Harry Coccossis / Antonia Koutsopoulou

Measuring and monitoring sustainability of coastal tourism destinations in the Mediterranean

Abstract

A key component towards sustainability in coastal tourist destinations is to establish monitoring and evaluation schemes in order to measure the impacts of tourism on the economy, society and the environment. Although there is a great deal of frameworks providing the methodological baseline for developing the essential monitoring schemes, the relevant literature has shown that a challenge still exists on adapting these general frameworks to the particularities of the destinations under assessment. This paper presents a framework that measures and monitors sustainability at the local level by introducing a three-tier system of indicators. The framework manages to incorporate the different types of tourism activities as well as the special characteristics of coastal tourist destinations in the Mediterranean while at the same time allows for comparisons among them. The paper emphasizes the role of local stakeholders' engagement in the development of the monitoring framework and discusses the challenges that emerged during the process. Essentially, the paper provides an alternative way for adjusting general frameworks to allow sustainability evaluations at the local level. In this sense, five types of coastal tourism destinations have been identified as critical in the case of the Mediterranean: beach/maritime destinations, urban/cultural, cruising, recreational boating and nature/ecotourism destinations.

Key words: coastal tourism destinations; tourism sustainability; co-evolution; sustainability indicators; Mediterranean

1. Introduction

Tourism grows internationally in a dynamic way and future prospects suggest continuing growth for the next decade or so. European destinations account for over 50% of tourist arrivals, expected to continue attracting a growing number of visitors in the future. The Mediterranean coastline is a dynamic part of European destinations (United Nations World Tourism Organization [UNWTO], 2018; European Commission, 2010). Cultural heritage, natural beauty, mild climatic conditions and visitor friendly societies with long tradition in tourism are strong competitive factors. The Mediterranean coasts provide a diversity of attractive areas of various types, such as urban centers, tourist resort areas, natural areas of special tourism interest, etc.

Tourism development in coastal areas is generally oriented towards those elements which are particular or even unique such as the dynamics and diversity of land/sea interface (e.g. sandy beaches and rocky shores, enclosed gulfs, islands, lagoons, river deltas, etc.). Apart from the geographic particularities, the natural and cultural assets, the way coastal tourism is developed in a destination depends also on human activities and related development as well as the role, growth and dynamics of the area in its wider region. So, coastal tourism in various contexts assumes different forms and functions, from one area

Harry Coccossis, Emeritus Professor at Department of Planning and Regional Development, University of Thessaly, Volos, Greece; e-mail: hkok@prd.uth.gr

Antonia Koutsopoulou, MSc Environment and Development, Research Associate at Department of Planning and Regional Development, University of Thessaly, Volos, Greece; e-mail: askoutso@uth.gr

to another, ranging from sun and sea tourism product with large resorts or beach hotel concentrations to milder types of development, particularly in rural or natural areas, or even waterfront development as part of a city with port facilities (Bramwell, 2004).

Like any other human activity, tourism has impacts which might affect resources, natural ecosystems, society and culture, as well as the economy in an area, in a positive and/or negative way (Butler, 1991). Such impacts can be particularly important given that coastal areas are characterized by a dynamic interaction and interdependence of human activities and natural ecosystems in a land/sea interface (European Environmental Agency [EEA], 1999; Coccossis, 2004).

Tourism impacts in coastal areas include the direct outcomes of tourist development and activities but also outcomes indirectly generated such as the associated infrastructure development and urbanization and their impacts on a destination (Hunter, 1995). Furthermore, impacts depend on the type and intensity of tourism development in relation to the particular characteristics of the area, as well as, on the particular characteristics of tourist development and related activities, that is, on the "type" of tourism. Therefore, impacts can be different from one area to another. Of special interest is the typology of tourism impacts in similar types of destinations in spite of eventual area-specific characteristics and particularities. These similarities and differences are reflected in addressing tourism impacts and tourism development strategies (Wall, 1996).

The broader contemporary context of seeking tourism development strategies is of course sustainable development, meaning a balance of goals relating to economic efficiency, social equity and environmental conservation. UNWTO (2020) defines sustainable tourism as *"Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities"*. Sustainability in tourism is sought at various levels, from the global to the local, as evident from a broad range of activities, initiatives, strategies and policies, while its perspective is increasingly enriched and developed (Ko, 2005). However, it is interesting to focus on sustainable tourism development at a local level, since this is the level where impacts are more evident, where action can be operational and effective but also where the tourist product is best structured (Choi & Sirakaya, 2006).

Although the meaning of "destination" is widely understood, there is a flexible interpretation in the attempt to operationalize it, meaning to identify it in spatial and functional terms (Pearce, 2014). It is evident that there can be several definitions including a wide diversity of spatial entities and spatial levels, from local areas to cities, regions. countries or supra-local levels (i.e. the Adriatic, the Aegean, etc.) depending on the purpose of focus. This issue has already been recognized by Saarinen (2004) who stated that the definition of a "destination is by nature a problematic concept" since it refers to a great variety of spatial scales, from continents to municipalities or even tourist resorts and single tourist products. The use of administrative boundaries in defining tourist destinations, although practical, tends to approach destinations in a very limited, technical and static point of view that ignores wider social and spatial connections. On the contrary, "tourist destinations are transforming spatial structures constructed by social forces, systems and relations" (Saarinen, 2004).

Seeking sustainability in tourist destinations means essentially to identify, on the basis of the characteristics and dynamics of the destination and relevant tourism prospects, appropriate goals and objectives taking into consideration society, economy and environment and develop relevant strategies and actions which would lead to a desired outcome of future tourist development (Spangenberg, 2002; Tanguay, Rajaonson, & Therrien, 2013).

