



Balearic Islands
Coastal Observing
and Forecasting
System



Spatial Characterization of Badia de Palma

(Mallorca, W. Mediterranean)

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0 2,5 5 km

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5.- Preliminary results

6.- Applications

Inventory of land uses of functional areas of *Badia de Palma* (*decision support tool*)

Relationship with Environmental Sensitivity of the coastline

Relationship with system of indicators (for ICZM/ICMM)

7.- Future work





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1.- INTRODUCTION



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INTRODUCTION

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Balearic Islands Coastal Observing and Forecasting System

SOCIB is composed of three Divisions:

SOS Division

- Observing Facilities
- Modelling and Forecasting Facility
- Data Center Facility

Systems Operation and Support Division

ETD Division

- Facility Support and Technology Development
- New Technology Pilot Programme

Engineering and Technology Development Division

SIAS Division

- Sustainability Science & ICOM Research
- Tools for Science based ICOM

Strategic Issues and Applications for Society Division

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INTRODUCTION

- Integrated Coastal Zone Management (ICZM) is a process by which decisions are made concerning the conservation and suitable use of coastal and ocean/marine resources and space.
- ICZM lead a management of coastal and ocean/marine resources and space should be as fully integrated as are the ecosystems making up the coastal and ocean/marine realms.
- ICZM: continuous and dynamic process.
- The process is designed to overcome the fragmentation inherent in both the sectoral management approach and the splits in jurisdiction among levels of government at the land-water interface (Cicin-Saint & Knecht, 1998).

2.5 5 km



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INTRODUCTION

- Marine Spatial Planning (MSP) is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process (Ehler & Douvere, 2009).
- Characteristics of MSP include ecosystem-based, area-based, integrated, adaptive, strategic and participatory.
- In coastal environments MSP initiatives must be complemented with ICZM
- ICZM initiatives normally more related to landward (terrestrial) environments.
- ICZM and MSP shares the study zones
- More appropriate to use the concept: ICMM (Integrated Coastal and Marine Management) ICZM + MSP

0 2,5 5 km



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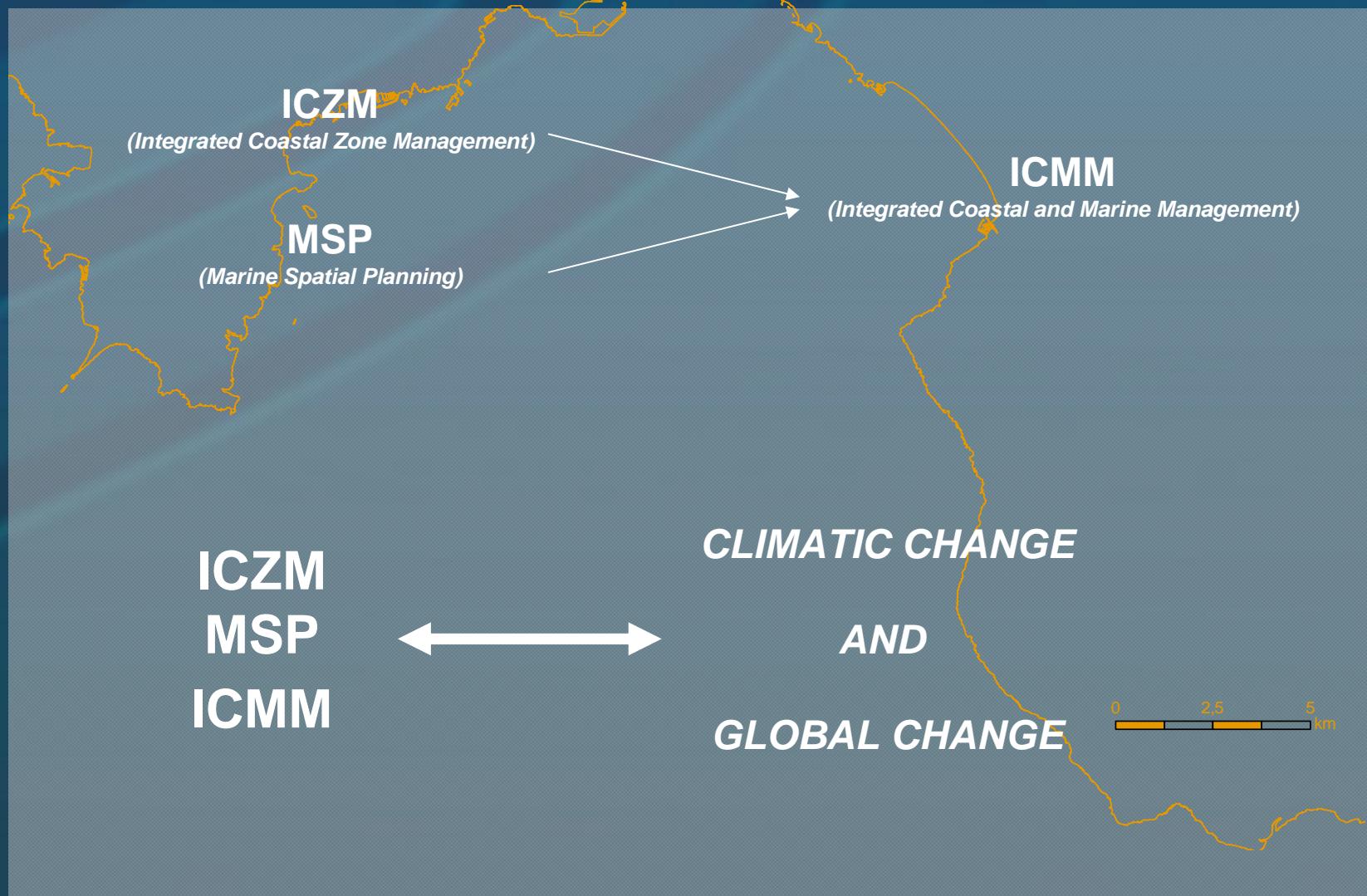
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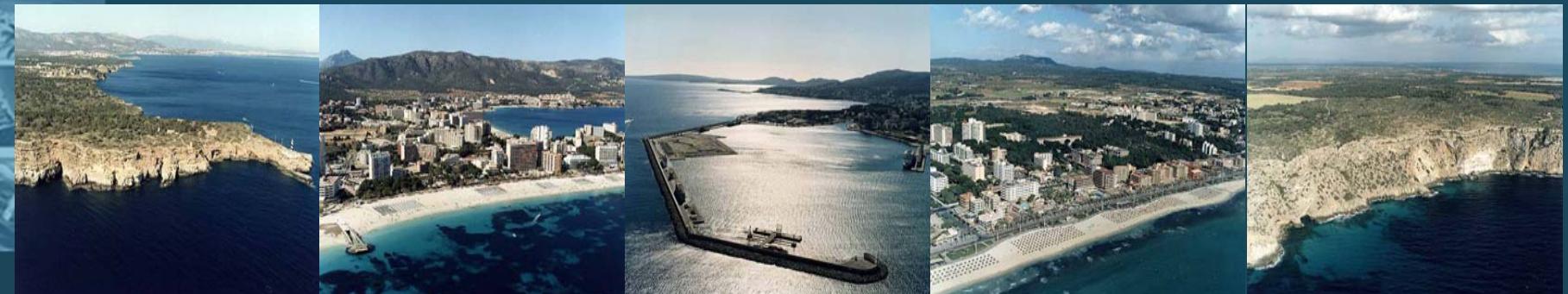
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INTRODUCTION

- Boundary delimitation according with an initiative of Integrated Coastal Zone Management (ICZM) as a preliminary step for a Marine Spatial Planning (MSP).
- Coastal zone is considered as a system consisting of marine and terrestrial environment.
- The aim of this work is the application of a criteria for zoning the coastal areas according with a ICZM initiative in order to determine areas with greatest influence on the coastal zone.



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INTRODUCTION

- Expected results are based on the recognition of areas that receive a major influence of the whole of the Badia de Palma (areas with the greatest influence on the rest of the territory)
- When the areas of greatest influence have been recognized, we can organize and analyze the main uses of the marine environment of the Badia de Palma.



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INTRODUCTION

-The structure of the proposal is organized as follows:

- Determine the boundaries of the coastal zone (landward and seaward) of the Badia de Palma. According with an initiative of ICZM.
- Determine land uses of landward areas.
- Identify the areas with the greatest influence on the coastal zone and vice versa.
- Establishment the main uses of marine areas of Badia de Palma.
- Analyze the compatibility of existing uses with the distribution of areas with greater influence over the whole bay.





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BADIA DE PALMA



1

Boundary delimitation of coastal areas according with an ICZM initiative



2

Marine Spatial Planning (MSP)

- Establishment of the existing uses normally developed in the Bay.
- Ability to establish areas with higher / lower pressure. Depending on the degree of vulnerability of marine areas.

(Influence degree of landward over marine areas, protected areas and habitats, etc.)



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- Boundary delimitation of the coastal areas according with an ICZM initiative.
- Geographical characterization of coastal areas (influence, land uses).
- Boundary delimitation of coastal areas, first step required to develop an appropriate MSP.

0 2,5 5 km

Cooperación Costero de las Illes Balears



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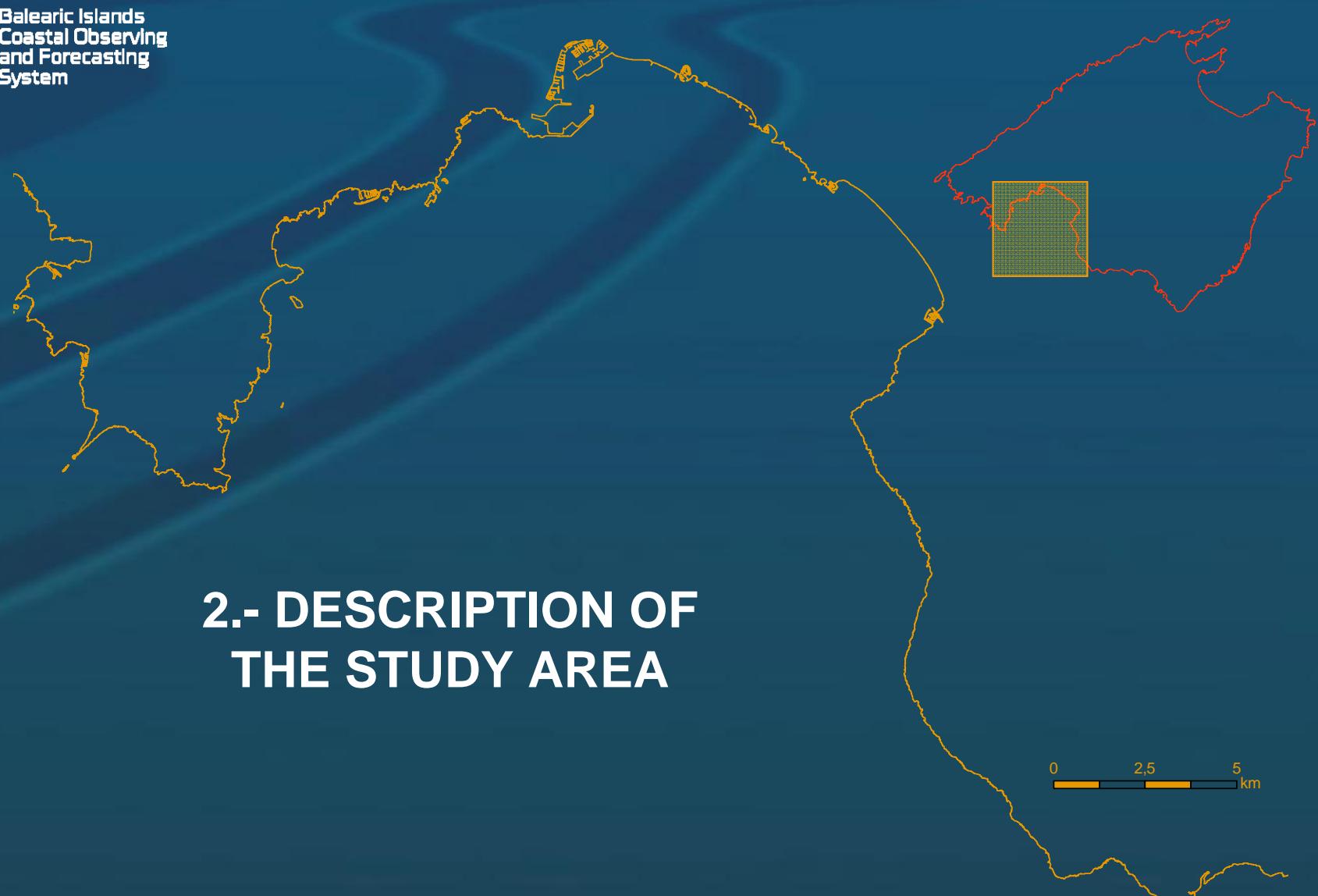
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2.- DESCRIPTION OF THE STUDY AREA



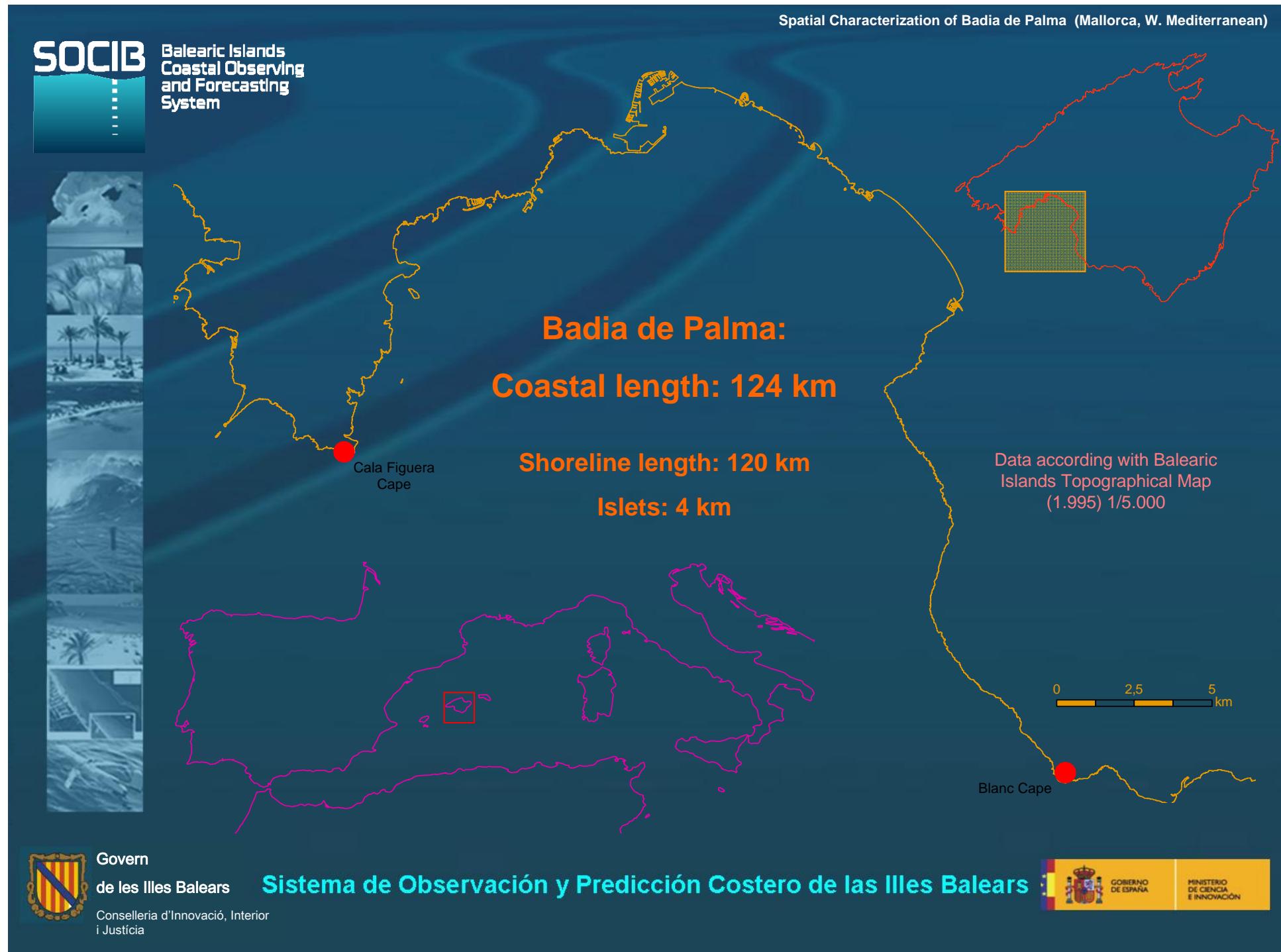
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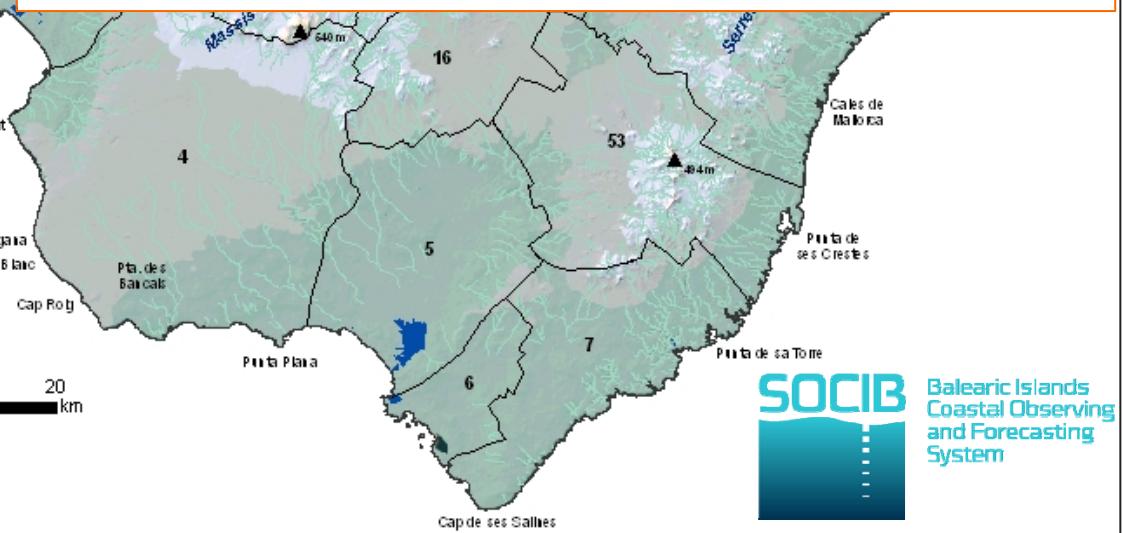
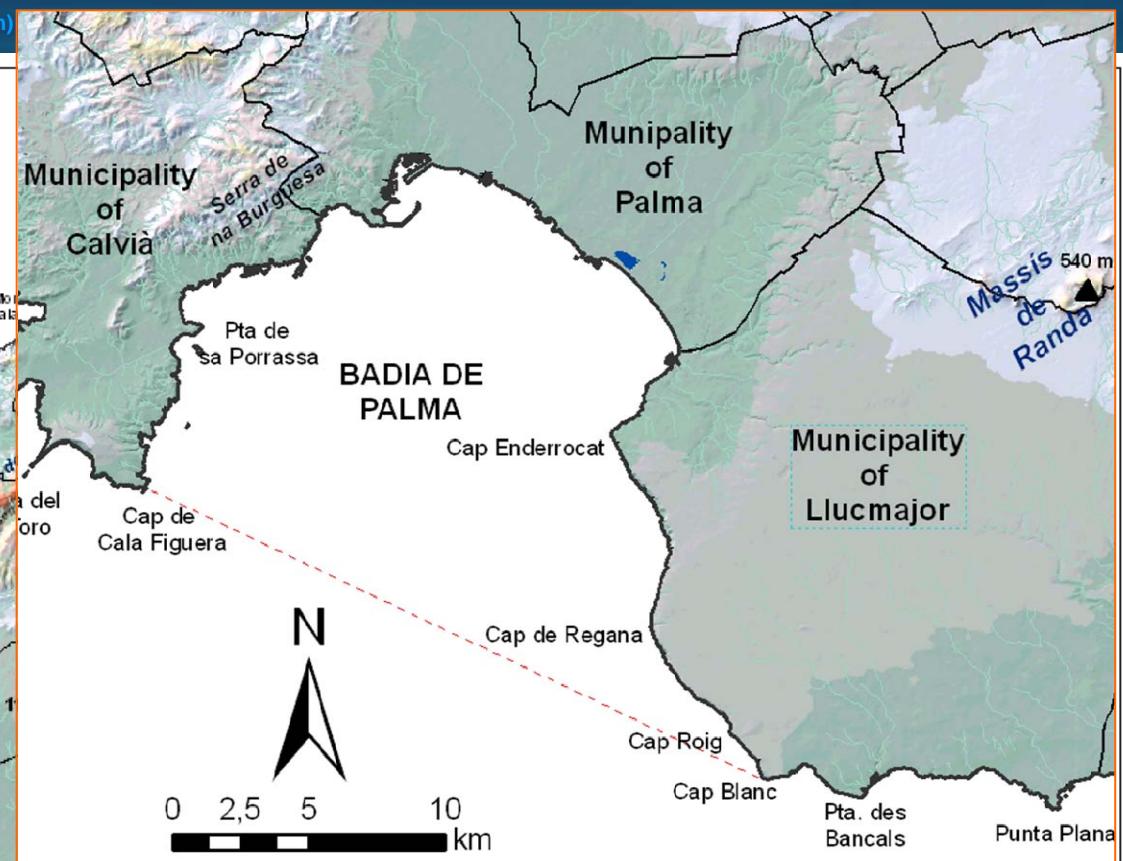
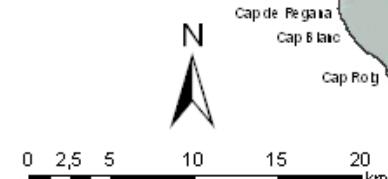
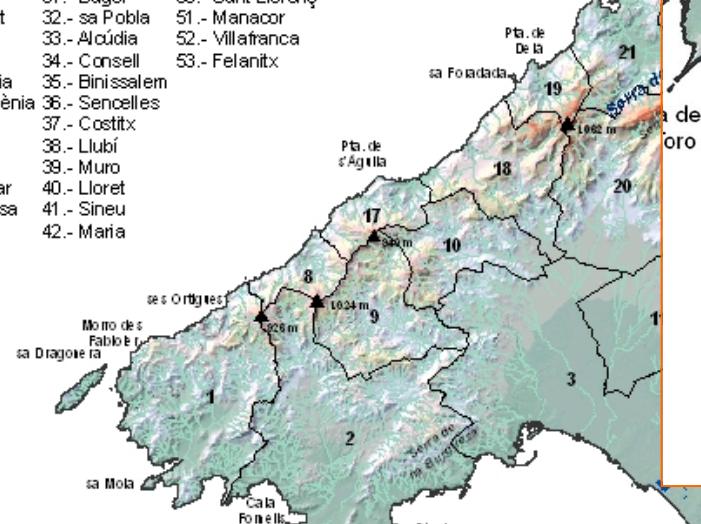
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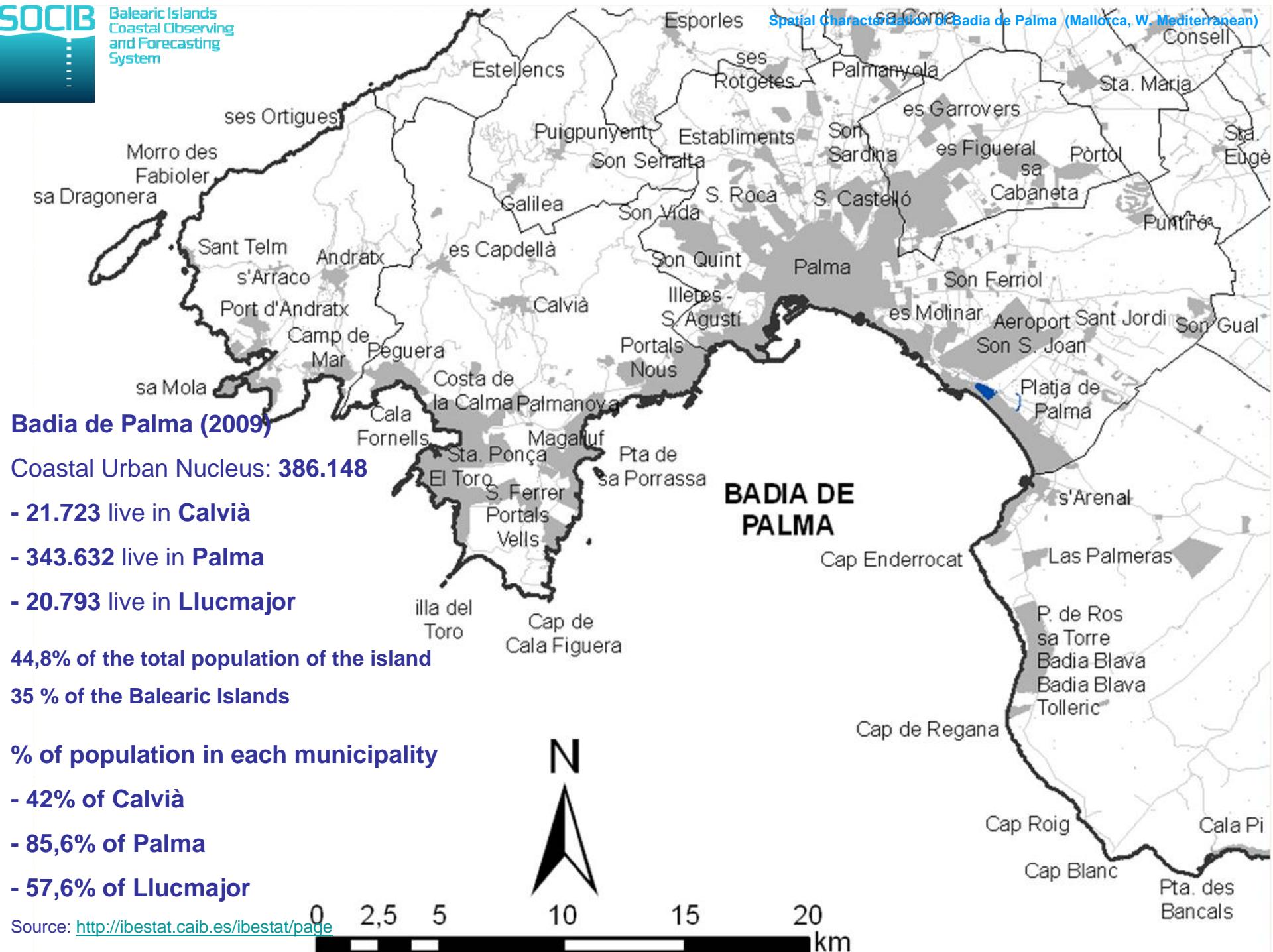


Mallorca (Balearic Islands, Spain) (municipalities and relief)

name of municipalities

- | | | |
|--------------------|-----------------|---------------------|
| 1.- Andratx | 24.- Escorca | 43.- Sta. Margalida |
| 2.- Calvià | 25.- Selva | 44.- Sant Joan |
| 3.- Palma | 26.- Pollença | 45.- Petra |
| 4.- Llucmajor | 27.- Manacor | 46.- Ariany |
| 5.- Campos | 28.- Lloseta | 47.- Artà |
| 6.- Ses Salines | 29.- Inca | 48.- Capdepera |
| 7.- Santanyí | 30.- Campanet | 49.- Son Servera |
| 8.- Estellencs | 31.- Búger | 50.- Sant Llorenç |
| 9.- Puigpunyent | 32.- sa Pobla | 51.- Manacor |
| 10.- Esporles | 33.- Alcúdia | 52.- Villatanca |
| 11.- Marratxí | 34.- Consell | 53.- Felanitx |
| 12.- Santa Maria | 35.- Binissalem | |
| 13.- Santa Eugènia | 36.- Sencelles | |
| 14.- Algaida | 37.- Costitx | |
| 15.- Montuiri | 38.- Llubí | |
| 16.- Porreres | 39.- Muro | |
| 17.- Banyalbufar | 40.- Lloret | |
| 18.- Valldemossa | 41.- Sineu | |
| 19.- Deià | 42.- Maria | |
| 20.- Bunyola | | |
| 21.- Sóller | | |
| 22.- Fornalutx | | |
| 23.- Alaró | | |





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DIVERSITY OF HABITATS AND TYPES OF COASTS



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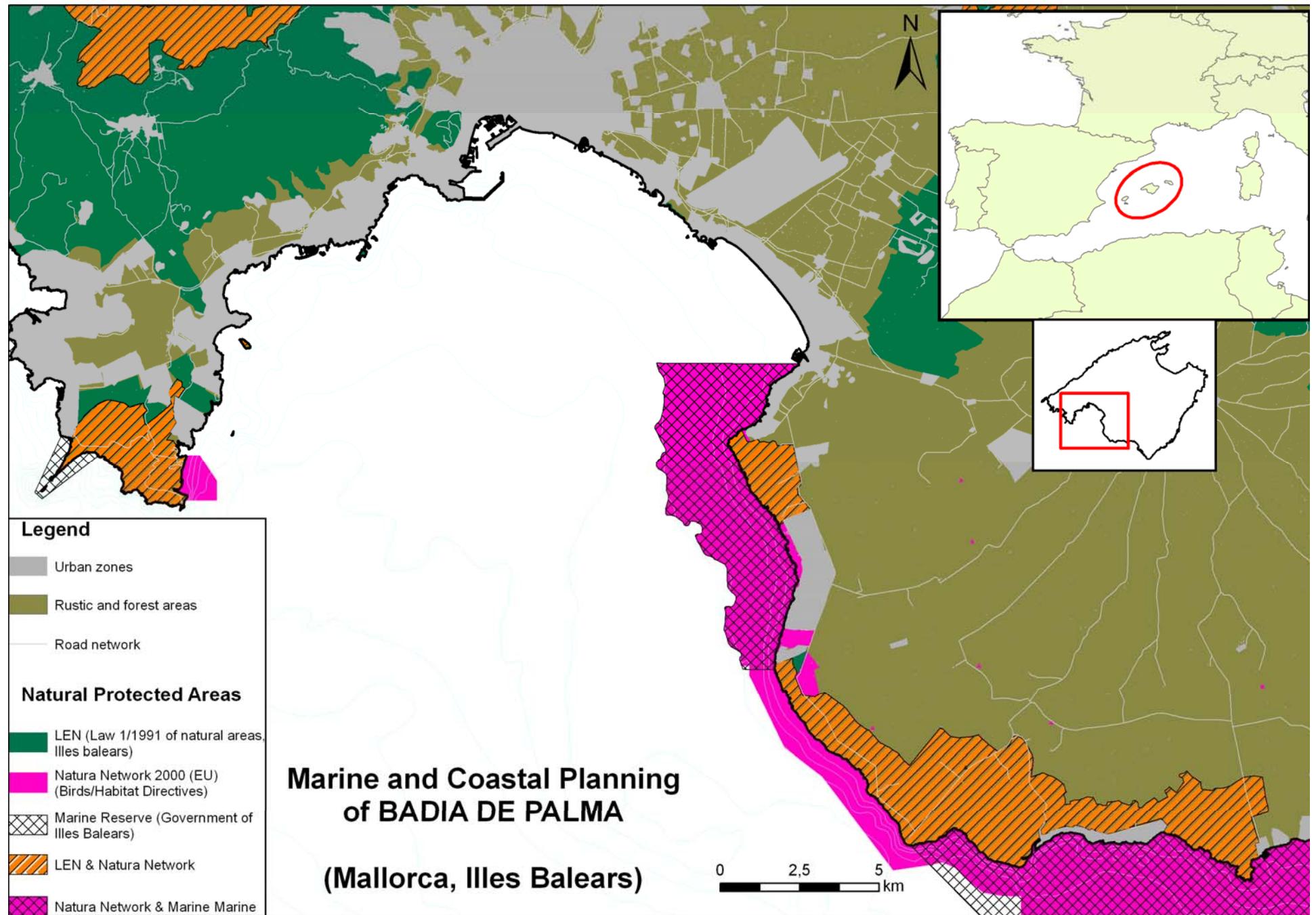
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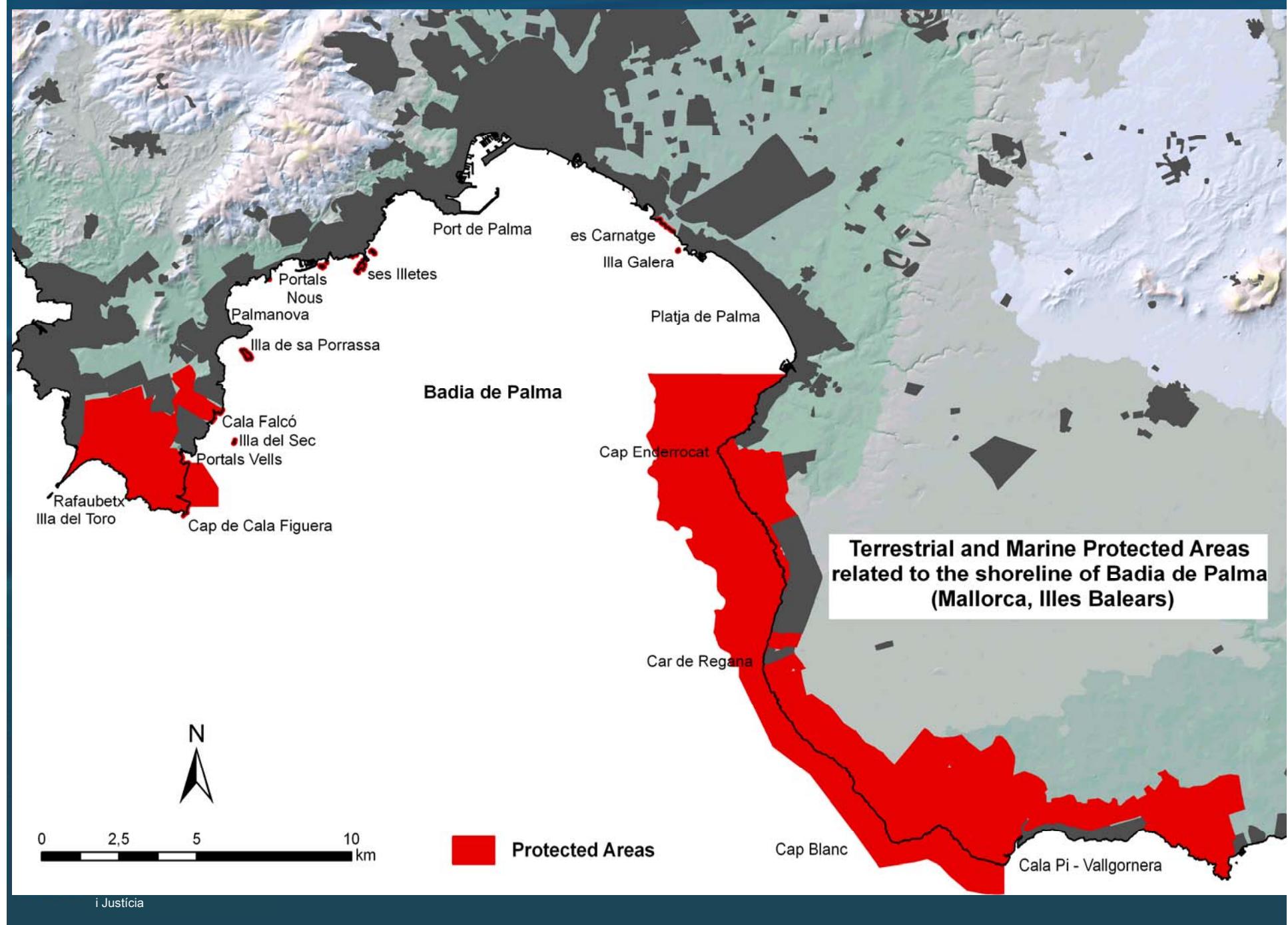


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Spatial Characterization of Badia de Palma (Mallorca, W. Mediterranean)



3.- METHODS AND CRITERIA FOR BOUNDARY DELIMITATION OF COASTAL AREAS



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METHODS AND CRITERIA FOR BOUNDARY DELIMITATION OF COASTAL AREAS

- Definition of Shoreline Units (SU)
- Shoreline Units defined according to the following criteria:
 - Elevation (0-200m, > 200m)
 - Coastal typologies (rocky, sandy)
 - Tourist nucleus (POOT, Arrangement plan of Touristic Supply))
 - Land uses (natural protected, rural landscapes or urban areas)
- Definition of Functional areas of SU.
 - Management nucleus
 - Complementary management zones
 - Adjacent management zones
- Analysis Units (AU).





