

# Science based Integrated Coastal Zone Management in the Balearic Islands

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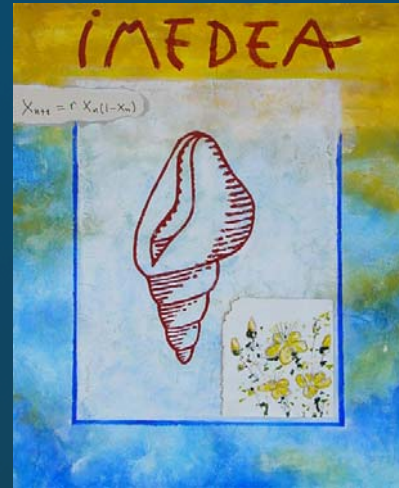
# Outline

1. Introduction – IMEDEA, Balearic Islands, ICZM climate
2. The Balearic ICZM Project – Objectives and Structure
3. Examples of research projects



# The Mediterranean Institute for Advanced Studies

## Spanish National Research Council/University of the Balearic Islands



### Mission

- To generate the scientific base that allows for better understanding and prediction of responses of insular, coastal and marine systems to anthropogenic pressures and global change in order to advance the capacity to respond and manage these systems in a sustainable manner and inspire adaptive response strategies from society.
- To transfer knowledge and technology to society.

# The Balearic Islands



Google™



# The Balearic Islands

- Area 5,014 km<sup>2</sup> (Hawaii 28,311 km<sup>2</sup>)
- Length of coastline 1,428 km (Hawaii 1,210 km)
- 1,001,062 inhabitants (INE 2006), Hawaii 1,285,498 (Gov. Hawaii 2006)
- GDP 24,391,053,000€ (IBAE 2006), Hawaii 39,089,250,000€ (Gov. Hawaii 2005)
- 80% of GDP generated from activities taking place in the coastal zone
- Mature tourism destination
  - 12.5m tourist arrivals in 2006 (CITTIB), Hawaii 7.5m (Gov. Hawaii 2005)
  - 48% GDP (INESTUR 2006)
  - 39.5% of jobs in the high season (ibid)
- Large number of governing agencies and actors with competence in the coastal zone

## Environmental Threats to the Coastal Zone of the Balearic Islands

- Coastal development and habitat destruction
- Degradation of water quality
- Beach erosion
- Red tides
- Loss of fisheries resources
- Degradation of *Posidonia oceanica* meadows
- Proliferation of invasive species
- Marine litter
- Accidental spills
- Proliferation of jellyfish



↕  
**Unlimited pressure on a limited resource**



# The Balearic Islands

## Santa Ponça, 2001

Source: Coastal Directive, Balearic Islands





# The Balearic Islands



Hotel Playa del Moro today

Cala Millor, Mallorca



# ICZM in the Balearic Islands

The location is favorable for ICZM because:

- There exists the need (social, economic and environmental).
- There exists understanding, demand from civil society and awareness among politicians - the socio-political system favours preservation.

However:

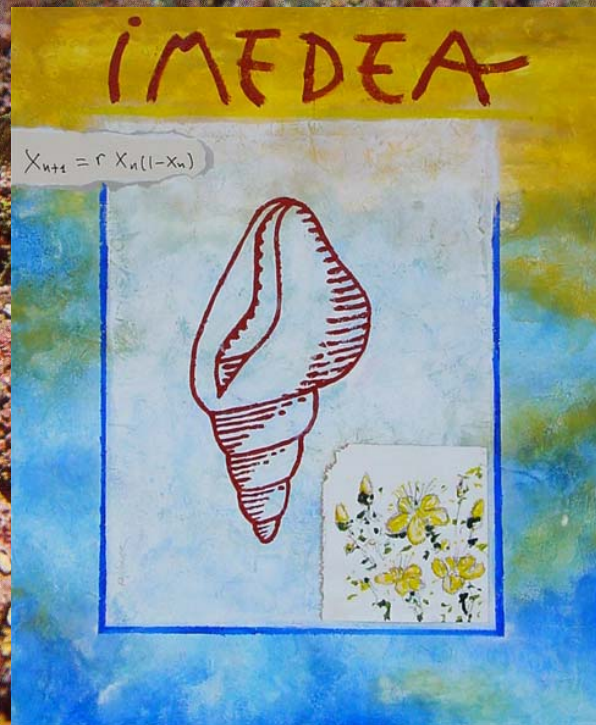
- There is no legislation and no organizations that specifically support or facilitate ICZM.
- ICZM is a relatively new concept in Europe – we are still learning.
- There is very little baseline or supporting data and those which do exist are often fragmented and/or inaccessible.

..... in the Balearics, we are essentially starting from scratch.....



# The Balearic ICZM Project

## *Science Based ICZM in the Balearic Islands*





# The Balearic ICZM Project


## Phase I: 2005-2008

### Objectives

- To use a multidisciplinary approach to generate scientific knowledge to facilitate and inform the implementation of ICZM in the Balearic Islands.
- To develop new methods, tools and instruments for both science and management and establish the bases and strategies necessary to achieve sustainability in the coastal zone of the Balearic Islands.
- To re-enforce the role of scientific research as a critical basis for future decision-making in ICZM at an international level.
- To close the link between science and policy.





The image is a photograph of a coastal scene. In the foreground, there is a rocky shore covered with dense, low-lying green vegetation, possibly sea purslane or similar coastal plants. The rocks are partially covered in green algae or moss. In the background, the ocean is visible with white foam from breaking waves. The text "Thematic Structure of the Balearic ICZM Project" is overlaid in the center of the image in a yellow, sans-serif font.

## Thematic Structure of the Balearic ICZM Project



## 1. Disciplinary Research



### 1.1 Environment



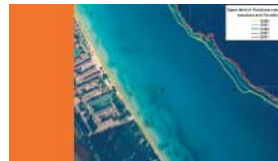
### 1.2 Society, economy and culture



### 1.3 Governance

## 2. Multidisciplinary research

The horizontal projects respond to cross-cutting research needs requiring an interdisciplinary approach



## 3. Research aimed at technological development

Responds to the need for new scientific tools and technologies that support ICZM in the Balearics



## 4. Transfer of knowledge



RESEARCH

TECHNOLOGICAL  
DEVELOPMENT

INNOVATION OF  
TECHNOLOGY AND  
SERVICES

1.1.1 Coastal variability and global change  
1.1.2 Biodiversity and global change  
1.1.3 Water quality and public safety in the coastal zone  
1.1.4 Operational oceanography and marine technology

1.2.1 Natural and cultural heritage  
1.2.2 Population, territory and land uses  
1.2.3 Economy, employment and tourism

1.3.1 Provision of information to help generate and guide policy development  
1.3.2 Evaluation of the governance system  
1.3.3 Cooperation and coordination

#### 1. Disciplinary Research



##### 1.1 Environment



##### 1.2 Society, economy and culture



##### 1.3 Governance

#### 2. Multidisciplinary research

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#### 3. Research aimed at technological development

Responds to the need for new scientific tools and technologies that support ICZM in the Balearics



#### 4. Transfer of knowledge



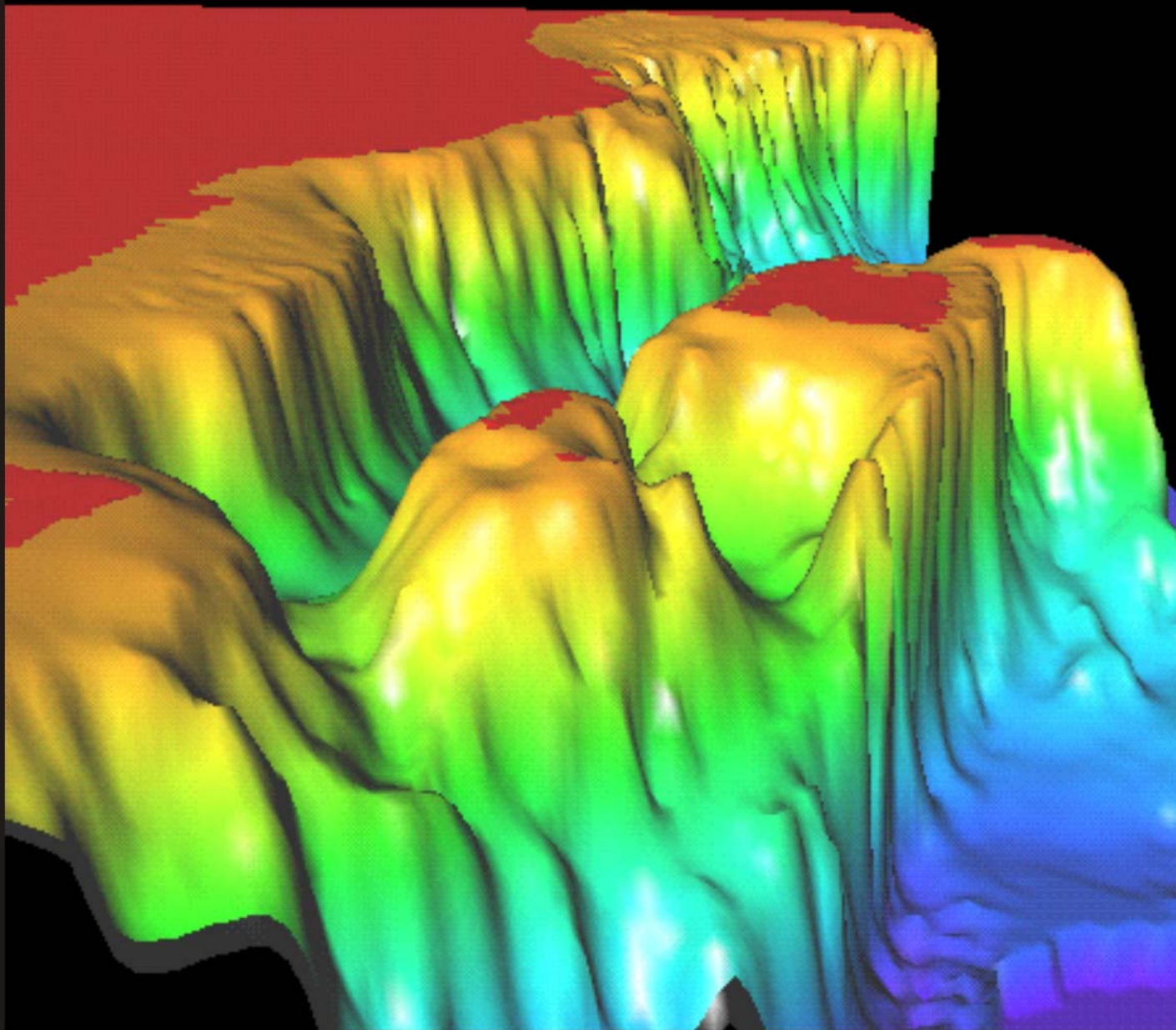
4.1 Strategy for dissemination of results, stakeholder participation and transfer of knowledge

