharp decrease in EU tourist arrivals over the previous two years), seeking to "stimulate competitiveness in the sector" while recognizing that "competitiveness is closely linked to the 'sustainable' way in which it is developed" (p.6). Admitting the varying response from tourism businesses across Europe to concerns about sustainability and the limited application of the tools it promoted to "facilitate sound environmental management for business," namely EU Eco-label and EMAS, it announced a new initiative for the development of "a system of indicators for the sustainable management of destinations" in cooperation with the

[1] Data Sourced from Eurostat Regional Yearbook, March 2017

Network of European Regions (p.11). The *European Tourism Indicator System* was launched in 2013 and its latest version (March 2016) comprises 43 core indicators which "cover the fundamental aspects of sustainability monitoring" (ETIS Toolkit 2016, p.20)[2] [3].

ETIS includes indices on the number of tourist nights per month and the number of 'same day' visitors per month (B.1.1 and B.1.2 respectively), as well as, occupancy rate in TAE per month (B.2.2), but no indicator is used to establish a direct relation between the recognized seasonality (the number of tourist nights do vary per month) and its effects on the destination. Indices on waste management (D.3.1/2/3), water management (D.5.1/2/3) and energy usage (D.6.1/2/3) could only be used to establish a relation between what can be attributed to tourist influx compared to what is attributed to the local population (as they are, the indices are designed to measure waste production per tourist night compared to general population waste production per person, or water consumption per tourist night compared to general population water consumption per resident night, or energy consumption per tourist night compared to general population energy consumption per resident night).

While ETIS indices provide an interesting comparative insight, they do not capture the varied, week by week, full pressure placed on local authorities by the dramatic rise in human presence and the consequent demand on administrative capacities and capabilities (human resources and equipment as combined in order to meet demand for the required services) and the burden on the geographic locality, the specific environment which is the ultimate host for all human activity.

Evidently, neither the statistical measures utilized and by Eurostat to assess "Tourism Pressures", nor the indicators jointly developed by the Network of European Regions and the European Commission to monitor the "sustainable" development of tourism within the EU, express the impact of seasonality of tourism flow in the EU, which is especially important for island/coastal regions as the more intensely visited tourist destinations.

[2] http://ec.europa.eu/DocsRoom/documents/21749

[3] http://ec.europa.eu/DocsRoom/documents/15849

INTRODUCTION

Program Goal and Relevant Parameters

Interreg MED Blue Islands joins partner islands from across the Mediterranean basin, with the goal to systematically address a known and recurrent challenge: the seasonal variation of waste generated as a direct effect of tourism. Mallorca, Sardinia, Sicily, Malta, Rab, Mykonos, Rodos, Crete and Cyprus are all popular Mediterranean tourist destinations and all experience the sharp increase in waste generation during the "tourist season" extending from Spring to Autumn and peaking over the summer months (in recent years September and October have also been popular with tourists wishing to avoid the August beach crowds). And yet, while the phenomenon is expected and every season exacts its toll on local resources and the environment, it has yet to be methodically and systematically studied so that its actual extend and important parameters are delineated. Moreover, potential spillover effects on the immediate environment that receives the repeated waves of visitors have not been recognized, especially in such a way as to indicate a direction of causality.

It is important to recognize that what makes Mediterranean insular regions attractive places to visit (at least in most cases and more so in smaller rather than larger islands), relative remoteness surrounded by sea, with primarily rural, traditional set up and low population density, makes it harder to create and develop an expansive waste management infrastructure. For example, it is not a simple task to design, build and operate a proper waste management infrastructure (waste collection and processing) on an island with less than 11.000 population and an area of just over 100 km^2 which plays host to over 1 million visitors in a span of about 7 months in a given year. Furthermore, economic viability dictates that most waste streams requiring processing more specialized than plain sorting would almost invariably need to be exported (for example sorted recyclates), adding to the overall waste processing cost.