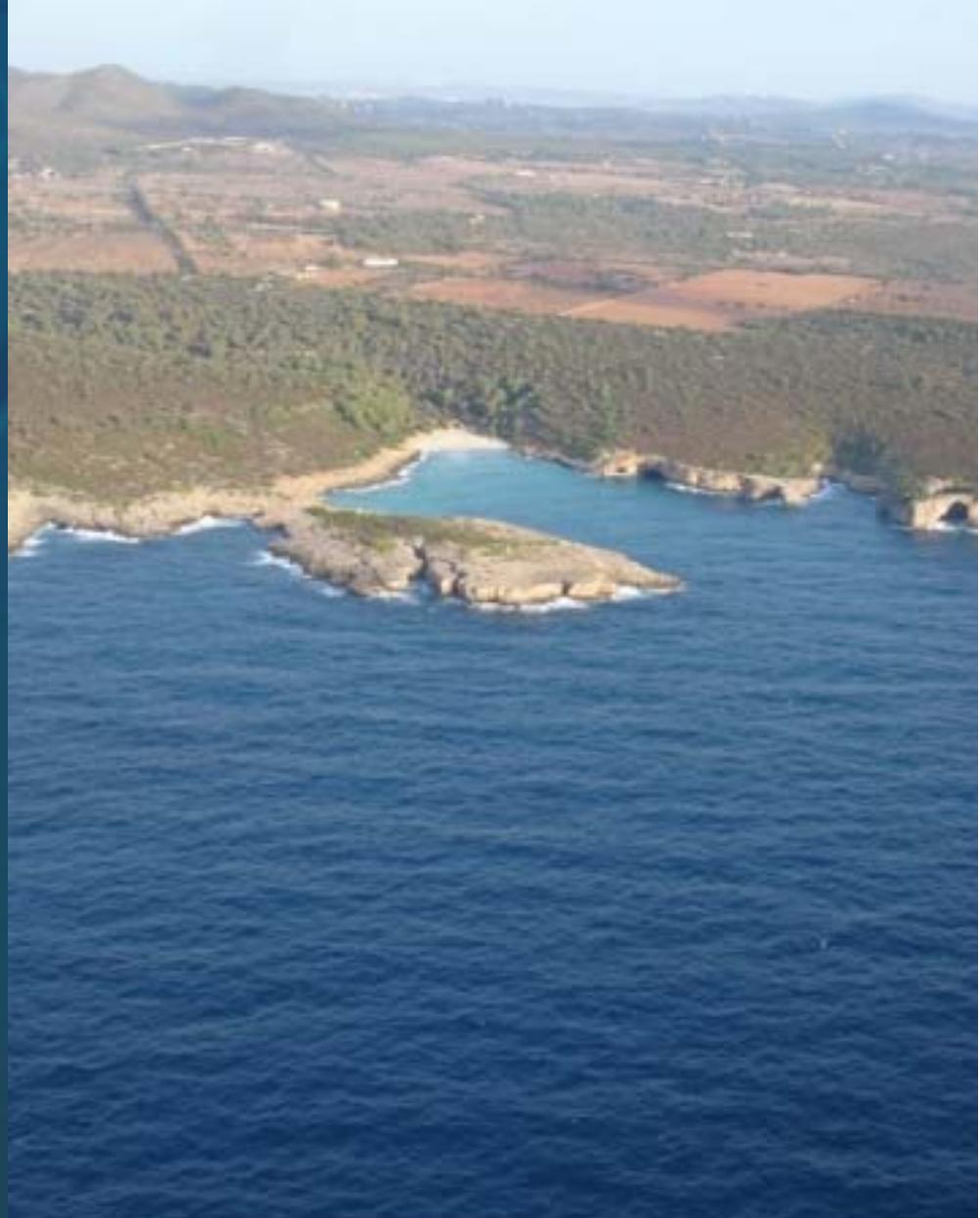
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Methods and criteria for boundary delimitation of coastal areas

The aim of the initiative for zoning is to propose a more proactive, widely-applicable method for delimiting boundaries of ICZM-ICMM initiatives based not on a specific problem.

The study supports on data availability and the geo-environmental, socio-economic and jurisdictional characteristics of the management area.



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Methods and criteria for boundary delimitation of coastal areas

Although presented in the context of an insular environment, the methodology may be applied to any coastal zone.

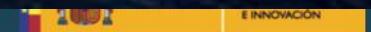
Defining territorial units using this method is a visual tool that can be used to make informed decisions about the area that needs to be taken into consideration for implementing ICZM - ICMM at any given location.

Spatial Characterization of Badia de Palma (Mallorca, W. Mediterranean)



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Methods and criteria for boundary delimitation of coastal areas. SUs (Shoreline Units)



SUs represent the state and organization of coastal areas

The inland boundary of SU is determined by the jurisdictional *Zone of Influence* defined by Spanish Coastal Law (i.e. 500m inland).

SUs incorporate:

- Elevation levels (0 to 200m, higher than 200 m)
- Land uses: urban, rural and natural
- Coastal typologies (rocky coasts and beaches)
- Tourist sites (according with the *Arrangement Plan of Touristic Supply -POOT- of the Tourism Council of the Government of the Balearic Islands*)

The maps were converted to raster data with a cell size of 50 m. The 500 m buffer was then applied and finally, the map of coastal typologies was overlaid.



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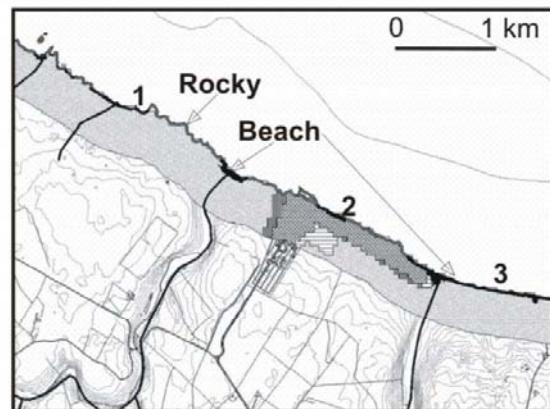
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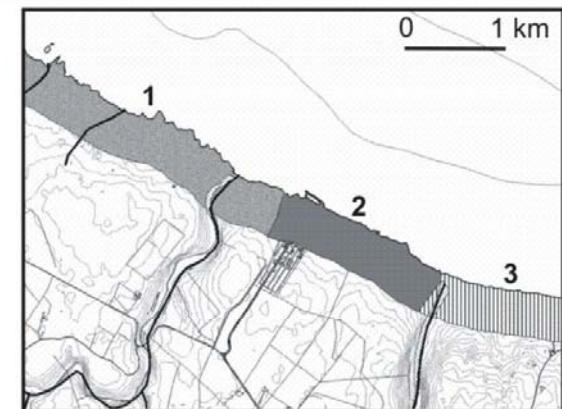
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Methods and criteria for boundary delimitation of coastal areas. SUs (Shoreline Units, SUs)



Raster information concerning land use,
height and coast type (rocky or beach)

Territorial homogenization
of Shoreline Units



Establishment of Shoreline Units
(territorial organization types of the coastline)



1.- Son Real
Natural mixed coast (rocky and beach)



2.- Son Serra
Tourist nucleus beach



3.- Sa Canova
Natural beach

Analysis of maps and geoprocessing has been supported by

Geographical Information Systems (GIS)

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Methods and criteria for boundary delimitation of coastal areas. SUs (Shoreline Units, SUs)



Sample photographs of **SHORELINE UNITS** categories



Natural Beach
(S'Arenal de sa Ràpita)



Urban beaches non tourist nucleus
(Port des Canonge)



Tourist nucleus Beach
(Platja de Palma)



Natural rocky coast
(Sa Dragonera)



Urban rocky coast
non tourist nucleus
(Port de Valldemossa)



Tourist nucleus rocky coast
(Cala Pi)



Salt marshes and lagoons
(S'Albufereta de Pollença)



Natural mixed coasts
(rock and beach)
(Cap Salines - Cala Màrmols)



Mixed coasts (rock and beach)
close to tourist nucleus
(Cala Ferrera)



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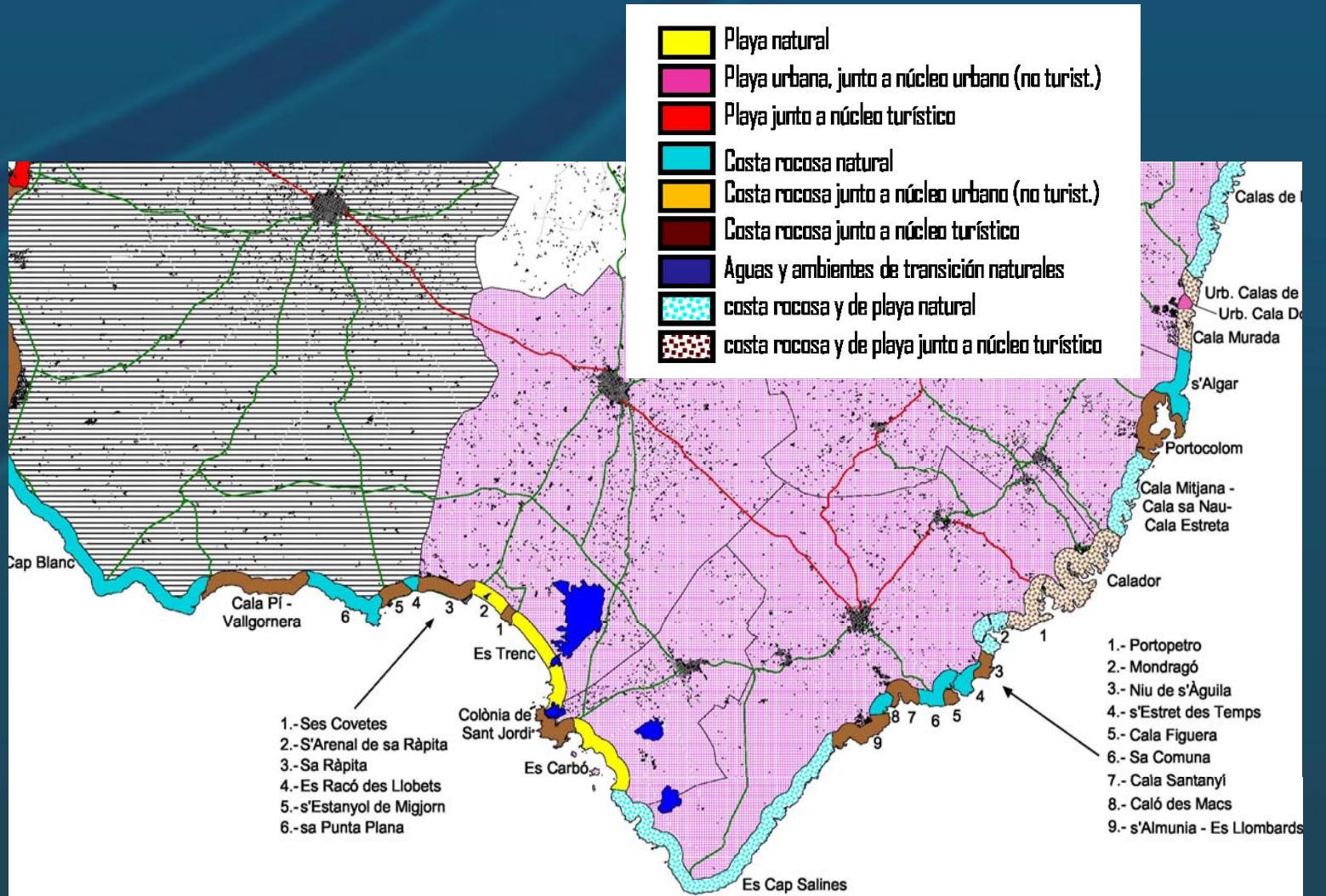
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Methods and criteria for boundary delimitation of coastal areas. SUs (Shoreline Units, SUs)



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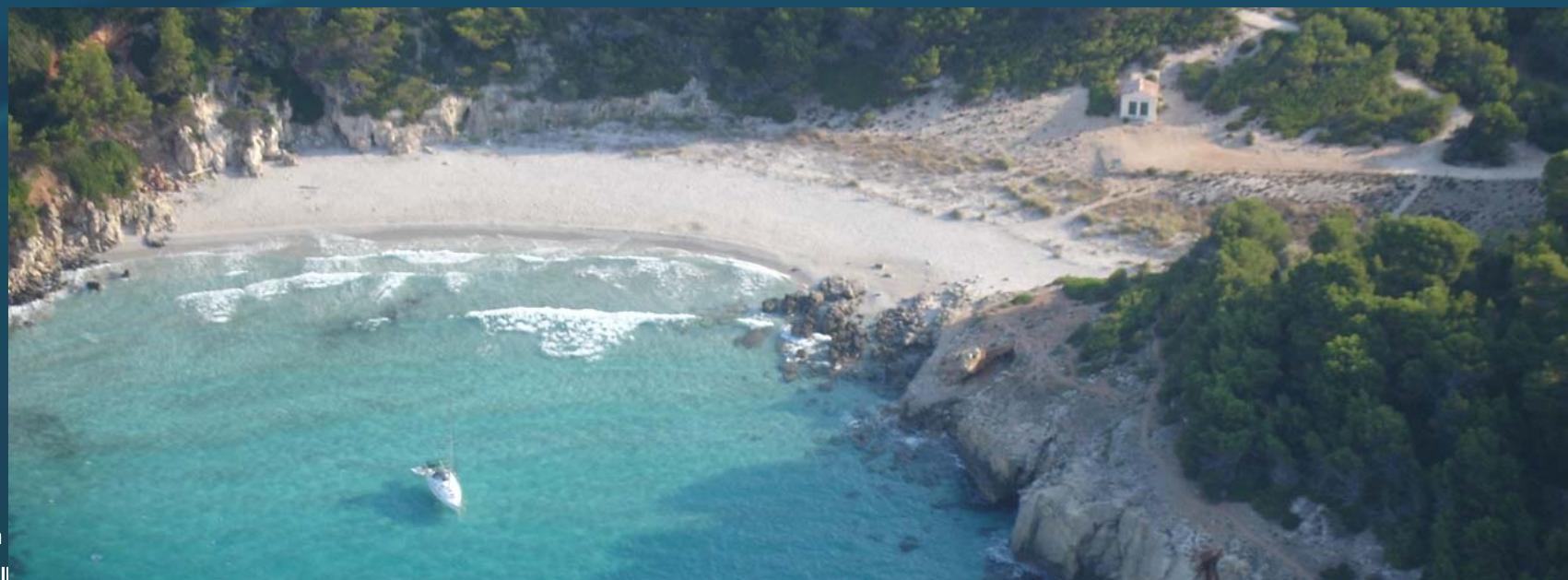
Methods and criteria for boundary delimitation of coastal areas. FUNCTIONAL AREAS



SUs are often located within larger territorial areas, expanding landward to a distance greater than 500m or extending out into the territorial sea.

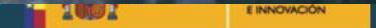
These areas have been defined as Functional Areas.

The boundary of the SU-Functional Area delimits the spatial area that needs to be taken into consideration for ICZM implementation in that zone.



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Methods and criteria for boundary delimitation of coastal areas. FUNCTIONAL AREAS

Three different zones can be observed within a SU-Functional Area.



Management Nucleus:

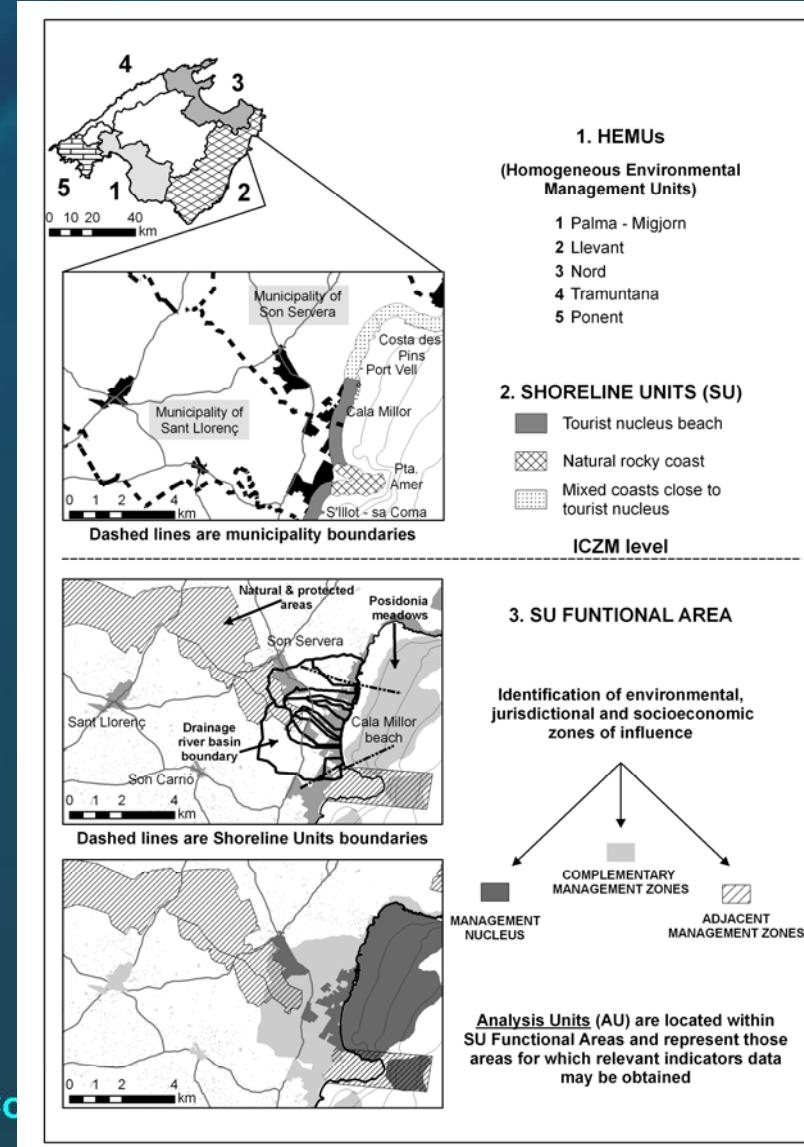
Represents the central focus of the ICZM initiative (urban zone, popular beach, critical habitat, protected area or an area of agricultural productions).

Complementary Management Zone:

This area takes in account the drainage basin, which may extend inland beyond 500 m.

Adjacent Management Zone:

Take into account jurisdictional limits defined by protected areas.



Methods and criteria for boundary delimitation of coastal areas. AUs (Analysis Units)



Analysis Units (AUs) are located within SU-Functional Areas and represents those areas for which relevant indicator data may be obtained.

Describes tangible activities (construction, reforestation...)

Also reflects less tangible aspects (consumption or generation of wastes)

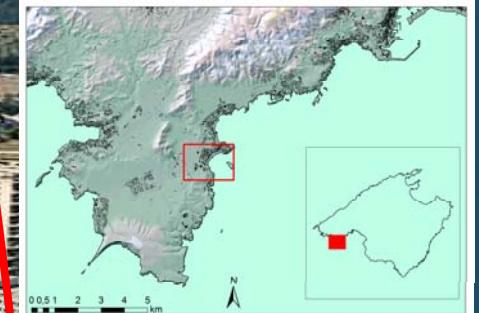
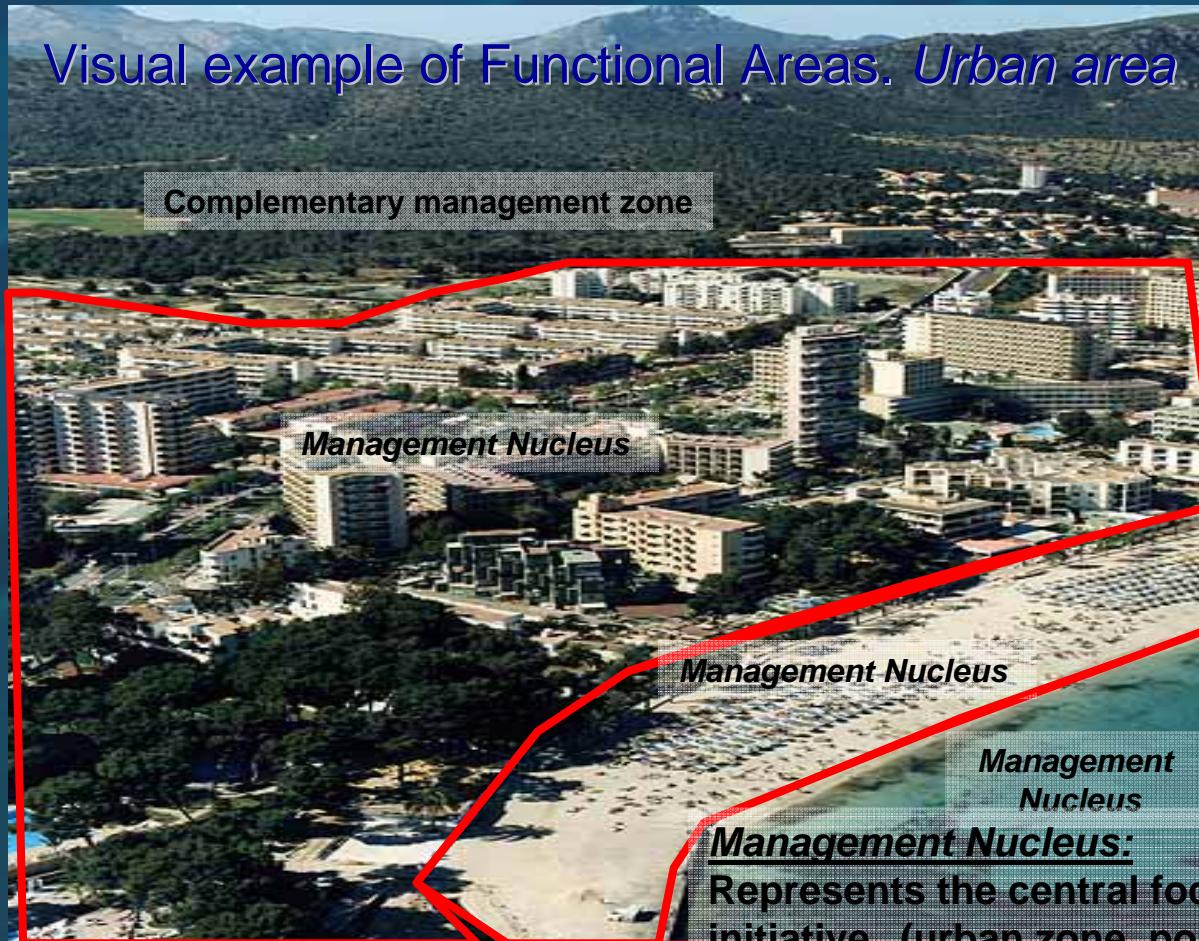
Aus may overlap or be incorporated within other AUs

Each SU and their functional areas contains a number of AUs



Methods and criteria for boundary delimitation of coastal areas.

Visual example of Functional Areas. *Urban area*



Magalluf, Calvià

Management Nucleus:
Represents the central focus of the ICZM initiative (urban zone, popular beach, critical habitat, protected area or an area of agricultural productions).



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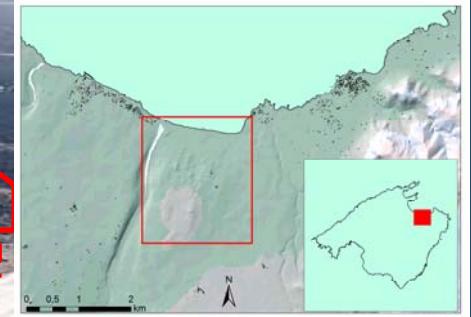
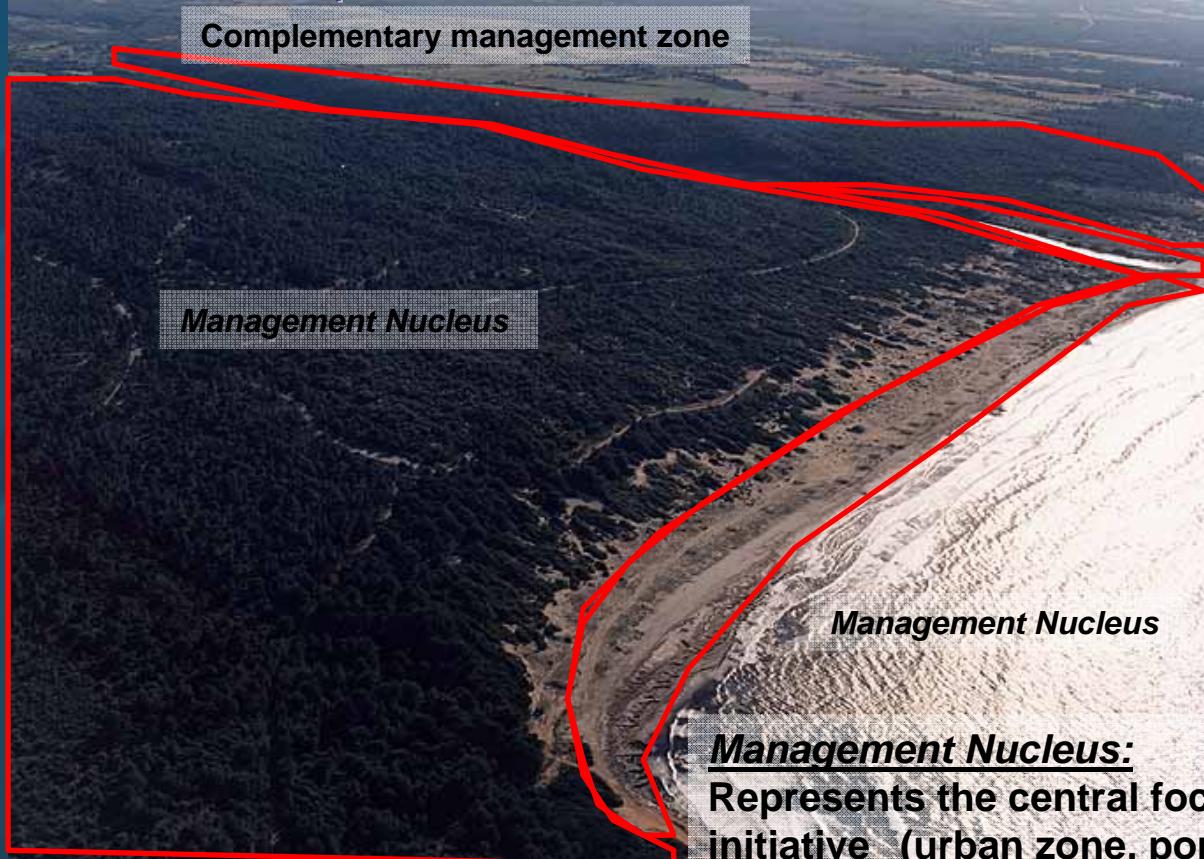
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Methods and criteria for boundary delimitation of coastal areas.

Visual example of Functional Areas. Natural area



Sa Canova, Artà

Management Nucleus:

Represents the central focus of the ICZM initiative (urban zone, popular beach, critical habitat, protected area or an area of agricultural productions).



