



MED4EBM - Mediterranean Forum For Applied Ecosystem-Based Management

Work Packages 3 and 4. Technical illustration of EB-ICZM-DSS applications (MED4EBM deliverables WP3.6, WP3.7, WP3.8, WP3.9).

Release 1, Covering Phase 1 of Work Packages 3 and 4 implementation course. November 11th, 2020.



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Content

ABOUT THIS DOCUMENT

1 - TECHNICAL ILLUSTRATION OF THE FOUR MED4EBM EB-ICZM-DSS APPLICATIONS (MED4EBM DELIVERABLES WP3.6, WP3.7, WP3.8, WP3.9)

- 1.1 - Thematic Scoping and Key-Stakeholders Mapping Report
- 1.2 - Ecosystem Context Analysis: from System Matrices to System Diagrams
- 1.3 - The four EB-ICZM-DSS applications



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ABOUT THIS DOCUMENT

The present document illustrates technical elements of and provides key screenshots from the four software applications established by AdT, INSTM, JREDS, and TCNR using the PROGES-ISP software shell, which constitute the four Ecosystem-Based Integrated-Coastal-Zone-Management Decision-Support-Systems (EB-ICZM-DSSs) established throughout the implementation of Work Packages 3 and 4 of the partnership project *Mediterranean Forum For Applied Ecosystem-Based Management (MED4EBM)*.

Detailed planning and reporting on the execution of the said Work Packages 3 and 4 are reported in the report titled *MED4EBM Work Packages 3 and 4. Technical Report on activities executed and deliverables produced* (uploaded in the Library section of MED4EBM website at www.enicbcmmed.eu/projects/med4ebm).

This report is conceived and structured as an evolving document, which will be progressively updated and integrated along the execution course of the various phases for the implementation of the said Work Packages 3 and 4. When each of these phases is completed, a new release of this document is issued which includes the reporting facts on this very phase.

The current release of this report covers Phase 1, which has been executed between June 15th and November 12th, 2020. The bulk of this implementation period falls in MED4EBM 2nd Semester of implementation (April 3rd to October 2nd, 2020). However, due to the 8-months-long negotiation between the ENI CBC MED Management Authority and the MED4EBM Lead Applicant on administrative issues, MED4EBM actual implementation activities could start only mid-June 2020; therefore Phase 1 execution period must be more appropriately considered to coincide with the first four months of MED4EBM deployment course.

The various releases of this report, as well as all the related MED4EBM deliverables and working documents mentioned in this document, will be uploaded in the Library section of MED4EBM website (www.enicbcmmed.eu/projects/med4ebm).

1 - TECHNICAL ILLUSTRATION OF THE FOUR MED4EBM EB-ICZM-DSS APPLICATIONS (MED4EBM DELIVERABLES WP3.6, WP3.7, WP3.8, WP3.9)

Four software applications established by AdT, INSTM, JREDS, and TCNR using the PROGES-ISP software shell, which constitute the embryonic stage of the four EB-ICZM-DSSs which represent MED4EBM Output 3.2. These applications will be progressively developed/enhanced all-through the implementation of WP3 and WP4 by integrating into it all the produced deliverables as they will be ready (e.g. EB-ICZM reference models; indicators and related datasets; EB-ICZM management measures).

At this initial stage, the said applications integrate the above-mentioned *Thematic Scoping and Key-Stakeholders Mapping Reports* and some contextualised sample of the *System Boxes-and-Arrows diagrams* constituting the backbone of the EB-ICZM reference models. These elements of the EB-ICZM-DSS software applications are illustrated in the following sections.

1.1 - Thematic Scoping and Key-Stakeholders Mapping Report

First step was focused on the drafting of a *Thematic Scoping and Key-Stakeholders Mapping Report* for each of the four MED4EBM target areas (MED4EBM Deliverables WP3.2, WP3.3, WP3.4 and WP3.5). They consist of synoptic text tables, named System Matrices, which, defines the following essential elements to plan and implement EB-ICZM applications:



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- main components of key coastal and marine biophysical systems,
- plant Species of interest,
- animal Species of interest,
- coastal infrastructures,
- economic activities,
- available data.