3.1 GIS Database  
3.2 Proposal for technological development

2.1 Zoning criteria for implementing ICZM  
2.2 Literature review  
2.3 Development of a system of indicators for ICZM



## Examples of Research Projects





# Disciplinary Research

*Society, economy, and culture*

# Comparative Study of Urban Development in the Coastal Zone of the Balearic Islands

## Objective

To conduct a spatial analysis of the effects of urban settlements and urbanization in the coastal zone of the Balearic Islands.





# Land Categories



1 - Transformed land (developable or developed)

2 - Developable, non-transformed land

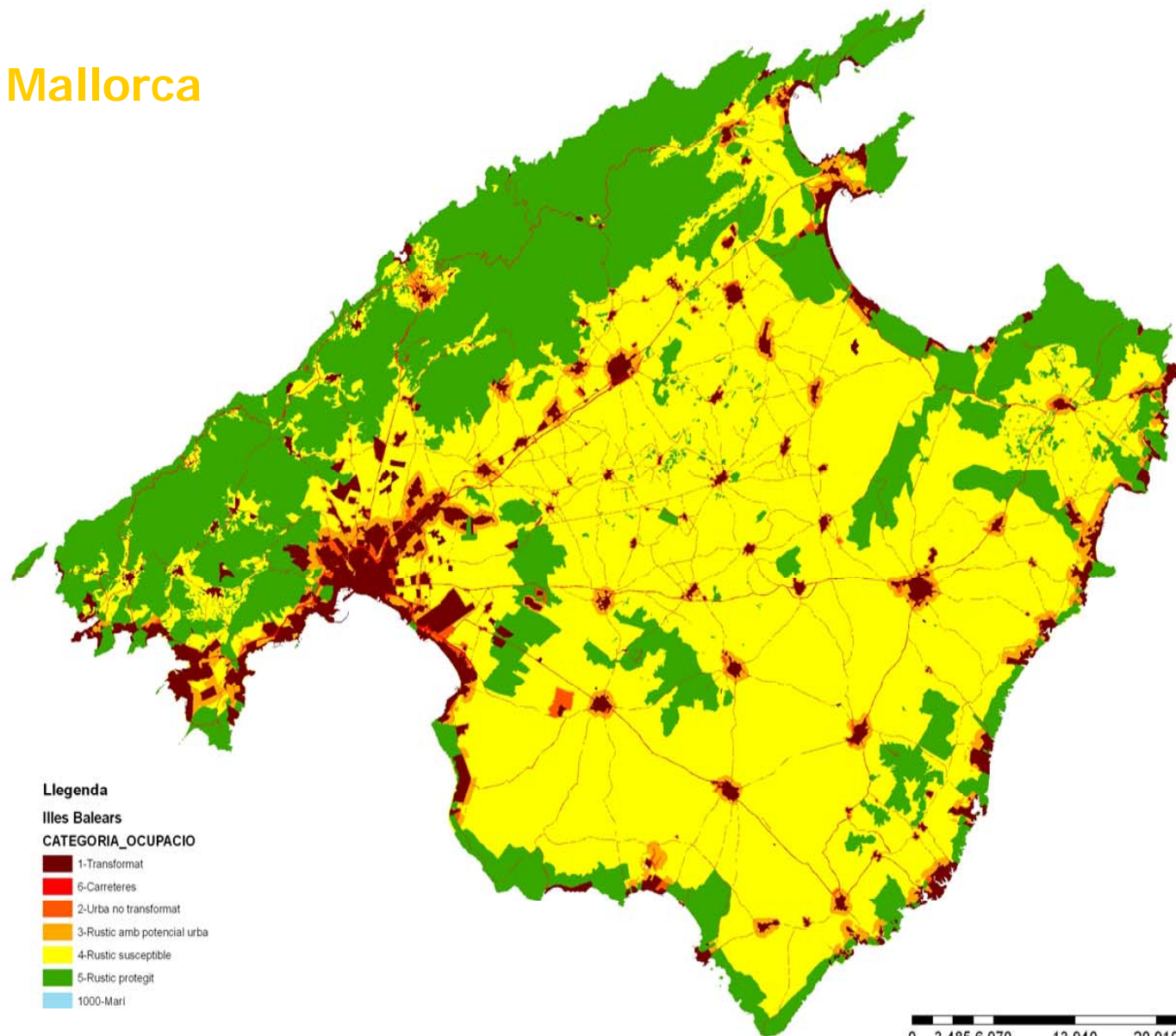
3 - Rustic land, potentially urbane

4 - Rustic land, potentially constructible

5 - Protected rustic land

6 - Road infrastructures

# Mallorca



## Llegenda

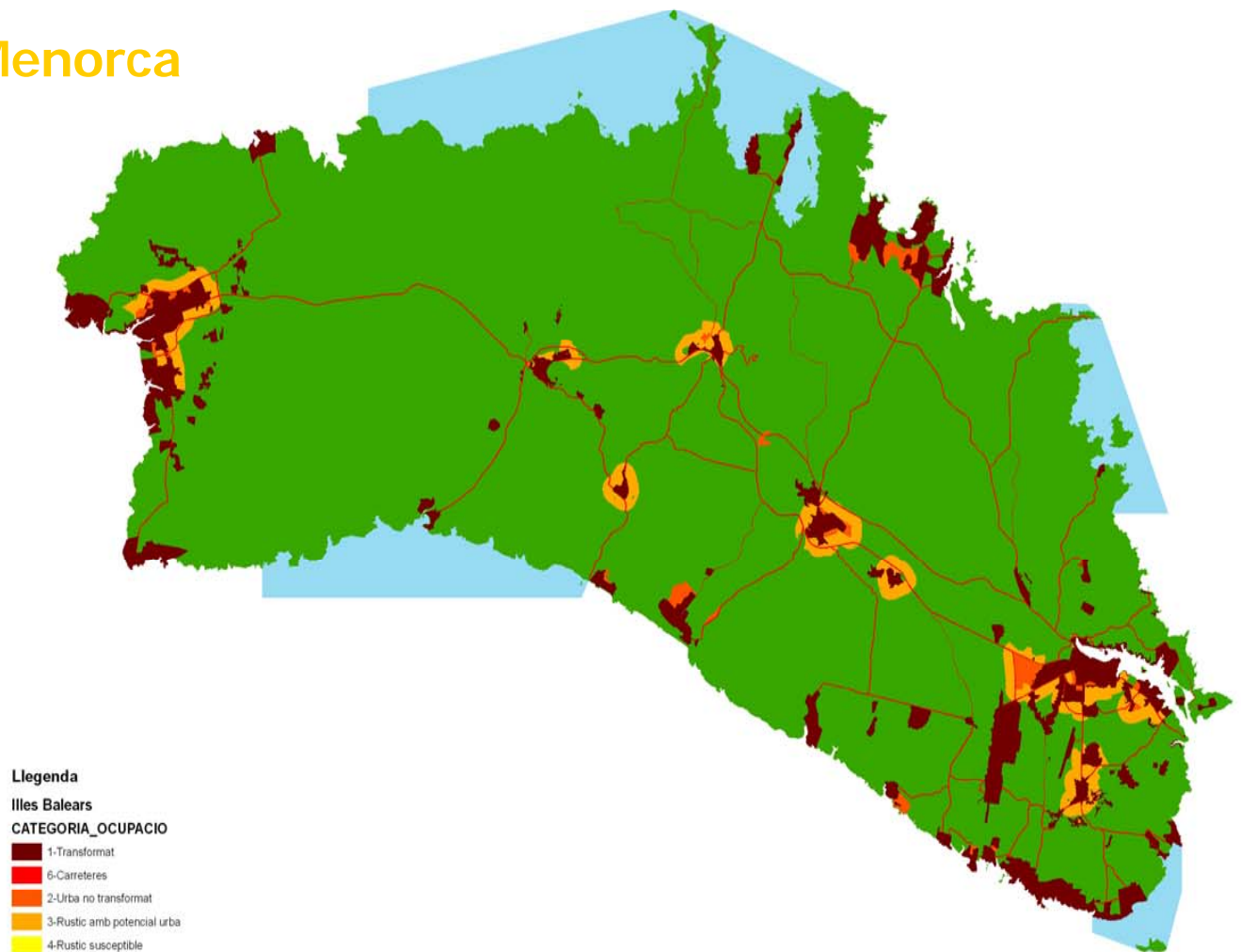
Illes Balears

CATEGORIA\_OCUPACIO

- 1-Transformat
- 6-Carreteres
- 2-Urba no transformat
- 3-Rustic amb potencial urba
- 4-Rustic susceptible
- 5-Rustic protegí
- 1000-Mari