A key component towards sustainability in coastal tourist destinations is to establish monitoring and evaluation as an on-going process which would help to review, adapt and eventually revise the plan of actions (Torres-Delgado & Saarinen, 2014). However, measuring and monitoring sustainability is a very difficult task due to its complex nature and the different approaches to its operationalization at various spatial scales. Adjusting tourism sustainability indicators on the particularities of different destinations has proven to be a challenging task which entails addressing significant gaps and obstacles such as lack of data and defining sustainability thresholds (Niavis, Papatheochari, Psycharis, Rodriguez, Font, & Codina, 2019; Torres-Delgado & Saarinen, 2014).

The present paper seeks to develop and discuss such a framework of indicators, on the basis of key features that express the way tourism develops in a destination from a sustainability perspective; to analyze the impacts of tourism based on the type of tourism activities developed at the destination level as well as to link them to specific indicators; and to set a common framework of reference for measuring and monitoring sustainability among the diversified Mediterranean coastal tourist areas.

2. Use of indicators in measuring tourism sustainability: A review

Measuring sustainability in tourism has emerged as a key research field in international literature, an essential element in assessing progress towards the desired goals (UNWTO, 2017; Schianetz & Kavanagh, 2008). Towards this end, various attempts and approaches have been pursued towards identifying the suitable indicators.

The need for specialized measurements has been acknowledged and thoroughly examined by UNWTO in 2004 by presenting a wide scope of destination-specific indicators tailored to the characteristics of different destination types in an effort to highlight the use of sustainability indicators in tourism policy and planning processes. The key idea is to approach the development of indicators on the basis of specific thematic sectors (such as social well-being, health and safety, tourist satisfaction etc.) to describe the particularities of destinations (UNWTO, 2004).

In a policy-driven approach, Dupeyras and MacCallum (2013) developed a limited set of indicators for measuring tourism competiveness to be used by governments as guiding policy choices. The authors' approach is to provide indicators that can, on the one hand, capture the performance and impacts of tourism, the attractiveness of a destination and its ability to deliver quality and competitive tourism services and, on the other, highlight policy responses and economic opportunities. The criteria for selecting suitable indicators are the balanced coverage of the main elements of competitiveness in tourism, the identification of key issues for which indicators are needed, the use of a conceptual framework to demonstrate the integrated nature of competitiveness in tourism and finally, the selection of indicators that best reflect major trends related to these issues (Dupeyras & MacCallum, 2013).

In a similar context, the European Union in 2016 presented the European Tourism Indicator System (ETIS) which lists a set of core and supplementary indicators to address the key aspects of sustainability: economy, society and environment. ETIS primarily focuses on baseline issues for measuring, monitoring and managing the performance and impact of tourism activities at destination level in order to lay the foundations for sustainable destination management and secondarily on the special needs and characteristics met in different types of destinations. More specifically, ETIS provides a list of 43 core indicators to be used for comparisons over time and as a basis for sustainable destination management, organized in four thematic sectors: a. destination management, b. economic value, c. social and cultural impact and d. environmental impact (European Union, 2016).

These general frameworks have formed an initial basis for assessing sustainability and triggered a series of applications and discussions in international literature. Pérez V., Guerrero, González, Pérez F. and Caballero (2013) developed a methodology for measuring the sustainability of nature-based tourism destinations. Building a composite indicator/index comprised of a representative set of sub-indicators based on UNWTO's concept of sustainable tourist development. The results were used to identify the strengths and weaknesses of Cuban nature-based tourism destinations in terms of sustainable development and to guide future planning policies.

Torres-Delgado and Palomeque (2014) developed an ETIS-based indicator system adapted to the tourism sector for studying sustainability at the local level. The system listed 26 indicators addressing the social, economic and environmental dimensions of sustainability and was tested in 20 Catalonian municipalities. The results confirmed the effectiveness of the tool for planning and managing tourism development at the municipal level.

Lozano-Oyola, Blancas, González and Caballero (2012) adopted an analytical approach to construct an indicator system for measuring the sustainability of cultural destinations based on the guidelines of the Organisation for Economic Co-operation and Development (OECD). The system was comprised of a set of negative and positive indicators based on the concept of sustainable development and the characteristics of the destinations analyzed. The method was tested in cultural tourism destinations in Andalusia region and was used to provide guidelines as a tool in tourism planning.

In the same context, Blancas, Gonzalez, Lozano-Oyola and Perez (2010) developed an indicator system that simultaneously takes into account social, economic and environmental aspects to produce and calculate a synthetic indicator at Spanish coastal destinations. The selection of indicators in this case was strongly related to the availability of statistical data and was applied to 32 areas delimited as groups of coastal municipalities with high concentration of tourist facilities.

However, different destinations and different tourism activities do not necessarily imply the same issues and thereby the practical use of universal sets of indicators may be limited. The perceptions of sustainability are shifting towards local scale analyses and site-specific focus, without of course diminishing the importance of core indicators for different destinations that incorporate a more holistic approach of the sustainable development goals (Torres-Delgado & Saarinen, 2014).

This paper aims to bridge the gap between holistic and site-specific approaches and introduces a framework that measures, evaluates and monitors sustainability by taking into account the different types of tourism activities as well as special characteristics of coastal tourist destinations in the Mediterranean. It also deals with the challenge of measuring sustainability at the actual tourist areas where tourism activities are really taking place and which are more than usually smaller than the municipal level.