Shoreline Units of Mallorca (Balearic Islands, Spain)

(cities, villages and urban centers)



0 2,5 5 10 15 20 km

Legend

Salt marshes and lagoons

Mixed coasts (rock and beach) close to tourist nucleus

Tourist nucleus rocky coast

Urban rocky coast non tourist nucleus

Natural rocky coast

Tourist nucleus beach

Urban beach non tourist nucleus

Natural beach

Natural mixed coasts (rock and beach)

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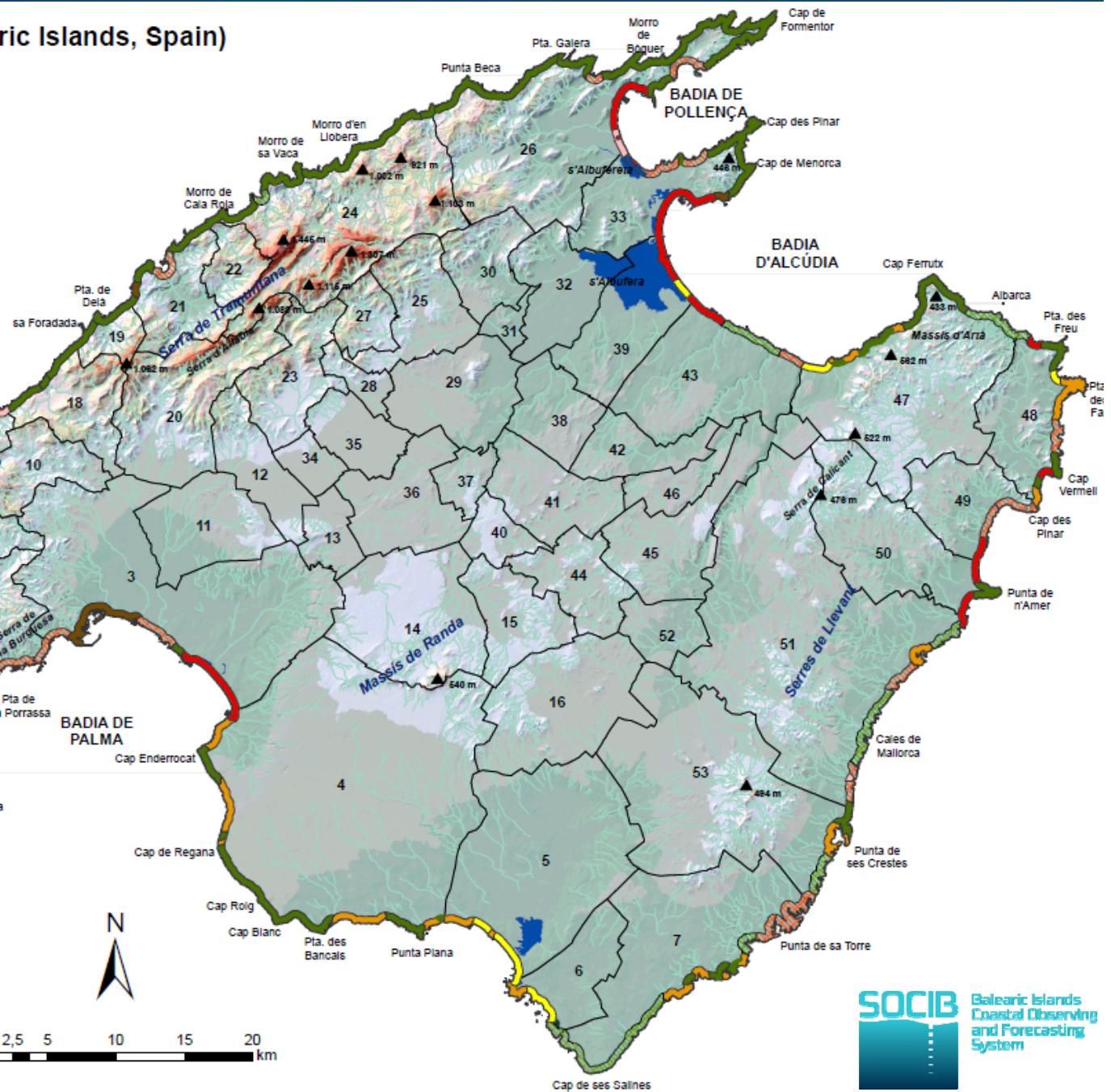
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Shoreline Units of Mallorca (Balearic Islands, Spain)

(municipalities and relief)

name of municipalities

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2.- Calvià	25.- Selva	44.- Sant Joan
3.- Palma	26.- Pollença	45.- Petra
4.- Llucmajor	27.- Mancor	46.- Ariany
5.- Campos	28.- Lloseta	47.- Artà
6.- Ses Salines	29.- Inca	48.- Capdepera
7.- Santanyí	30.- Campanet	49.- Son Servera
8.- Estellencs	31.- Büger	50.- Sant Llorenç
9.- Puigpunyent	32.- sa Pobla	51.- Manacor
10.- Esporles	33.- Alcúdia	52.- Villafranca
11.- Marratxi	34.- Consell	53.- Felanitx
12.- Santa Maria	35.- Binissalem	
13.- Santa Eugènia	36.- Sencelles	
14.- Algaida	37.- Costitx	
15.- Montuiri	38.- Llubí	
16.- Porreres	39.- Muro	
17.- Banyalbufar	40.- Lloret	
18.- Valldemossa	41.- Sineu	
19.- Deià	42.- Maria	
20.- Bunyola	ses Orques	
21.- Sóller	Morro des Fablier	
22.- Fornalutx	sa Dragonera	
23.- Alaró		



Legend

- Salt marshes and lagoons
- Mixed coasts (rock and beach) close to tourist nucleus
- Tourist nucleus rocky coast
- Urban rocky coast non tourist nucleus
- Natural rocky coast
- Tourist nucleus beach
- Urban beach non tourist nucleus
- Natural beach
- Natural mixed coasts (rock and beach)

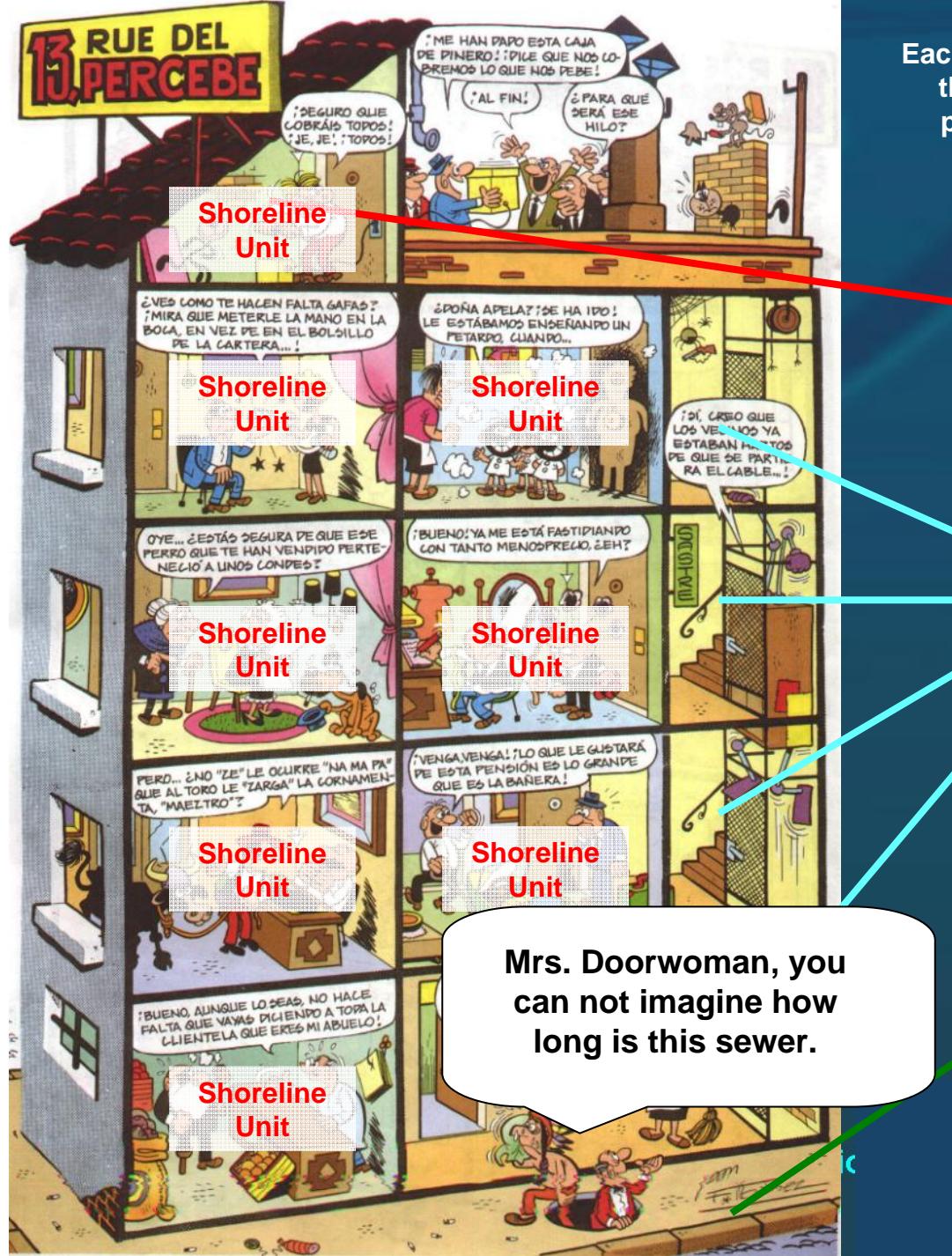


0 2,5 5 10 15 20 km

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Spatial Characterization of Badia de Palma (Mallorca, W. Mediterranean)

Each apartment represents a Shoreline Unit (represents the state and organization of coastal areas). Every person, at home, is organized as best as can be...

EXISTING REALITY

SHORELINE UNIT AND MANAGEMENT NUCLEUS

(Nucleus can include the entire area of the Shuoreline Unit)

(i.e. Beach and Dunar System may extend inland beyond 500 m, limits of Shoreline Units)

COMPLEMENTARY MANAGEMENT ZONE

(stairs or common areas)

May suffer the effects of one or several Shoreline Units (apartments) .

Shoreline Units can be influenced through the Complementary Management Zone

(i.e. marine environment of Badia de Palma)

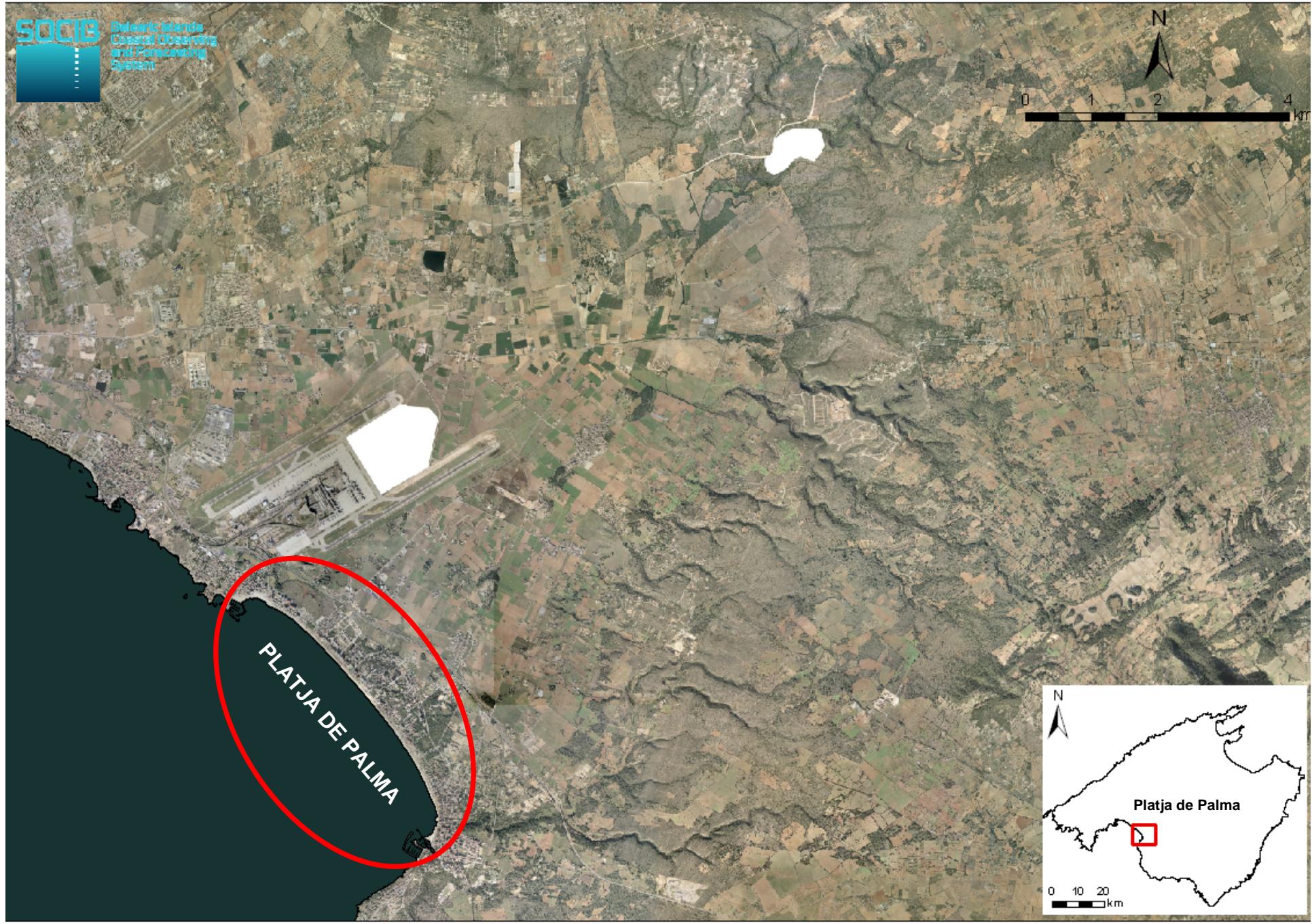
ADJACENT MANAGEMENT ZONE

(outside, street)

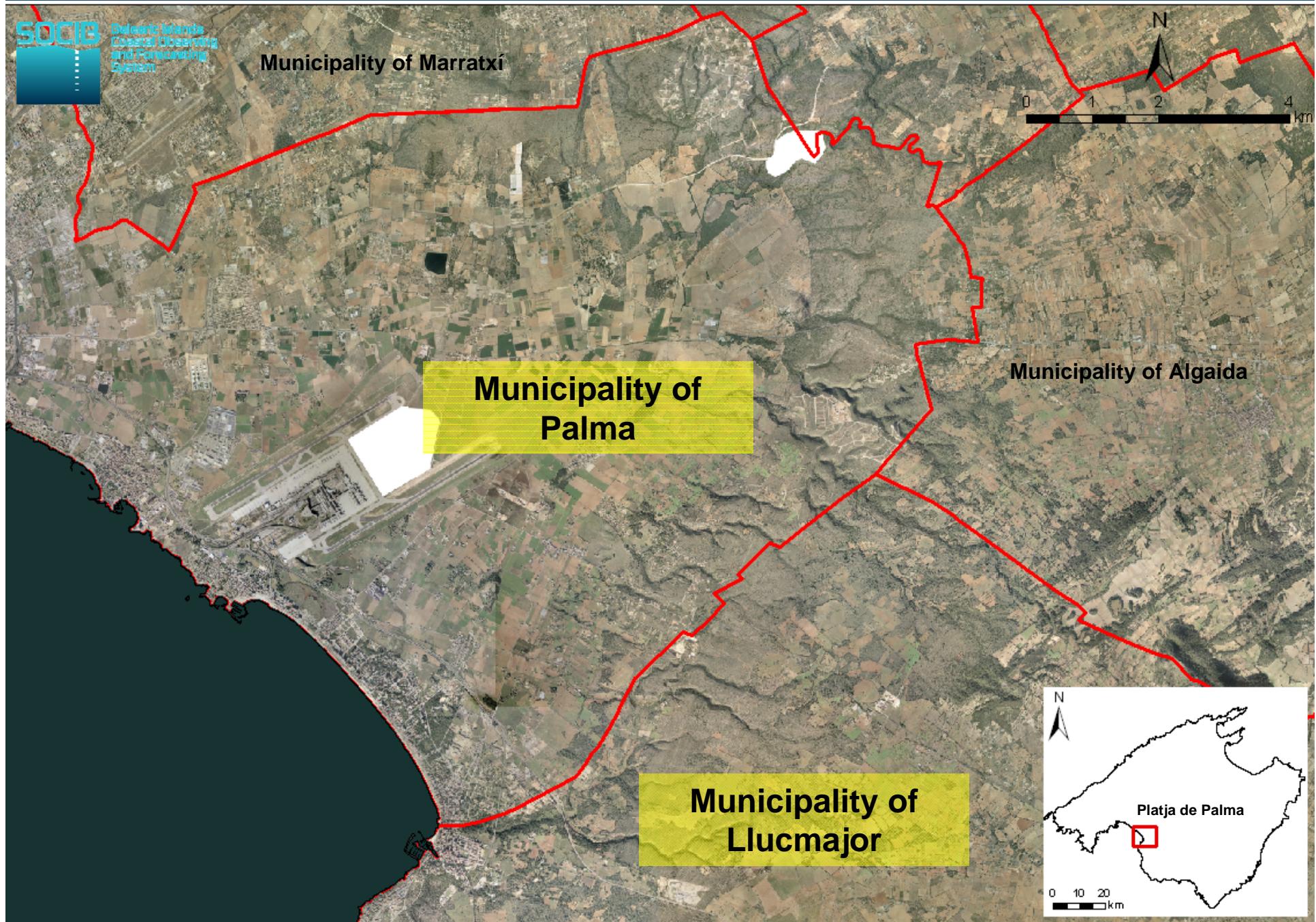
Homogeneous areas related to other Shoreline Units which incorporates a part in the complementary management area.

(p.e. part of a natural habitat or Natural protected area)

EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



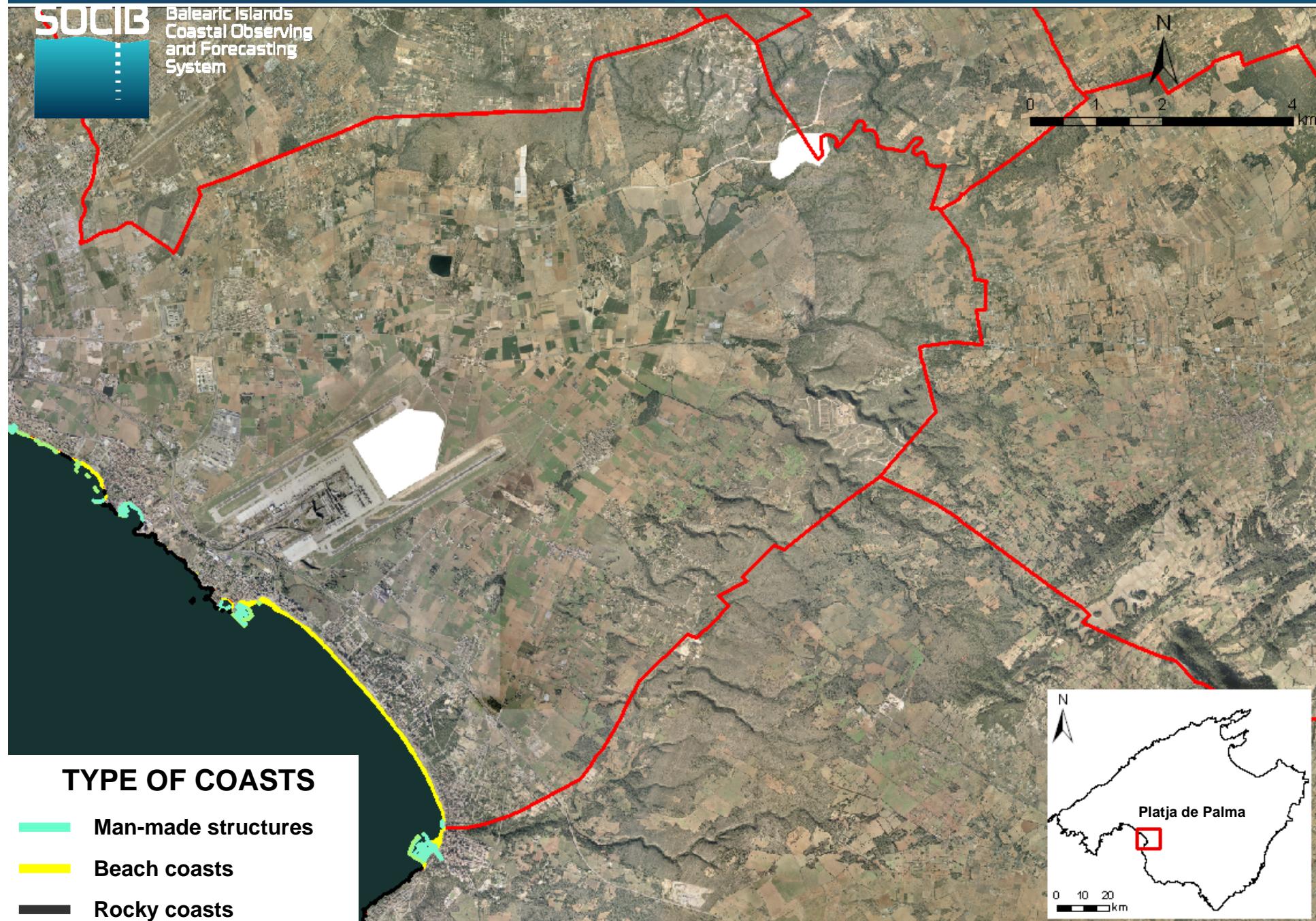
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



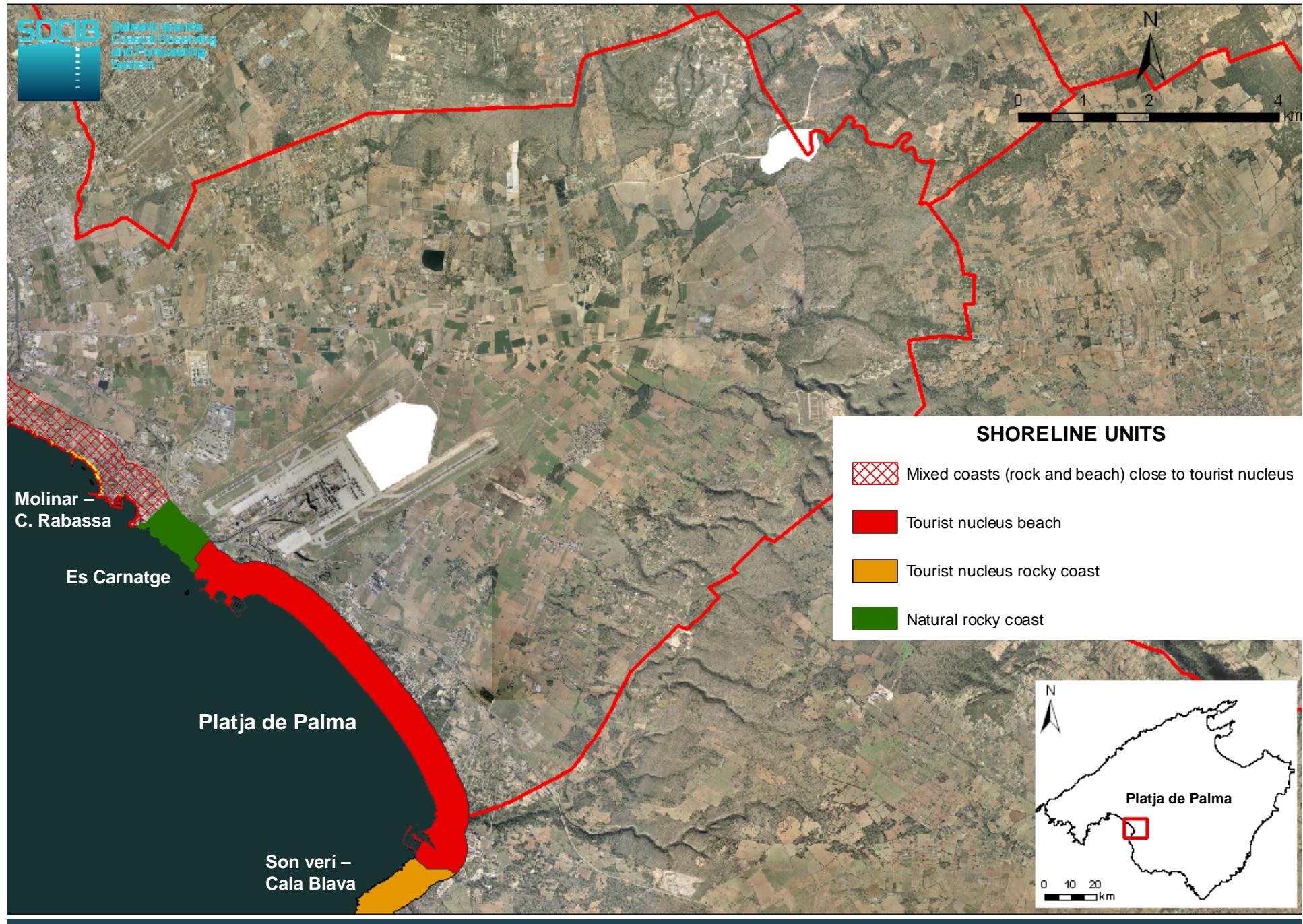
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



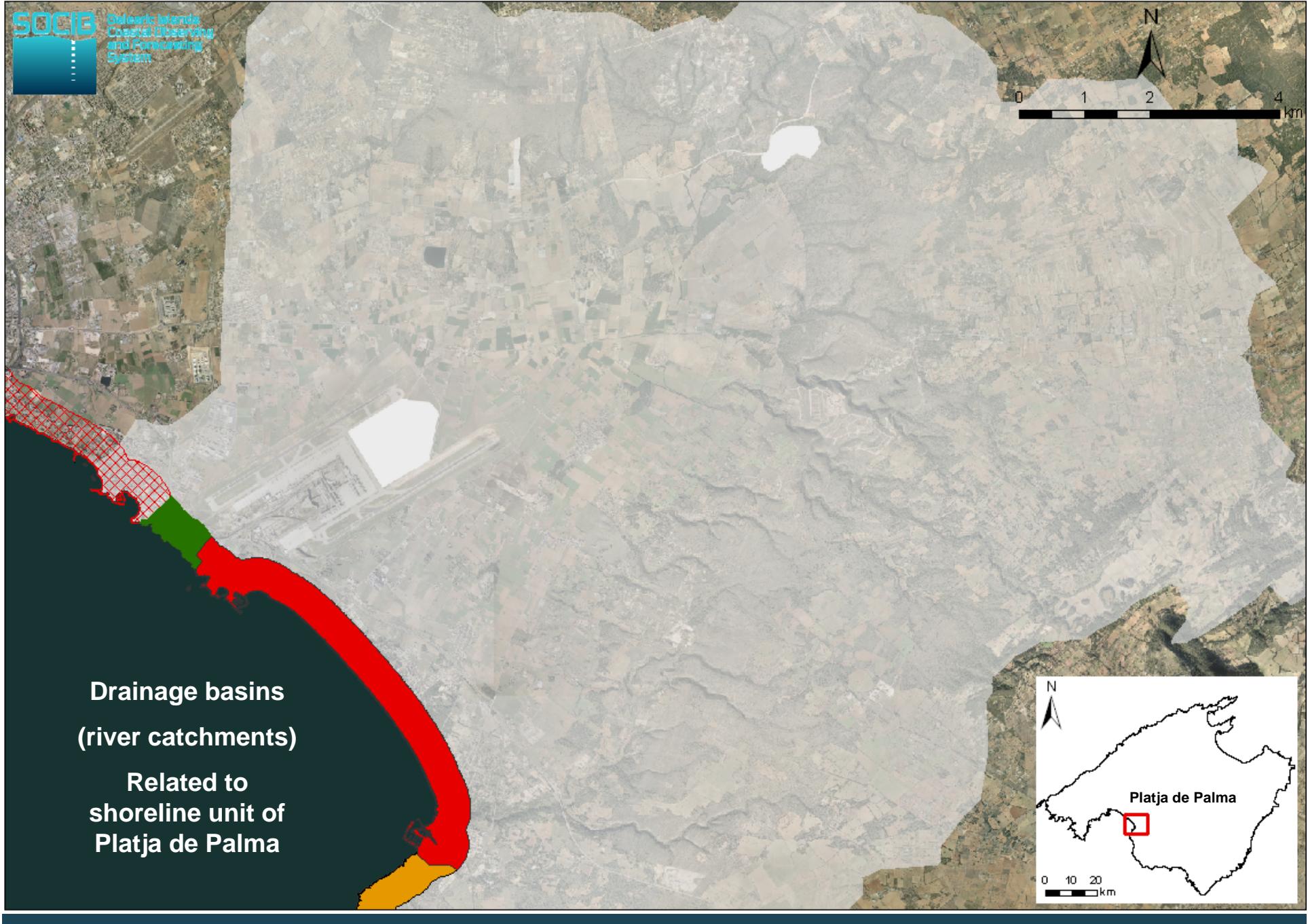
Balearic Islands
Coastal Observing
and Forecasting
System



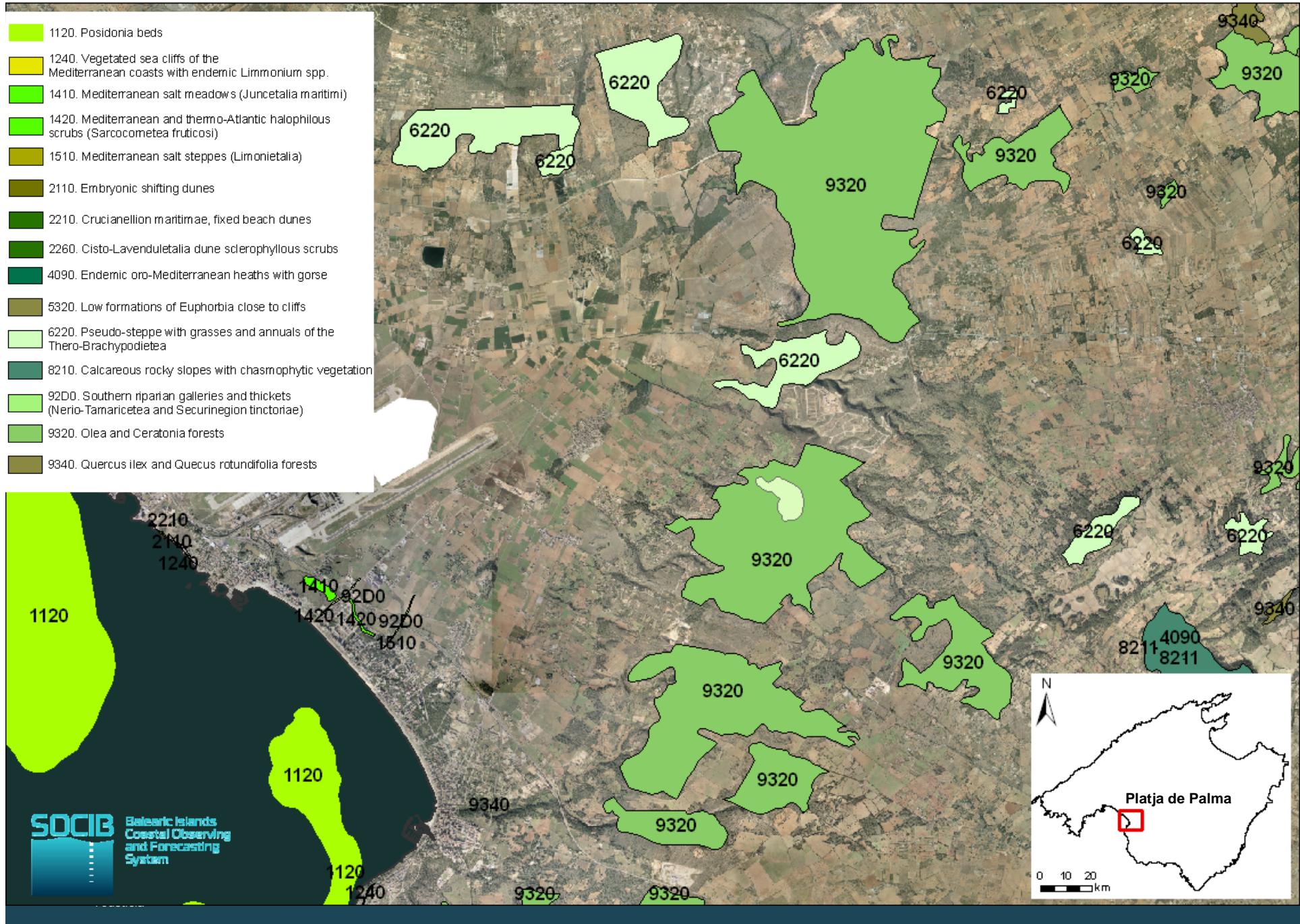
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



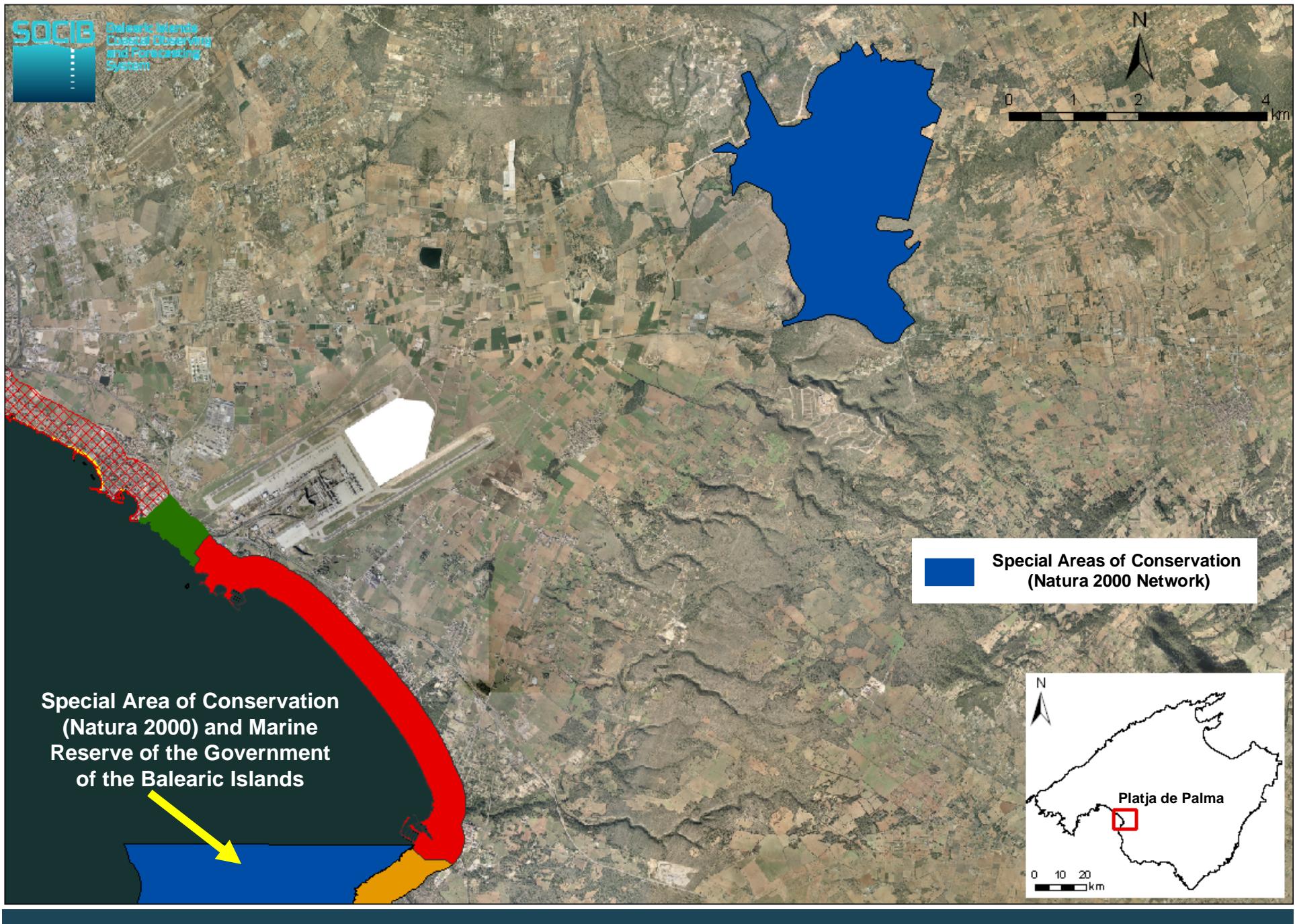
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