0 3.485 6.970 13.940 20.910 27.880 m

## Menorca



### Llegenda

Illes Balears

CATEGORIA\_OCUPACIO

- 1-Transformat
- 6-Carreteres
- 2-Urba no transformat
- 3-Rustic amb potencial urba
- 4-Rustic susceptible
- 5-Rustic protegit
- 1000-Mari

0 1.625 3.250 6.500 9.750 13.000 m



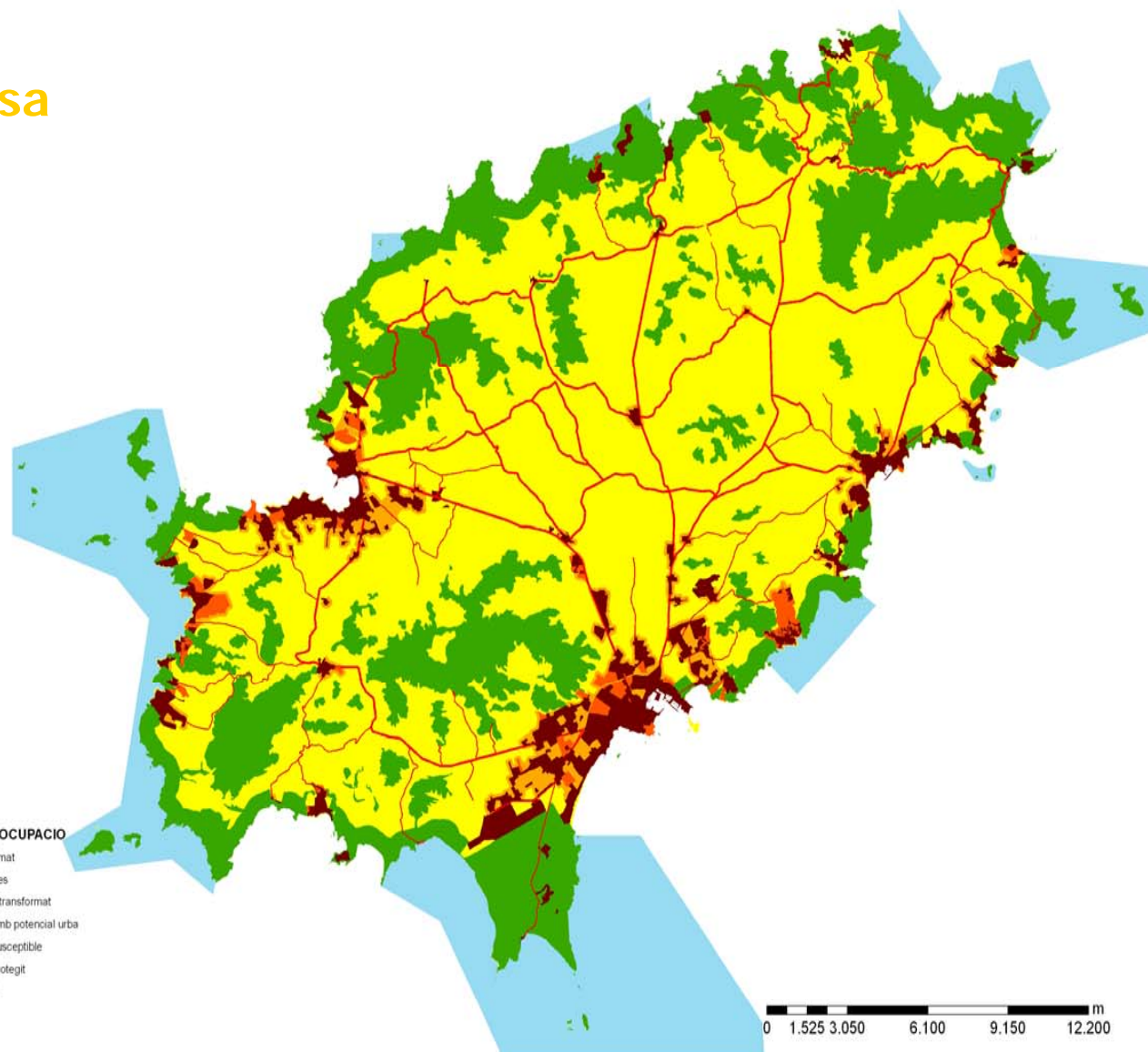
# Eivissa

## Llegenda

Illes Balears

CATEGORIA\_OCUPACIO

- 1-Transformat
- 6-Carreteres
- 2-Urba no transformat
- 3-Rustic amb potencial urba
- 4-Rustic susceptible
- 5-Rustic protegit
- 1000-Marí



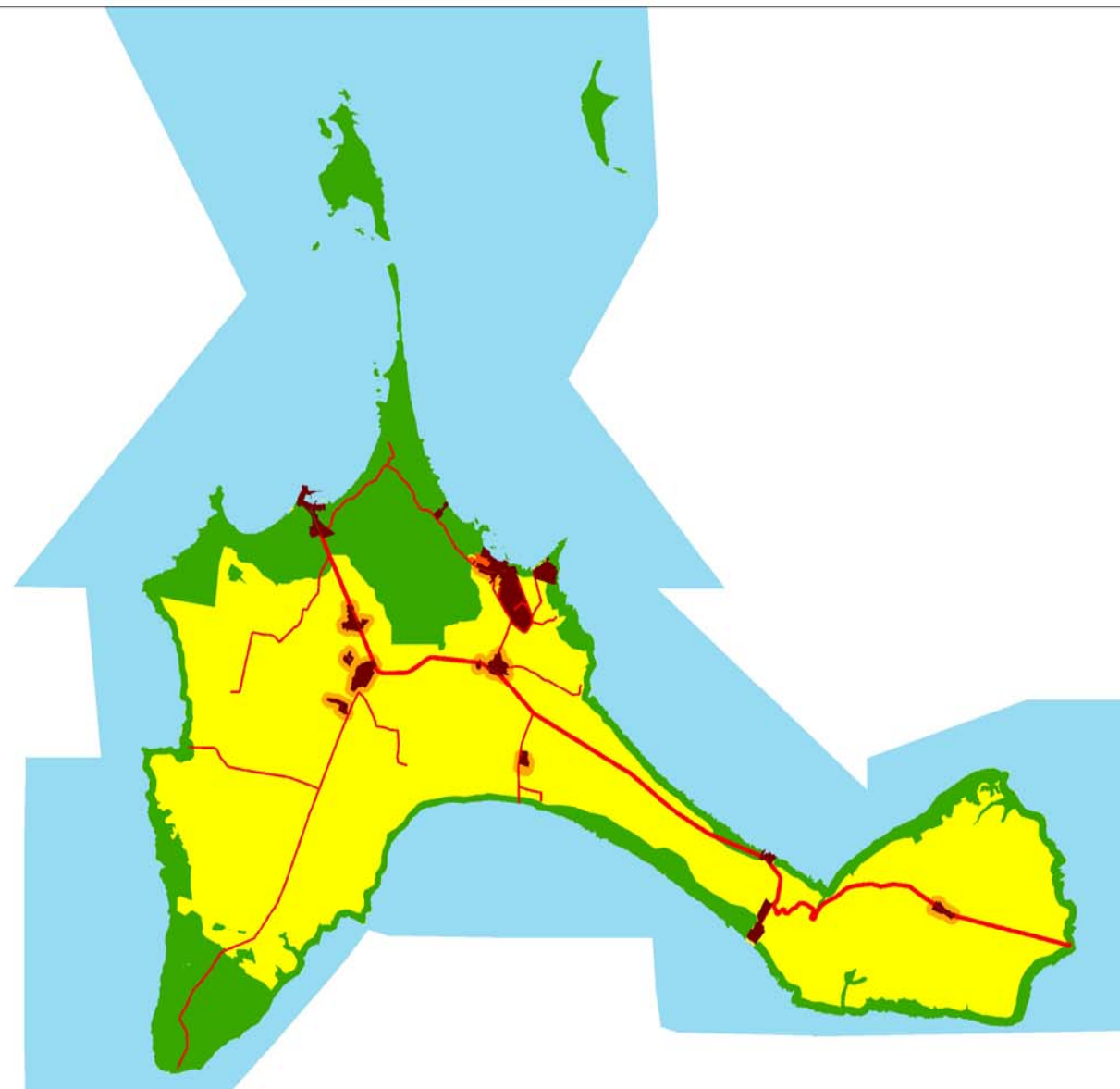
# Formentera

## Llegenda

Illes Balears

CATEGORIA\_OCUPACIO

- 1-Transformat
- 6-Carreteres
- 2-Urba no transformat
- 3-Rustic amb potencial urba
- 4-Rustic susceptible
- 5-Rustic protegit
- 1000-Marl