3. A multidimensional methodological approach in developing a sustainability indicators model for the Mediterranean

In the process of implementing the ETIS toolkit, Modica, Capocchi, Foroni and Zenga (2018) pointed out the necessity for a management approach that can adapt standardized indicators to different types of territories and especially tourist destinations. The present study goes one step further into highlighting a set of key parameters towards measuring and monitoring sustainability at selected types of Mediterranean coastal tourist destinations. Our approach builds upon existing sustainability

indicators systems, selected and organized on the basis of key characteristics of Mediterranean coastal tourist destinations, linking sustainability to the different types of tourism activities taking place in each type of tourist destination.

More specifically, sustainability indicators in the Mediterranean have to reflect the dominant characteristics of coastal tourism in the Region, which, in general terms, can be codified to sun and sea, cultural, nautical and eco-tourism. The opportunity to explore the dynamics of the highly diversified Mediterranean tourism destinations and develop a conceptual framework for measuring and monitoring sustainability according to the specificities of different destination types was provided by the INTERREG MED project CO-EVOLVE (https://CO-EVOLVE.interreg-med.eu/) which sought to analyze and promote the co-evolution of human activities and natural systems in Mediterranean coastal tourist destinations, taking advantage of broader regional policy contexts such as ICZM (Integrated Coastal Zone Management) and MSP (Maritime Spatial Planning) on the basis of experiences in selected areas among participating countries (Croatia, France, Greece, Italy and Spain). The project developed a conceptual model of indicators for assessing tourism sustainability at Mediterranean scale and tested it in 11 pilot sites, by conceptualizing the critical issues and dimensions of sustainability at destination level and translating them into model-based and operational sets of sustainability indicators.

Based on the concept and key outcomes of existing sustainable tourism indicators systems (UNWTO, OECD, Global Sustainable Tourism Council [GSTC], etc.) and building upon the approaches previously described, this paper suggests that sustainability of coastal tourist destinations should be measured on the basis of three key parameters addressing:

- ***Key issues*** for tourism sustainability in coastal areas in relation to: economy, society and environment
- ***Specific issues*** of coastal areas according to the characteristics of the dominant types of tourism activity in each type of destination: i) Beach/Maritime tourism, ii) Urban/Cultural tourism, iii) Cruising, iv) Recreational boating and v) Nature/Ecotourism
- ***Area-specific issues*** on the basis of particularities which may be considered as critical towards assessing the sustainability of the destination

On the basis of this concept, the sustainability model is constructed as a three-tier system of indicators to assess tourism development in Mediterranean coastal destinations taking into consideration: i) the basic dimensions of sustainability (environment, society, economy and governance), ii) the dominant types of tourism activity, and iii) site-specific key threats and enabling factors. Capitalizing on existing indicators systems from international research, the model incorporates more than 230 indicators, selected on the basis of addressing sustainability issues in coastal destinations, which can be customized to the local level through the selection of the most suitable indicators that correspond to the needs and particular characteristics of each destination.

The first set of ***Core indicators*** is based on ETIS and is meant to serve as the elementary basis of reference for all tourist destinations by measuring and monitoring common key issues for tourism sustainability. A total of 40 core indicators has been selected to address the key issues for tourism sustainability in coastal areas on the basis of CO-EVOLVE approach.

The second set of ***Destination indicators*** is designed to capture and measure the specific characteristics that derive from the development of different types of tourism activities (beach/maritime, urban/cultural, cruising, recreational boating and nature/ecotourism) at destination level on the basis of four main aspects/dimensions: i) socio-economic, ii) environmental, iii) management and optimization

of the key assets (cultural/environmental resources etc.) in relation to the type of tourism activities developed at destination level , and iv) governance.

The third set of ***Area-specific indicators*** is developed to measure and monitor critical/limiting factors which are identified in a specific area/destination in relation to its particular key threats, enabling factors and governance issues.

By using this multi-dimensional approach, measuring and monitoring tourism sustainability at the local level reflect the type of tourism activities developed and the particularities of each destination. This methodological model developed represents an ideal set of indicators which addresses the key issues in typical Mediterranean destinations and may serve as a guiding framework for current and future planning policies. The three-tier approach allows for comparisons among different types of destinations and yet it is flexible enough to adapt to the specific needs and characteristics of the highly diversified Mediterranean coast. A series of criteria related to the priority issues, type of destination and data availability is defined in order to initiate the adaptation process from the initial set to the local level which is meant to act as the starting point for measuring sustainability at destinations.

More specifically, the process of selecting and adapting the indicators at the destination level (Figure 1) began with the identification of a preliminary set of 73 Priority Indicators from the original pool that highlights: a) the most essential and critical issues in most Mediterranean coastal tourism destinations and b) the most important specificities of different types of tourism activities. This Priority List of Indicators (Table 1) maintains the three-tier conceptual scheme of the initial model and is meant to act as a starting basis for comparisons among Mediterranean coastal tourism destinations.