In order to effectively address a problem, it must first be properly defined. In order to properly address the seasonality of waste generation due to tourism as a phenomenon in Mediterranean islands, the following must first be determined:

i. Locations of significant waste generation due to tourist arrivals (in general, TAE, restaurants and other establishments whose core business is directly tied to tourism, for example souvenir shops),
ii. Weekly waste generation, so that the absolute increase/decrease and the rate of increase/decrease per week especially over the tourist season can be ascertained,
iii. Weekly composition of waste generated, so that the change in the type of waste per week especially over the tourist season can be ascertained,
iv. Weekly number of visitor presence so that the absolute increase/decrease and the rate of increase/decrease per week especially over the tourist season can be ascertained – along with the number, the type of visitor (foreign or domestic, vacationer or day visitor) and basic demographics (at least gender and age) need also to be determined.
v. Means and frequency of waste collection from waste deposit locations (i.e. locations where there are waste receptacles),
vi. Method(s) of waste processing by type.

Once the above information is collected, the phenomenon of the seasonal variation of waste generation as an effect of tourism can be quantified and it would become possible to draw direct correlations between relevant factors, at first for the islands participating in the Interreg MED Blue Islands Program. Inferences could then be made for other islands / regions similarly affected until proper studies are concluded there as well. Quantification and assessed causality would allow for the development of feasible and viable means to effectively deal with this chronic issue, which constitutes the ultimate goal for the original proposal submission and now for this Program's implementation.

SECTION 1
What, Where, How, When

In order to make this Manual easier to follow and implement, the Technical steps which need to be followed are presented as answers to the following questions:

What are we Measuring / Calculating?

For the purposes of this Program as previously outlined, this Manual sets out the process for Measuring / Calculating:

I. Municipal Waste, by weight and type (composition) defined as,

(a) mixed waste and separately collected waste from households including:
- *paper and cardboard, glass metals, plastics, bio-waste, wood, textiles, waste electrical and electronic equipment, waste batteries and accumulators;*
- *bulky waste, including white goods, mattresses, furniture;*
- *garden waste, including leaves, grass clipping;*

(b) mixed waste and separately collected waste from other sources that is comparable to household waste in nature and composition.

(c) market cleansing waste and waste from street cleaning services, including street sweepings, the content of litter containers, waste from park and garden maintenance.

Municipal waste does not include waste from sewage network and treatment, including sewage sludge and construction and demolition waste.

The above definition which addresses an important shortcoming of the Waste Framework Directive (2008/98/EC) in that no such definition was included (a much shorter definition is included in the Landfill Directive, 1999/31/EC) is part of the current effort undertaken by European Institutions to amend all four Waste Directives (also the Directives on Packaging and Packaging Waste and on Waste Electrical and Electronic Equipment). Should the amendment process be completed prior to the application of this Manual, then the above definition of Municipal Waste should be replaced with the one finally adopted and included in the amended Waste Framework Directive.

In parallel to Municipal Waste and its composition, we are also recording the means and frequency of waste collection and its processing method by waste type.

II. Human Presence, i.e. number, type (foreign, domestic, vacationer, day visitor) and demographics (age and gender).

Where are we measuring it?

For conducting the micro- / macro-plastics survey overseen by the UAB, each island partner selected three beaches, each with different visitor presence, i.e., one “highly frequented,” one remote and the least frequented of the three and one in the middle, frequented more by local rather than foreign visitors. For the purposes of this Manual, we will extend the Impact Zone (the area where the surveys are conducted) to include the “hinterland” behind the selected beaches, so that it could then be examined whether there is any relation (and even correlation) between the micro- / macro-plastics quantity and type found on each beach with the waste and type generated and the human presence recorded, respectively.

How are we actually measuring it?

I. Municipal Waste will be measured by applying the *Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste, D5231 – 92 (Re-approved 2008).* This test method describes procedures for measuring the composition of unprocessed municipal solid waste (MSW) by employing manual sorting. It applies to determination of the mean composition of MSW based on the collection and manual sorting of a number of samples of waste over a selected time period covering a minimum of one week.

II. Human presence (number) will be measured by

    a. collecting data from TAE located within Impact Areas under study, and by
    b. applying methods adopted for measuring the number of people at public open places, while type and demographic information will be collected through surveys.

When are we measuring it?