0 945 1.890 3.780 5.670 7.560 m

# Level of Satisfaction and Perceptions of Resident and Tourist Beach Users on the Island of Mallorca

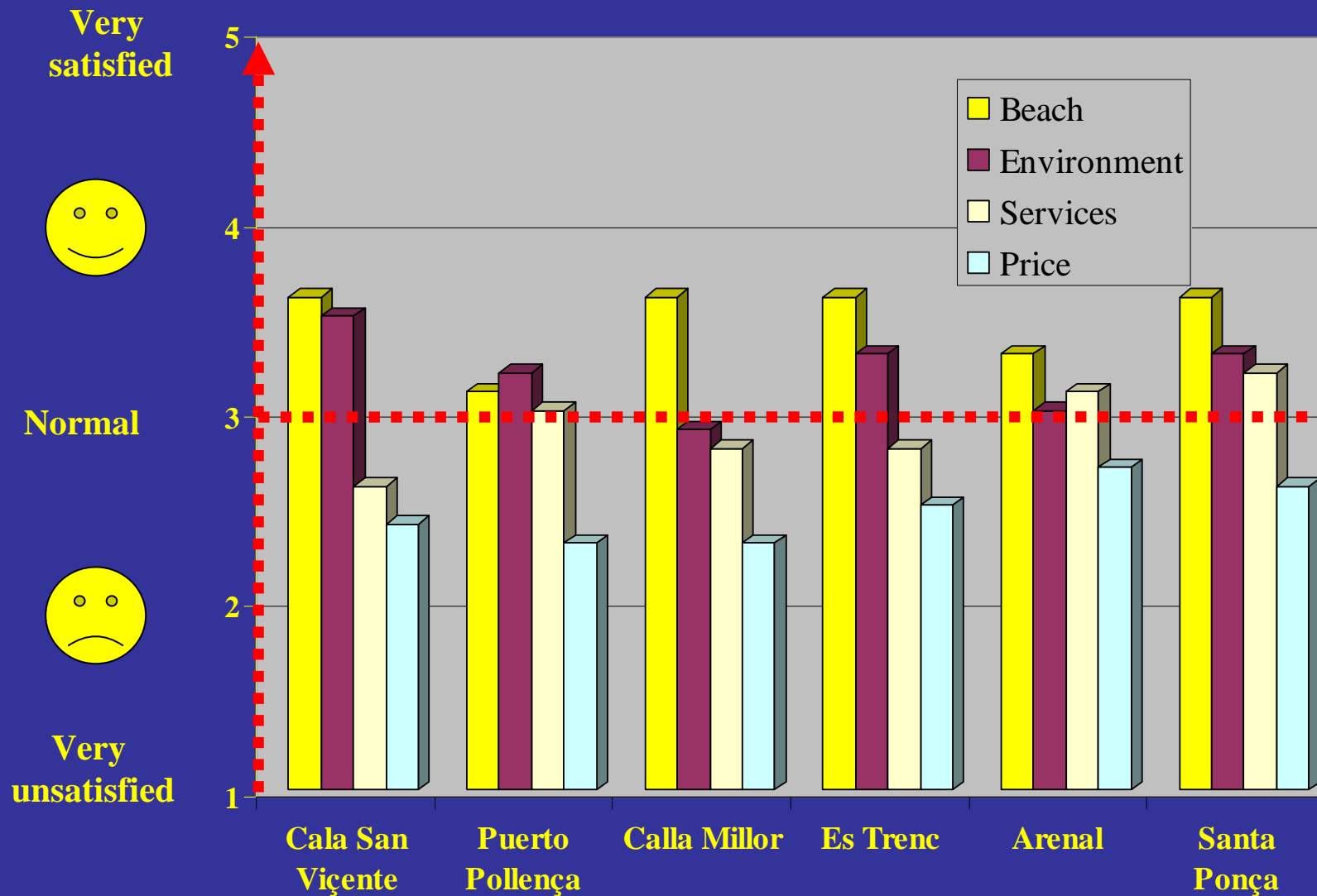
## Objective

To assess the level of satisfaction (environment, services, prices, beach quality) and perceptions of resident and tourist beach users in six pilot sites in Mallorca.

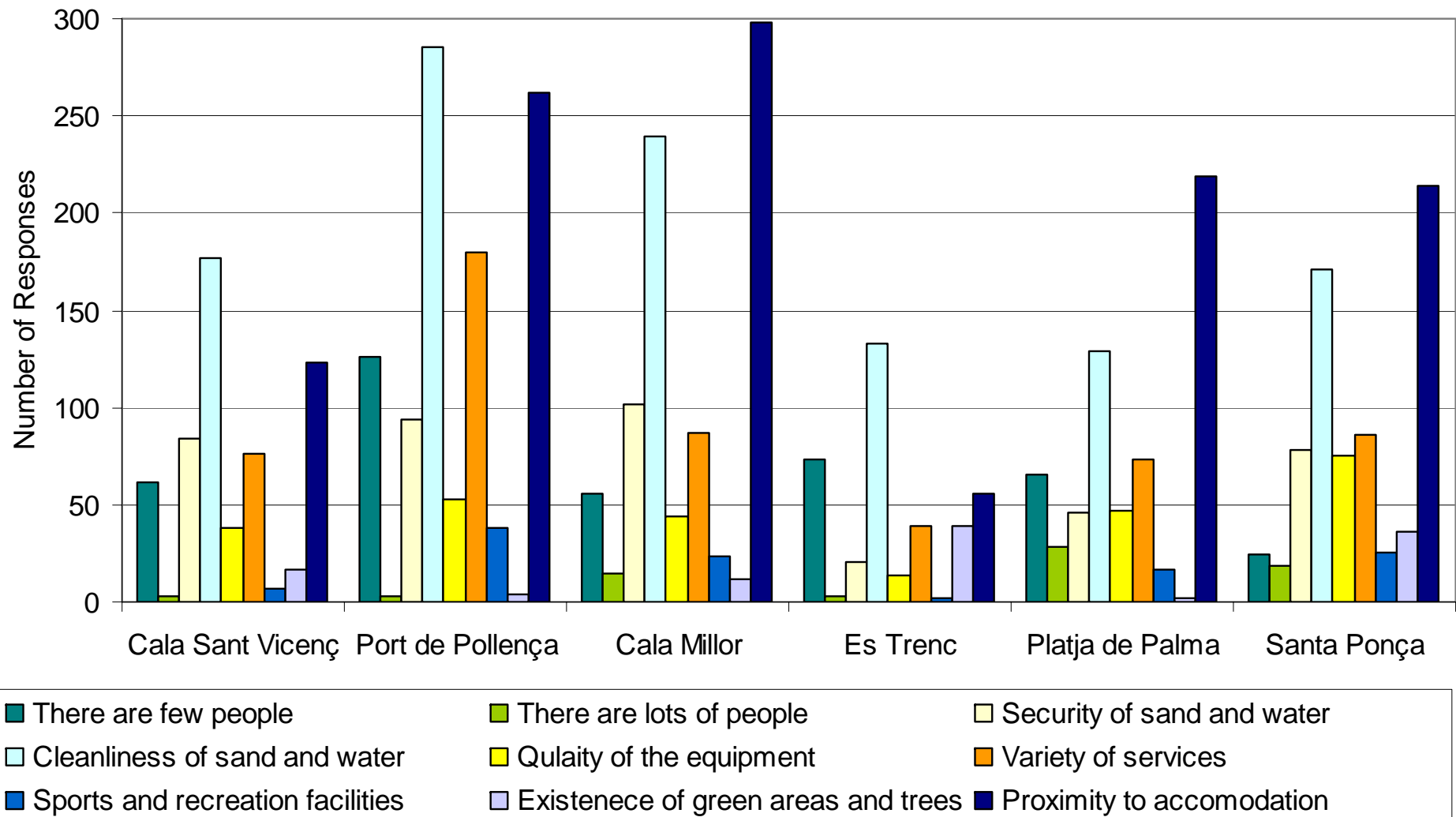




# Satisfaction Levels of Resident Beach Users in Six Pilot Sites on the Island of Mallorca (N = 645)



# Primary Reasons of Tourists for Beach Selection







# Multidisciplinary Research



# Indicators for Assessing and Monitoring Sustainability in the Coastal Zone of the Balearic Islands

## Objective

To develop a proposal for a list of indicators to monitor and assess sustainability in the coastal zone of the Balearic Islands.

## How?

Through a full evaluation of international scientific standards and protocols for indicator development and through a participatory, cooperative process in order to tailor such standards to the environmental-socio-economic reality of the Balearic Islands.