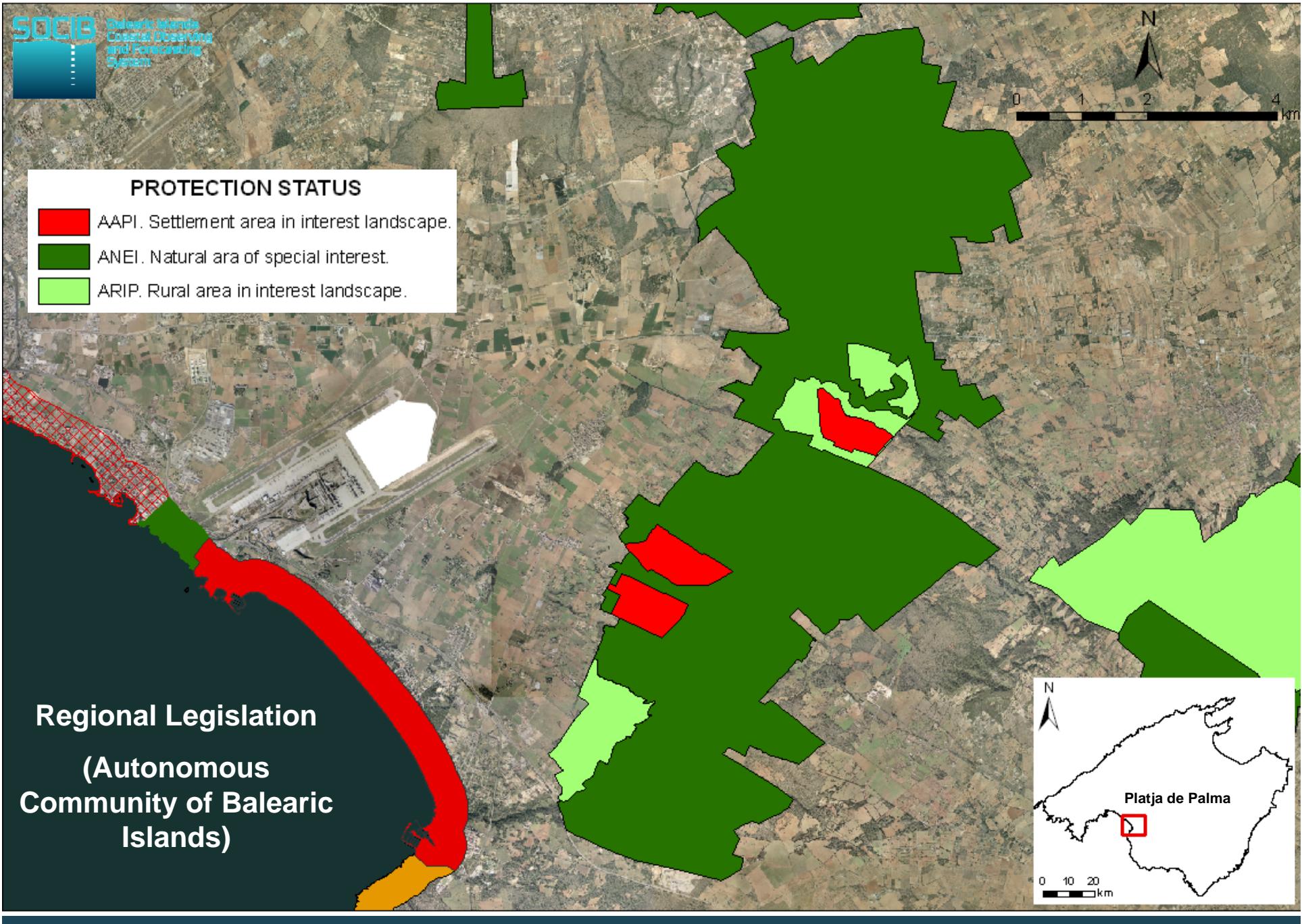
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



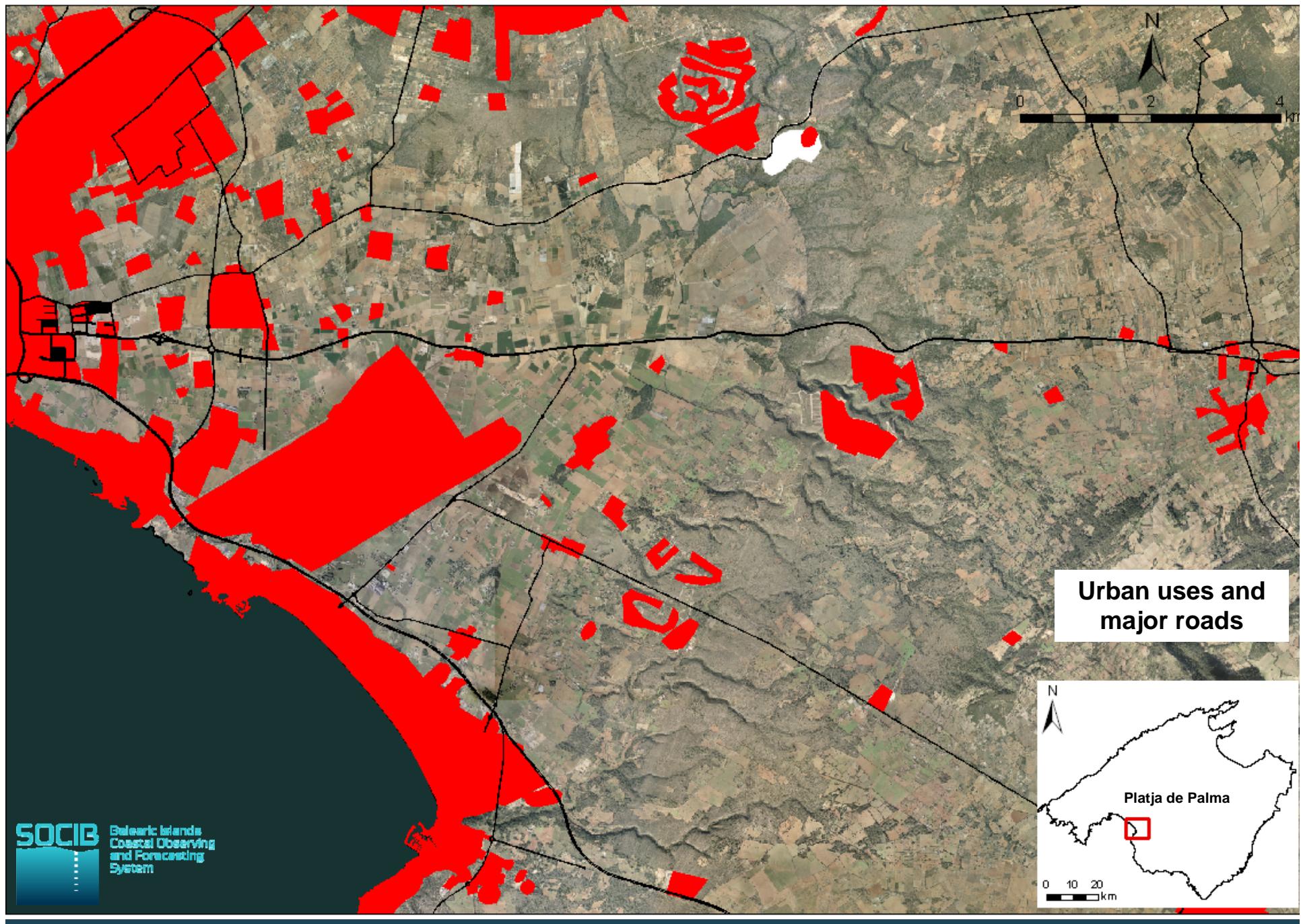
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



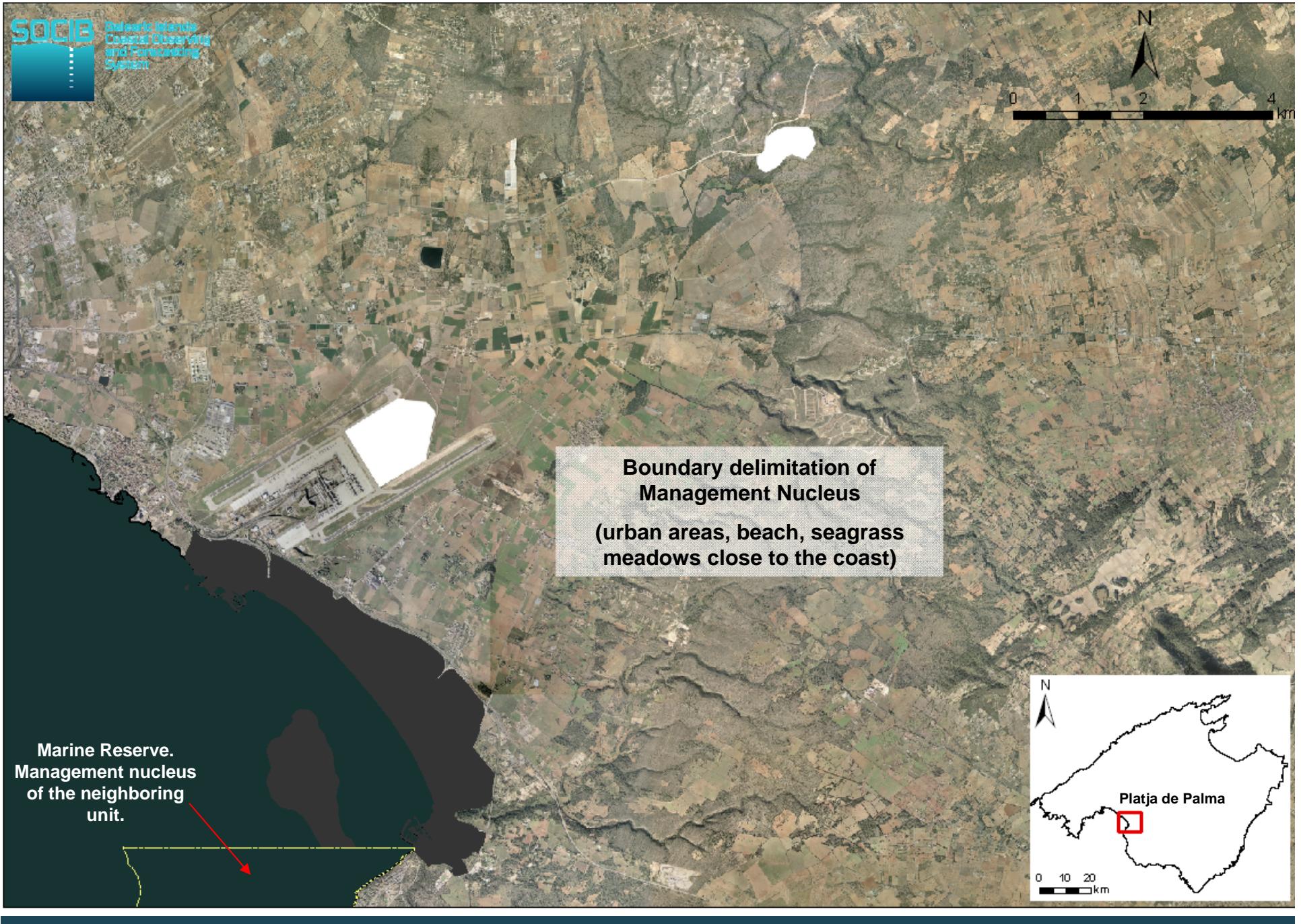
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



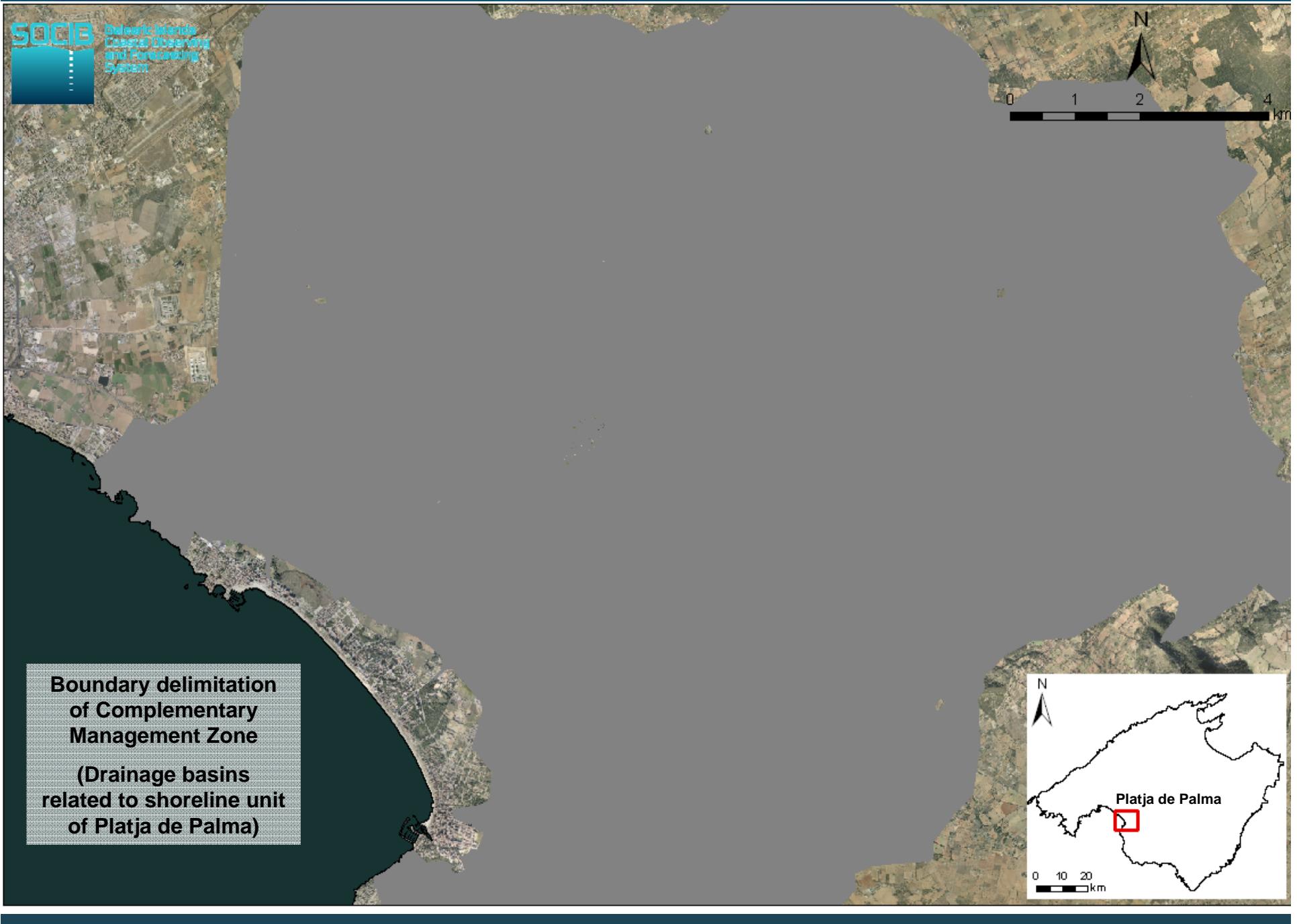
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



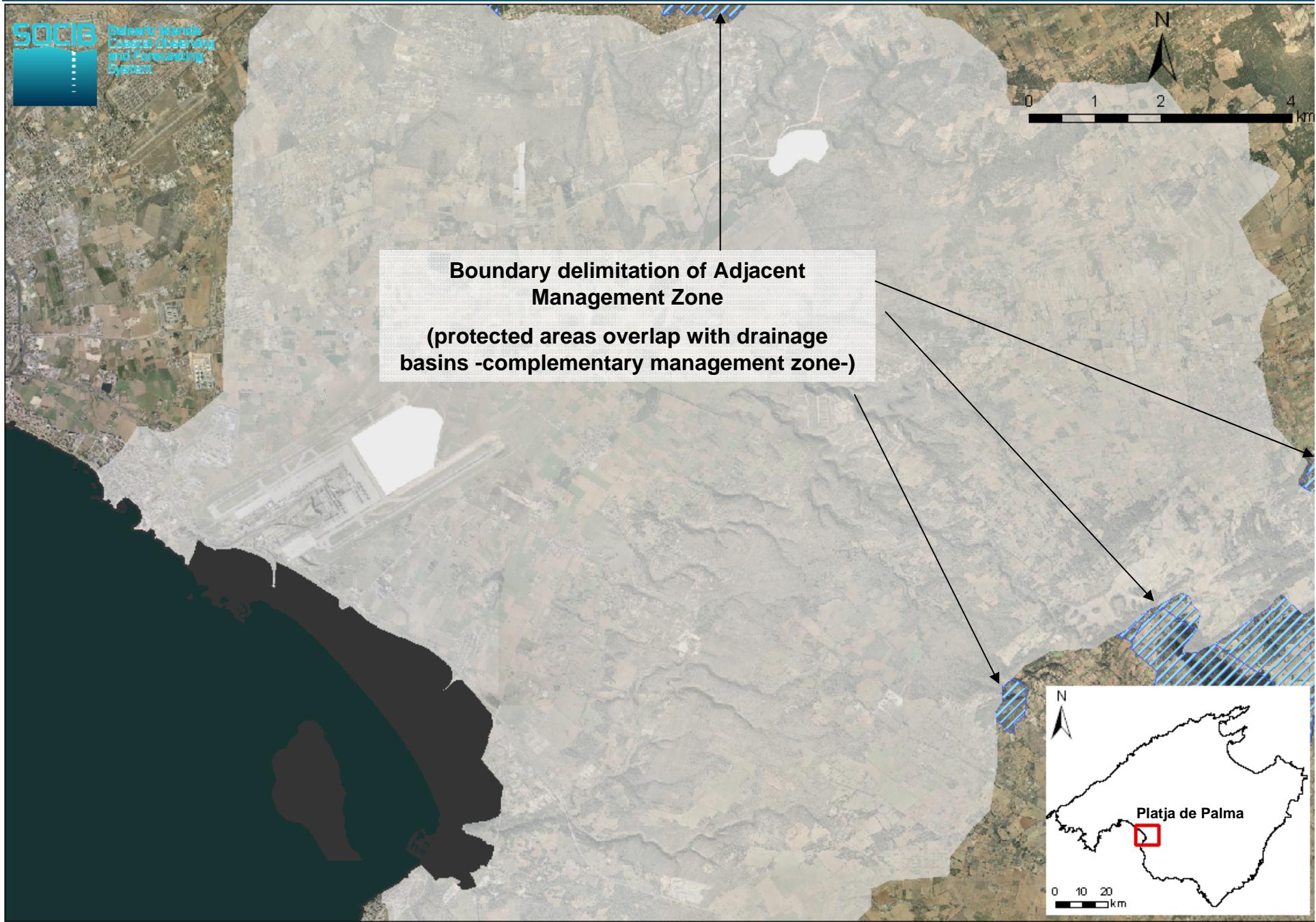
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.



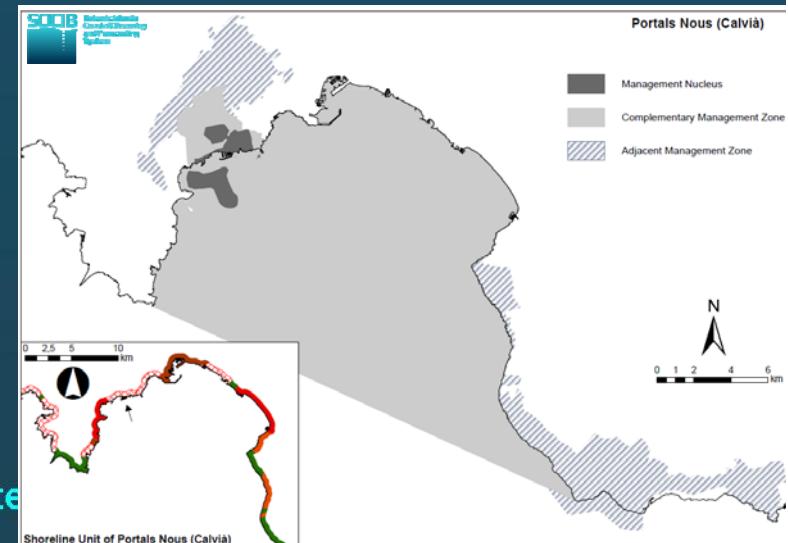
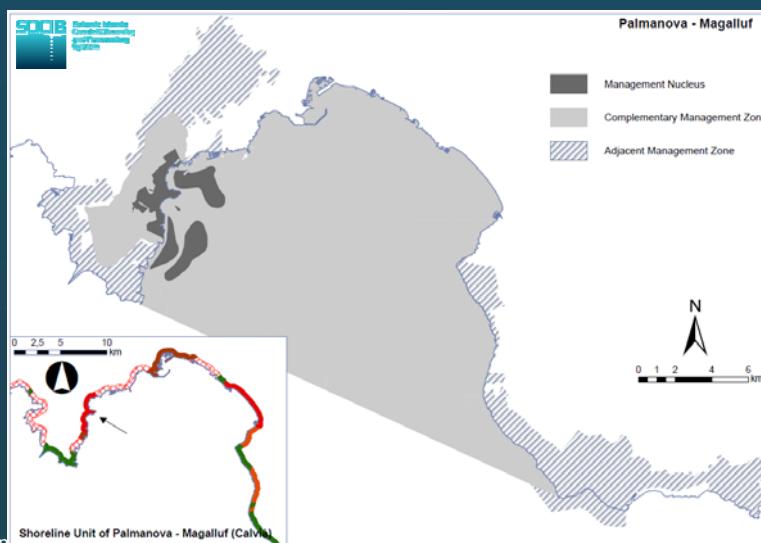
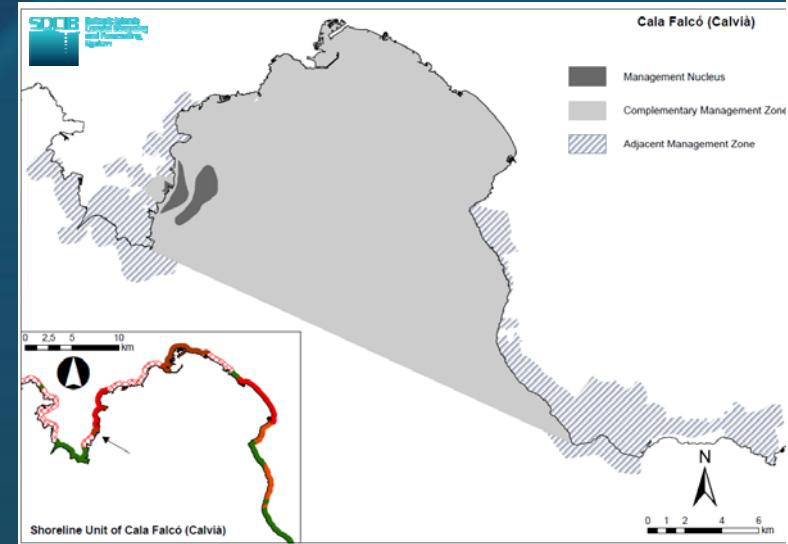
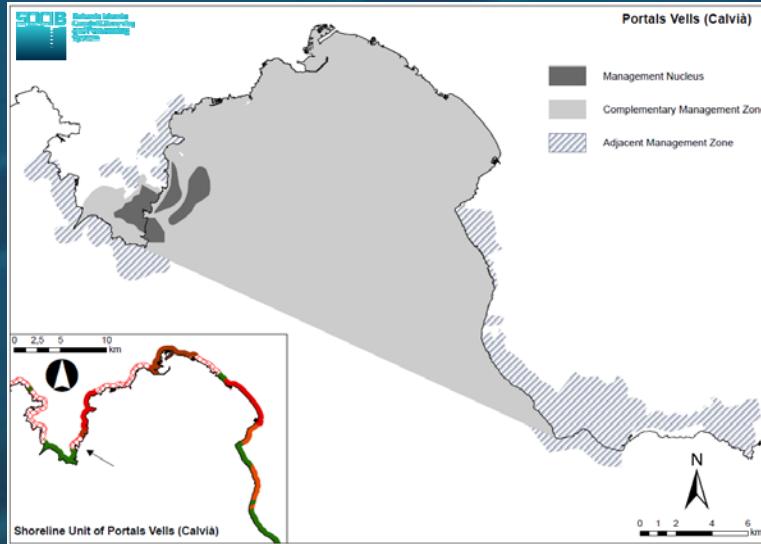
EXAMPLE OF BOUNDARY DELIMITATION OF THE COASTAL AREA OF A SHORELINE UNIT.





Methods and criteria for boundary delimitation of coastal areas

Functional areas can be shared for several Shoreline Units



File Edit View Insert Selection Tools Window Help

Editor Task: Create New Feature Target: 1:194.718 Spatial Adjustment

Layers

- Balears_2006
- Unidades Litorales Mallorca
 - <all other values>
 - TIPO_ESCEN
 - Aguas y Ambientes de t
 - Costa mixta (rocosa y p
 - Costa rocosa junto a n
 - Costa rocosa junto a n
 - Costa rocosa natural (p
 - Costa rocosa rústica (si
 - Playa junto a núcleo tur
 - Playa junto a núcleo ur
 - Playa natural
 - costa mixta (rocosa y pl
- sum_5
 - <all other values>
 - CONDICIO
 - adjacent
 - complementari
 - nuchi
- HABITATS_2
- HABITATS_1
- Imatges Aèries 1.1.1
 - Layers
 - Troquelat 2006
 - ORTOFOTO 2008 R
 - ORTOFOTO 2006
 - ORTOFOTO 04-05 I
 - OF_2005_R10C
 - OF_2004_R10C
 - SAT_2002_R10M
 - OF_2002_R45CM
 - FO_2001_R80CM
 - OF_1956_R50CM



Balearic Islands
Coastal Observing
and Forecasting
System

Spatial Characterization of Badia de Palma (Mallorca, W. Mediterranean)

METHODOLOGICAL CONSIDERATIONS (Geographical Information Systems)



Govern
de les Illes Balears
Conselleria d'Innovació, Interior
i Justícia

Sistema de Observación y Predicción Costero de las Illes Balears



GOBiERNO DE ESPAÑA

MINISTERIO DE CIENCIA E INNOVACIÓN



METHODOLOGICAL CONSIDERATIONS (Geographical Information Systems)

- Arranging digital cartographic layers (*shapefiles*) according with their range (Nucleus, Complementary & Adjacent)
- Mission: Avoid overlapping of polygons with different ranks
- Each rank (type of Functional area) have a value:
 - Management Nucleus ----- value 100
 - Complementary Management Zone ----- value 10
 - Adjacent Management Zone----- value 1

FID	Shape *	AREA	condicion	valor
0	Polygon	1,655776	núcleo	100
1	Polygon	0,643844	núcleo	100
2	Polygon	0,424722	núcleo	100
3	Polygon	2,84473	núcleo	100
4	Polygon	0,393537	núcleo	100
5	Polygon	1,916839	núcleo	100
6	Polygon	1,459998	núcleo	100
7	Polygon	0,956714	núcleo	100
8	Polygon	1,124374	núcleo	100
9	Polygon	0,000444	núcleo	100
10	Polygon	0,000523	núcleo	100
11	Polygon	0,176016	núcleo	100
12	Polygon	355,747	núcleo	100
13	Polygon	6,314537	núcleo	100
14	Polygon	13562,8	núcleo	100
15	Polygon	0,421476	núcleo	100
16	Polygon	0,630831	núcleo	100
17	Polygon	91,4459	núcleo	100
18	Polygon	8485,9	núcleo	100
19	Polygon	23984,1	núcleo	100
20	Polygon	2246,48	núcleo	100
21	Polygon	19850,2	núcleo	100
22	Polygon	1552,57	núcleo	100
23	Polygon	2693,88	núcleo	100
24	Polygon	2532,59	núcleo	100
25	Polygon	6,901431	núcleo	100

FID	Shape *	AREA	condicion	valor
0	Polygon	108,899444	Complementario	10
1	Polygon	466,223612	Complementario	10
2	Polygon	19,391113	Complementario	10
3	Polygon	160,19082	Complementario	10
4	Polygon	484,46476	Complementario	10
5	Polygon	1144,368387	Complementario	10
6	Polygon	708,349961	Complementario	10
7	Polygon	1990,2114	Complementario	10
8	Polygon	2745,418593	Complementario	10
9	Polygon	1787,291861	Complementario	10
10	Polygon	395,403455	Complementario	10
11	Polygon	23,954134	Complementario	10
12	Polygon	199,669084	Complementario	10
13	Polygon	1718,189398	Complementario	10
14	Polygon	416,545712	Complementario	10
15	Polygon	71,400777	Complementario	10
16	Polygon	55,1157	Complementario	10
17	Polygon	191,192017	Complementario	10
18	Polygon	121,528244	Complementario	10
19	Polygon	761,67802	Complementario	10
20	Polygon	103,0519	Complementario	10
21	Polygon	660,476556	Complementario	10
22	Polygon	288,247537	Complementario	10
23	Polygon	513,483479	Complementario	10
24	Polygon	550,838562	Complementario	10
25	Polygon	191,106765	Complementario	10
26	Polygon	145,2972	Complementario	10

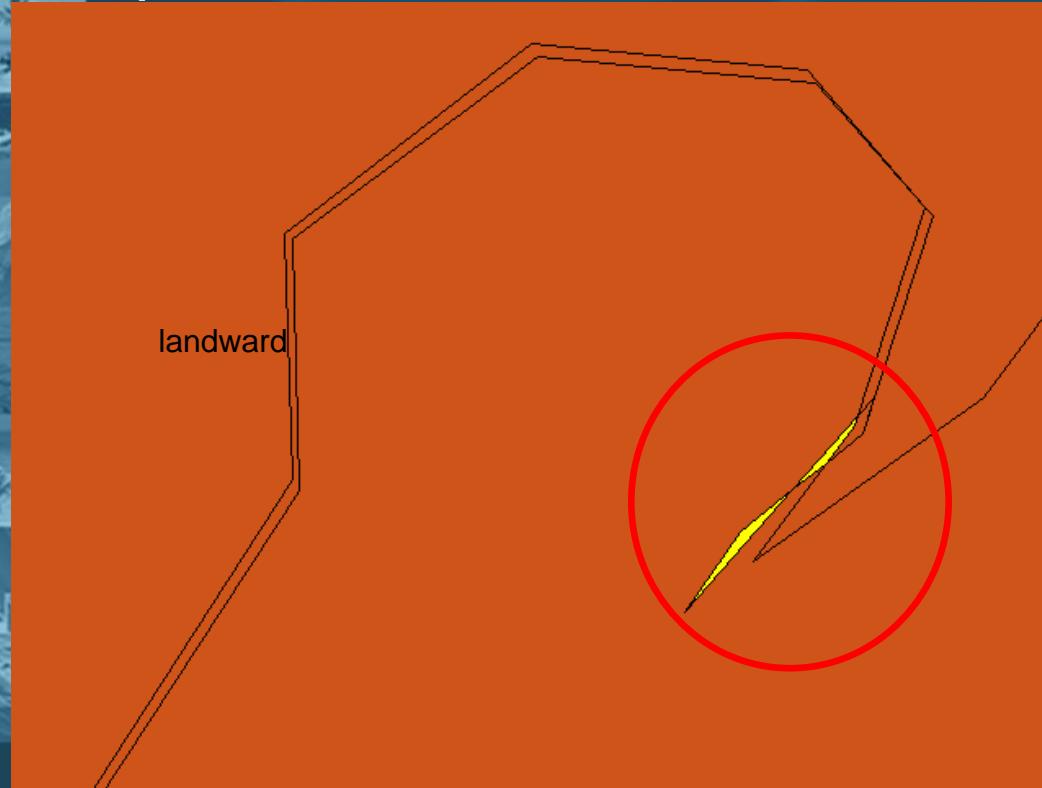
FID	Shape *	condicion	valor
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2	Polygon	adyacente	1
3	Polygon	adyacente	1
4	Polygon	adyacente	1
5	Polygon	adyacente	1
6	Polygon	adyacente	1
7	Polygon	adyacente	1
8	Polygon	adyacente	1
9	Polygon	adyacente	1
10	Polygon	adyacente	1
11	Polygon	adyacente	1
12	Polygon	adyacente	1
13	Polygon	adyacente	1
14	Polygon	adyacente	1
15	Polygon	adyacente	1
16	Polygon	adyacente	1
17	Polygon	adyacente	1
18	Polygon	adyacente	1
19	Polygon	adyacente	1
20	Polygon	adyacente	1
21	Polygon	adyacente	1
22	Polygon	adyacente	1

In the attributes table has been added a column in order to note the value for each type of Functional Areas

METHODOLOGICAL CONSIDERATIONS

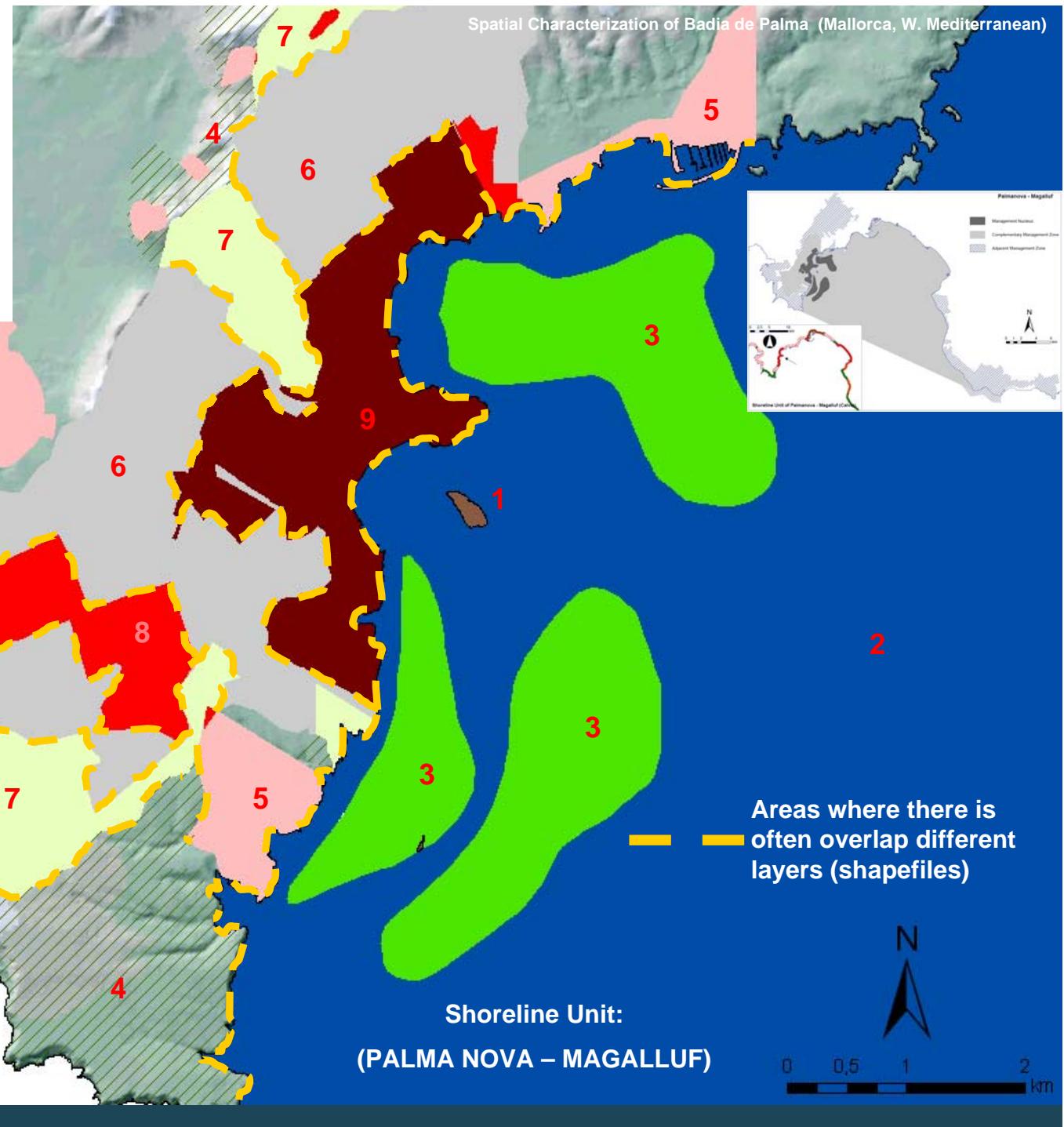
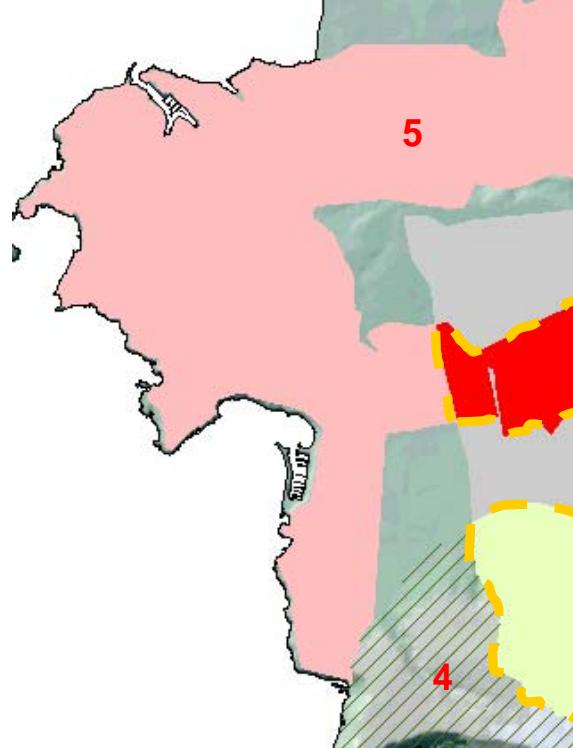
(Geographical Information Systems)

- Overlapping between different layers (digital maps, *shapes*) of functional areas of each shoreline unit may result small polygons.
- Small polygon features resulted used to appear in margins (limits of natural protected areas or natural habitats, coastline, etc..).