In order to adequately gauge the seasonality of waste generation, to abide by the aforementioned Standard Test Method and correspond to the micro- / macro- plastics surveys conducted, measurements will take place at single weekly intervals during each month in,

- January or February, May through September and November 2018,
- January or February and July or August 2019, and
- January or February, May through September and November 2020.

SECTION 2

Cooperation with Local Authorities and Private Businesses

In order to carry out all of the measurements, calculations and surveys outlined above, it is essential that we cooperate effectively with the local authorities in whose areas we will be working and with the local businesses from whom we would be collecting data.

Before any activity commences, we should present the plan of what we intend to do to each of the local authorities in whose areas we will be working. That is, we should

- Explain the Program, its overall goal and what we seek to accomplish by collecting the specific data and information in the area,
- Provide an overview of where and how we intend to conduct waste sampling and surveys, presenting maps, pictures or diagrams of defined Impact Areas and included Waste Zones, similar to the examples included in Sections 3 and 4.
- Inform local authorities of the private businesses we would need to approach for information, for example TAE, restaurants, bars, clubs, kiosks, souvenir shops and any other establishments located within our Impact Areas from which we would need permission to carry out sampling and/or surveys and seek the local authorities' assistance in approaching them,
- Ask for the means and frequency of waste collection within our Impact areas and for each identified Waste Zone, as well as, the method of waste processing. For example, with the help of the local authorities we would determine that, for example, waste is Waste Zone II which is deposited in 1100lt bins, it is collected by Refuse Collection Vehicles (RCVs) of 15m^3 capacity, three times weekly and then transported to a sanitary landfill 25 km away. Or that, for example, waste in Waste Zone IV deposited in 50lt bins is collected in plastic bags daily with a pickup truck and then delivered to an RCV collecting waste in a different area, which then transports it to a Mechanical Biological Treatment (MBT) Plant 10 km away.
- For locations with increased waste generation such as TAE, restaurants and pubs or clubs, we could ask for information on the estimate of waste generated at each establishment based on the local authorities' experience. For example, how many 1100lt bins does the RCV collect from hotel A at each route, or how often is the waste compactor emptied at restaurant D and is it weighed at emptying so that we would know the weight of the waste collected each time.

In a similar fashion, we should approach the private businesses from which we intend to seek information (preferably in cooperation with the local authority) and,

- Explain the Program, its overall goal and what we seek to accomplish by collecting the specific data and information,
- Provide assurances that all information collected will be confidential and would not be collected under the businesses' name, for example guest number at Hotel X or number of tables served at Restaurant Y, or number of customers at kiosk Z).
- Ask for their cooperation for the waste sampling, especially at locations with increased waste generation where waste sampling will be the most challenging.

It is important to remember that our role is definitely NOT to pass judgement on how things are done, but rather to collect the data and information required in order to implement the Program.