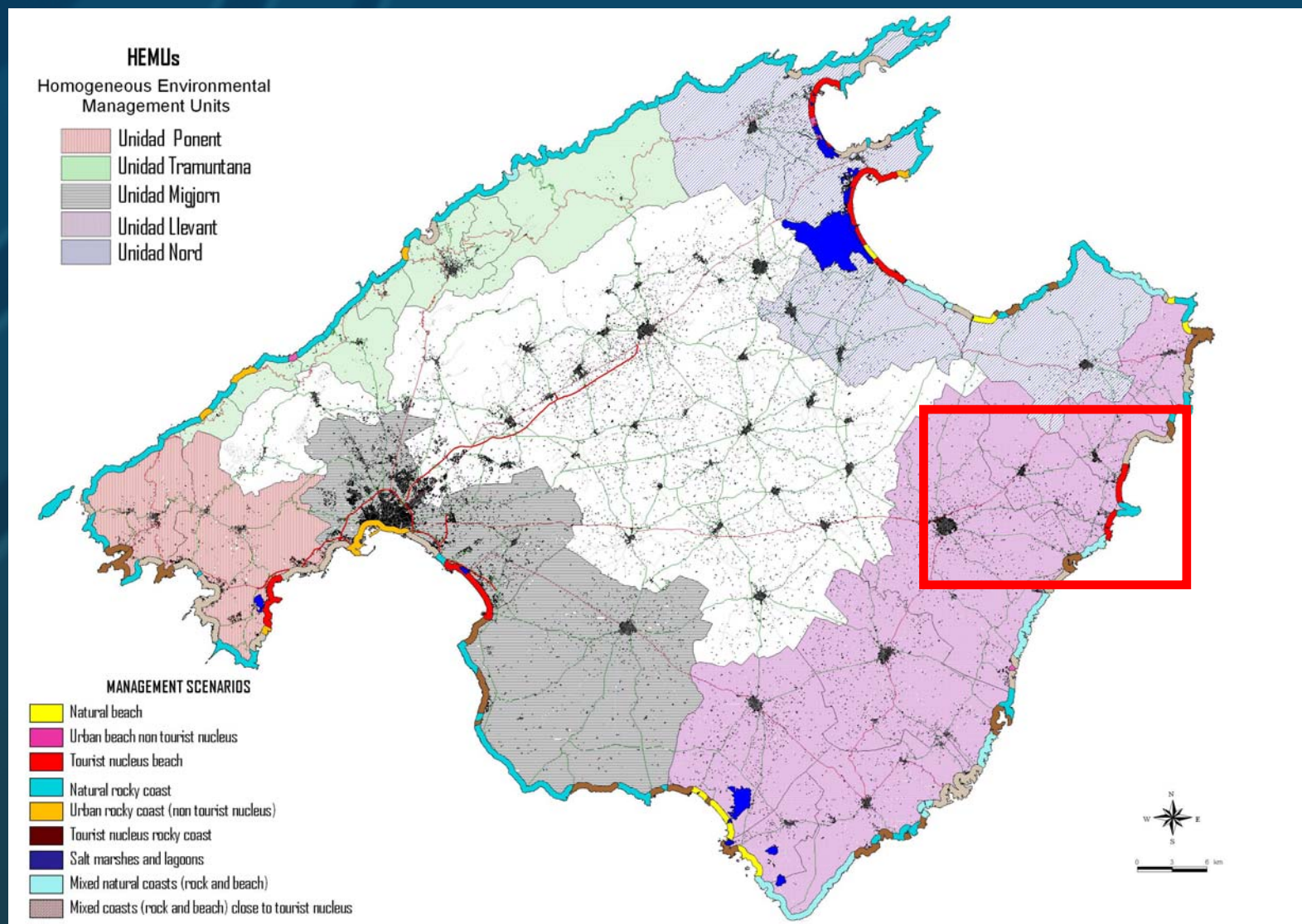
# Methodological Approach to Boundary Delimitation for ICZM

## Objective

To generate a methodology for preemptive boundary delimitation for ICZM initiatives, taking into account the interactions among the geophysical, environmental, societal, and jurisdictional dimensions.