This first step of the EBM Protocol aims at defining the spatial and thematic scopes of the EB-ICZM-DSS applications, as well as at identifying key stakeholders, potential partners and their related roles in the project. This information help assessing the feasibility and the effort needed to execute the project. The *Thematic Scoping and Key-Stakeholders Mapping Report* also includes a brief description of all the components and sub-components there listed, with circumstantial or local information included if available. Key management issues and relevant actors and stakeholders are also associated to each of the above listed elements in the same text tables.

Fundamental support for this step was a specific format prepared and technical instructions provided by PROGES as well as one of the specific features of the PROGES-ISP software as illustrated in the Fig.2.1.



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Preview

Application case: EB-ICZM for Kneiss Islands, Tunisia
Report type: Thematic Scoping for Application Case (System Matrix)

Application case: EB-ICZM for Kneiss Islands, Tunisia
Report type: Thematic Scoping for Application Case (System Matrix)
Issued on: 25-09-2020
Issued by:

MED4EBM
Mediterranean Forum For Applied Ecosystem-Based Management

ISP Account of:
Institut National des Sciences et Technologies de la Mer
Print Date: 03/12/2020
Page 1 of 9

System component	Key management issue	Key stakeholders
1 - Main components of key coastal and marine biophysical systems.		
Wetlands	Subsidence and status issues.	APAL (Agence de Protection et d'Aménagement du Littoral), DGM (General Affairs Direction).
Supralittoral mudflat (sabbkha)	Subsidence of Kneiss siltica.	CCDA
Tidal channels	Subsidence of Kneiss siltica.	CCDA, Delegation of Ghazala.
Intertidal sands (shbar)	Degradation of both the macrofauna (appearance of bare spaces) and the benthic macrofauna. Impact on eelgrass.	APAL, DGM, Scientific research institutions (INSTM, Ifremer University, INAT, ...).
Wetlands (Oued)	Pollution of drained water.	Local industry (TRAPSA, CGT), Ministry of Agriculture, APAL, ANPE (National Agency for Environmental Protection).
Climatic	Sea level rise, Temperature rise, Rainfall decrease.	APAL, INM (National Institute of Meteorology).

ISP Account of:
Institut National des Sciences et Technologies de la Mer
Print Date: 03/12/2020
Page 2 of 9

System component	Key management issue	Key stakeholders
Marine fauna	Degradation of macrofauna specific richness. Fishing issues.	CCDA, Scientific research institutions (INSTM, Ifremer University, INAT, ...), ANPE
Marine flora	Degradation of seabed. Industrial pollution (drainage and petroleum industries, ...)	Ministry of Industry, Industrial companies, Ministry of Interior, Ministry of Defense, UTAA/Mahorom (Tunisian Union of Agriculture and Fishing).
	Dredging, Thermal burning.	DGM, ...

ISP Account of:
Institut National des Sciences et Technologies de la Mer
Print Date: 03/12/2020
Page 3 of 9

System component	Key management issue	Key stakeholders
Marine plant cover: - Thalassia, - Zostera (Halodule).	Limits regression and structures destruction. Use of prohibited destructive fishing gear. Industrial pollution.	APAL, ANPE, Ministry of Interior, Ministry of Defense, CCDA, UTAA/Mahorom, Ministry of Industry, Industrial companies.
		APAL, DGM

ISP Account of:
Institut National des Sciences et Technologies de la Mer
Print Date: 03/12/2020
Page 4 of 9

Page 1 of 9 58%

Fig.2.1: Example of *Thematic Scoping and Key-Stakeholders Mapping Report* drafted by INSTM Partner for KNEISS ISLAND.