SECTION 3

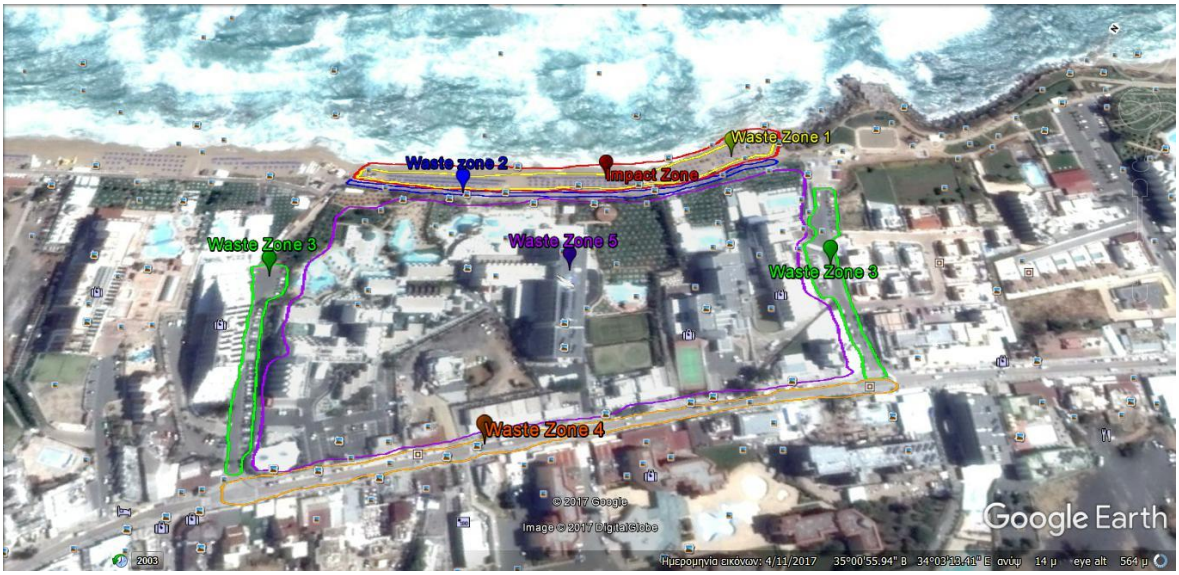
Impact Areas and Waste Zones

As already indicated, for the purposes of this Manual we will extend each Impact Zone selected for conducting the micro- / macro-plastics surveys to include its hinterland, the area behind the beach. In this fashion, we will be collecting data on waste generation and human presence from the same area as the micro- / macro-plastics surveys, allowing for the examination of any relation (or correlation) between the quantity and type of micro- / macro-plastics found with the quantity and composition of waste generated (and the means and frequency of its collection) and the recorded human presence,

in a set time-frame extending from low to high tourist season, thus accounting for seasonality. This extended area we will call an **Impact Area** and it will be geographically defined by the length of the selected beach on the seaside, an approximately equal in length parallel to the sea on the landside and two other parallels extending from the landside and reaching the two ends of the selected beach. Please note that each partner will geographically define the Impact Areas accordingly, using the descriptions and examples provided as a guide.

The quantity and composition of waste generated varies by the human activity associated with it, i.e. the waste we generate when we work differs in quantity and composition from what we generate when we work out, or when dining out as compared to when having lunch at home. Correspondingly, the waste quantity and composition of waste generated within each Impact Area will vary according to the human activity prevalent in identified **Waste Zones**. The quantity and composition of waste generated within a hotel, differs from that generated by sunbathers at the beach, or from that generated by families strolling on a beachfront walkway.

In *Picture 1* below, Impact Area A and its included 5 Waste Zones are presented as an example from Cyprus.



Picture 1: Impact Area A and Waste Zones (Example from Cyprus)

The Impact Area itself is defined by and extends from the Impact Zone on the seaside (the selected "highly frequented" beach in Cyprus), to a parallel road on the landside and two other parallel access routes starting from the landside parallel road and reaching the two ends of the beach stretch (the Impact Zone). As will be more clearly evident when the other two Impact Area examples from Cyprus are presented, the geographical extend of each Impact Area will be largely determined by the development configuration and infrastructure layout behind the Impact Zone (hinterland), which though will remain the single standard defining element for each Impact Area. The total area occupied by Impact Area A is 60,300m^2, or 0.0603km^2 (Google Earth Ruler tool).