Figure 1
Process for adapting the set of indicators at destination level

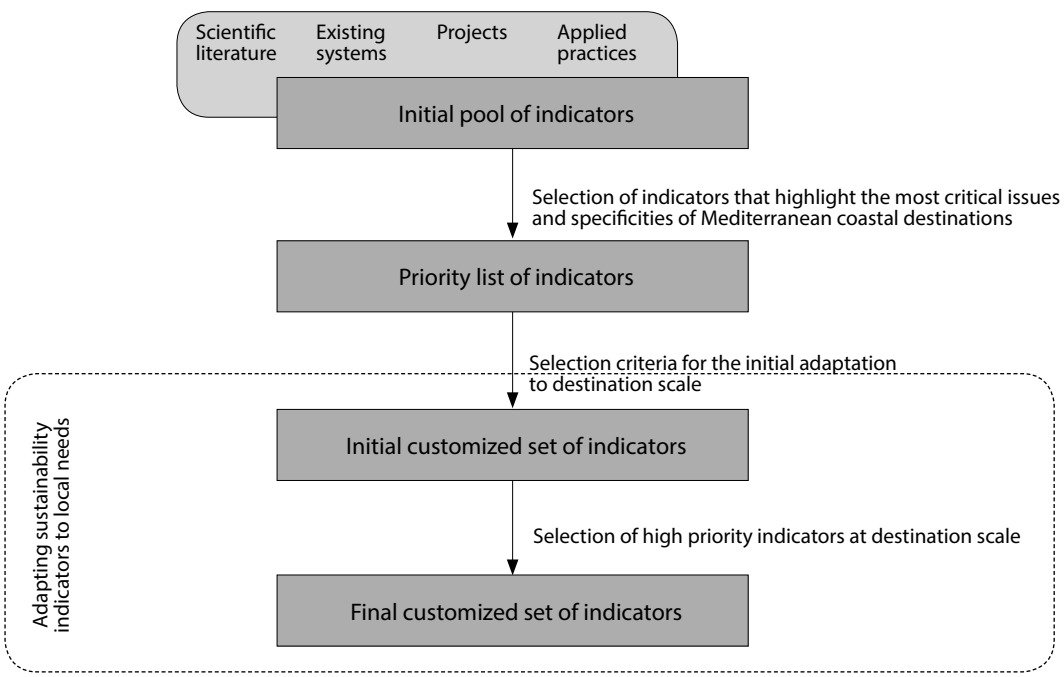


Table 1
CO-EVOLVE priority indicators list

Core indicators	Related sources
% of tourism enterprises/establishments in the destination using a voluntary certification/labelling for environmental /quality/ sustainability and/or Corporate Social Responsibility	European Union (2016)
Number of tourist nights per month	European Union (2016)
Average length of stay of tourists (nights)	European Union (2016)
Direct tourism employment as % of total employment in the destination	European Union (2016)
Number of tourists/visitors per 100 residents	European Union (2016)
Average carbon footprint of tourists and same-day visitors travelling from home to the destination	European Union (2016)
Waste production per tourist night compared to general population waste production per person (kg)	European Union (2016)
Water consumption per tourist night compared to general population water consumption per resident night	European Union (2016)
% of tourism enterprises taking actions to reduce water consumption	European Union (2016)
% of tourism enterprises that take actions to reduce energy consumption	European Union (2016)
% of annual amount of energy consumed from renewable sources (Mwh) compared to overall energy consumption at destination level per year	European Union (2016)
% of local enterprises in the tourism sector actively supporting protection, conservation and management of local biodiversity and landscapes	European Union (2016)
Destination indicators: Beach/maritime tourism	**Related sources**
Number of second homes per 100 homes in coastal zones[1]	European Union (2016), UNWTO (2004)
% of tourist infrastructure (hotels, other) located in coastal zones	UNWTO (2004)
% of beaches awarded the Blue Flag	European Union (2016), MITOMED project (2015), UNWTO (2004)
Costs of erosion-protection measures (e.g. sea walls.)	UNWTO (2004)
Beach nourishment: sand volume and extension of the restored beach (m^3 and m^2)	European Union (2016), Deduce project (2007), MITOMED project (2015), UNWTO (2004)
Existence of up to date tourism plans and policies	European Union (2016), MITOMED project (2015), UNWTO (2004)
Existence of a land use or development plan	UNWTO (2004)
Existence of performance indicators designated for evaluating the plan developed and used	UNWTO (2004)
Existence and functioning of a representative coordinating mechanism for MSP/ICZM	United Nations Educational, Scientific and Cultural Organization [UNESCO] (2006)
Destination indicators: Urban/cultural tourism	**Related sources**
% of total tourists visiting in peak month and average for the year	UNWTO (2004)
Total number of tourists per square km in key sites (crowding/spatial distribution)	UNWTO (2004)
% of sites under a management and monitoring system for protection of cultural sites	GSTC (2013)
Existence of up to date tourism plans and policies	European Union (2016), MITOMED project (2015), UNWTO (2004)
Existence of a land use or development plan	UNWTO (2004)
Existence of performance indicators designated for evaluating the plan developed and used	UNWTO (2004)
Existence and functioning of a representative coordinating mechanism for MSP/ICZM	UNESCO (2006)

Table 1 **Continued**

Destination indicators: Cruising	Related sources
Number of ship visits per year (by month)	UNWTO (2004)
Average duration of stay in port (in days)	UNWTO (2004)
Average spending per cruise ship visitor (€)	UNWTO (2004)
Volume of fresh water on-loaded at port (m^3)	Plan Bleu (2011), UNWTO (2004), UNWTO and Asia-Pacific Tourism Exchange Center [APTEC] (2016)
Volume of waste accepted for disposal (solid, liquid) at port (m^3)	Plan Bleu (2011), UNWTO (2004), UNWTO and APTEC (2016)
Maximum capacity of docking facilities (number)	Plan Bleu (2011), UNWTO (2004), UNWTO and APTEC (2016)
Existence of up to date tourism plans and policies	European Union (2016), MITOMED project (2015), UNWTO (2004)
Existence of master plan	UNWTO (2004)
Existence of performance indicators designated for evaluating the plan developed and used	UNWTO (2004)
Existence and functioning of a representative coordinating mechanism for MSP/ICZM	UNESCO (2006)