- Small polygons may lead errors in order to consider an area as Nucleus, Complementary or Adjacent.
- Reason: different degree of resolution of the map layers used.

- Marine Management Nucleus (islet) 1
- Marine Complementary Management Zone 2
- Marine Management Nucleus (seagrass) 3
- Adjacent Management Zone (protected areas) 4
- Adjacent Management Zone (urban nucleus) 5
- Complementary Management Zone (catchment) 6
- Complementary Management Zone (protected areas) 7
- Complementary Management Zone (urban areas) 8
- Management Nucleus (urban areas) 9



File Edit View Insert Selection Tools Window Help

Editor Task: Create New Feature Target: 1:127.416 Spatial Adjustment

Layers

- mallorcacoastline
- adyacente_platja_de_palma
- complementario_marino_platja_de_palma
- zona_complementaria_platja_de_palma
- nucleo_marino_platja_de_palma
- nucleo_Platja_de_palma

Attributes of zona_complementaria_platja_de_palma

FID	Shape *	AREA	condicion	valor
0	Polygon	108,899444	Complementario	10
1	Polygon	466,223612	Complementario	10
2	Polygon	19,391113	Complementario	10
3	Polygon	1602,19082	Complementario	10
4	Polygon	484,46477	Complementario	10
5	Polygon	1144,36837	Complementario	10
6	Polygon	708,349941	Complementario	10
7	Polygon	1990,214	Complementario	10
8	Polygon	2745,418,93	Complementario	10
9	Polygon	1787,291,61	Complementario	10
10	Polygon	395,40,455	Complementario	10
11	Polygon	23,95,134	Complementario	10
12	Polygon	199,66,084	Complementario	10
13	Polygon	1718,18,398	Complementario	10
14	Polygon	416,54,712	Complementario	10
15	Polygon	71,40,777	Complementario	10
16	Polygon	55,157	Complementario	10
17	Polygon	191,192,117	Complementario	10
18	Polygon	121,528,44	Complementario	10
19	Polygon	761,878,02	Complementario	10
20	Polygon	103,05,9	Complementario	10
21	Polygon	660,47855	Complementario	10
22	Polygon	288,247537	Complementario	10
23	Polygon	513,483479	Complementario	10
24	Polygon	550,838562	Complementario	10
25	Polygon	191,106765	Complementario	10
26	Polygon	145,2977	Complementario	10

Record: 0 Show: All Selected

Attributes of nucleo_Platja_de_palma

FID	Shape *	AREA	condicion	valor
0	Polygon	1,67,5776	núcleo	100
1	Polygon	0,613844	núcleo	100
2	Polygon	0,124722	núcleo	100
3	Polygon	2,84473	núcleo	100
4	Polygon	1,393537	núcleo	100
5	Polygon	1,916839	núcleo	100
6	Polygon	1,459998	núcleo	100
7	Polygon	0,956714	núcleo	100
8	Polygon	1,124374	núcleo	100
9	Polygon	0,000444	núcleo	100
10	Polygon	0,000523	núcleo	100
11	Polygon	0,176016	núcleo	100
12	Polygon	355,747	núcleo	100
13	Polygon	6,314537	núcleo	100
14	Polygon	13562,8	núcleo	100
15	Polygon	0,421476	núcleo	100
16	Polygon	0,630831	núcleo	100
17	Polygon	91,4459	núcleo	100
18	Polygon	8485,9	núcleo	100
19	Polygon	39984,1	núcleo	100
20	Polygon	2,46,48	núcleo	100
21	Polygon	19,50,2	núcleo	100
22	Polygon	155,57	núcleo	100
23	Polygon	2693,5	núcleo	100
24	Polygon	2532,59	núcleo	100
25	Polygon	6,901431	núcleo	100

Record: 0 Show: All Selected

Attributes of adyacente_platja_de_palma

FID	Shape *	condicion	valor
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1	Polygon	adyacente	1
2	Polygon	adyacente	1
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4	Polygon	adyacente	1
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6	Polygon	adyacente	1
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14	Polygon	adyacente	1
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17	Polygon	adyacente	1
18	Polygon	adyacente	1
19	Polygon	adyacente	1
20	Polygon	adyacente	1
21	Polygon	adyacente	1
22	Polygon	adyacente	1

Record: 0 Show: All Selected

Sin título - ArcMap - ArcInfo

Spatial Characterization of Badia de Palma (Mallorca, W. Mediterranean)

NEW CONDITION:

NUCLEUS
(MANAGEMENT NUCLEUS)

The screenshot illustrates a spatial analysis workflow in ArcMap. It shows four main dialog boxes:

- Attributes of nucleo de gestión**: Shows three records for 'nucleo' with 'condicio' and 'valor' values.
- Attributes of zona complementaria de gestión**: Shows three records for 'complementario' with 'condicio' and 'valor' values.
- Attributes of SUM_1**: Shows a table with columns FID, Shape, condicio, valor, condicio_1, valor_1, and SUM_1. The SUM_1 column is highlighted in red.
- Field Calculator**: Shows a script to calculate the SUM_1 field as [valor] + [valor_1].

Yellow arrows point from the 'nucleo de gestión' and 'zona complementaria de gestión' tables to the 'SUM_1' table, indicating their relationship. Red arrows point from the 'Field Calculator' to the 'SUM_1' table, indicating the calculation process.

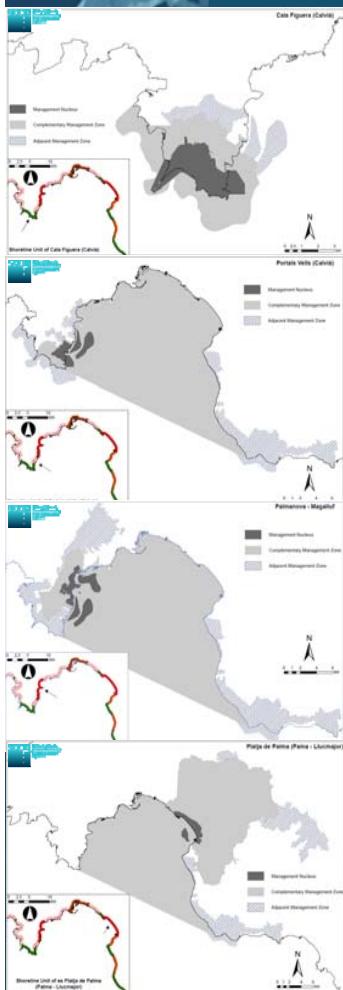
Tables Data (SUM_1)

FID	Shape	condicio	valor	condicio_1	valor_1	SUM_1
0	Polygon	nucleo	100	complementario	10	110
1	Polygon	nucleo	100	complementario	10	110
2	Polygon	nucleo	100	complementario	10	110
3	Polygon	nucleo	100	complementario	0	100
4	Polygon	nucleo	100	complementario	0	100
5	Polygon	nucleo	100	complementario	0	100
6	Polygon	nucleo	100	complementario	0	100
7	Polygon	nucleo	100	complementario	0	100
8	Polygon	nucleo	100	complementario	10	110
9	Polygon	nucleo	100	complementario	10	110
10	Polygon	nucleo	100	complementario	10	110
11	Polygon	nucleo	100	complementario	0	100
12	Polygon	nucleo	100	complementario	0	100
13	Polygon	nucleo	100	complementario	0	100
14	Polygon	nucleo	100	complementario	0	100
15	Polygon	nucleo	100	complementario	0	100
16	Polygon	nucleo	100	complementario	0	100
17	Polygon	nucleo	100	complementario	0	100
18	Polygon	nucleo	100	complementario	0	100
19	Polygon	nucleo	100	complementario	0	100
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21	Polygon	nucleo	100	complementario	0	100
22	Polygon	nucleo	100	complementario	0	100
23	Polygon	nucleo	100	complementario	0	100
24	Polygon	nucleo	100	complementario	0	100
25	Polygon	nucleo	100	complementario	0	100
26	Polygon	nucleo	100	complementario	0	100
27	Polygon	nucleo	100	complementario	0	100
28	Polygon	nucleo	100	complementario	0	100
29	Polygon	nucleo	100	complementario	0	100
30	Polygon	nucleo	100	complementario	0	100
31	Polygon	nucleo	100	complementario	0	100
32	Polygon	nucleo	100	complementario	0	100
33	Polygon	nucleo	100	complementario	0	100
34	Polygon	nucleo	100	complementario	0	100
35	Polygon	nucleo	100	complementario	0	100
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37	Polygon	nucleo	100	complementario	0	100
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39	Polygon	nucleo	100	complementario	0	100
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41	Polygon	nucleo	100	complementario	0	100
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47	Polygon	nucleo	100	complementario	0	100
48	Polygon	nucleo	100	complementario	0	100
49	Polygon	nucleo	100	complementario	0	100
50	Polygon	nucleo	100	complementario	0	100
51	Polygon	nucleo	100	complementario	0	100
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66	Polygon	nucleo	100	complementario	0	100
67	Polygon	nucleo	100	complementario	0	100
68	Polygon	nucleo	100	complementario	0	100
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71	Polygon	nucleo	100	complementario	0	100
72	Polygon	nucleo	100	complementario	0	100
73	Polygon	nucleo	100	complementario	0	100
74	Polygon	nucleo	100	complementario	0	100
75	Polygon	nucleo	100	complementario	0	100
76	Polygon	nucleo	100	complementario	0	100
77	Polygon	nucleo	100	complementario	0	100
78	Polygon	nucleo	100	complementario	0	100
79	Polygon	nucleo	100	complementario	0	100
80	Polygon	nucleo	100	complementario	0	100
81	Polygon	nucleo	100	complementario	0	100
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87	Polygon	nucleo	100	complementario	0	100
88	Polygon	nucleo	100	complementario	0	100
89	Polygon	nucleo	100	complementario	0	100
90	Polygon	nucleo	100	complementario	0	100
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97	Polygon	nucleo	100	complementario	0	100
98	Polygon	nucleo	100	complementario	0	100
99	Polygon	nucleo	100	complementario	0	100
100	Polygon	nucleo	100	complementario	0	100



METHODOLOGICAL CONSIDERATIONS (Geographical Information Systems)

SUMMARY OF SCORING PROCESS OF FUNCTIONAL AREAS:



case 1: Nucleus + Nucleus. Resulting value: 200

Functional area remains as Management NUCLEUS

case 2: Nucleus + Complementary. Resulting value: 110

Functional area remains as Management NUCLEUS

case 3: Nucleus + Adjacent. Resulting value: 101

Functional area remains as Management NUCLEUS

case 4: Complementary + Complementary. Resulting value: 20

Functional area remains as Complementary Management Zone

case 5: Complementary + Adjacent. Resulting value: 11

Functional area remains as Complementary Management Zone

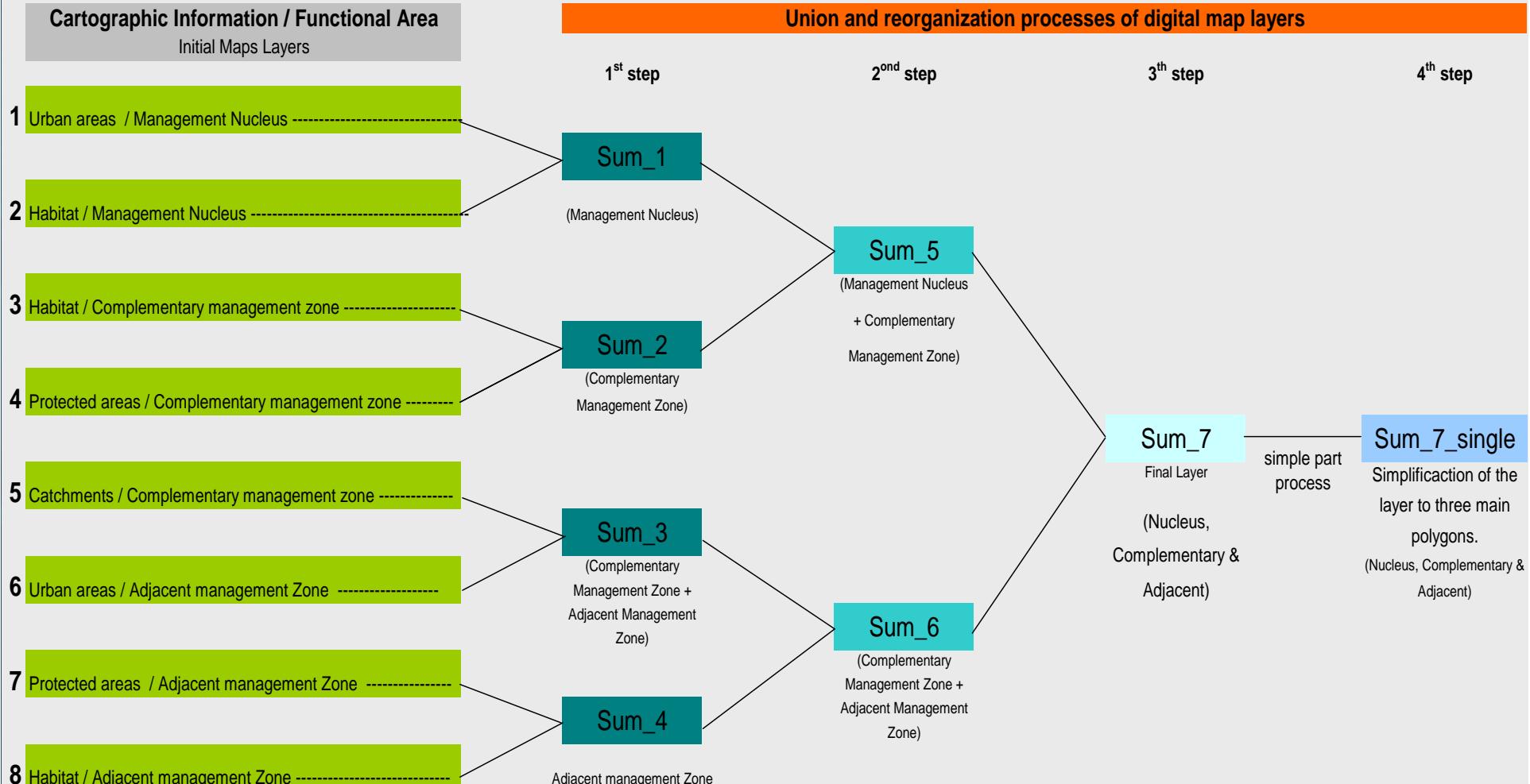
case 6: Adjacent + Adjacent. Resulting value: 2

Functional area remains as Adjacent Management Zone



METHODOLOGICAL CONSIDERATIONS (Geographical Information Systems)

PROCESS FOR DETERMINATION OF FUNCTIONAL AREAS OF A SHORLINE UNIT (S.U.)



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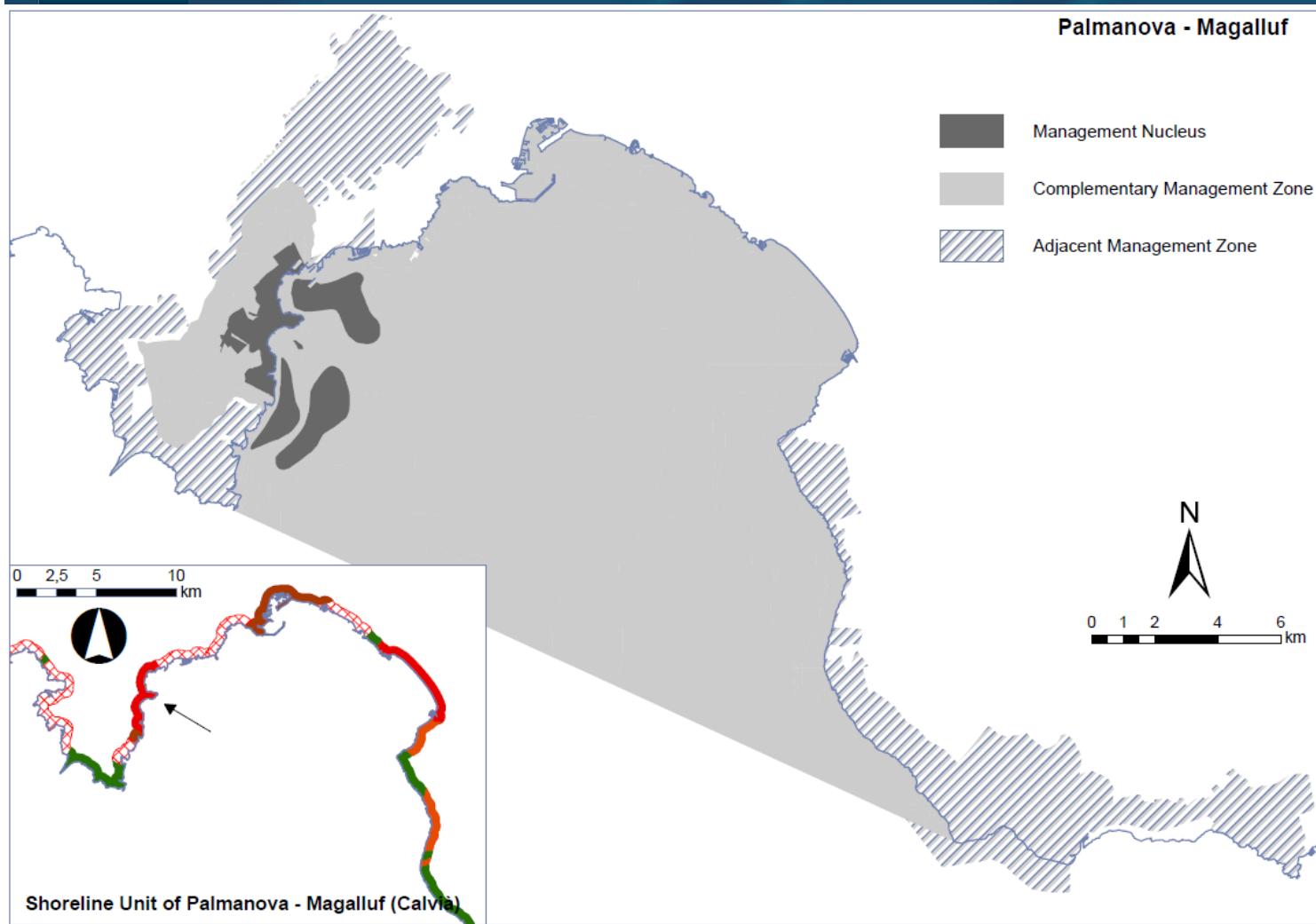
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The results of these processes (exposed above) are the clear establishment of functional areas of Shoreline Units



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METHODOLOGICAL CONSIDERATIONS (Geographical Information Systems)

LAST STAGE

Functional Areas S.U. 1

Functional Areas S.U. 2

Functional Areas S.U. 3

Functional Areas S.U. 4

Functional Areas S.U. 5

Functional areas establishment of
Functional Areas
of each S.U.

Functional Areas S.U. 6

Functional Areas S.U. 7

**JUST
EXPLAINED!!!**

Functional Areas S.U. 8

Functional Areas S.U. 9

Functional Areas S.U. 10

Functional Areas S.U. 11

Functional Areas S.U. 12

Functional Areas S.U. 13

Functional Areas S.U. 14

Functional Areas S.U. 15

Functional Areas S.U. 16

Union between layers of Shoreline Units (S.U.) of Badia de Palma

union 1

union 2

union 3

union 4

union 5

union 6

union 7

union 8

union 9

union 10

union 11

union 12

union 13

union 14

union 15



**Final map concerning to
Functional Area of Badia
de Palma**





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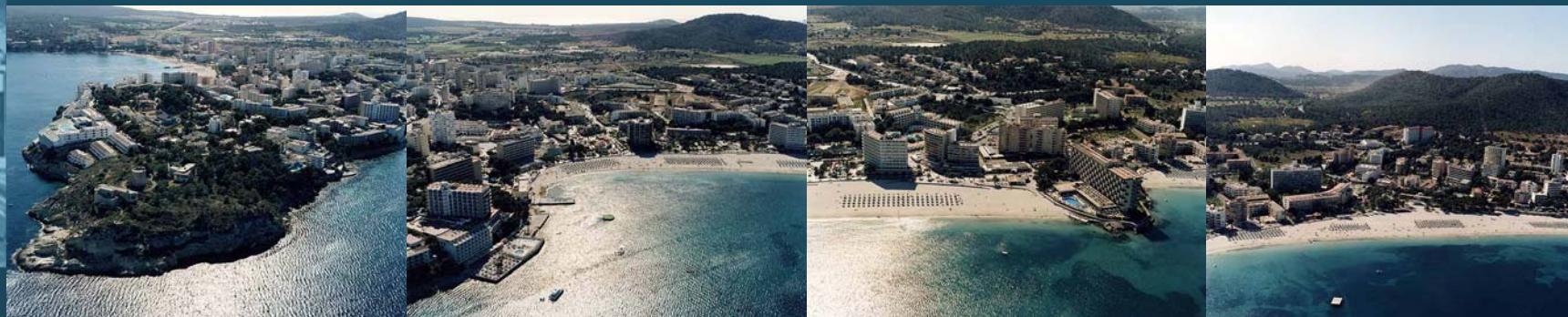
METHODOLOGICAL CONSIDERATIONS (Geographical Information Systems)

- Scoring process of functional areas in order to determine most vulnerable areas in Badia de Palma.

- This section is based on overlying processes, using GIS, of all functional areas of each SU. Have been given a value/score according with the status of functional areas (nucleus, complementary, adjacent).

- Score:

- 1) Management nucleus: value 3
- 2) Complementary management zone: value 2
- 3) Adjacent management zone: value 1



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METHODOLOGICAL CONSIDERATIONS (Geographical Information Systems)

Attributes of palmanova_mag...

FID	Shape *	CONDICION	PALMA NOVA
0	Polygon	adjacent	1
1	Polygon	complementari	2
2	Polygon	nucli	3

Attributes of cala_falco_tot_sin...

FID	Shape *	CONDICION	CALA FALCO
0	Polygon	adjacent	1
1	Polygon	complementari	2
2	Polygon	nucli	3

-Sum of values of functional units belonging to SUs of Badia de Palma

Attributes of Z

sum

FID	Shape	C_FALCO	CONDICION	CONDICION1	PALMA NOVA	HOT_Z
37	Polygon	1	adjacent		0	
38	Polygon	1	adjacent		0	
39	Polygon	1	adjacent		0	
40	Polygon	1	adjacent		0	1
41	Polygon	1	adjacent		0	1
42	Polygon	1	adjacent		0	1
43	Polygon	1	adjacent		0	1
44	Polygon	1	adjacent		0	1
45	Polygon	1	adjacent		0	1
46	Polygon	1	adjacent		0	1
47	Polygon	1	adjacent		0	1
48	Polygon	1	adjacent		0	1
49	Polygon	1	adjacent		0	1
50	Polygon	1	adjacent		1	
51	Polygon	1	adjacent		1	
52	Polygon	1	adjacent		1	
53	Polygon	1	adjacent	adjacent	2	
54	Polygon	1	adjacent	adjacent	2	
55	Polygon	1	adjacent	adjacent	2	
56	Polygon	1	adjacent	complementari	3	
57	Polygon	1	adjacent		1	
58	Polygon	1	adjacent	adjacent	2	
59	Polygon	1	adjacent	complementari	3	
60	Polygon	1	adjacent	nucli	4	
61	Polygon	1	adjacent	nucli	4	
62	Polygon	1	adjacent		1	
63	Polygon	2	complementari	complementari	4	
64	Polygon	2	complementari	complementari	4	
65	Polygon	2	complementari	complementari	4	
66	Polygon	2	complementari	complementari	4	
67	Polygon	2	complementari	complementari	4	
68	Polygon	2	complementari	complementari	2	4
69	Polygon	2	complementari	complementari	2	4
70	Polygon	2	complementari	complementari	2	4
71	Polygon	2	complementari	complementari	2	4
72	Polygon	2	complementari	complementari	2	4
73	Polygon	2	complementari	complementari	2	4
74	Polygon	2	complementari	complementari	2	4
75	Polygon	2	complementari	complementari	2	4
76	Polygon	2	complementari	complementari	2	4
77	Polygon	2	complementari	complementari	2	4



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5.- PRELIMINARY RESULTS



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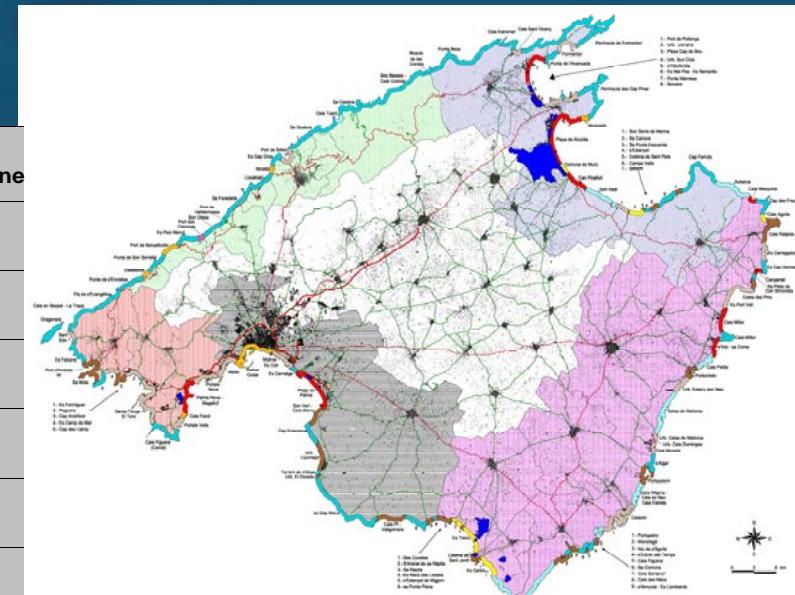
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Shoreline Unit (type)	Number of SU	Length of coastline (km)	% of coastline
Natural beach	7	15.04	2.2
Urban beaches non tourist nucleus	3	2.99	0.4
Tourist nucleus beach	10	70.66	10.3
Natural rocky coast	41	272.81	39.6
Urban rocky coast	7	39.14	5.7
Tourist nucleus rocky coast	22	96.31	14
Salt marshes and lagoons	1	0.73	0.1
Mixed natural coasts (rock and beach)	8	62.38	9.1
Mixed coasts (rock and beach) close to tourist nucleus	23	128.24	18.6
HEMUs	SU categories	Number of SU	Length of coastline (km)
Palma – Migjorn	5	15	103.63
Llevant	7	42	190.10
Nord	9	29	181.30
Tramuntana	5	18	85.38
Ponent	5	18	126.83
			18.5



General results for Mallorca

(Balaguer et al., 2008)



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Badia de Palma 16 Shorelines Units

- 1.- Cala Figuera (Calvià)
- 2.- Portals Vells
- 3.- Cala Falcó
- 4.- Palma Nova –Magalluf
- 5.- Portals Nous
- 6.- Sant Agustí
- 7.- Palma Ciudad
- 8.- Molinar – Coll d'en Rabassa
- 9.- es Carnatge
- 10.- Platja de Palma
- 11.- Son Verí – Cala Blava
- 12.- Cap Enderrocat
- 13.- Urbanitzacions Llucmajor
- 14.- Torrent de s'Osca d'es Pi
- 15.- Tolleric – El Dorado
- 16.- Cap Blanc

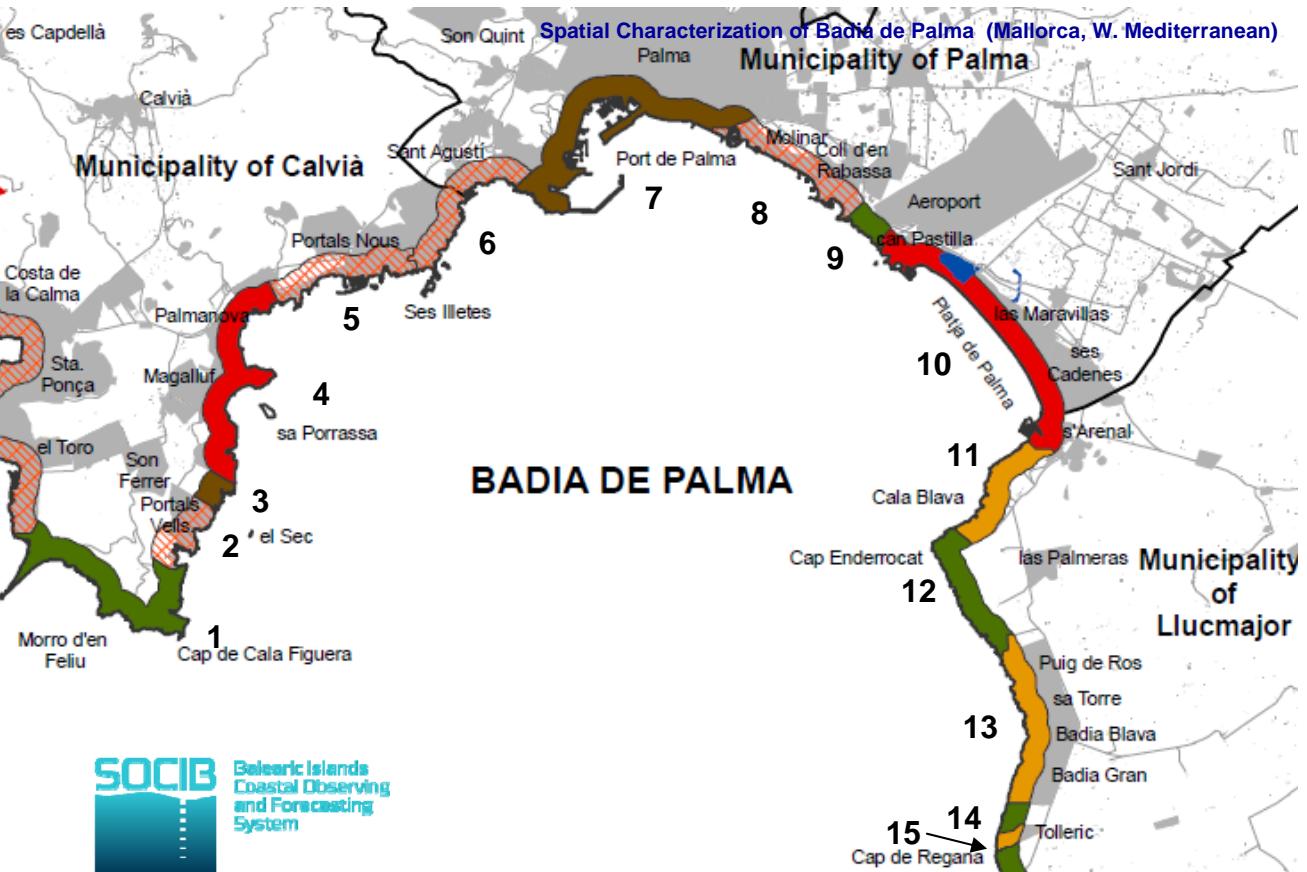


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**Shoreline Units, Municipalities
and
Urban Centers**