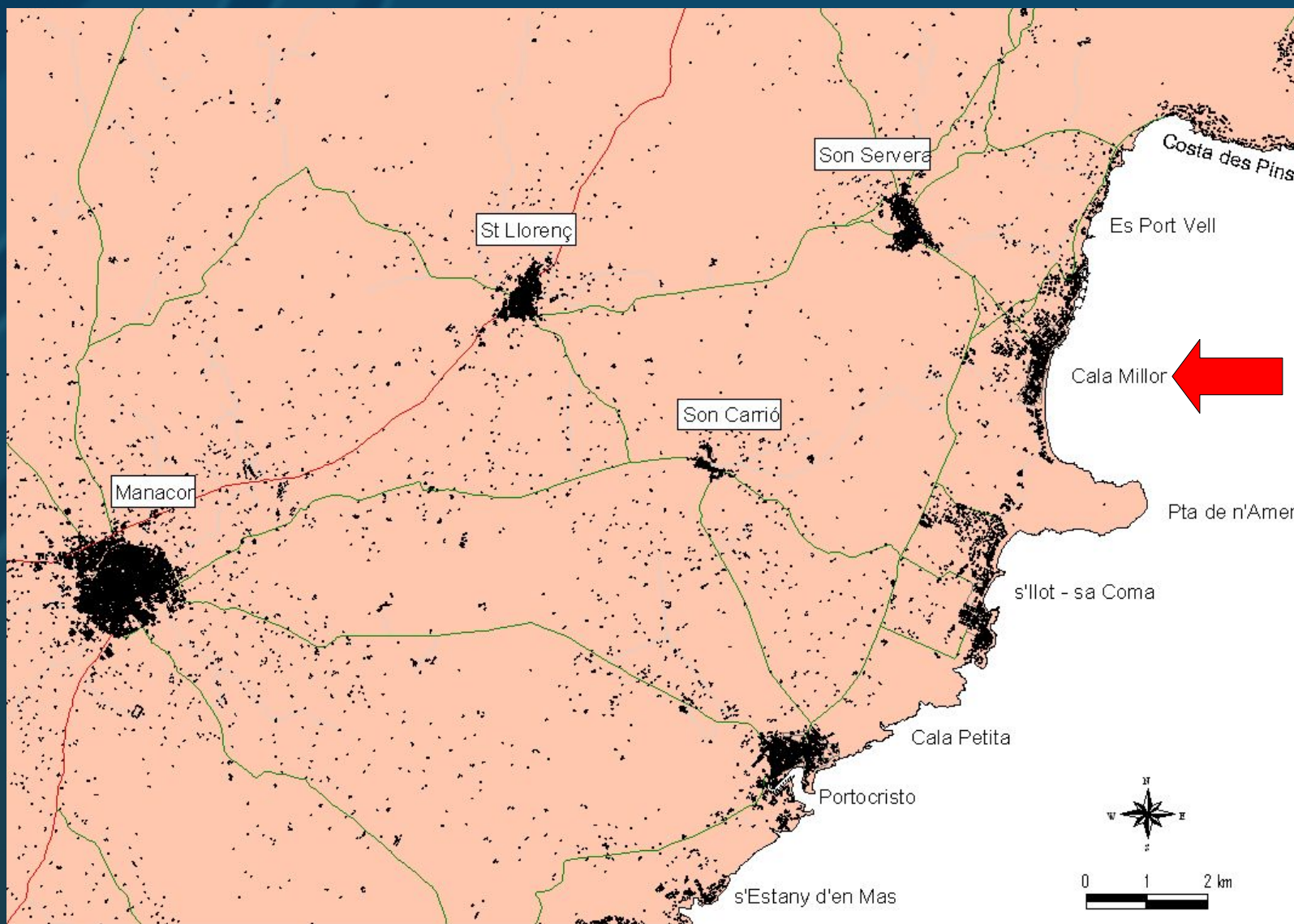


# Methodological Approach to Boundary Delimitation for ICZM



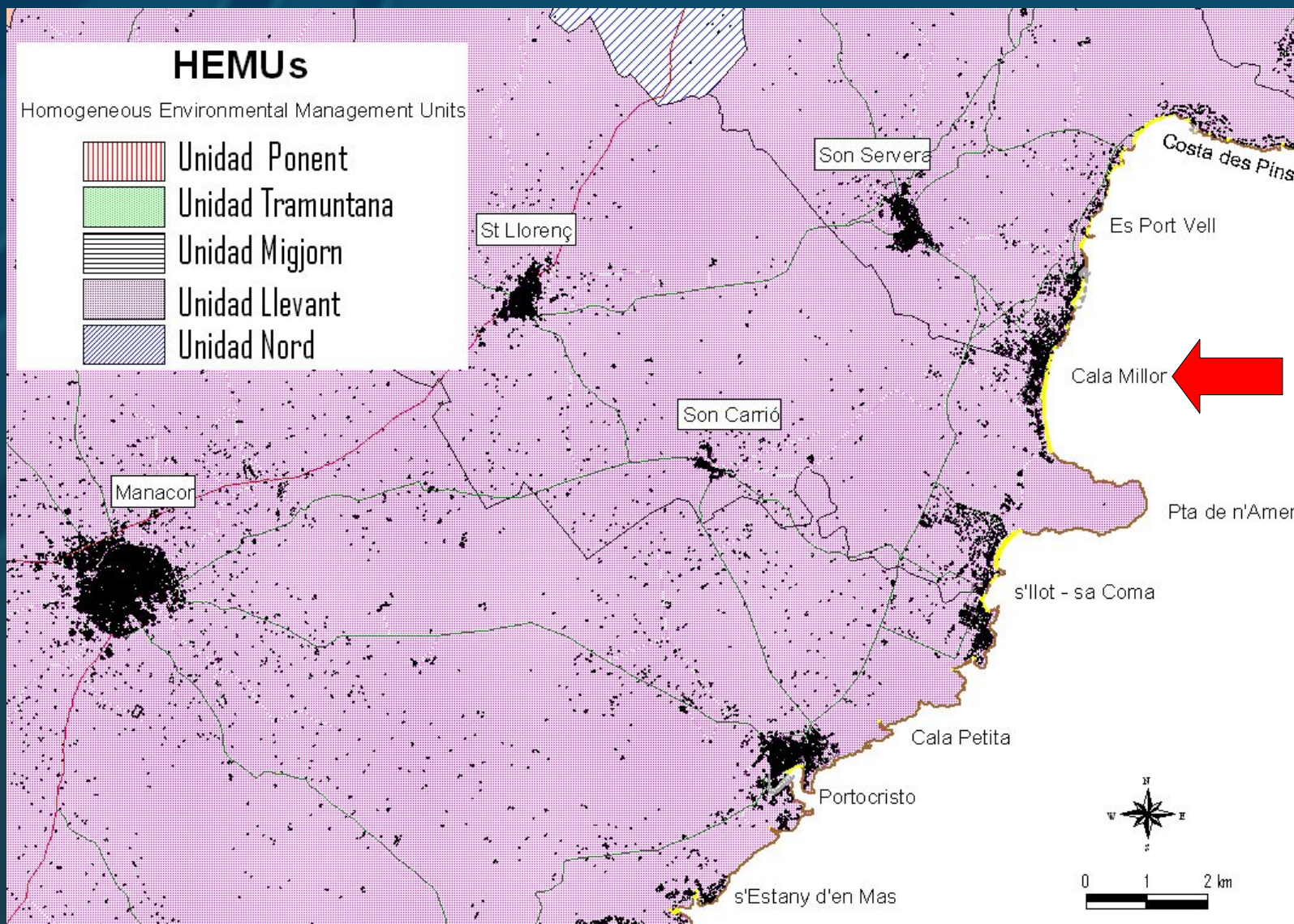


# Methodological Approach to Boundary Delimitation for ICZM



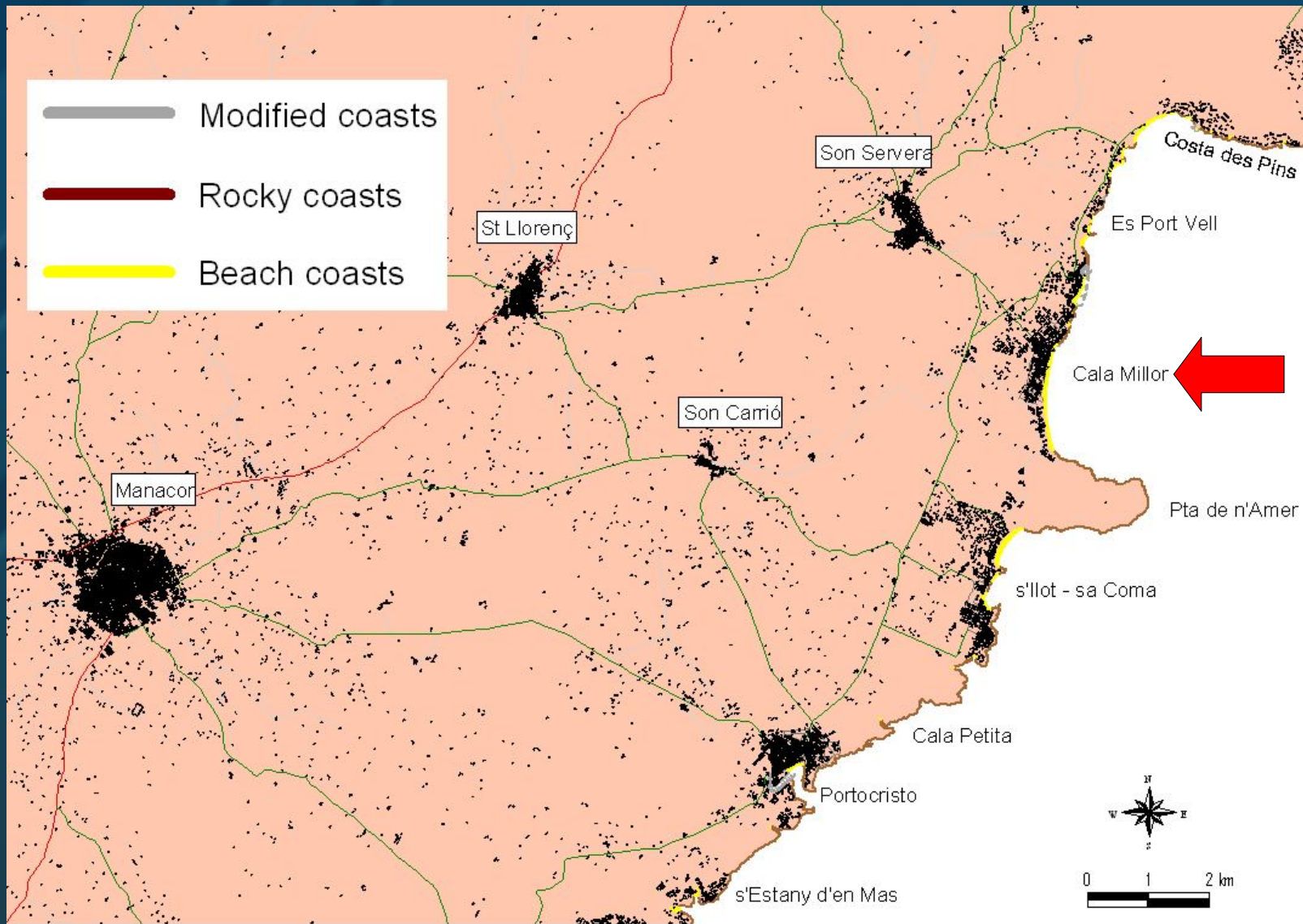


# Methodological Approach to Boundary Delimitation for ICZM



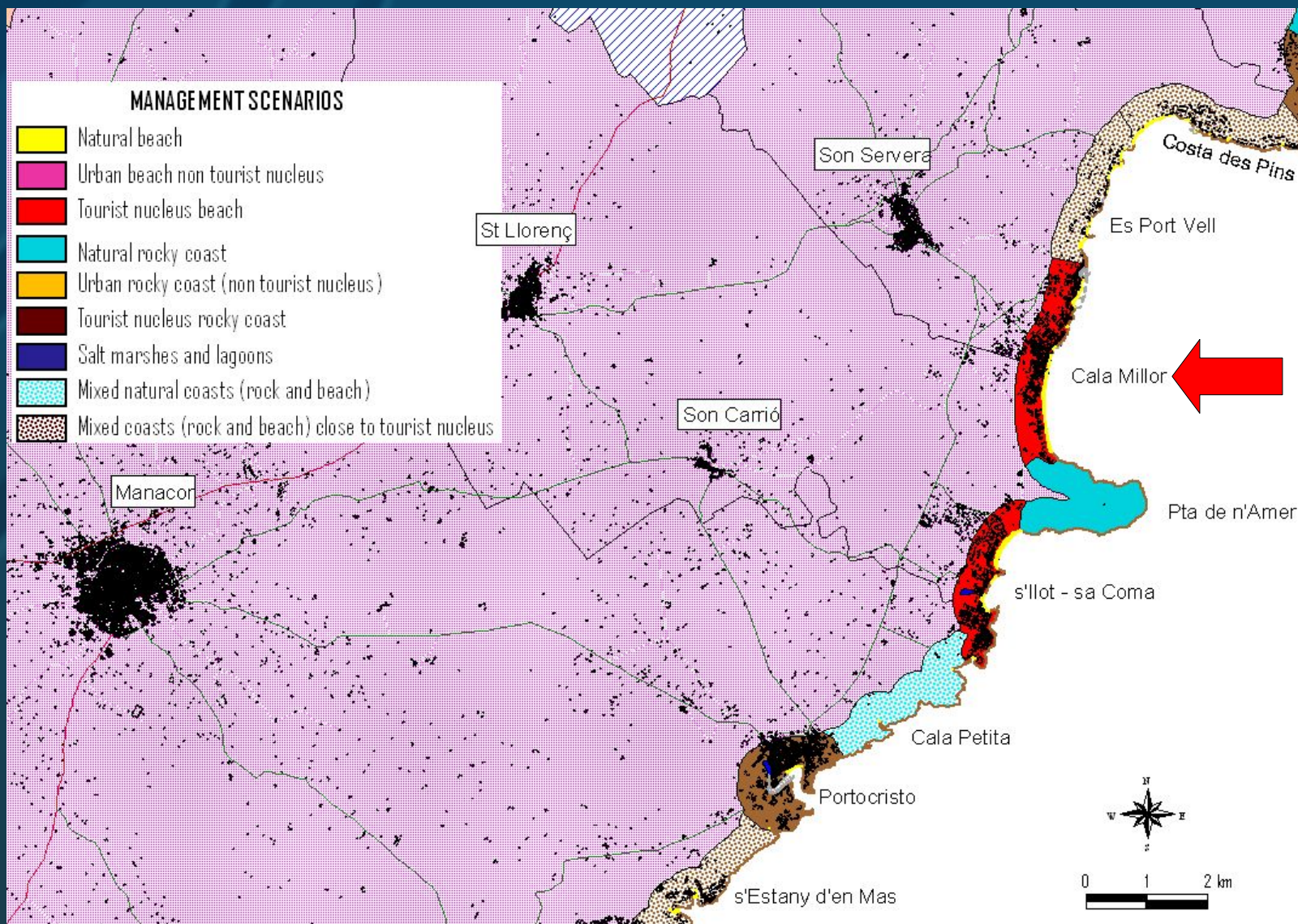


# Methodological Approach to Boundary Delimitation for ICZM



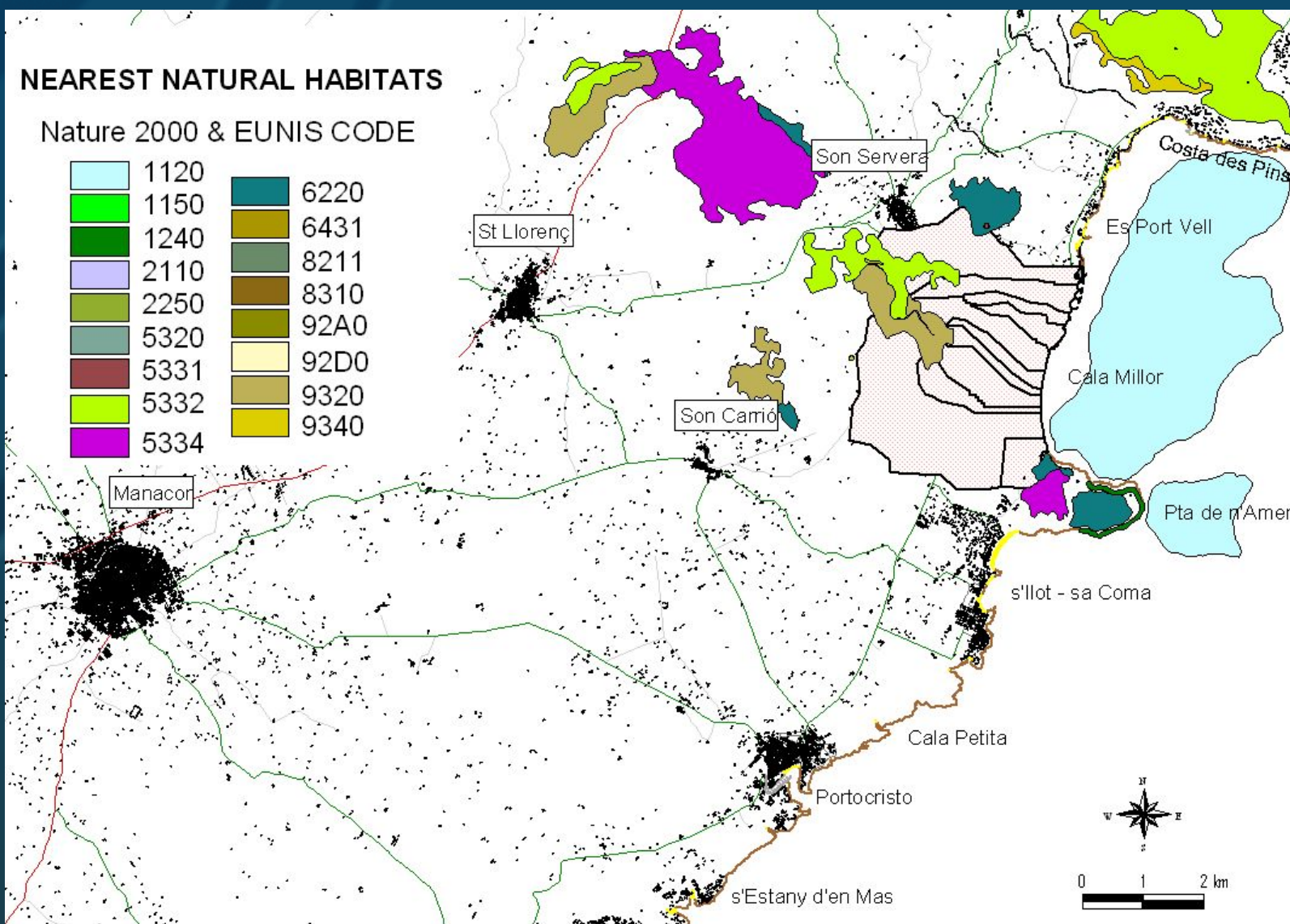


# Methodological Approach to Boundary Delimitation for ICZM

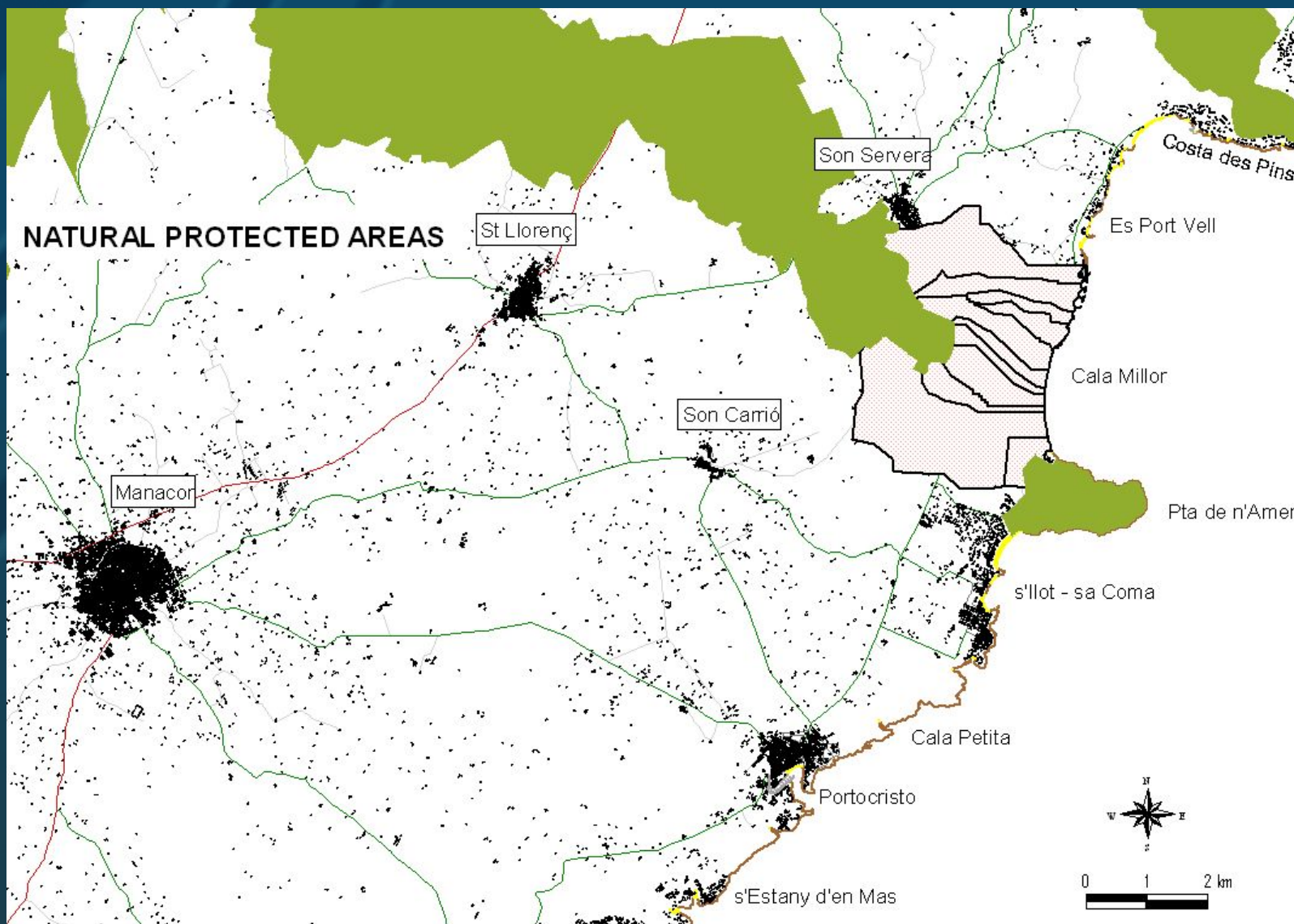




# Methodological Approach to Boundary Delimitation for ICZM

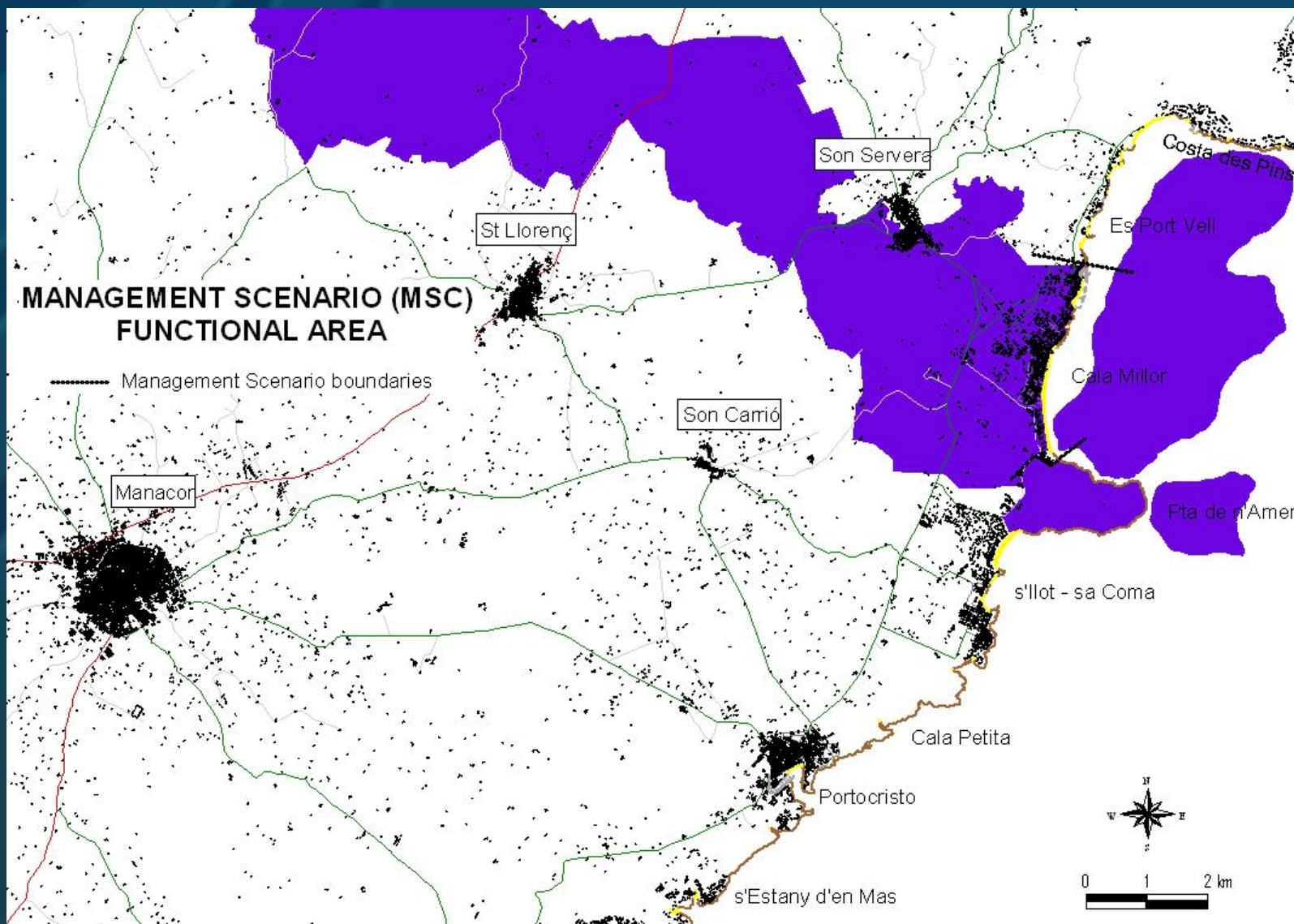


# Methodological Approach to Boundary Delimitation for ICZM





# Methodological Approach to Boundary Delimitation for ICZM





# Tools and Technological Development

# GIS Database for ICZM

## Objective

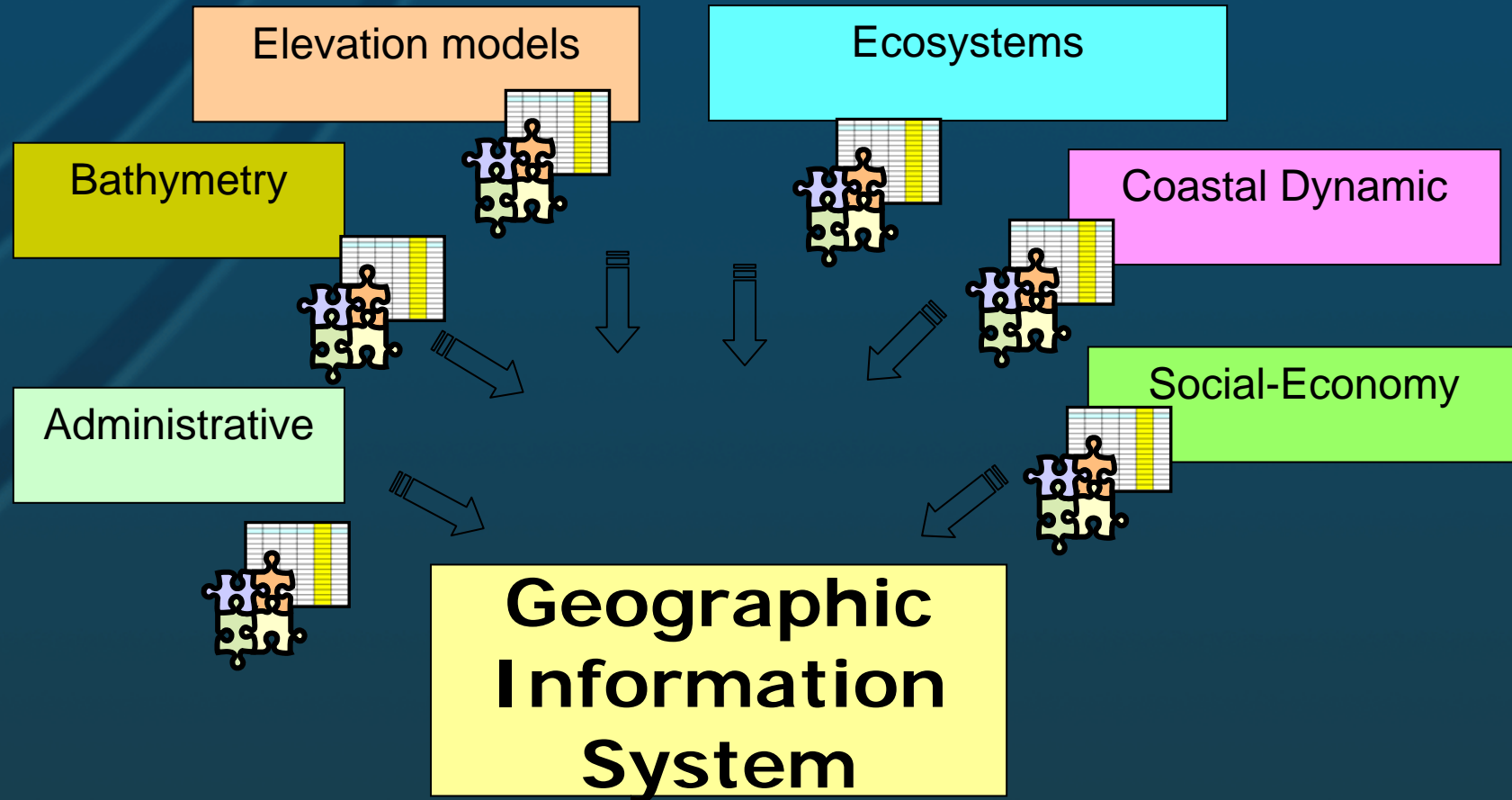