Destination indicators: Recreational boating (yachting/marinas)	Related sources
Number of yachts per year (by month)	UNWTO (2004)
Average duration of stay in port (in days)	UNWTO (2004)
Volume of fresh water on-loaded at port(m^3)	Plan Bleu (2011), UNWTO (2004)
Volume of waste accepted for disposal (solid, liquid) at port(m^3)	Plan Bleu (2011), UNWTO (2004)
Number of berths and moorings for recreational boating	European Union (2016), Deduce project (2007), MITOMED project (2015)
Existence of up to date tourism plans and policies	European Union (2016), MITOMED project (2015), UNWTO (2004)
Existence of a land use or development plan	UNWTO (2004)
Existence of performance indicators designated for evaluating the plan developed and used	UNWTO (2004)
Existence and functioning of a representative coordinating mechanism for MSP/ICZM	UNESCO (2006)

Destination indicators: Nature/ecotourism	Related sources
Total number of visitors to parks and to key sites	UNWTO (2004)
Number of sites/ecosystems/assets considered to be damaged or threatened (% of all defined systems/assets in protected area)	Deduce project (2007), UNWTO (2004)
No of visitors acceptable, according to the capacity of the equipment and facilities of the site (depends on capacity studies establishing limits)	UNWTO (2004)
% of site area occupied by rare or unique species	UNWTO (2004)
% of endemic species at the site	UNWTO (2004)
Existence of up to date tourism plans and policies	European Union (2016), MITOMED project (2015), UNWTO (2004)
Existence of environmental plan and management	UNWTO (2004)
Existence of performance indicators designated for evaluating the plan developed and use	UNWTO (2004)
Existence and functioning of a representative coordinating mechanism for MSP/ICZM	UNESCO (2006)

Table 1 **Continued**

Area-specific indicators	Related sources
% shoreline subjected to erosion	UNWTO (2004)
Coastal area in degraded condition (low/medium/high)	UNWTO (2004)
Coastal flooding events per year(number)	Own adaptation
Land occupied by artificial surfaces within the first 500m of coast (in %)	Malak et al. (2015), Deduce project (2007)
% of area designated for tourism purposes	UNWTO (2004)
Total tourist numbers (mean, monthly, peak) (categorized by their type of activity)	UNWTO (2004)
Water use (total volume in liters or m^3 consumed and liters per tourist per day)	UNWTO (2004)
Rate of loss of protected areas	Deduce project (2007), UNWTO (2004)
Total use of water by tourism sector (Tourism as a % of all users)	UNWTO (2004)
Energy use by tourism industry as % of total	UNWTO (2004)
Existence of a coastal planning management system	UNWTO (2004)
Length of protected and defended coastline (km)	Deduce project (2007), UNWTO (2004)
Volume (m^3) of sediments dredged per year	Own adaptation
% environmental, social, cultural actions recommended in plan which have been implemented	UNWTO (2004)
Level of tourism sector involvement in public policy (advisory bodies, review panels etc)	UNWTO (2004)

[1]Coastal Zone as defined in Article 2 of the ICZM Protocol.

The next step involved the selection of indicators that best address the specific needs and particularities of a destination, meaning the type of tourism activities, threats and enabling factors. Local stakeholders with highly diversified background– from policy makers, technical and administrative authorities to scientific experts and universities – were engaged in the selection process to ensure both the reliability of the final selected set of indicators as well as their commitment in the actual measuring/monitoring process after the end of the project. Stakeholders' boards of each pilot area chose indicators that expressed the key issues and policy objectives for tourism development in each destination based on the following criteria:

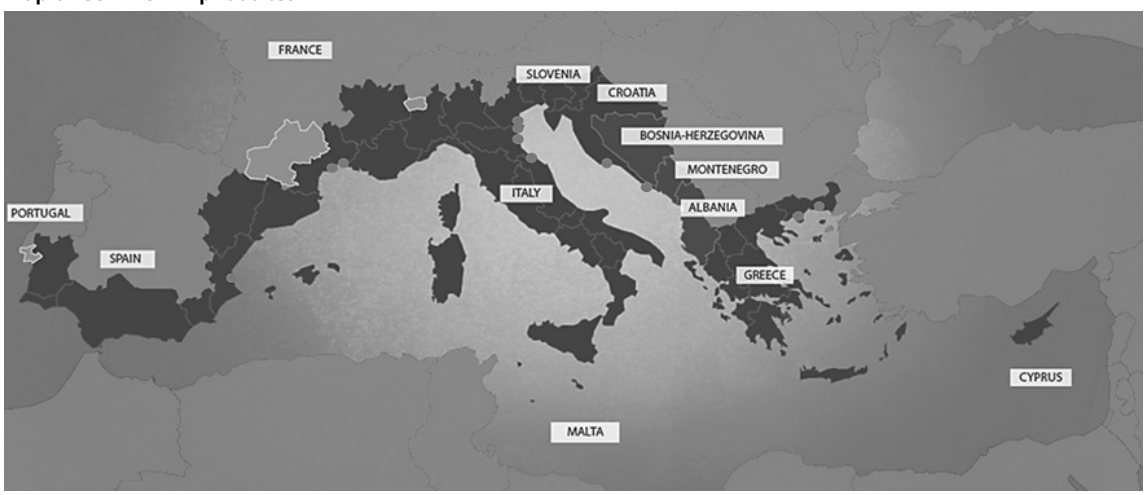
- Identification of the ***relevance/priority*** of each indicator to the destination in order to limit the range of possible indicators and highlight the most important ones that should be measured and monitored
- Review of ***data availability*** in order to identify the type of available data and highlight important data gaps
- Identification of the ***Destination indicators sets*** that correspond to the types of tourism activities currently or planned to be developed at the destination
- Identification of the ***Pilot area – specific indicators*** that better describe the particular characteristics and critical issues of the destination