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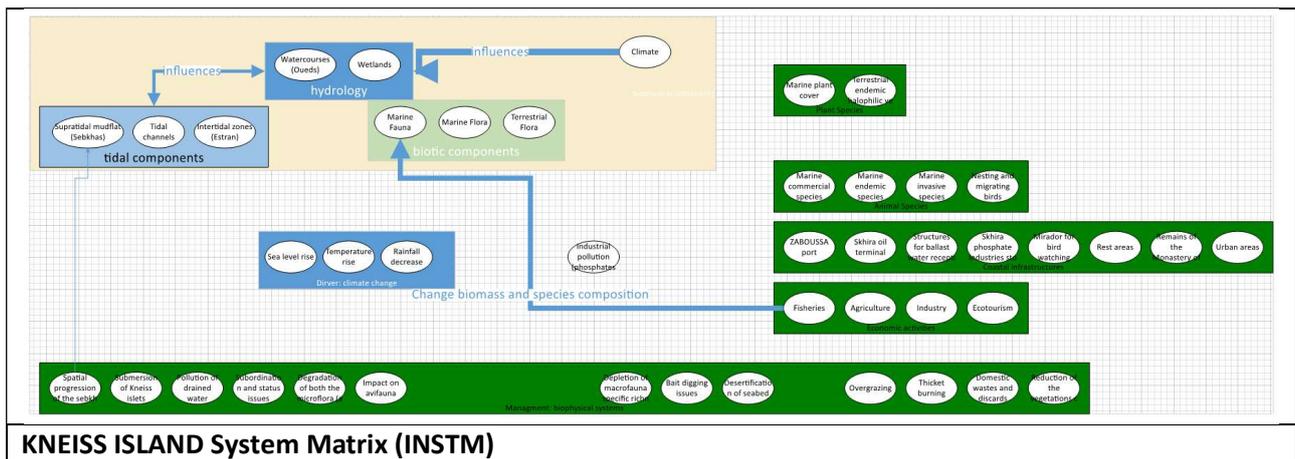
1.2 - Ecosystem Context Analysis: from System Matrices to System Diagrams

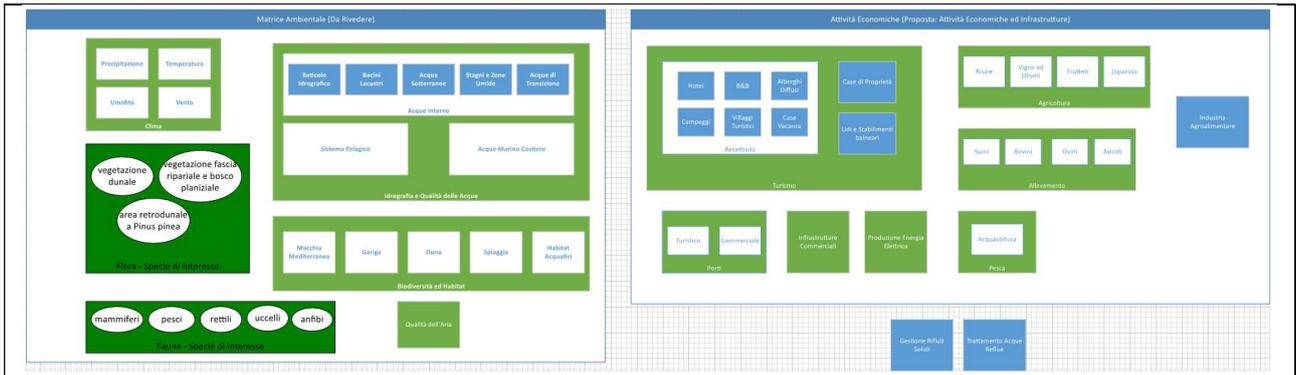
Second step focused the starting of the *Ecosystem Context Analysis*, an analytical procedure which aims at developing a structural model of the ecosystem components and services, the associated human activities, as well as the interactions between them. It recognizes the key connections within and across the ecological and the human systems spanning over the focused area, so as to provide a manageable framework for understanding how ecosystems, biodiversity and human activities inter-operate in EBM applications. The *Ecosystem Context Analysis* allows establishing and managing a participatory analytical process which ensures an effective dialogue between all the stakeholders involved. This methodological procedure guided the four working teams from a conceptual representation of the system to be managed to a structural practical one.

This process builds upon the identification of the major characteristics of the areas, as captured in the *Thematic Scoping and Key-Stakeholders Mapping Reports* described in the previous Section. These *Reports* consist of a set of text-tables (*System Matrices*) where all the components of the relevant environmental, social and economic systems are listed and illustrated, with components possibly comprising one or more sub-components.