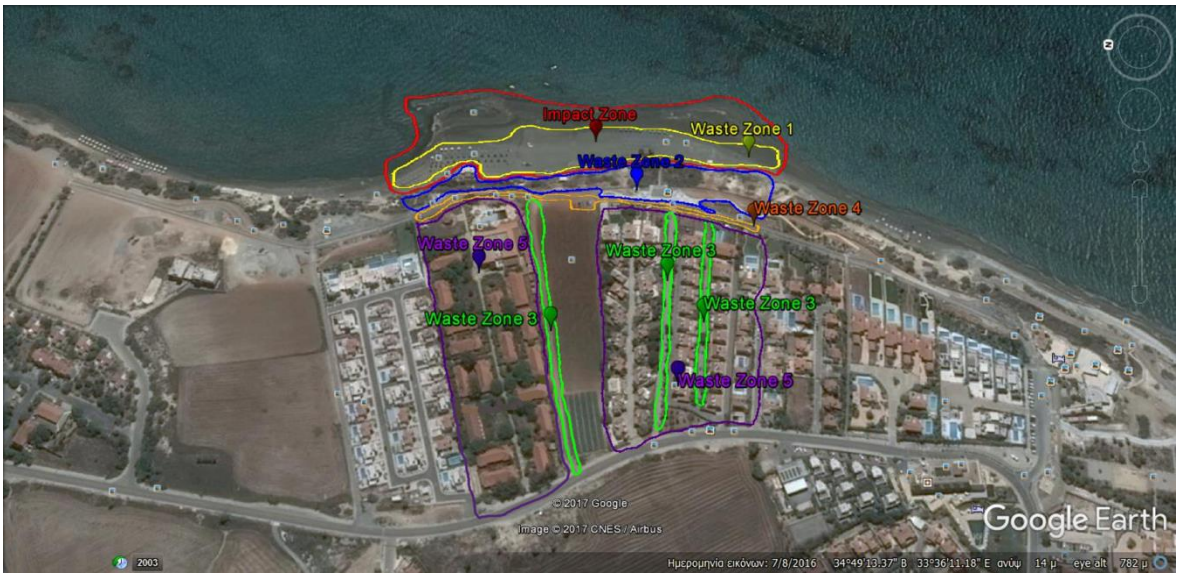
In Impact Area A, 5 distinct Waste Zones are determined based on varied human activity:

- Waste Zone 1: Waste generated at the beach,
- Waste Zone 2: Waste generated at the beachfront pedestrian walkway,
- Waste Zone 3: Waste generated at the two beach access routes,
- Waste Zone 4: Waste generated at the road parallel to the beach,
- Waste Zone 5: Waste generated at Hotel / Hospitality establishments (TAEs).

Note that there are no restaurants in this Impact Area and that had there been they would have constituted a separate Waste Zone, as would have kiosks or souvenir shops[4].

In each Waste Zone generated waste is deposited for collection in some form of waste receptacles (mixed waste bins that vary in size and design, recycling bins, deposit banks, advanced waste bins with build-in weighing and compacting features, waste compactors, Reverse Vending Machines, etc.). The kind(s) of waste receptacle(s) in each Waste Zone needs to be clearly identified, counted and a representative photo taken (there may be more than one kind of waste receptacle in each Waste Zone).

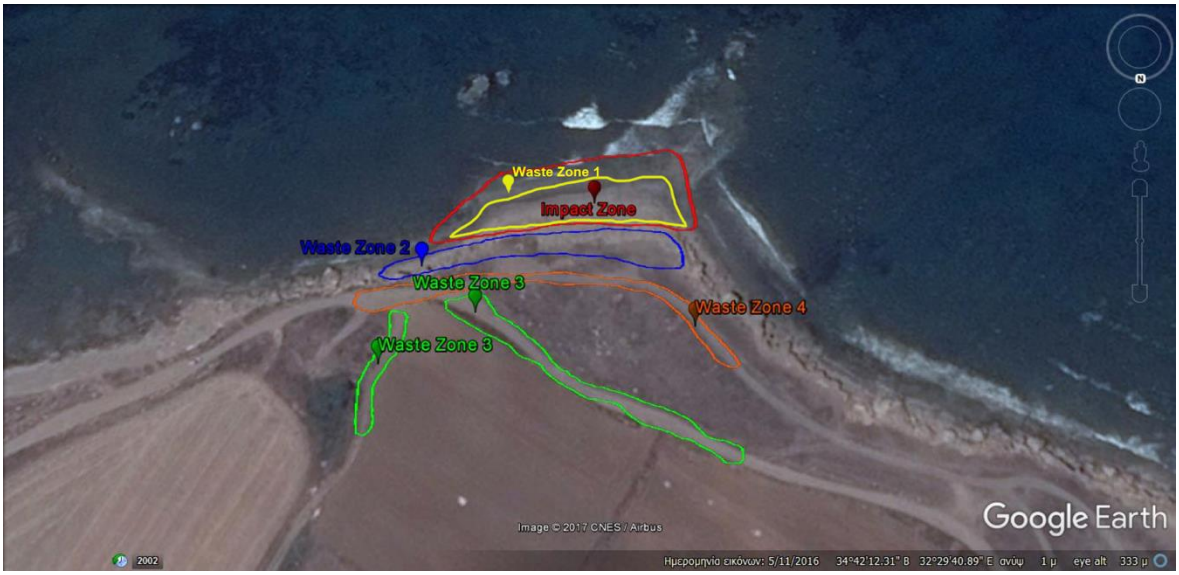
In *Picture 2* and *Picture 3* below, Impact Areas B and C are respectively defined and the Waste Zones included in each determined. Note that the hinterlands in each of the Impact Areas presented differ greatly, reflecting varying degrees and kind of development and infrastructure layout. Whereas Impact Area A comprises a highly developed hinterland for