The core indicators selected for each destination represent the key issues in terms of sustainable development that need to be initially measured at destination level. Building upon this common basis, additional parameters related to the type of tourism activities and area-specific challenges were incorporated to the final customized sets of sustainability indicators to complete the sustainability toolkit of each destination. The selection of common indicators allows for comparisons among the different types of destinations and enhances the functionality of the model. This process was implemented

in 11 pilot sites (Figure 2) and resulted in 11 improved sets of sustainability indicators, specifically customized to address the specific development patterns, needs and characteristics of each study area (Appendix A). The selection of the pilot sites to test the three-tier sustainability model was based on the following criteria:

- Environmental and socio-economic diversity: Destinations representative of different environmental characteristics and socio-economic conditions
- Diversity of tourism activities: Destinations representative of different types of tourism activities and level of tourism development
- Diversity in governance structures: Destinations representative of different governance systems and organizational structures

Figure 2
Map of CO-EVOLVE pilot sites



Unlike other studies, these criteria allowed us to include destinations with different specialization in tourism and different level of tourism development - in terms of numbers of tourists and tourism structures - which are typical to the Mediterranean coast. Also, the study areas were not strictly delimited by their administrative boundaries but by the actual areas where tourist activities are taking place or are planned to be developed. This often means that the actual destination is smaller than the municipality or is an aggregation of areas belonging to different municipalities.

The selection of indicators by each pilot area reflects their challenges and special characteristics whereas it is not strictly limited to the data available at present. It includes and reflects all the key issues that need to be measured and monitored at each destination to promote the co-evolution of human activities and natural systems in the future. Common needs, obstacles and goals among the study areas emerged during the selection process since several indicators seemed to be of key significance for the majority of the destinations and were identified as High Priority. Core Indicators depicting tourism flows, contribution to local economy and spatial concentration were most frequently selected by the study areas. Beach and maritime tourism as well as ecotourism were adopted in their entirety by all destinations active in these types of tourism activities while indicators related to tourism flows, management of key assets and policy implementation were among the most highly prioritized issues in all types of destinations. Finally, Pilot Area Specific indicators related to the environmental problems,

use, protection and management of the coastal zone were most frequently identified as key indicators for the sustainability of the destinations.

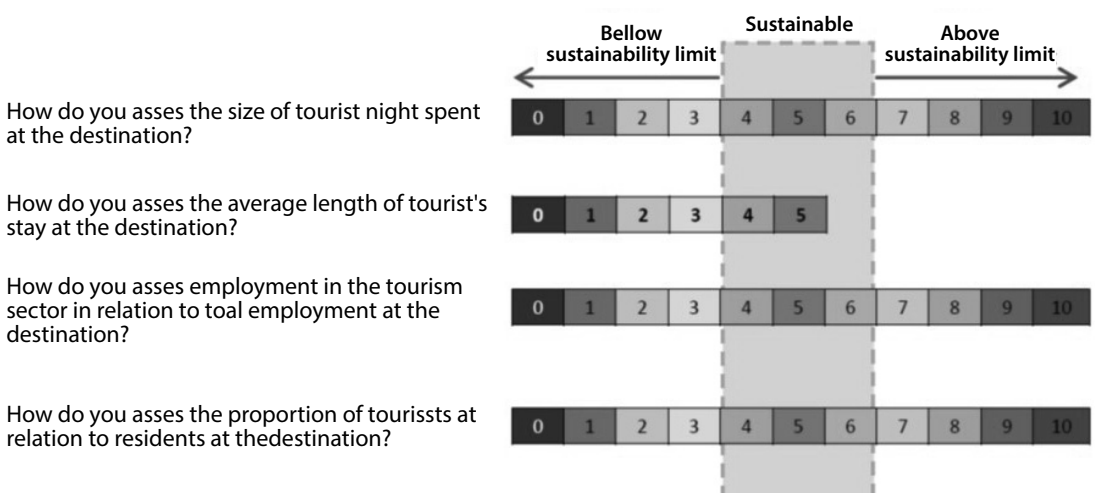
4. Gaps and challenges for the implementation of the model

Three issues proved to be critical for the implementation of the model at the study areas. The first refers to the homogenization of different types of data, meaning quantitative or proxy estimations and qualitative assessments. The second refers to spatial and temporal inconsistencies of the available data, meaning data from different time series or available at a different spatial scale such as the municipal or regional level. The third one refers to the existence of thresholds and the complex process of defining them where they do not exist.

The above issues are key steps for the implementation of the model and constitute the biggest challenges for its success towards guiding future efforts in prioritizing, evaluating and monitoring the sustainability indicators at the local level.

A first effort to overcome these challenges was attempted in one of the study areas and more specifically in the coastal area of Alexandroupoli-Makri (Greece). A working group of stakeholders with expert knowledge of the area was formed to measure and quantify stakeholders' perceptions where quantitative data was not available and also to define thresholds through consultation processes where needed in order to initiate the measuring process. Stakeholders and invited experts were asked to evaluate the extent to which the destination a) coincides with the ideal sustainability value, b) approaches the sustainability limit (0-4) or c) exceeds the sustainability limit 6-10) where applicable.

Figure 3
Questionnaire on measuring tourism sustainability based on stakeholders' perceptions



Processing the results of the questionnaires resulted to useful inputs about previously non-existent or not accessible data and provided an initial basis for the definition of reference values to critical indicators. The process also provided valuable input for future policy making and prioritization of actions needed for the sustainability of the destination while it constituted a step forward towards the actual engagement of stakeholders in planning. Whereas the process cannot substitute the measuring of official quantitative data, it can be perceived as a process to overcome data gaps and acquire a sustainability overview of the destination recorded in time.