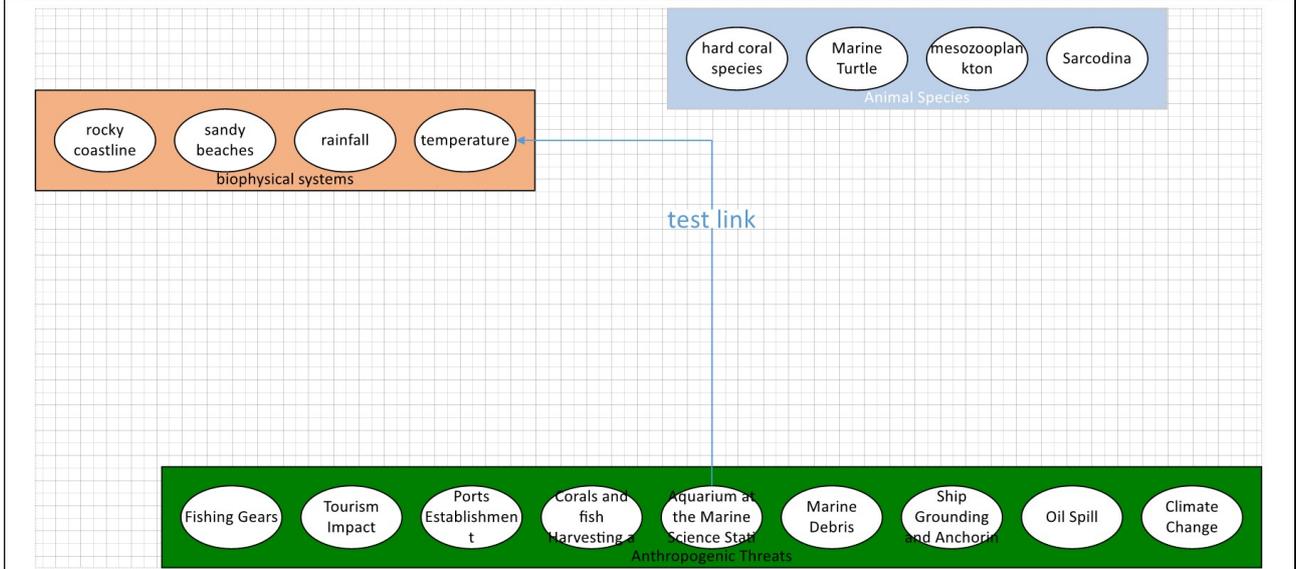
The said *System Matrices* are transposed using the PROGES-ISP software tools into *System Diagrams*, where all the components and sub-components defined in each of the matrices are drawn in a system diagram as box items. Once all components and sub-components of the matrices have been drawn in the *System Diagrams*, the information reported in the matrices to describe the interactions between the components and sub-components are used to draw the initial set of links (arrows) between relevant components (boxes) of the diagrams. As mentioned, the PROGES-ISP software provides a specific feature for transforming the system matrices directly into diagrams, having only to refine the shape, the arrangement, the description of all the components and the related interconnections.

This new diagrammatic representation of the same information can help to identify possible inconsistencies and/or incompleteness of the model, either in the definition of components and sub-components in their interconnections. The four System Diagrams are reported table here below.