Picture 2: Impact Area B and Waste Zones (Example from Cyprus)

the tourist industry it caters to, Impact Area B comprises a much less developed hinterland of single housing units rather than hotels, while Impact Area C comprises no development whatsoever.

[4] Partners may wish to consult the LP regarding the geographical definition of each Impact Area and the determination of Waste Zones included therein.



Picture 3: Impact Area C and Waste Zones (Example from Cyprus)

It is reasonable therefore to expect that waste generation and composition in each of the above Impact Areas will vary to reflect the level of human impact exerted.

SECTION 4

Waste Sampling at defined Waste Zones

As already indicated, waste sampling will be taken following the **Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste**, with the designation **D5231 – 92 (Reapproved 2008)**. The most important guidance included in this Standard method and which should invariably be followed by all and anyone engaged in waste sampling are the safety instructions (Sections 1.5, 6). Moreover, each participant to waste sampling must exercise caution and common sense in discharging their duties so that they do not endanger themselves.

The Standard test method is readily available for purchase on the internet:
https://www.astm.org/DATABASE.CART/HISTORICAL/D5231-92R08.htm

It is important to note that the individuals conducting waste sampling or surveys for or on behalf of participating partners within the scope of this Program's implementation must be easily recognizable and it is therefore suggested that they should wear at least a hat with the Program's name, or any other article of clothing which may be deemed appropriate in this respect.

The Standard will be primarily followed for waste sampling at locations with significant waste generation (Waste Zone 5, in Impact Area A in the example above), such as TAEs, restaurants, clubs / pubs and the like (Sections 2,4,5,7,8) for mixed and sorted waste, while the "Waste Composition Data Sheet" (Fig.1 on p.4), will be filled in for each waste sampling at all locations (Vehicle Type and Route No. would be omitted where Non-Applicable). For waste receptacles located at public areas with a capacity up to 120lt, the full contents will be weighed and the composition ascertained through the completion of the "Waste Composition Data Sheet." The same applies to recycling/sorting bins, while if there are advanced waste and/or recycling bins or other waste receptacles equipped with counting and/or weighing features, respective collected data should be sought and obtained in cooperation with the local authorities.

For each waste sampling conducted:

- ✓ All collected data are carefully recorded and the sample examined along with its contents and composition is photographed,
- ✓ After the sampling process is completed, the waste is returned for collection and the area where the waste sample was examined is thoroughly cleaned,
- ✓ For each waste sample, the means and frequency of the collection from the waste receptacle it was taken along with the intended processing method is also recorded (added to the "Waste Composition Data Sheet").

Waste sampling will take place at single weekly intervals during each month in,

- January or February, May through September and November 2018,
- January or February and July or August 2019, and
- January or February, May through September and November 2020.

For January or February (2018-2020) and July or August 2019, waste samplings may take place at any full week within the months, while November samplings must be completed within the first or second full week of the month, both in 2018 (4-10/11/2018 or 11-17/11/2018) and 2020 (1-7/11/2020 or 8-14/11/2020). The May-September waste samplings in 2018 and 2019 may take place at any full week within the months. Full week means the 7-day period starting on Sunday and ending on Saturday.