5. Discussion and conclusions

The challenges of implementing ETIS and similar methodologies for measuring sustainability at the local level have been acknowledged and thoroughly researched in the past few years (Modica et al., 2018; Tudorache, Simon, Frent, & Musteaţă-Pavel, 2017). The implementation of sustainability indicators methodologies needs to be simplified and adapted to the local level with the support of scientific and research institutions and the constant collaboration with local stakeholders in order to produce reliable and comparable data, develop practical methodologies and facilitate sustainable planning processes (Byrd, 2008; Brščić et al., 2020; Soldić Frleta & Smolčić Jurdana, 2020).

Unlike other studies, this paper goes a step further on how to select and adjust sustainability indicators from existing indicators systems like ETIS to the particular characteristics of different types of coastal destinations according to the type of tourism activities they develop, while incorporating a set of core indicators that allows for comparisons among different destinations. It also highlights the importance for engaging local stakeholders in the initial selection of indicators as well as in the process of measuring them using both quantitative and qualitative assessments. It goes beyond the administrative boundaries to address sustainability at the actual destinations where tourist activities are developed.

The difficulty in collecting statistical data at the local level, the differences in the methodologies used to provide such data, the delays in collecting statistical information as well as the complex process of defining reference values pose important limitations for implementing the model and achieving tangible outcomes at the local level. The high cost of collecting statistical data - in terms of time and financial resources - in addition to the lack of administrative structures and organizational tools on behalf of the local stakeholders' community highlight the need for establishing governance systems at the local level for promoting sustainable destination management.

Measuring sustainability at the destination level needs to incorporate several dimensions (socio-economic, environmental, governance, specific characteristics, local needs etc.) and the selection of the suitable indicators should not be restricted to the data available at the present. Sustainability needs to be perceived in an integrated and long-term perspective and the respective indicators systems have to provide the ground for comparisons over time and among different destinations. The methodology and toolkit presented in this paper should be perceived as a flexible and adjustable tool for measuring and monitoring sustainability at the destination level in a long-term perspective as well as the basis for improving capacity building and establishing governance mechanisms in coastal tourist destinations.

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Appendix A

Table 1. Comparison of the selection of indicators among the study areas

Core indicators		1A	1B	2A	2B	3A	3B	4	5A	5B	6	7
C.A1.1.	% of tourism enterprises/establishments in the destination using a voluntary certification/labelling for environmental/ quality/sustainability and/or Corporate Social Responsibility					✓	✓	✓	✓	✓		
C.B1.1.	Number of tourist nights per month	✓	✓			✓	✓	✓	✓	✓	✓	
C.B2.1.	Average length of stay of tourists (nights)	✓	✓					✓	✓	✓	✓	
C.B3.1.	Direct tourism employment as % of total employment in the destination	✓	✓	✓	✓		✓	✓	✓	✓		✓
C.C1.1.	Number of tourists/visitors per 100 residents	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
C.D1.4.	Average carbon footprint of tourists and same-day visitors travelling from home to the destination											
C.D3.1.	Waste production per tourist night compared to general population waste production per person (kg)		✓					✓		✓		
C.D5.1.	Water consumption per tourist night compared to general population water consumption per resident night							✓				
C.D5.2.	% of tourism enterprises taking actions to reduce water consumption								✓	✓		
C.D6.2.	% of tourism enterprises that take actions to reduce energy consumption									✓		
C.D6.3.	% of annual amount of energy consumed from renewable sources (Mwh) compared to overall energy consumption at destination level per year							✓				
C.D7.1.	% of local enterprises in the tourism sector actively supporting protection, conservation and management of local biodiversity and landscapes		✓			✓	✓		✓	✓		✓
Pilot area-specific indicators		**1A**	**1B**	**2A**	**2B**	**3A**	**3B**	**4**	**5A**	**5B**	**6**	**7**
P.A1.2.	% shoreline subjected to erosion	✓	✓	✓	✓	✓	✓		✓	✓		✓
P.A1.3.	Coastal area in degraded condition (low/medium/high)			✓	✓	✓	✓			✓		
P.A1.6.	Coastal flooding events per year(number)	✓	✓	✓	✓					✓		✓
P.A2.1.	Land occupied by artificial surfaces within the first 500m of coast (in %)					✓	✓			✓	✓	✓
P.A2.2.	% of area designated for tourism purposes					✓	✓		✓	✓	✓	✓
P.A3.1.	Total tourist numbers (mean, monthly, peak) (categorized by their type of activity)			✓	✓	✓	✓	✓		✓	✓	
P.A3.3.	Water use (total volume in liters or m^3 consumed and liters per tourist per day)										✓	
P.A4.2.	Rate of loss of protected areas				✓	✓	✓					✓
P.A4.3.	Percentage of bathing sites with excellent water quality								✓	✓		
P.A5.1.	Total use of water by tourism sector (Tourism as a % of all users)										✓	
P.A5.2.	Energy use by tourism industry as % of total											
P.B1.1.	Existence of a coastal planning management system		✓			✓	✓		✓	✓		✓
P.B1.2.	Length of protected and defended coastline (km)	✓		✓	✓	✓	✓		✓	✓	✓	✓
P.B2.6.	Implementation of Natura 2000 management plans								✓	✓		
P.B4.8.	Volume (m^3) of sediments dredged per year			✓	✓	✓	✓					
P.C1.2.	% environmental, social, cultural actions recommended in plan which have been implemented			✓						✓		✓
P.C3.1.	Level of tourism sector involvement in public policy (advisory bodies, review panels etc)			✓				✓				