0 2,5 5 10 km

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DIVERSITY OF HABITATS AND TYPES OF COASTS



Spatial Characterization of Badia de Palma (Mallorca, W. Mediterranean)



**BADIA
DE
PALMA**



0 2,5 5 km



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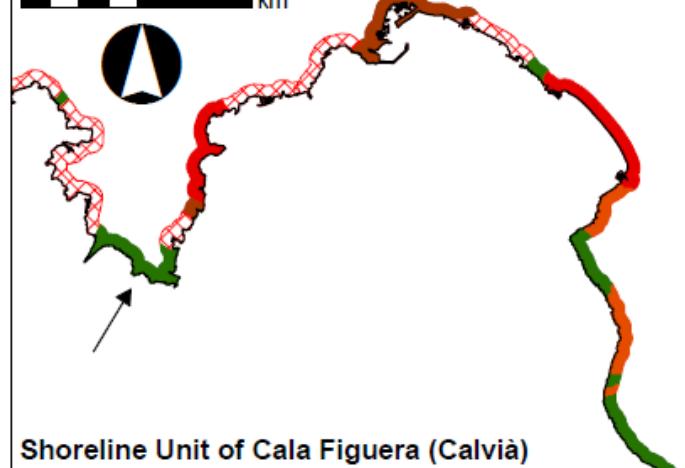
Cala Figuera (Calvià)

Management Nucleus

Complementary Management Zone

Adjacent Management Zone

0 2,5 5 10 km



Shoreline Unit of Cala Figuera (Calvià)

0 0,5 1 2 3 km



0 0,5 1 2 3 km



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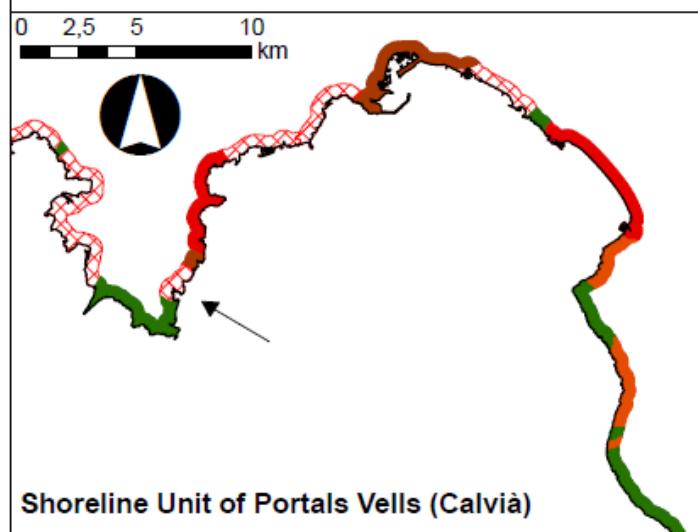
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Portals Vells (Calvià)

- Management Nucleus
- Complementary Management Zone
- Adjacent Management Zone



0 1 2 4 6 km



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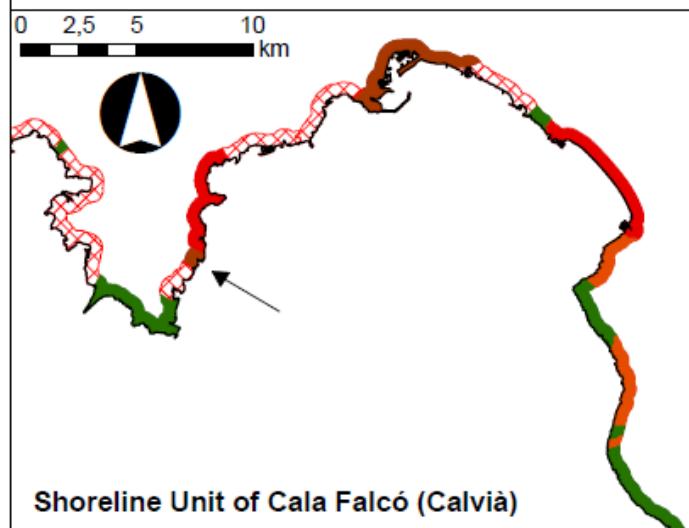
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Cala Falcó (Calvià)

- Management Nucleus
- Complementary Management Zone
- Adjacent Management Zone



0 1 2 4 6 km



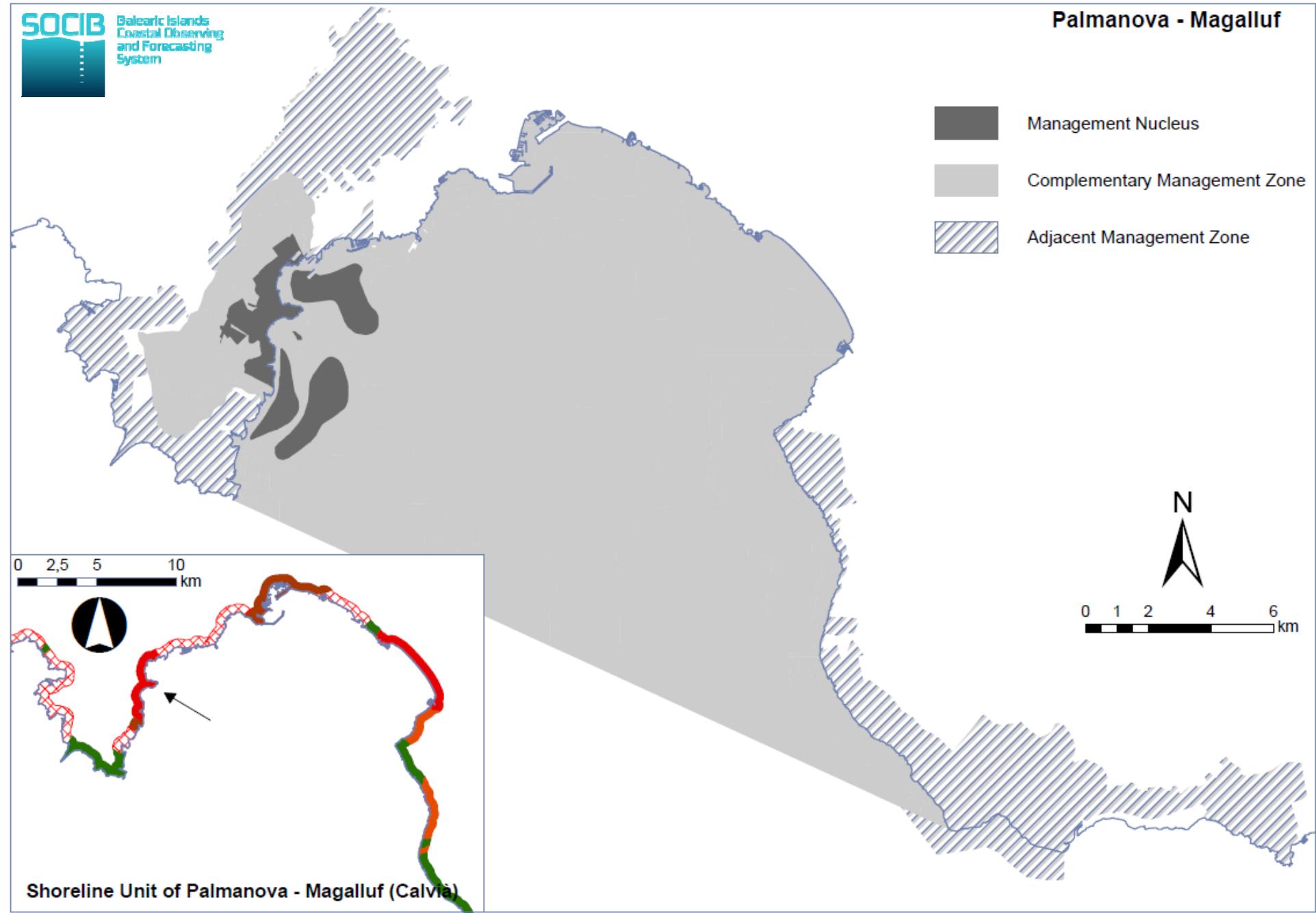
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Palmanova - Magalluf



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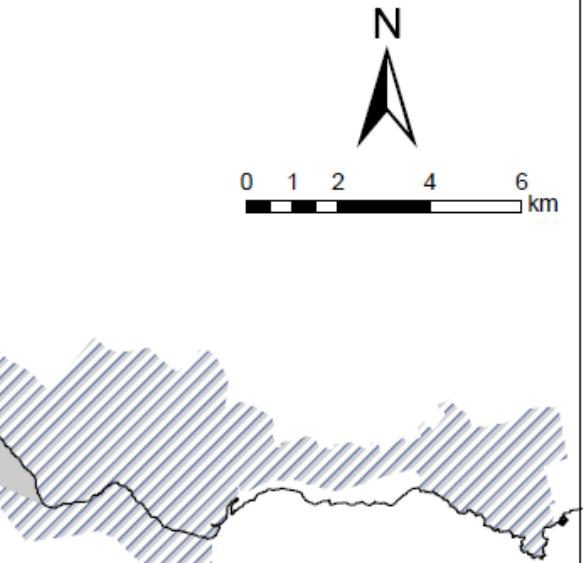
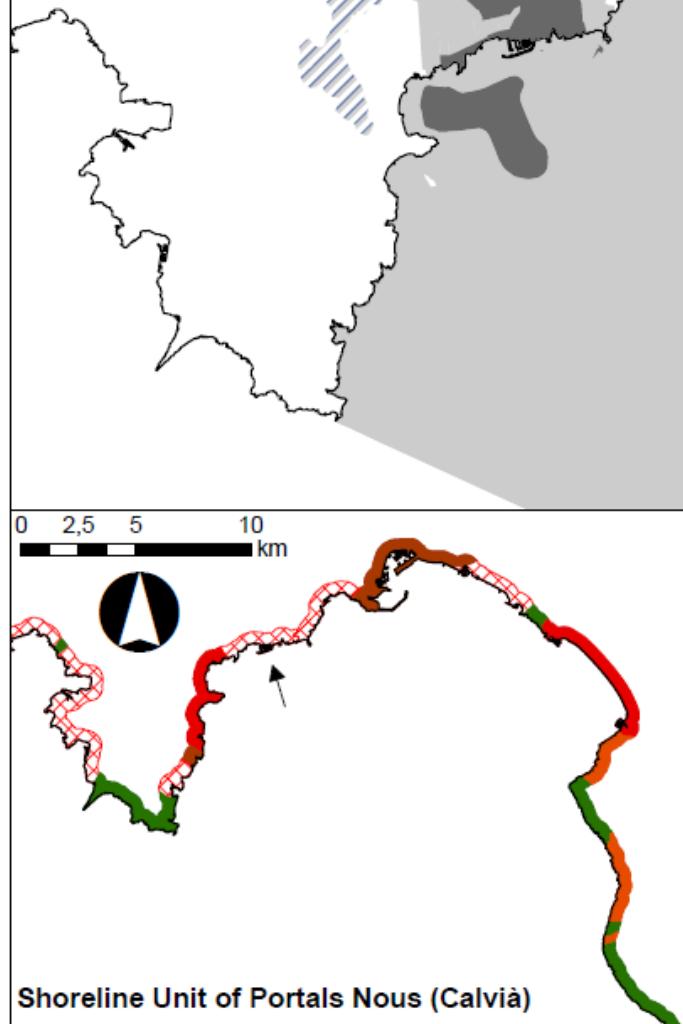
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Portals Nous (Calvià)

- Management Nucleus
- Complementary Management Zone
- Adjacent Management Zone

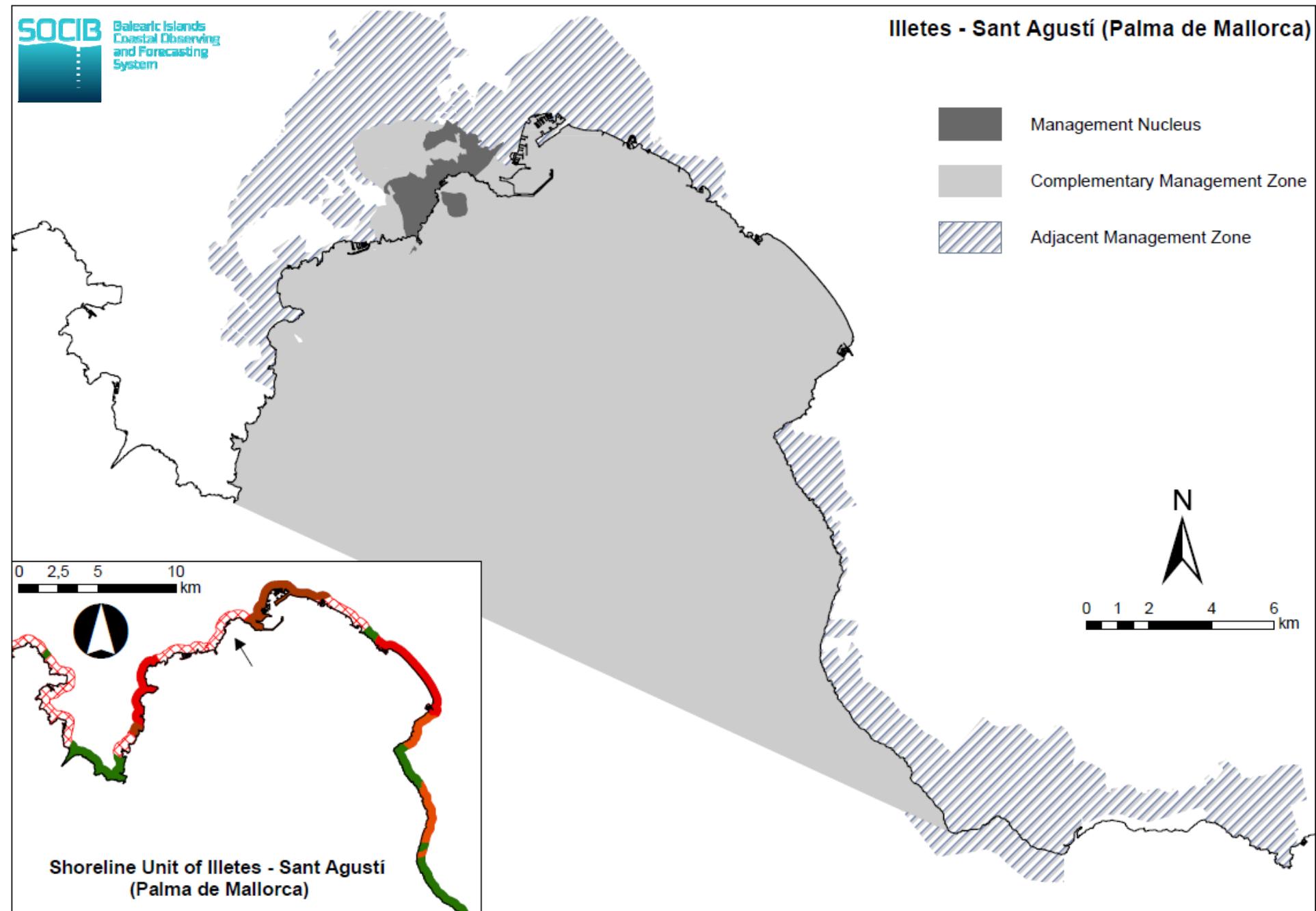
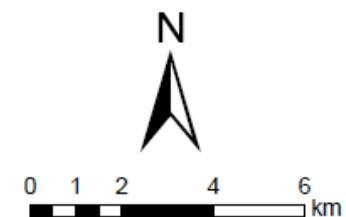
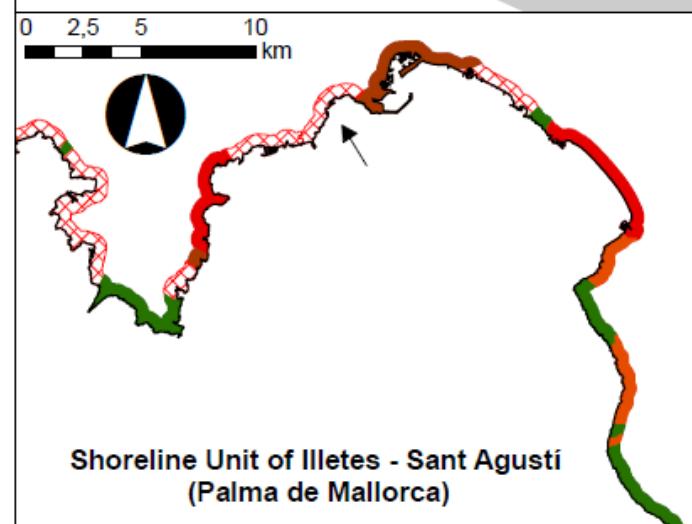




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Illetes - Sant Agustí (Palma de Mallorca)

- Management Nucleus
- Complementary Management Zone
- Adjacent Management Zone



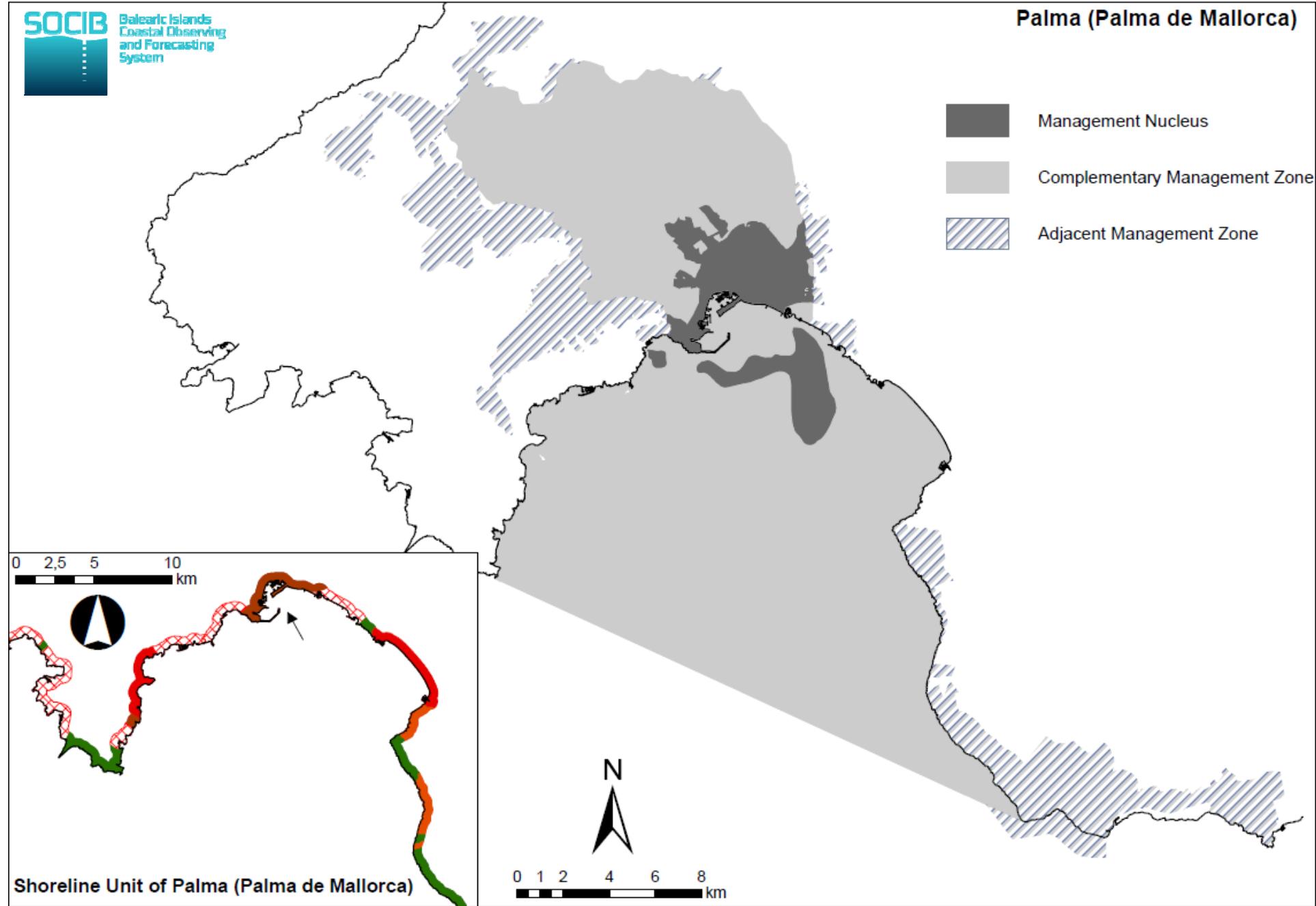
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Palma (Palma de Mallorca)



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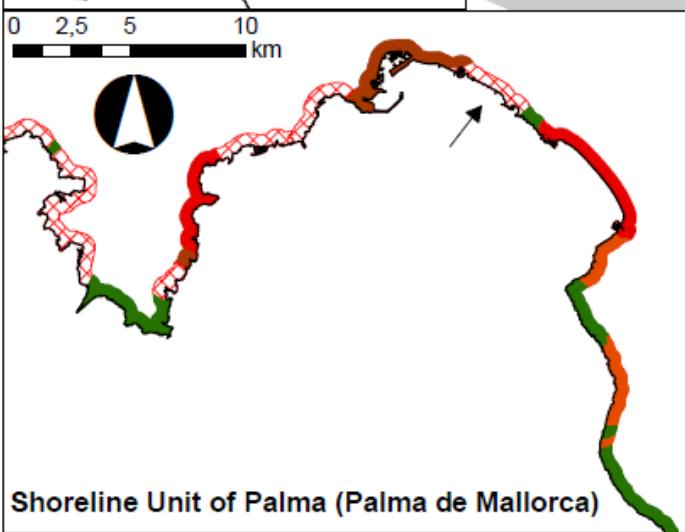
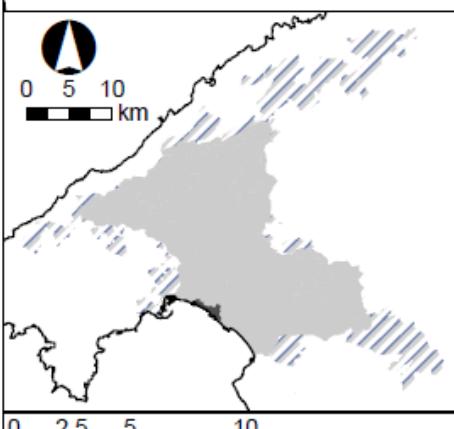
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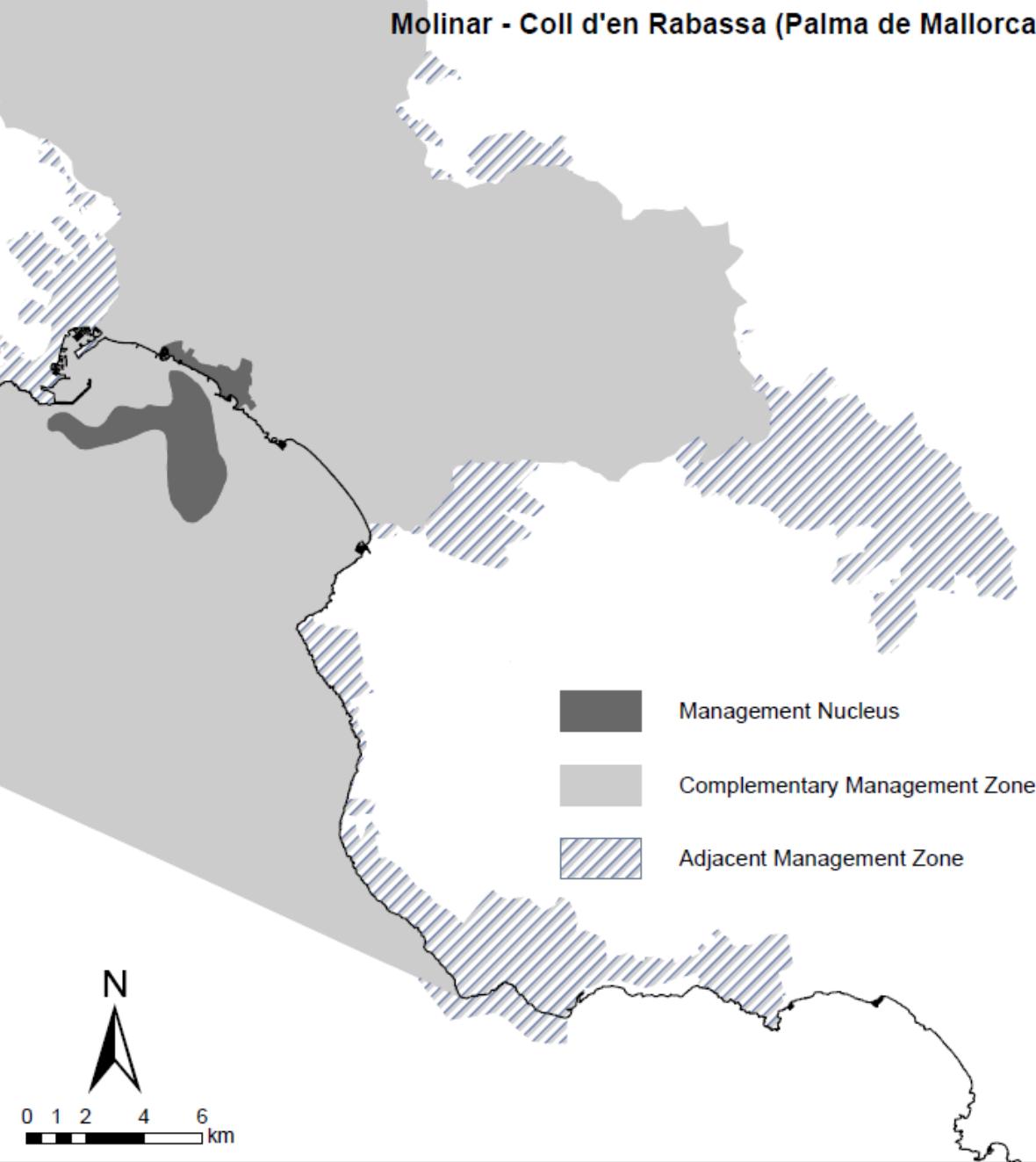


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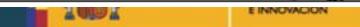
Molinar - Coll d'en Rabassa (Palma de Mallorca)



Shoreline Unit of Palma (Palma de Mallorca)



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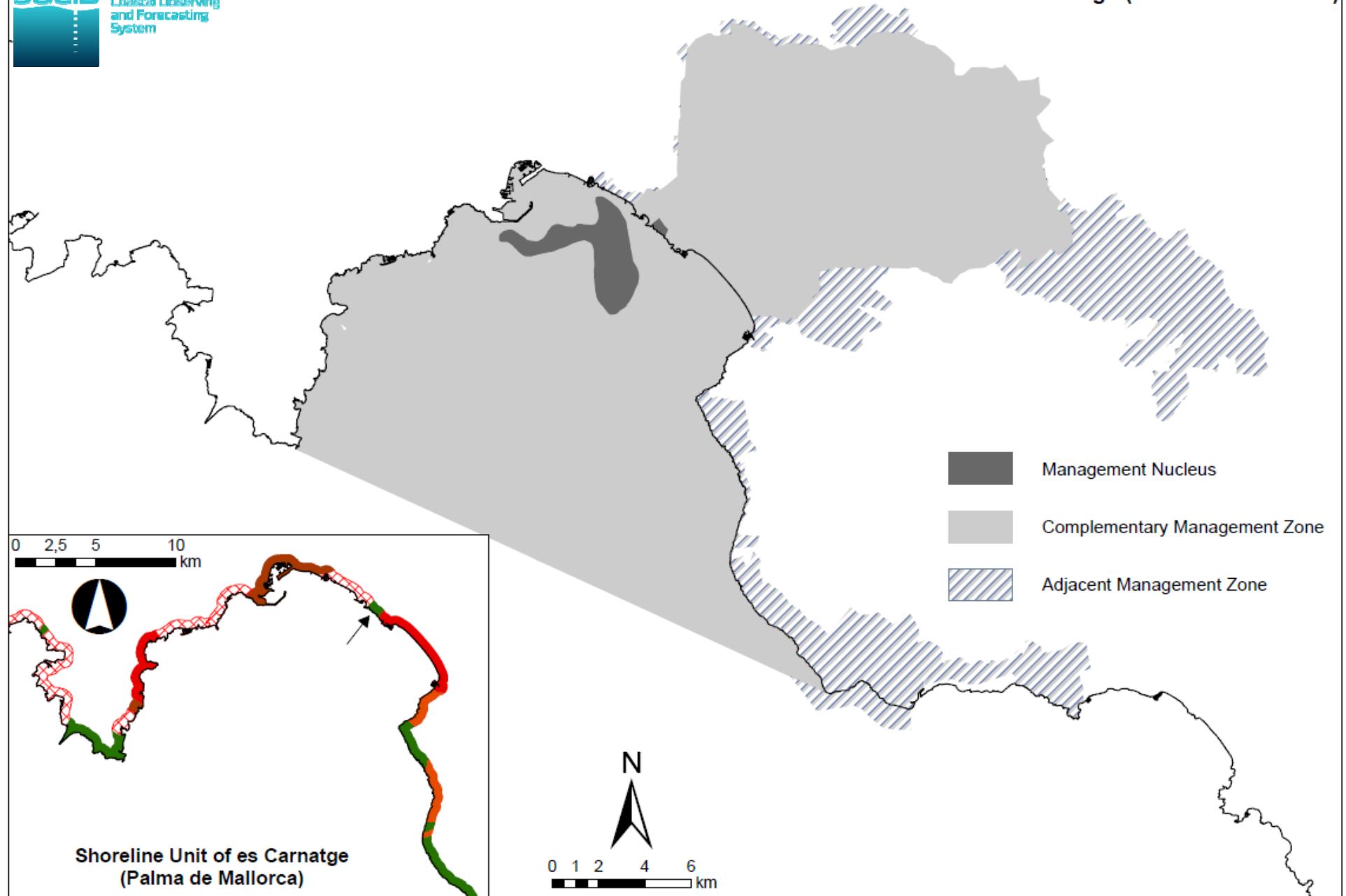
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es Carnatge (Palma de Mallorca)



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Agència Catalana de l'Aigua

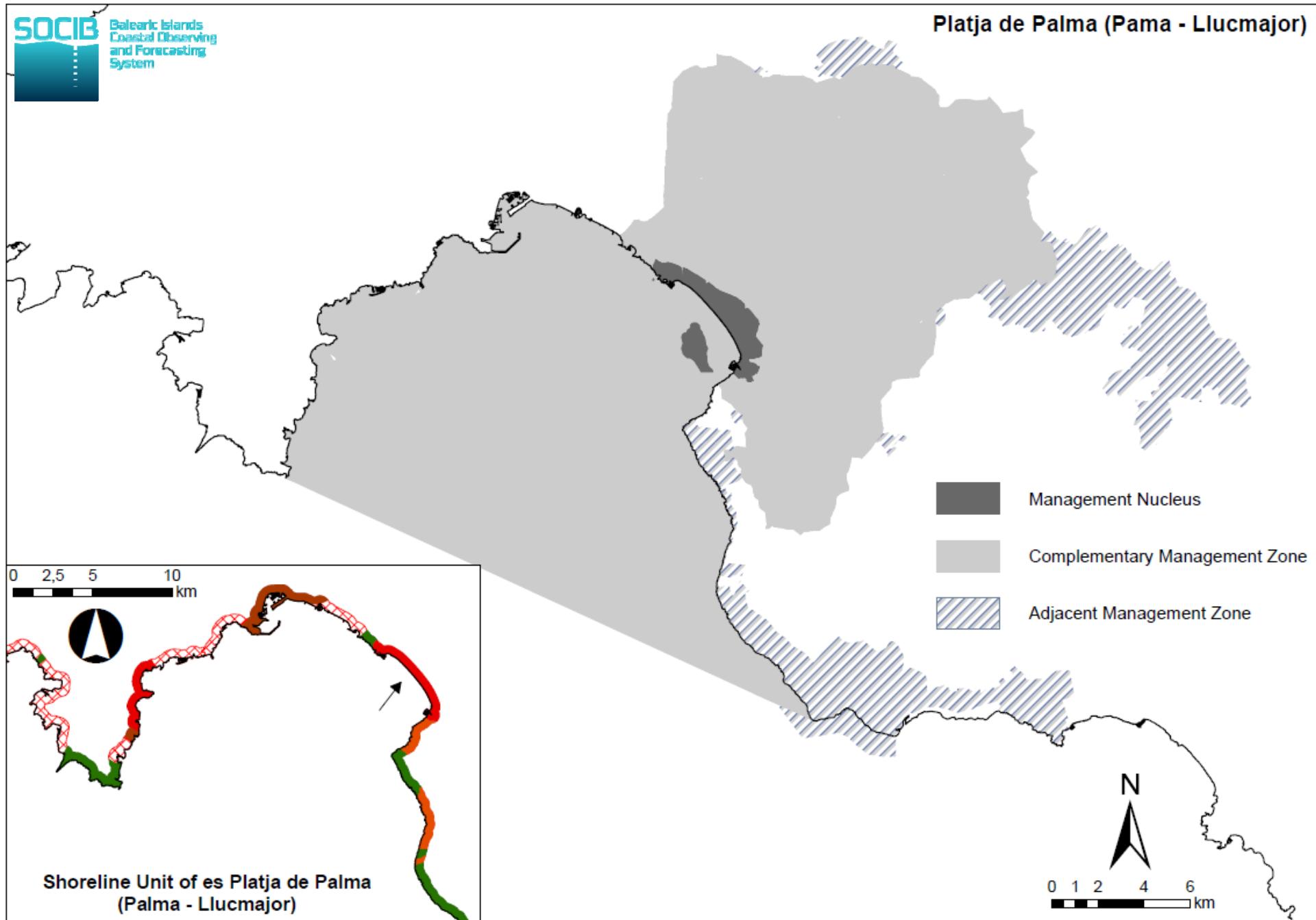
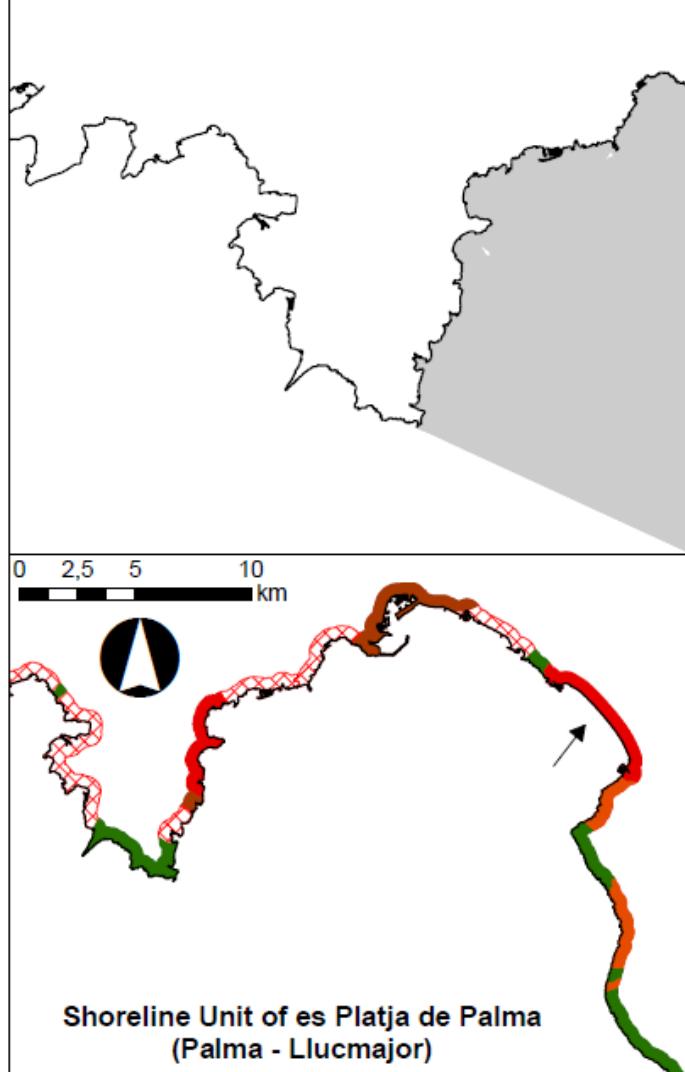
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Platja de Palma (Pama - Llucmajor)