Waste sampling frequency within a full week at each Waste Zone in all Impact Areas will take place as outline below:

a. Within the Waste Zone where all locations with significant waste generation as defined above are included, waste sampling will take place just prior to waste collection, after coordination both with the private business concerned and the local authority (in case there is a private contractor, that company must also be notified, in cooperation with the local authority). For example, if waste collection at a hotel takes place every day then waste sampling must take place every day for the duration of the sampling week, just before the waste is collected. If waste collection takes place every other day, then waste sampling will take place every other day just before the waste is collected. If, for example, at a restaurant waste is deposited in a waste compactor and the hotel notifies a contractor to collect it when it is full, then the waste sampling will take place just prior the waste compactor is collected, after coordination with both the restaurant and the contractor.

   Apart from the sample examined in each of these locations, it is important to have a second estimate of the waste collected. If waste is deposited in bins and collected with RCVs which do not have weighing mechanisms, then the waste collector should be consulted for this estimate. If waste is deposited in a waste compactor and then transported to a facility for processing, then the waste weight should be obtained either from the local authority or the contractor.

b. Within each Waste Zone where there are primarily waste receptacles of up to 120lt capacity located in public areas, the total number of receptacles should be counted and then divided by seven, which will yield the number of receptacles sampled each day. For example, consider that in Impact Area A, Waste Zone 3 there are 23 waste bins of 70lt capacity. If sampling is to take place daily for a full week, then waste samples can be collected from 3 of these bins each day, while on two days there will be sampling from 4 bins. A random sequence of waste bins should be followed, thus ensuring that samples are collected from all waste bins once, whereas no waste bin is sampled more than twice (in this example, samples will be taken twice from two bins). Waste sampling should be conducted just before waste collection, so that the sample taken is as rich as possible, therefore close coordination with the local authority is essential.

c. If there are waste receptacles of larger capacity than 120lts within any Waste Zone, then sampling must follow the process set for Waste Zones which include locations with significant waste generation.

SECTION 5
Calculating Human Presence

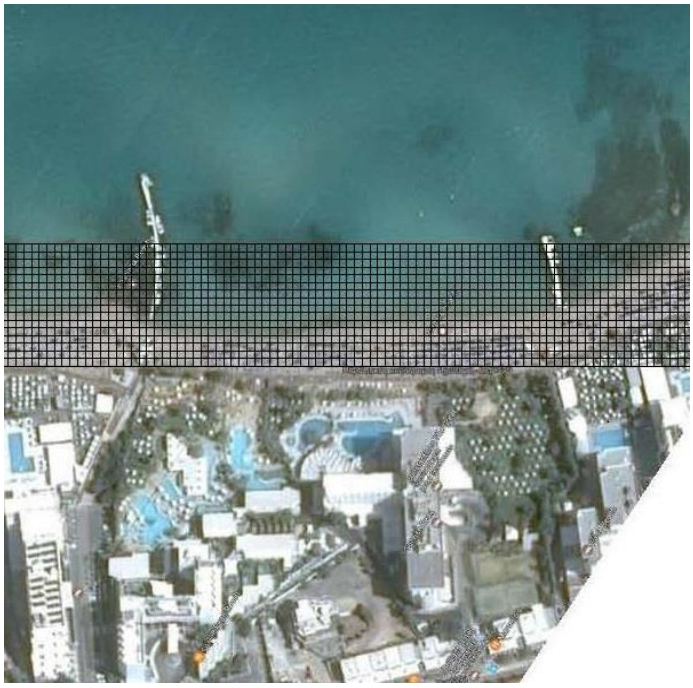
Sseasonality of waste generation occurs because of the seasonality of human presence at the Impact Areas under examination. In order to be able to draw a direct relation (or correlation) between these factors, waste generation and human presence, each must be measured at the same time. Therefore, the process for calculating human presence at the selected Impact Areas outlined below, must take place at the same weekly intervals the waste samples are taken.

At first, the number of guests at TAE located within the Impact Areas must be ascertained, by directly asking the TAE operating within our Impact Areas. It may be easier to obtain the number of guests present at a TAE rather than the occupancy rate, from which the number of guests is indirectly derived while at the same time an indicator regarding the efficiency of each TAE is also revealed. Therefore, for each day of the weekly waste sampling as outlined in the previous Section, the number of guests at each TAE within each Impact Area must be collected and, in order to be comparable to the indicators developed/utilized by Eurostat and ETIS, it needs to be expressed as nights spent in TAE (one guest = one night spent). In addition to the number of guests at TAE it would also be useful to ascertain how many of them are foreign and how many are domestic visitors.