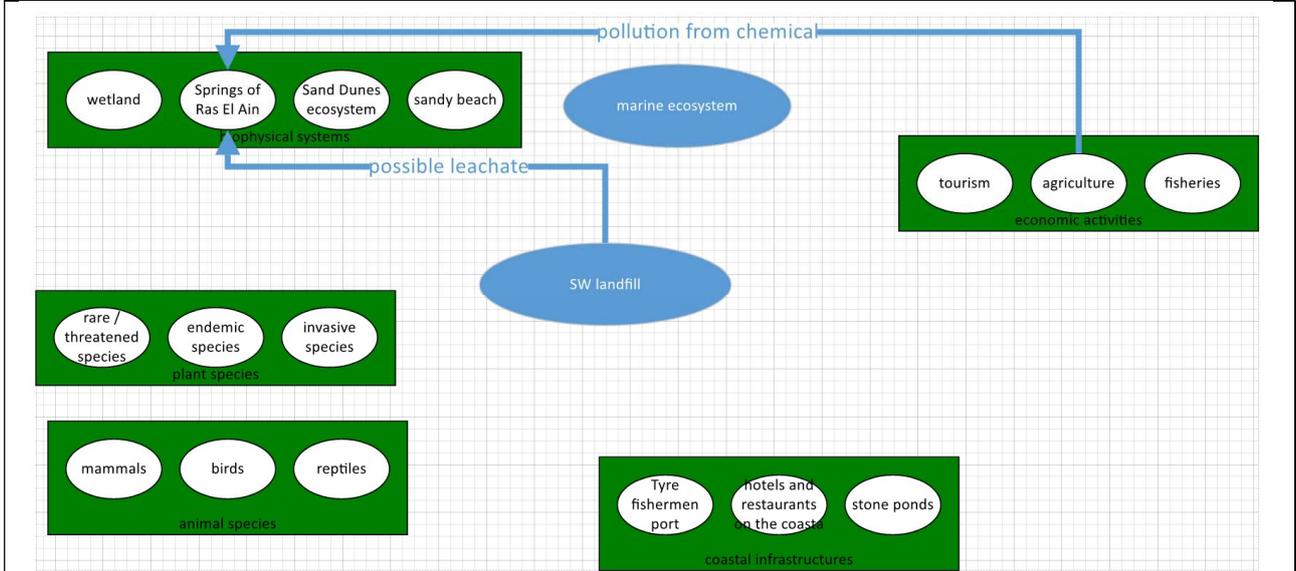




Riserva Naturale del Lago di Tarsia e della Foce del Fiume Crati System Matrix (ADT)



Royal Marine Conservation Society of Jordan System Matrix (JREDS)



Tyre Coast Nature Reserve System Matrix (TCNR)

The above illustrated *System Boxes-and-Arrows diagrams* constitute the backbone of the EB-ICZM-DSS reference models (as described in MED4EBM Working Document WD.WP3.1, Section 2.2.2).



These *System Boxes-and-Arrows diagrams* are initial samples developed internally by MED4EBM Partners and will be further developed/rebuilt with the active contribution of key stakeholders during Phase 2 of the implementation of MED4EBM Work Packages 3 and 4.

1.3 - The four EB-ICZM-DSS applications

The four EB-ICZM-DSS applications developed, although still in an embryonic state, already contain data linked to the various components drawn. A remarkable milestone considering that every single activity described was implemented remotely.

These four EB-ICZM-DSS software applications can be downloaded and installed via the Microsoft ClickOnce software distribution technology; credentials for downloading, installing and accessing the EB-ICZM-DSS Applications are available to the four MED4EBM Partner's Focal Points. The use of the Microsoft ClickOnce online software publishing system allows to have a resident software installed on the local computer of the user, while at the same time being also able to benefit from a permanent online support to obtain any software update the PROGES will release in the future.

Screenshots from the four EB-ICZM-DSSs applications, as so far developed, are shown in the following pages.



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System Model

Spatial Maps

Fisheries (Id=29) => Fish Catch => Tunisia => yyyy-mm not null

Select	Name	Description	Update Frequency	Data Source	Notes
<input checked="" type="checkbox"/>	Fish Catch				

Is Selected	Name	Description	Spatial reference
<input checked="" type="checkbox"/>	Tunisia		TUN_adm0

Is Selected	Name	Description	Chart type	GIS Key	Data	Map legend	Images serie
<input checked="" type="checkbox"/>	yyyy-mm ...		XY Dia...	ISO			

Name	Description	Db_Data...	Chart series	Chart Pane	Secondar...	Label Patt...
Catch Coastal Kg	Catch Coa...	Catch Coa...	StackedBar			
Catch Small Pelagi...	Catch Sm...	Catch Sm...	StackedBar			
Catch Clam Kg	Catch Cla...	Catch Cla...	StackedBar			

Fisheries (Id=29) => Fish Catch => Tunisia => yyyy-mm not null

Data key: yyyy-mm Location_Code

Hide/Show legend: Labels min. value visible:

KNEISS ISLAND EB-ICZM-DSS (INSTM)



The screenshot displays the ISP software interface, divided into three main sections:

- System Model:** A diagram titled "Matrice Ambientale (Da Rivedere)" showing various environmental components. It includes boxes for "Clima" (Precipitazioni, Temperatura, Umidità, Vento), "Acque" (Reticolo Idrografico, Bacini Lacustri, Acque Sotterranee, Stagni e Zone Umide, Acque di Transizione, Acque Interne, Sistema Pelagico, Acque Marino Costiere), "Idrografia e Qualità delle Acque", "Biodiversità ed Habitat" (Macchia Mediterranea, Gariga, Duna, Spiaggia, Habitat Acquatici), "Flora - Specie di Interesse" (vegetazione dunale, vegetazione fascia ripariale e bosco planiziale, area retrodunale a Pinus pinea), and "Fauna - Specie di Interesse" (mammiferi, pesci, rettili, uccelli, anfibi). A "Qualità dell'aria" box is also present.
- Spatial Maps:** A window showing a map of the study area, which is the coastline and surrounding land of the Lago di Tarsia and the Crati river delta.
- Data Table:** A table titled "Precipitazione (Id=160) => Precipitazione Totale Mensile => Comune => Mese". It shows a single record for "Precipitazione Totale" with a spatial scale of "Comune" and a time scale of "Mese".

Select	Name	Descript...	Update Frequency	Data Source	Notes
<input checked="" type="checkbox"/>	Precipitazione Totale				

Spatial Scales					
Is Selected	Name	Description	Spatial reference		
<input type="checkbox"/>	Bacino Idrografico				Bacini_Idro
<input checked="" type="checkbox"/>	Comune				Comuni

Time scales						
Is Selected	Name	Description	Chart type	GIS Key	Data	Map legend
<input checked="" type="checkbox"/>	Mese		XY Diagram	NAME_3		

Data Series						
Is Selected	Name	Description	Db_Data/Velw	Chart series	Chart Pane	Secondary Axis
<input type="checkbox"/>						

Riserva Naturale del Lago di Tarsia e della Foce del Fiume Crati EB-ICZM-DSSS (ADT)



The screenshot displays the MED4EBM software interface, which is used for modeling and monitoring coastal systems. It is divided into several main sections:

- System Model:** A diagram showing the relationships between different components. It includes:
 - biophysical systems:** rocky coastline, sandy beaches, rainfall, temperature.
 - Animal Species:** hard coral species, Marine Turtle, mesozooplankton, Sarcodina.
 - Anthropogenic Threats:** Fishing Gears, Tourism Impact, Ports Establishment, Corals and fish Harvesting, Aquarium at the Marine Science Station, Marine Debris, Ship Grounding and Anchors, Oil Spill, Climate Change.
 - A **test link** connects the biophysical systems to the animal species.
- Spatial Maps:** A map showing the geographical distribution of the monitoring sites, represented by a grey shaded area with a white outline.
- Data Table:** A table titled "biophysical systems (Id=14) => benthic cover => Monitoring sites => Year". It lists monitoring sites and their corresponding data series.

Select	Name	Descr...	Update Frequency	Data Source	Notes
<input checked="" type="checkbox"/>	benthic cover				
Spatial Scales					
<input checked="" type="checkbox"/>	Monitoring sites				
Time scales					
<input checked="" type="checkbox"/>	Year				
Data Series					
<input checked="" type="checkbox"/>	Hard coral...	Hard coral...	StackedBar		
<input checked="" type="checkbox"/>	Soft coral %	Soft coral %	StackedBar		
- Chart:** A stacked bar chart titled "biophysical systems (Id=14) => benthic cover => Monitoring sites => Year". It shows the percentage of hard coral (orange) and soft coral (dark red) at various monitoring sites for the year 2019.

Monitoring Site	Hard coral %	Soft coral %
Black Rock	~50	~0
Eel Canyon	~10	~0
Gorgon 1 & 2	~28	~0
King Abdullah Reef	~65	~0
Marine Science Station	~25	~0
Power Station North	~45	~0
Rainbow Reef	~35	~0

Royal Marine Conservation Society of Jordan EB-ICZM-DSS (JREDS)



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System Model

Diagram Network: No Selection: Green 5 Enable data refresh

rare / threatened species (Id=7)

Id	Item	Description	Key management issues	Key stakeholders
7	rare / threatened species	Ficus sycomorus. Panicratium maritimum.	Depend on the sand dunes' habitat, which is degrading on the national level, hence became threatened species.	Farmers of Ras El Ain/TCNR agricultural zone (for F. sycomorus). Visitors/Trespassers of the Conservation zone where P. maritimum is found. Institutional management (TCNR management team). Ministry of Environment.

[Id] = '7' Edit Filter

Spatial Maps

Tyre Coast Nature Reserve EB-ICZM-DSS (TCNR)