Table 1 **Continued**

Destination indicators: Di.Beach/Maritime tourism		1A	1B	2A	2B	3A	3B	4	5A	5B	6	7
Di.A4.	Number of second homes per 100 homes in coastal zones*	✓				✓	✓		✓	✓		
Di.B1.	% of tourist infrastructure (hotels, other) located in coastal zones*	✓		✓		✓	✓		✓	✓	✓	✓
Di.C2.	% of beaches awarded the Blue Flag	✓	✓	✓					✓	✓		
Di.C3.	Costs of erosion-protection measures (e.g. sea walls.)			✓		✓	✓		✓	✓		✓
Di.C4.	Beach nourishment: sand volume and extension of the restored beach (m^3 and m^2)			✓		✓	✓		✓	✓		
Di.D1.	Existence of up to date tourism plans and policies (YES/NO)			✓		✓	✓		✓	✓	✓	✓
Di.D2.	Existence of a land use or development plan (YES/NO)			✓		✓	✓		✓	✓	✓	✓
Di.D8.	Existence of performance indicators designated for evaluating the plan developed and used(YES/NO)			✓		✓	✓		✓	✓	✓	✓
Di.D11.	Existence and functioning of a representative coordinating mechanism for MSP/ICZM (YES/NO)			✓		✓	✓		✓	✓	✓	✓
Destination indicators: Dii.Urban/Cultural tourism		**1A**	**1B**	**2A**	**2B**	**3A**	**3B**	**4**	**5A**	**5B**	**6**	**7**
Dii.A3.	% of total tourists visiting in peak month and average for the year					✓			✓	✓	✓	✓
Dii.B1.	Total number of tourists per square Km in key sites (crowding/spatial distribution)					✓	✓					
Dii.C4.	% of sites under a management and monitoring system for protection of cultural sites								✓	✓		
Dii.D1.	Existence of up to date tourism plans and policies (YES/NO)					✓			✓	✓		✓
Dii.D2.	Existence of a land use or development plan(YES/NO)					✓			✓	✓		✓
Dii.D8.	Existence of performance indicators designated for evaluating the plan developed and used(YES/NO)					✓			✓	✓		✓
Dii.D11.	Existence and functioning of a representative coordinating mechanism for MSP/ICZM (YES/NO)					✓			✓	✓		✓
Destination indicators: Diii.Cruising		**1A**	**1B**	**2A**	**2B**	**3A**	**3B**	**4**	**5A**	**5B**	**6**	**7**
Diii.A4.	Number of ship visits per year (by month)							✓				
Diii.A6.	Average duration of stay in port (in days)							✓				
Diii.A8.	Average spending per cruise ship visitor (€)							✓				
Diii.B1.	Volume of fresh water on-loaded at port (m^3)							✓				
Diii.B2.	Volume of waste accepted for disposal (solid, liquid) at port (m^3)							✓				
Diii.C1.	Maximum capacity of docking facilities (number)							✓				
Diii.D1.	Existence of up to date tourism plans and policies(YES/NO)							✓				
Diii.D2.	Existence of Master Plan(YES/NO)											
Diii.D8.	Existence of performance indicators designated for evaluating the plan developed and used(YES/NO)							✓				
Diii.D11.	Existence and functioning of a representative coordinating mechanism for MSP/ICZM (YES/NO)											
Destination indicators: Div.Recreational boating (yachting/marinas)		**1A**	**1B**	**2A**	**2B**	**3A**	**3B**	**4**	**5A**	**5B**	**6**	**7**
Div.A2.	Number of yachts per year (by month)			✓			✓		✓	✓	✓	
Div.A4.	Average duration of stay in port (in days)			✓								
Div.B1.	Volume of fresh water on-loaded at port(m^3)											
Div.B2.	Volume of waste accepted for disposal (solid, liquid) at port(m^3)										✓	
Div.C1.	Number of berths and moorings for recreational boating											
Div.D1.	Existence of up to date tourism plans and policies(YES/NO)								✓	✓		
Div.D2.	Existence of a land use or development plan(YES/NO)								✓	✓		
Div.D8.	Existence of performance indicators designated for evaluating the plan developed and used(YES/NO)											
Div.D11.	Existence and functioning of a representative coordinating mechanism for MSP/ICZM (YES/NO)			✓					✓	✓		

Table 1 **Continued**

Destination indicators: Dv.Nature/Ecotourism		1A	1B	2A	2B	3A	3B	4	5A	5B	6	7
Dv.A3.	Total number of visitors to parks and to key sites		✓		✓	✓	✓			✓		✓
Dv.B1.	Number of sites/ecosystems/assets considered to be damaged or threatened (% of all defined systems/assets in protected area)		✓		✓	✓			✓	✓		✓
Dv.B5.	N° of visitors acceptable, according to the capacity of the equipment and facilities of the site (depends on capacity studies establishing limits)					✓						
Dv.C1.	% of site area occupied by rare or unique species		✓		✓	✓	✓					✓
Dv.C2.	% of endemic species at the site		✓		✓	✓	✓		✓	✓		✓
Dv.D1.	Existence of up to date tourism plans and policies(YES/NO)		✓		✓	✓			✓	✓		✓
Dv.D2.	Existence of environmental plan and management(YES/NO)		✓		✓	✓			✓	✓		✓
Dv.D10.	Existence of performance indicators designated for evaluating the plan developed and used(YES/NO)				✓	✓						✓
Dv.D13.	Existence and functioning of a representative coordinating mechanism for MSP/ICZM (YES/NO)				✓	✓						✓

1A: Alexandroupoli/Makri (GR), **1B**: Thassos/Keramoti (GR), **2A**: Cattolica (IT), **2B**: Comacchio (IT), **3A**: Rosolina (IT), **3B**: Camerini (IT), **4**: Valencia (ES), **5A**: Maguelon/Frontignan (FR), **5B**: Vias/Vendre Orb Delta (FR), **6**: Kastela (HR), **7**: Neretva River Delta area (HR).