Secondly, the number of people frequenting other establishments within the Impact Area (such as restaurants, clubs / pubs) should be ascertained, since they also add to the human impact within the Area and probably are not all guests at the TAE within the Area already canvassed. With these establishments' collaboration, daily surveys need to be conducted within the weekly sampling / surveying period, asking customers only whether they reside at one of the TAE included in the Impact Area. The number of customers found not to reside within the Impact Area, must be counted as day visitors.

The trickier part is determining the number of visitors present at the beach within the Impact Area each day, during each weekly sampling / surveying period. A number of methods have been developed to measure crowd congregation at open spaces, while more recently advanced flying apparatus (drones) equipped with state-of-the-art, high-resolution cameras and/or heat sensors have been known to be used. Lacking the budget for utilizing such complex means and being sensitive to the protection of individual privacy, an older and tried method will be used, first employed by Herbert A. Jacobs in order to count the crowds taking part in the 1967 Berkley riots. The method essentially uses a crowd density estimate multiplied by the area size in order to derive an estimate of crowd size.

As shown in *Picture 4* below, the beach side (extending into the sea) at Impact Area A is covered by a grid of 832 squares (after a number of tries) set at 4m x 4m as the most practical size for the purpose. Every day during the weekly sampling / surveying period, at 8:00, 11:00, 16:00 and 19:00 an estimate of crowd density will be made (for example 2 persons per square) which will then be multiplied by the number of squares in the beach (and sea) area in order to derive the number of people present (2 x 832 = 1,664).



Picture 4: Applying a grid for number of people at the beach estimate (Cyprus Example)

In order to double check the number of people calculated through the application of Jacob's method, once each day the people present at the beach should be counted using a hand-held counter like the one pictured below (it is also used in some airlines by air hostesses to count the number of passengers aboard a plane):

At 11:00 and 16:00 a survey of a simple random sample of the people present will be taken. In order for the sample to be truly random and avoid any bias, the people surveyed at each time should be those present in two selections of grid squares (as shown in the above picture) numbering at least 5% of the total grid squares and selected the previous day. The person conducting the survey after properly introducing him/herself, would ask the following questions:

a. Are you on vacation or are you visiting for the day? If the person surveyed replies that he/she is a vacationer, then question b. is posed. Otherwise, question c.
b. Are you residing in any of the following TAE? (and proceeds to read the names of the TEA located within the Impact Area).
c. What is the year of your birth?

The answers are recorded along with the gender for all respondents and the data is logged.

SECTION 6
DELIVERABLES

As indicated in the Introduction, the following data would need to be collected in order to enable the quantification of the seasonal variance in waste generation on participating Mediterranean islands as a consequence of tourism:

i. Weekly waste generation, so that the absolute increase/decrease and the rate of increase/decrease per week especially over the tourist season can be ascertained,
ii. Weekly composition of waste generated, so that the change in the type of waste per week especially over the tourist season can be ascertained,
iii. Weekly number of visitor presence so that the absolute increase/decrease and the rate of increase/decrease per week especially over the tourist season can be ascertained – along with the number, the type of visitor (foreign or domestic, vacationer or day visitor) and basic demographics (at least gender and age) need also to be determined.
iv. Means and frequency of waste collection from waste deposit locations (i.e. locations where there are located waste receptacles),
v. Method(s) of waste processing by type.

Following the method outlined in previous Sections herein and based on the data collected the following correlations could be investigated:

- Correlation between the number of guests and the amount and composition of waste generated at TAEs at the designated Waste Zone within the Impact Area, over specified time periods (seasonality),
- Correlation between the amount and composition of waste generated in identified Waste Zones (other than TAEs) and the number of visitors calculated at the Impact Area, over specified time periods (seasonality).
- Correlation between the amount and types of micro- / macro-plastics collected and,
  (a) the amount and composition of waste generated at Waste Zones in each Impact Area, and
  (b) the number of visitors calculated in each Impact Area.

The data collected from each partner will be shared and then compiled in a joined database for further analysis.