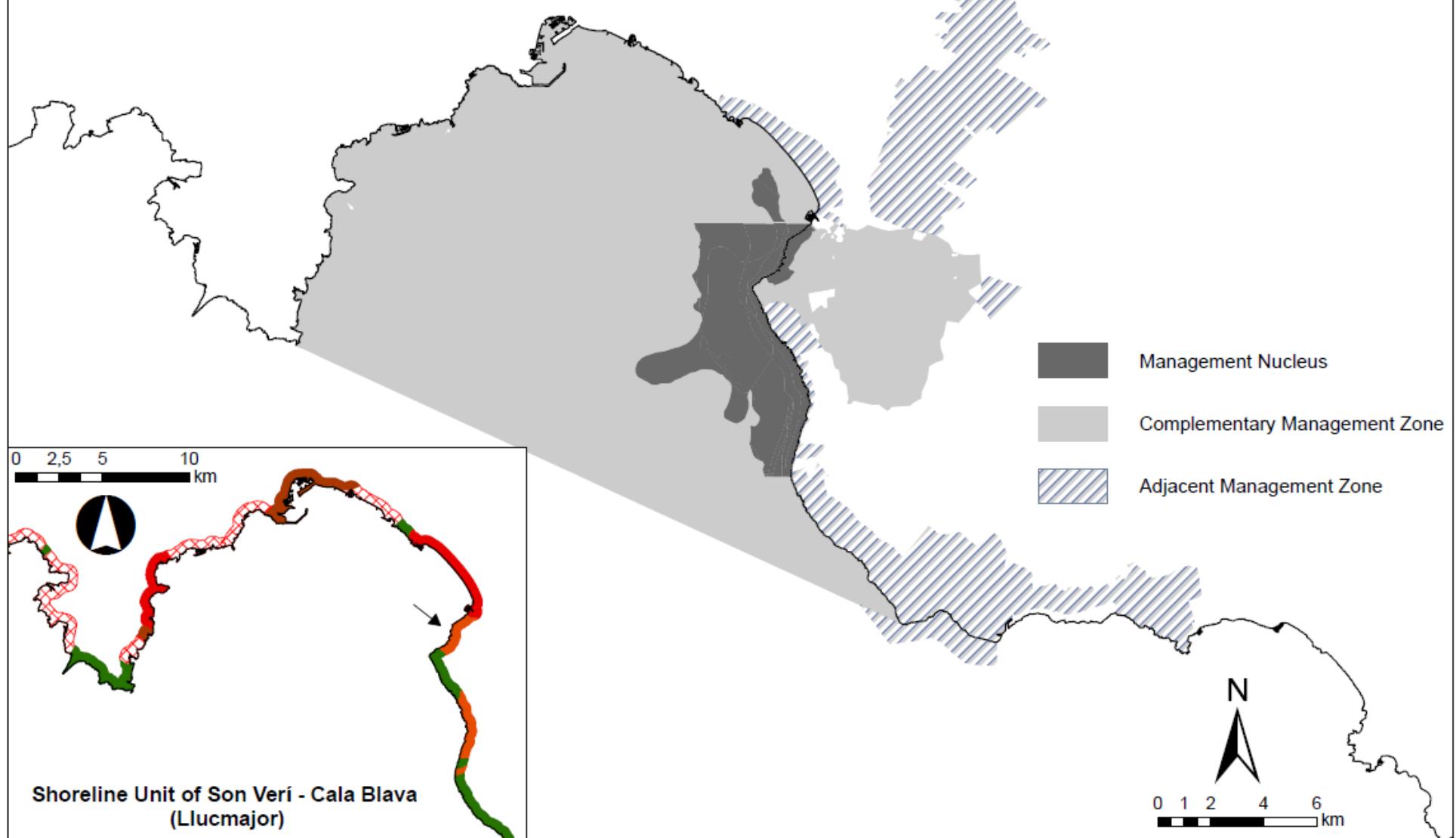
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Son Verí - Cala Blava (Llucmajor)



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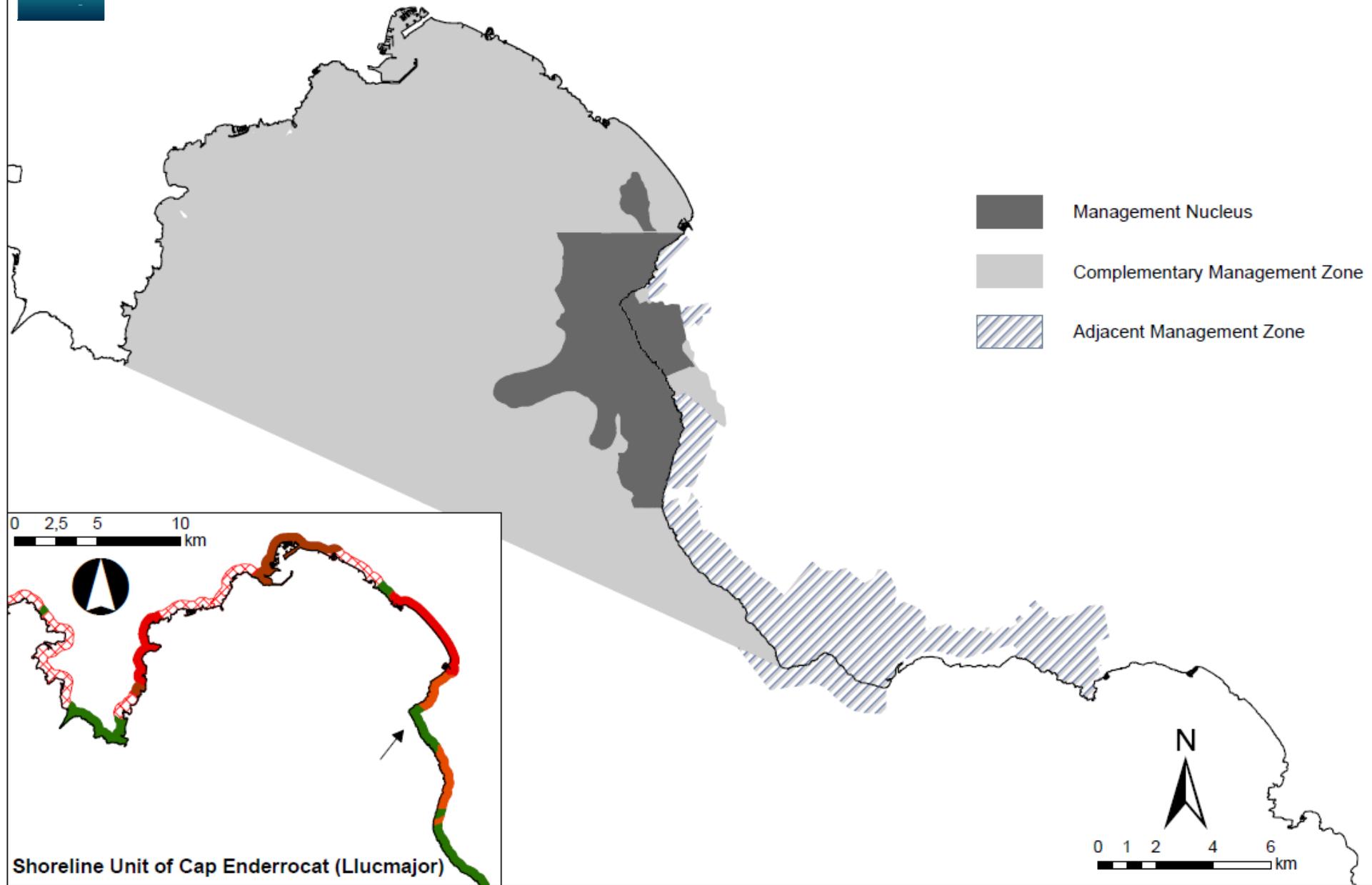
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Cap Enderrocat (Llucmajor)



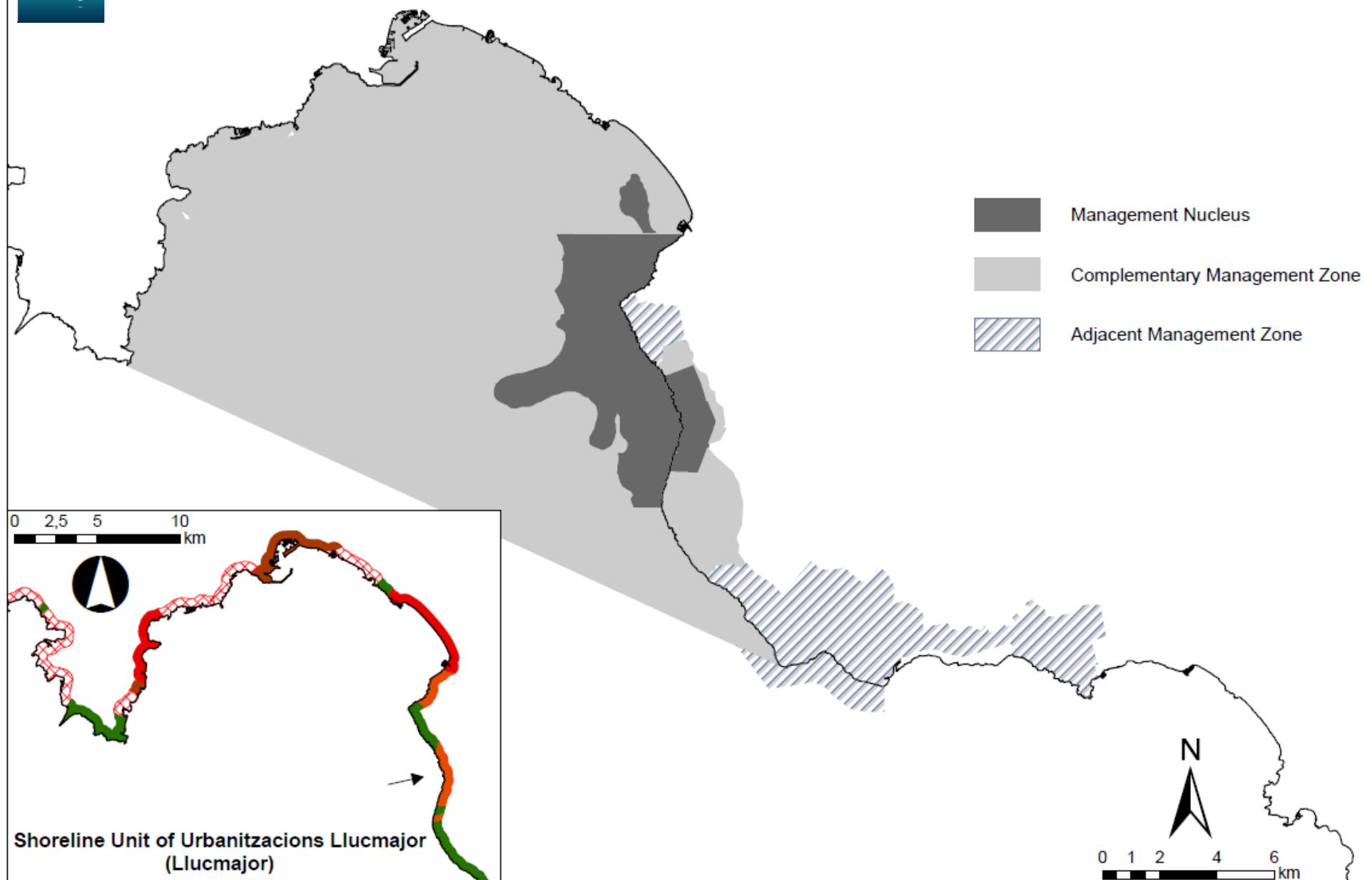
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Urbanitzacions Llucmajor (Llucmajor)



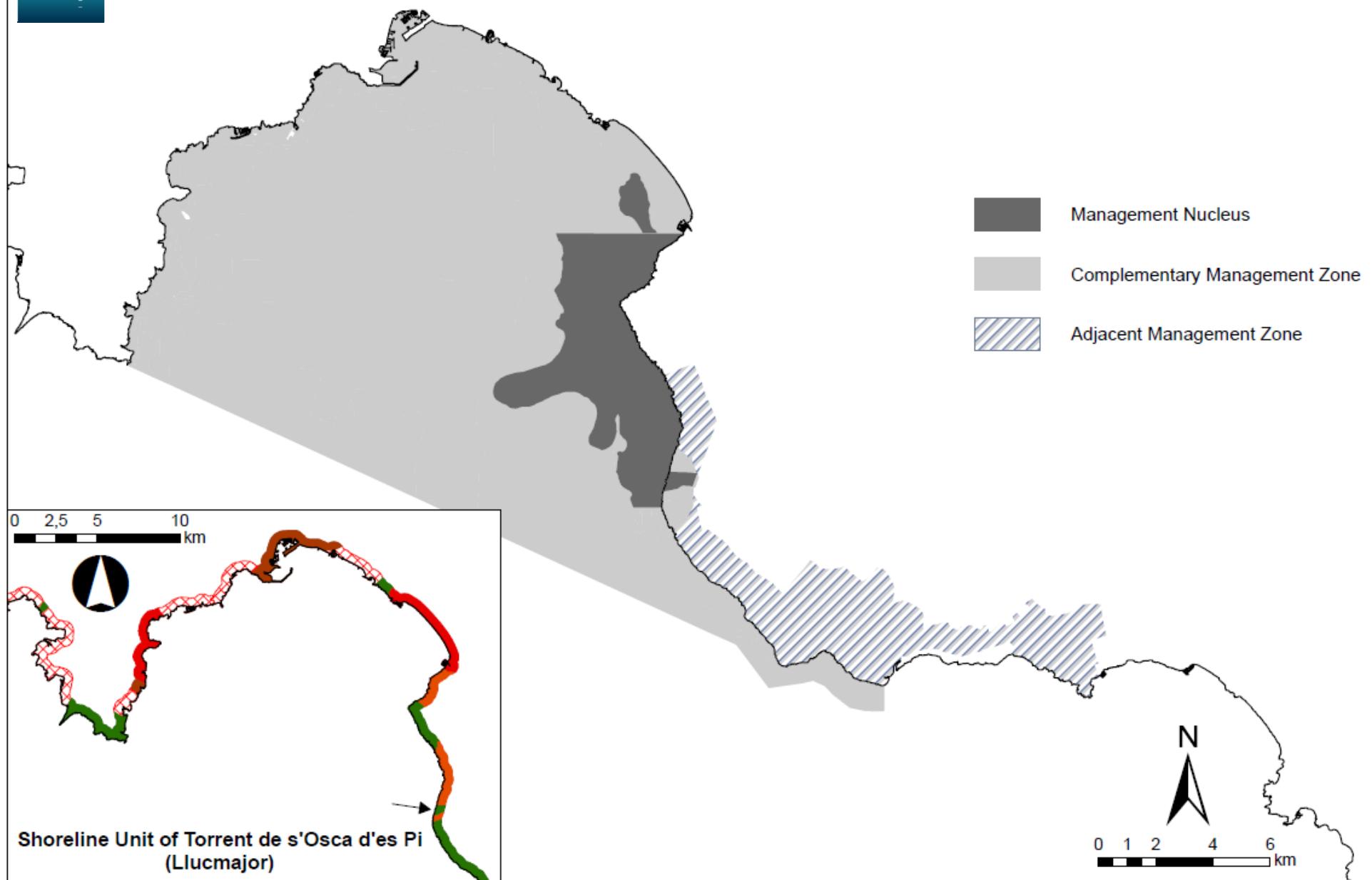
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Torrent de s'Osca d'es Pi (Llucmajor)



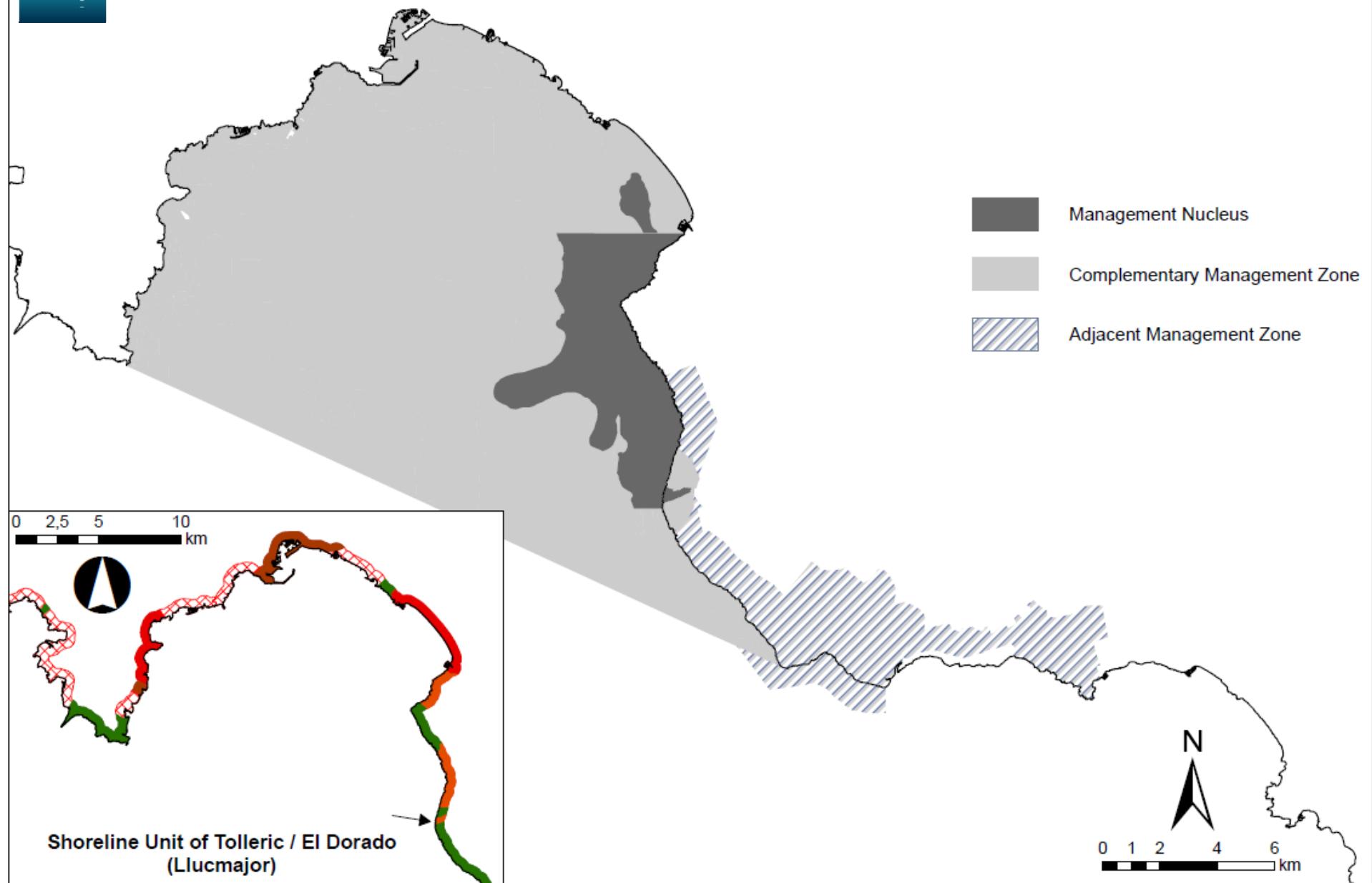
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Tolleric / El Dorado (Llucmajor)



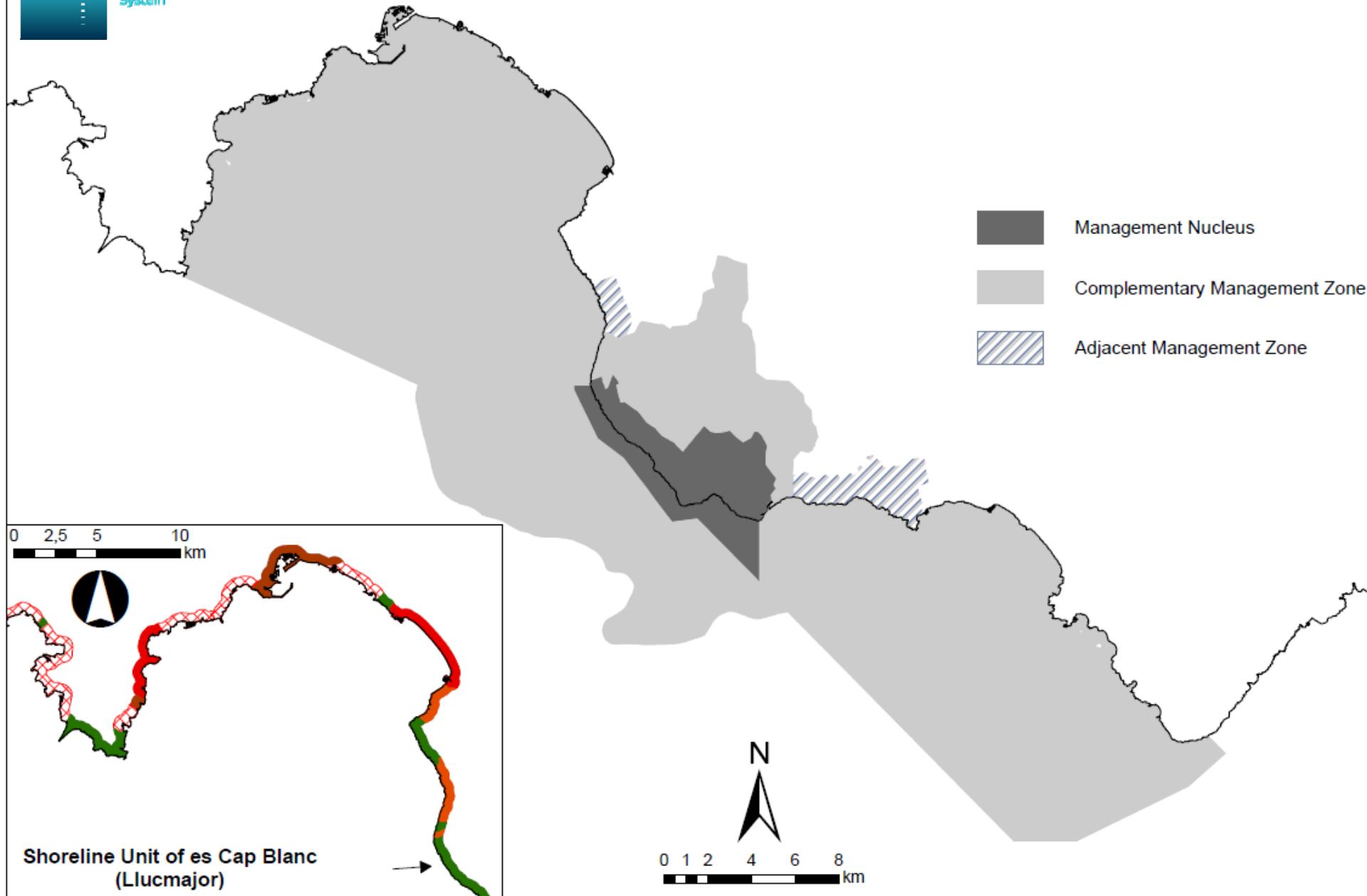
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es Cap Blanc (Llucmajor)



Functional Areas of Shoreline Units of Badia de Palma

boundary delimitation according with Integrated Coastal and Marine Zone Management

Name of shoreline units of Badia de Palma

A.- Cala Figuera; B.- Portals Vells; C.- Cala Falcó; D.- Palmanova-Magalluf;
 E.- POrtals Nous; F.- Illetes-Sant Agustí; G.- Palma; H.- Molinar-Coll d'en Rabassa;
 I.- Es Carnatge; J.- Platja de Palma; K.- Son Verí-Cala Blava; L.- Cap Enderrocat;
 M.- Urbanitzacions Llucmajor; N.- Torrent de s'Osca d'es Pi; O.- El Dorado/Tollerí;
 P.- Es Cap Blanc.

Legends

Functional areas of shoreline units of Badia de Palma

1, 2, 3.. Municipalities affected

A, B, C.. Name of Shoreline Units

shoreline units categories

Natural mixed coasts (rock and beach)

Natural beach

Urban beach non tourist nucleus

Tourist nucleus beach

Natural rocky coast

Urban rocky coast non tourist nucleus

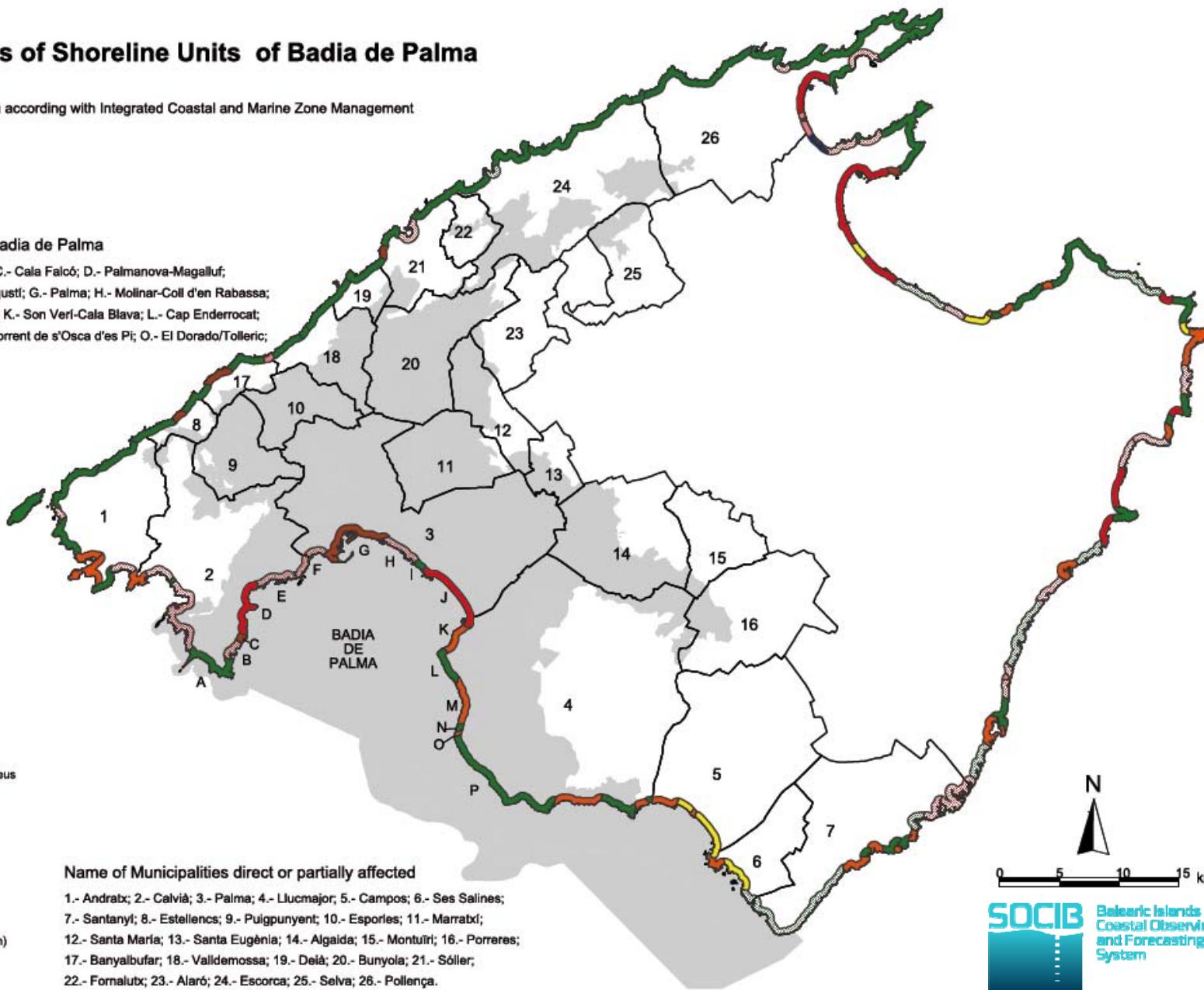
Tourist nucleus rocky coasts

Mixed coasts (rock and beach) close to tourist nucleus

Salt marshes and lagoons

Name of Municipalities direct or partially affected

1.- Andrabi; 2.- Calvià; 3.- Palma; 4.- Llucmajor; 5.- Campos; 6.- Ses Salines;
 7.- Santanyí; 8.- Estellencs; 9.- Puigpunyent; 10.- Esporles; 11.- Marratxí;
 12.- Santa Maria; 13.- Santa Eugènia; 14.- Algaïda; 15.- Montuiri; 16.- Porreres;
 17.- Banyalbufar; 18.- Valldemossa; 19.- Deià; 20.- Bunyola; 21.- Sóller;
 22.- Fornalutx; 23.- Alaró; 24.- Escorca; 25.- Selva; 26.- Pollença.