To design and implement a GIS database to serve as a technological support tool for the Balearic ICZM Project.





# What is GIS-IMEDEA?

<http://www.imedea.uib.es/gis/>



# Technological Platform for the Coastal Zone of the Balearic Islands

## Objective

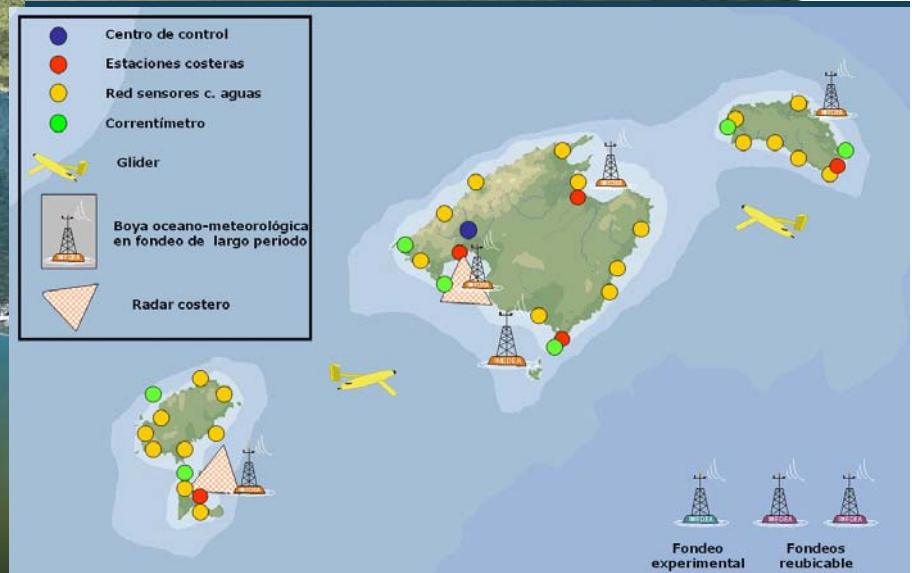
To establish a Technological Platform for the Coastal Zone of the Balearic Islands that will allow for “almost real-time” monitoring of the multidisciplinary processes taking place in the coastal zone, with particular emphasis on:

- The vulnerability of the Balearic Islands in relation to global change.
- The development of new scientific tools and technologies to support decision-making and that support progress towards management of the coastal zone that is sustainable, integrated and knowledge based.



The installation will consist of three systems:

- 1) Observation
- 2) Numerical prediction and data assimilation
- 2) Data management and transfer of results in appropriate formats for end users.





# Transfer of Knowledge

- Conferences
- Seminars
- Media
- Website
- Peer reviewed journals
- Reports
- Stakeholder meetings and collaborations
- Networking





An underwater photograph of a sandy seabed. In the center-right, a five-armed starfish with a light orange body and darker orange tips lies on the sand. To its left, a dark brown sea urchin is visible. Further left, another sea urchin is partially obscured by some green algae. The background is a deep blue, slightly hazy water. The text "Moltes Gràcies" is overlaid in yellow in the upper-middle part of the image.

**Moltes Gràcies**

<http://www.imedea.uib.es/goifis/UGIZC/>