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PRELIMINARY RESULTS

Shoreline Units	Terrestrial Functional Areas (km ²)			
	Nucleus	Complementary	Adjacent	Total (area)
Badia de Palma				
Cala Figuera	6,7	7,7	11,3	25,7
Portals vells	3,1	6,1	43,5	52,7
Cala Falcó	0,2	1,4	51,6	53,2
Palma Nova - Magalluf	4,6	17,1	72,6	94,4
Portals Nous	3,1	7,9	56,9	67,9
Illetes - Sant Agustí	4,5	6,7	85,8	97,1
Palma	21,0	98,4	89,4	208,8
Molinar - Coll d'en Rabassa	2,1	409,0	213,8	624,9
Es Carnatge	0,3	160,0	99,7	260,0
Platja de Palma	6,1	210,8	82,3	299,2
Son Verí-Cala Blava	1,3	35,8	86,4	123,5
Cap Enterrocated	4,1	2,2	36,6	42,9
Urbanitzacions Llucmajor	4,1	10,3	31,3	45,7
Torrent Osca d'es Pi	0,6	1,9	34,4	36,9
Els Dorado-Tolleric	0,3	2,2	34,4	36,9
Es Cap Blanc	20,8	47,3	13,5	81,6





PRELIMINARY RESULTS

Shoreline Units	Functional Areas (km ²)			
	Marine	Islets (marine)	Terrestrial	Total (area)
Badia de Palma				
Cala Figuera	22,2	0,1	25,6	47,9
Portals vells	277,4	0,2	52,5	330,1
Cala Falcó	277,4	0,2	52,9	330,5
Palma Nova - Magalluf	264,2	0,1	94,2	358,5
Portals Nous	264,2	0,1	67,8	332,1
Illetes - Sant Agustí	264,2	0,1	97,0	361,3
Palma	264,2	0,1	208,7	472,9
Molinar - Coll d'en Rabassa	264,2	0,1	624,8	889,1
Es Carnatge	264,2	0,1	259,9	524,2
Platja de Palma	264,2	0,1	299,1	563,3
Son Verí-Cala Blava	264,2	0,1	123,3	387,6
Cap Enterrocata	264,2	0,1	42,8	307,0
Urbanitzacions Llucmajor	264,2	0,1	45,6	309,9
Torrent Osca d'es Pi	264,1	0,1	36,8	301,0
Els Dorado-Tolleric	264,1	0,1	36,8	301,0
Es Cap Blanc	518,6	0,2	81,3	600,2

5
1
4
3
2





PRELIMINARY RESULTS

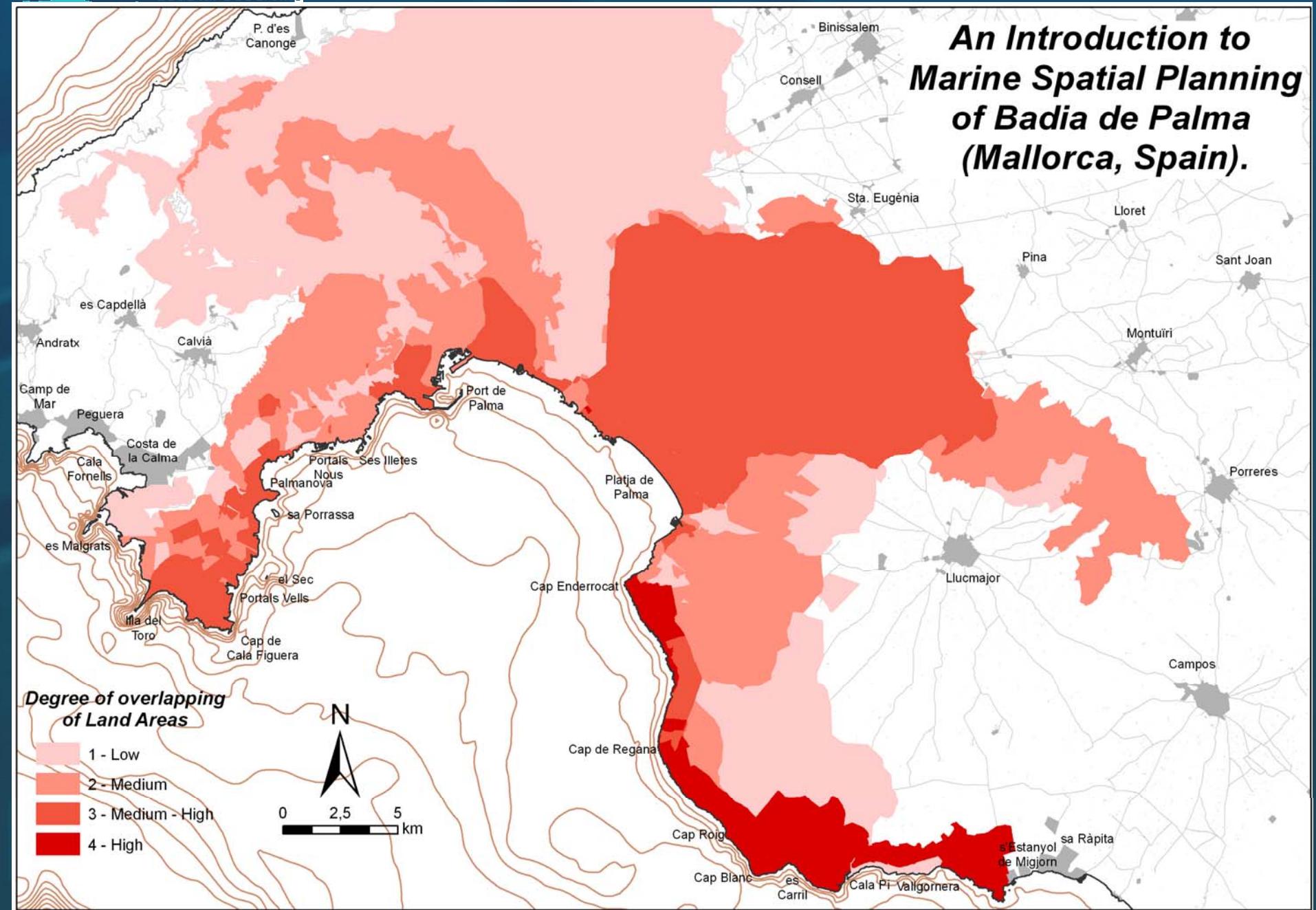
Degree of overlap of landward and marine areas

- Degree of overlap of functional areas of the coastal zone can provide useful information about most vulnerable areas of the Badia de Palma
- Maximum values of 48 (16 SUs x value 3 of Management Nucleus) and Minimum values of 1 (1 Sus x value 1 of Adjacent M.Z.)
- Results (values) obtained vary between 1 and 20 for terrestrial areas and between 2 and 36 for marine areas.
- The results are presented in separate maps for marine and terrestrial areas.



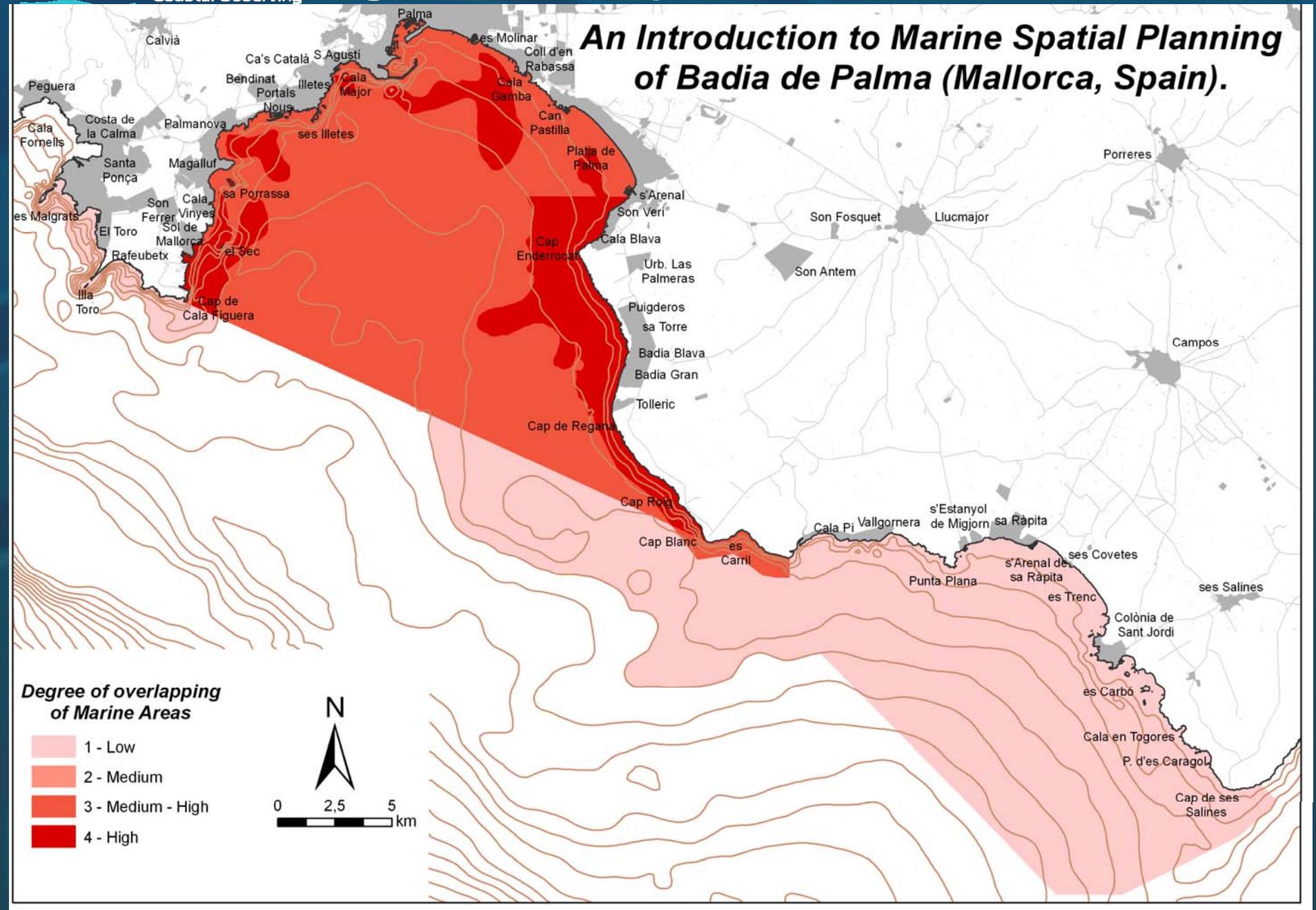
Degree of overlap of landward areas

**An Introduction to
Marine Spatial Planning
of Badia de Palma
(Mallorca, Spain).**



Degree of overlap of marine areas

*An Introduction to Marine Spatial Planning
of Badia de Palma (Mallorca, Spain).*





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Coastal Observing
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6.- CONCLUSIONS



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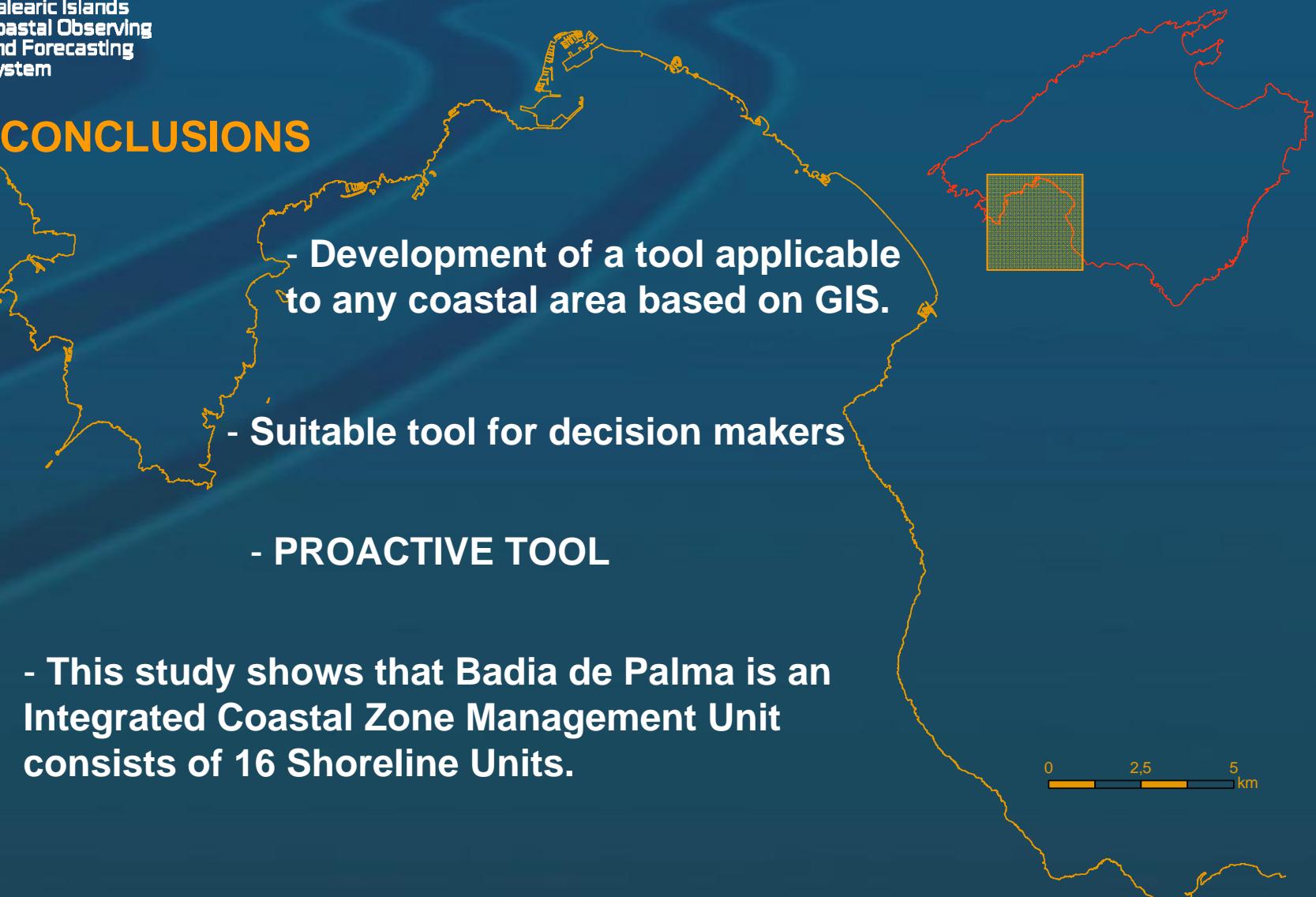
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CONCLUSIONS

- Development of a tool applicable to any coastal area based on GIS.
- Suitable tool for decision makers
- PROACTIVE TOOL
- This study shows that Badia de Palma is an Integrated Coastal Zone Management Unit consists of 16 Shoreline Units.



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7.- APPLICATIONS



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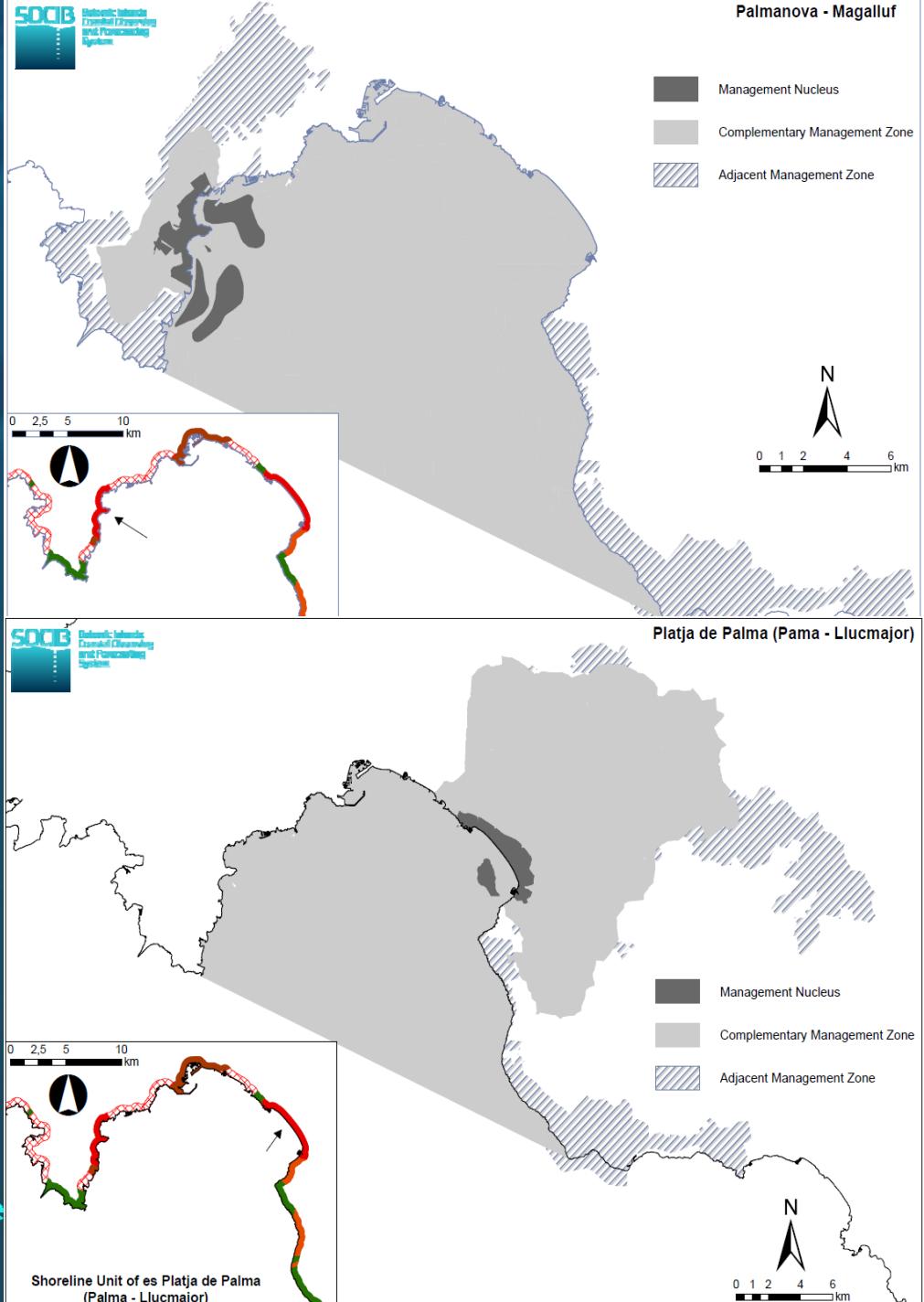
APPLICATIONS

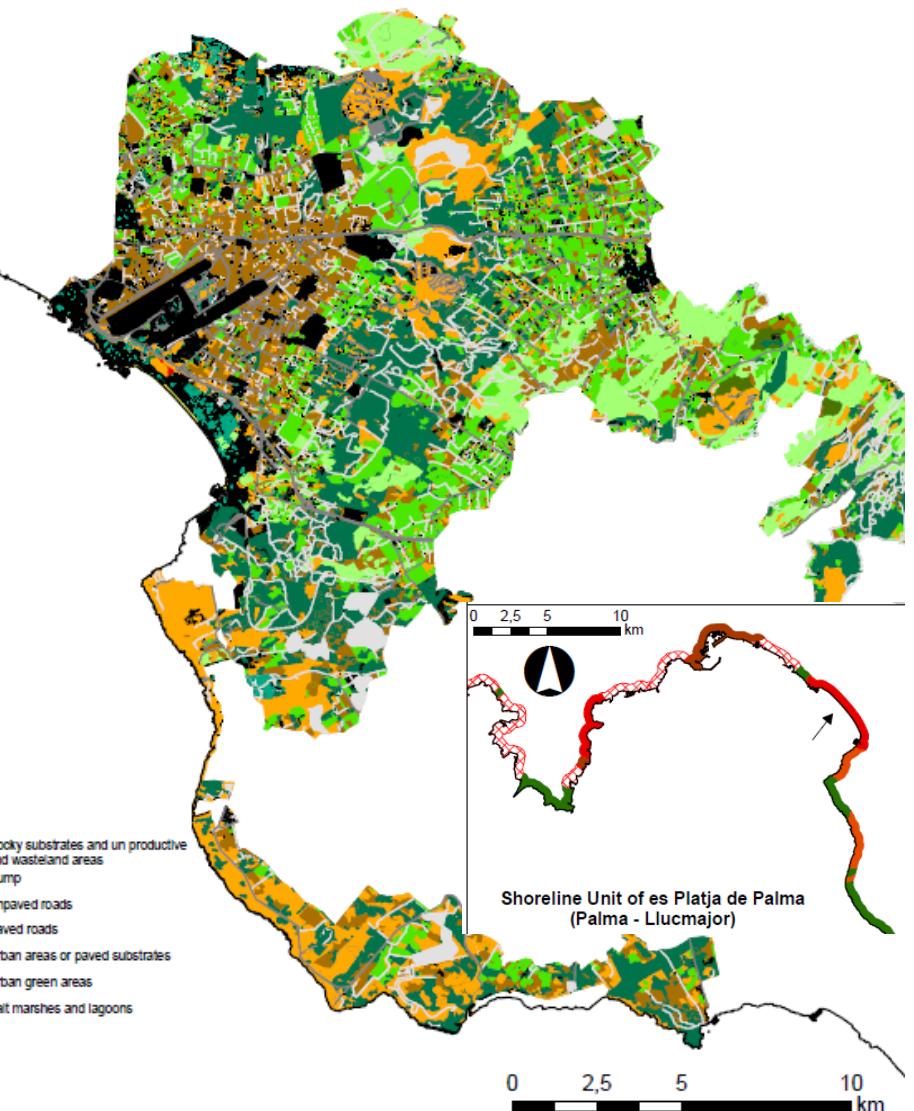
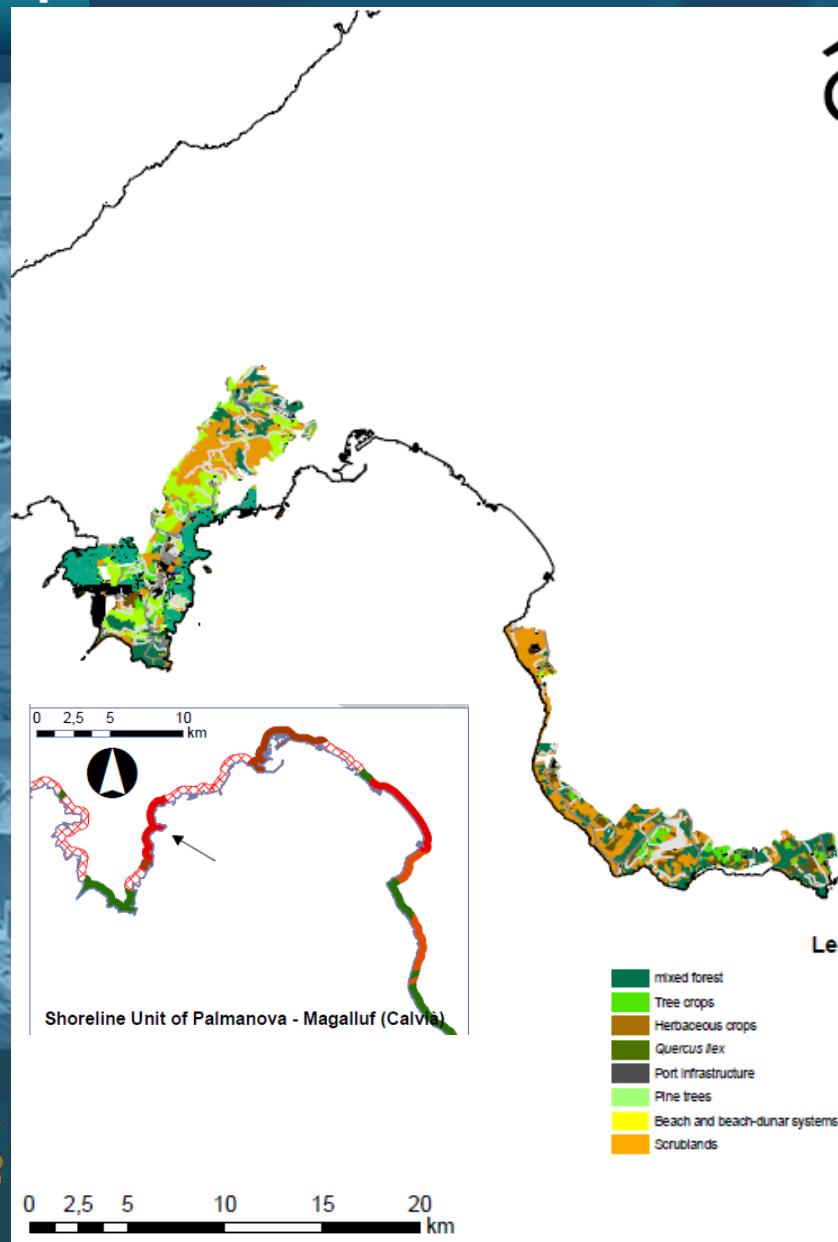
*Inventory of land uses
of functional areas of SUs
of Badia de Palma*



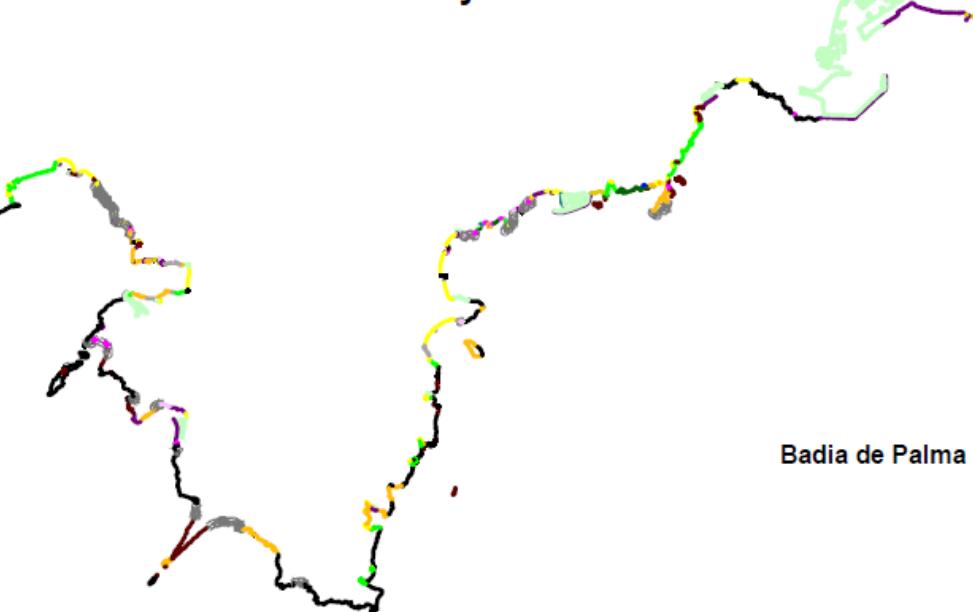
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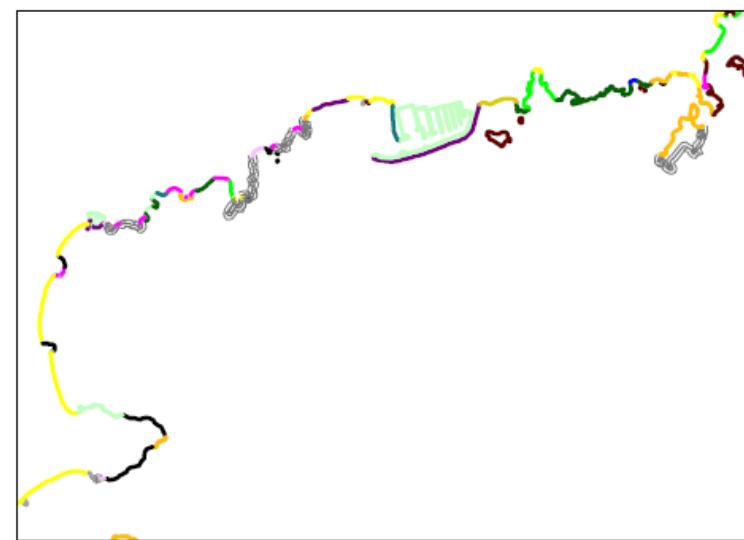


Inventory of land uses of functional
areas of *Badia de Palma***APPLICATIONS**

Environmental Sensitivity of coasts of Badia de Palma



Badia de Palma



*Relationship with
Environmental
Sensitivity of coastline*

Legend

- | | |
|-------|-------|
| — 1-A | — 6-B |
| — 1-B | — 7-A |
| — 1-C | — 7-B |
| — 2 | — 7-C |
| — 3-A | — 7-D |
| — 3-B | — 8-A |
| — 4 | — 8-B |
| — 5 | — 9 |
| — 6-A | |



Relationship with Environmental Sensitivity of coastline

APPLICATIONS

SA	Tipos de costas
1 A	Costas rocosas altas y acantilados expuestos a zonas de elevada energía.
1 B	Estructuras artificiales expuestas a zonas de elevada energía.
1 C	Costas rocosas altas con depósitos de derrubios y acumulación de bloques en la base expuestas a zonas de elevada energía.
2	Costas rocosas bajas expuestas.
3 A	Playas formadas por arenas finas y de grano medio.
3 B	Escarpes y costas de perfil escalonado formadas por conglomerados, arenas, limos y arcillas y por litologías calcareníticas.
4	Playas formadas por arenas gruesas.
5	Playas mixtas, formadas por arenas y gravas.
6 A	Playas de gravas, cantos y bloques.
6 B	Costas rocosas bajas expuestas, de perfil escalonado y cóncavo con presencia de bloques y/o playas de arenas y cantos. (Incluye rompeolas ratíficales).
7 A	Costas rocosas de altura variable en zonas de baja energía.
7 B	Estructuras artificiales localizadas en zonas de baja energía.
7 C	Costas rocosas bajas con presencia de bloques y/o playas de arenas y cantos en zonas de baja energía. Incluye (rompeolas artificiales).
7 D	Costas rocosas altas con depósitos de derrubios y acumulación de bloques en la base localizadas en zonas de baja energía.
8 A	Playas formadas por fangos y arenas en zonas de baja energía.
8 B	Playas de gravas, cantos y bloques en zonas de baja energía.
9	Zonas costeras en contacto o presencia de albuferas y marismas.





Relationship with system of indicators

APPLICATIONS

-Indicators extracted from a System of Indicators for the coastal zone of the Balearic Islands.

-A proposal of 54 Sustainability Indicators divided in three main groups:

- Governance Indicators (8)
- Socio-Economic Indicators (42)
- Environmental Indicators (4)

-Some of these indicators have been applied in the island of Menorca (2.009) and in the island of Mallorca (2.010).

- 17 Indicators has been applied in these islands.

SYSTEM OF INDICATORS for Integrated Coastal Zone Management in the Balearic Islands

Official Opinion 5/2007 of the Economic and Social Council of the Balearic Islands



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Relationship with system of indicators

APPLICATIONS

INDICATORS APPLIED:

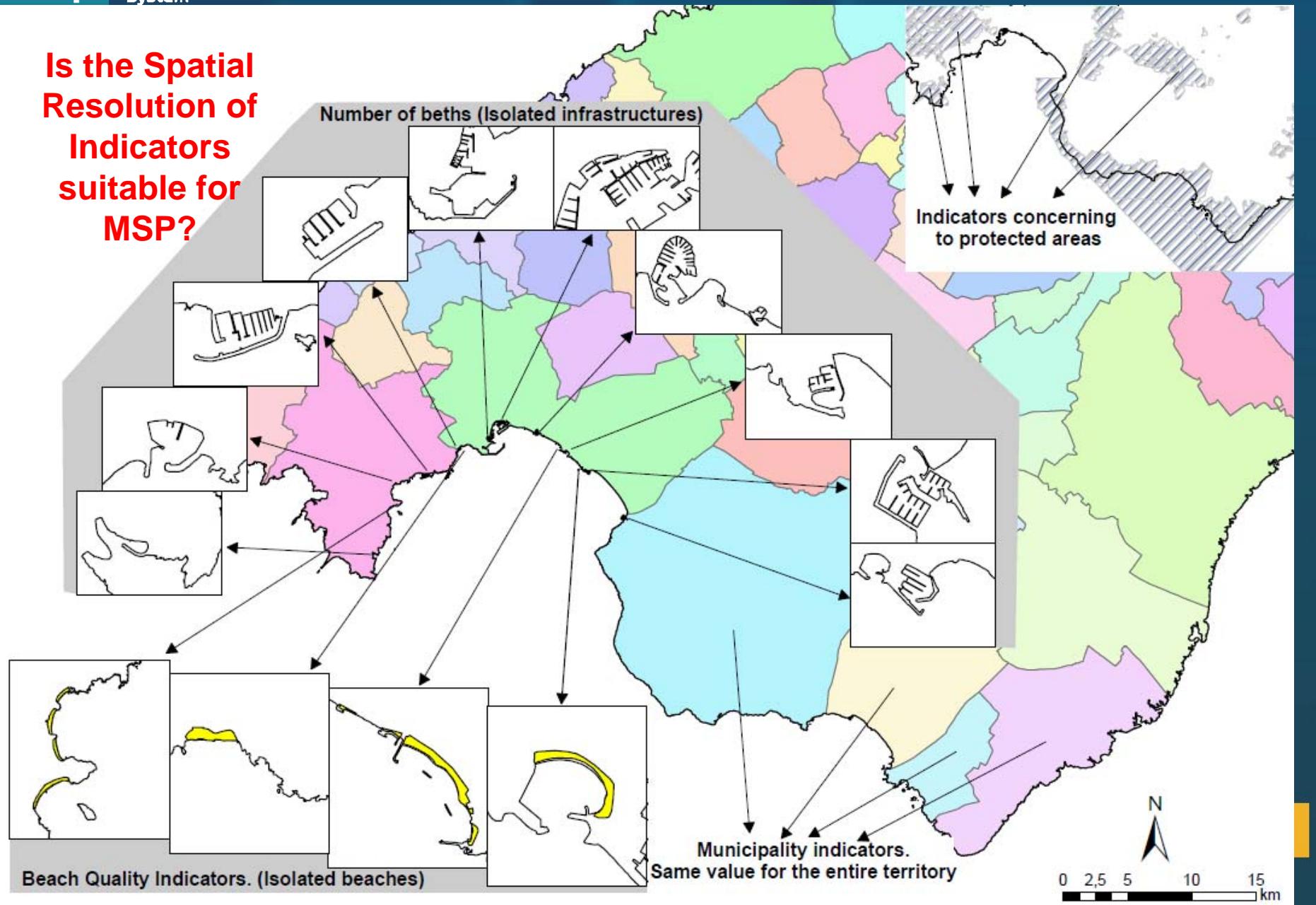
- Area of land and sea protected by statutory designation
- Unemployment
- Occupation of tourism accommodation supply
- Evolution of tourism demand
- Quality of tourism accommodation supply
- Cost of tourism accommodation supply
- Water consumption
- Electricity consumption
- Fisheries
- Water treatment
- Density of resident population
- Seasonality of population
- Immigration
- Construction of homes
- Number of moorings
- Existence and use of roads and social infrastructures
- Quality of beaches

TERRITORIAL LIMITS OF THESE INDICATORS MAY ARE FOR SPECIFIC AREAS (i.e.BEACH, PORT, PROTECTED AREA) OR FOR EXTENSIVE AREAS (i.e. MUNICIPALITIES)

Relationship with system of indicators

APPLICATIONS

Is the Spatial Resolution of Indicators suitable for MSP?





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7.- FUTURE WORK



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FUTURE WORK

- Peer review Process. Need to specify the criteria used for establishing Functional Areas of Shoreline Units.
- Need to complement these types of studies with marine climate data to establish more accurately functional areas of marine environments.
- Need to collect suitable digital cartographic data (i.e. layer of *Posidonia oceanica*)
- This work supports the **Water Framework Directive (2000/60/EC)** which try to achieve an integrated management of coastal, surface waters and groundwater.



