

## *Coast Bordeaux 2017*

Systemic and Biodiversity Evolution of Marine Coastal Ecosystems under the Pressure of Climate Change, Natural and Anthropogenic Local Factors

*From the 7th to the 10th of November 2017 - Domaine du Haut Carré*

# Developing proper indicators of tourism sustainability to protect Mediterranean coastal ecosystems

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National Research Council - Institute of Marine Sciences – Venice, Italy



Project co-financed by the European  
Regional Development Fund



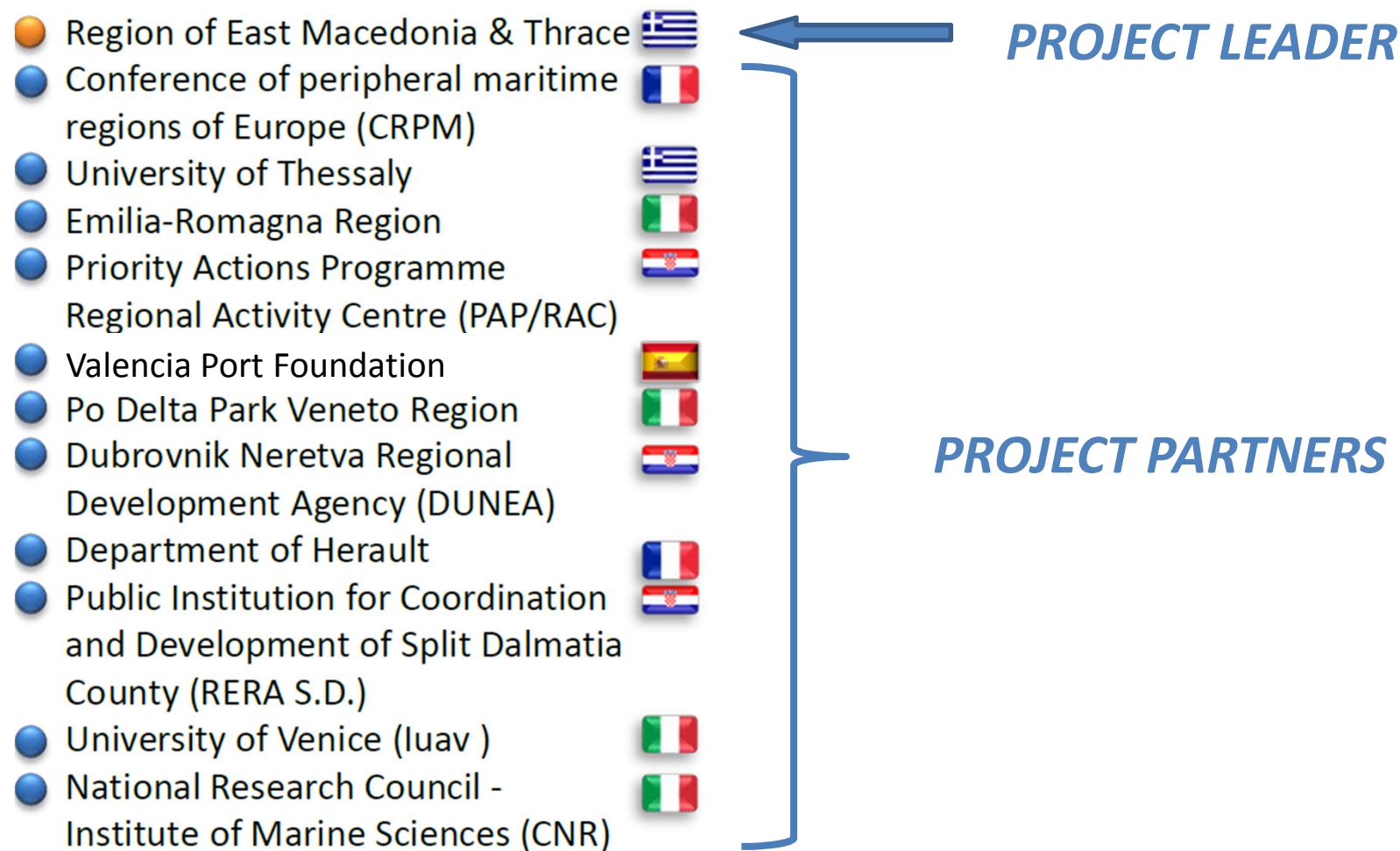
# The MED Project CO-EVOLVE

Promoting the co-evolution of human activities  
and natural systems for the development of  
sustainable coastal and maritime tourism

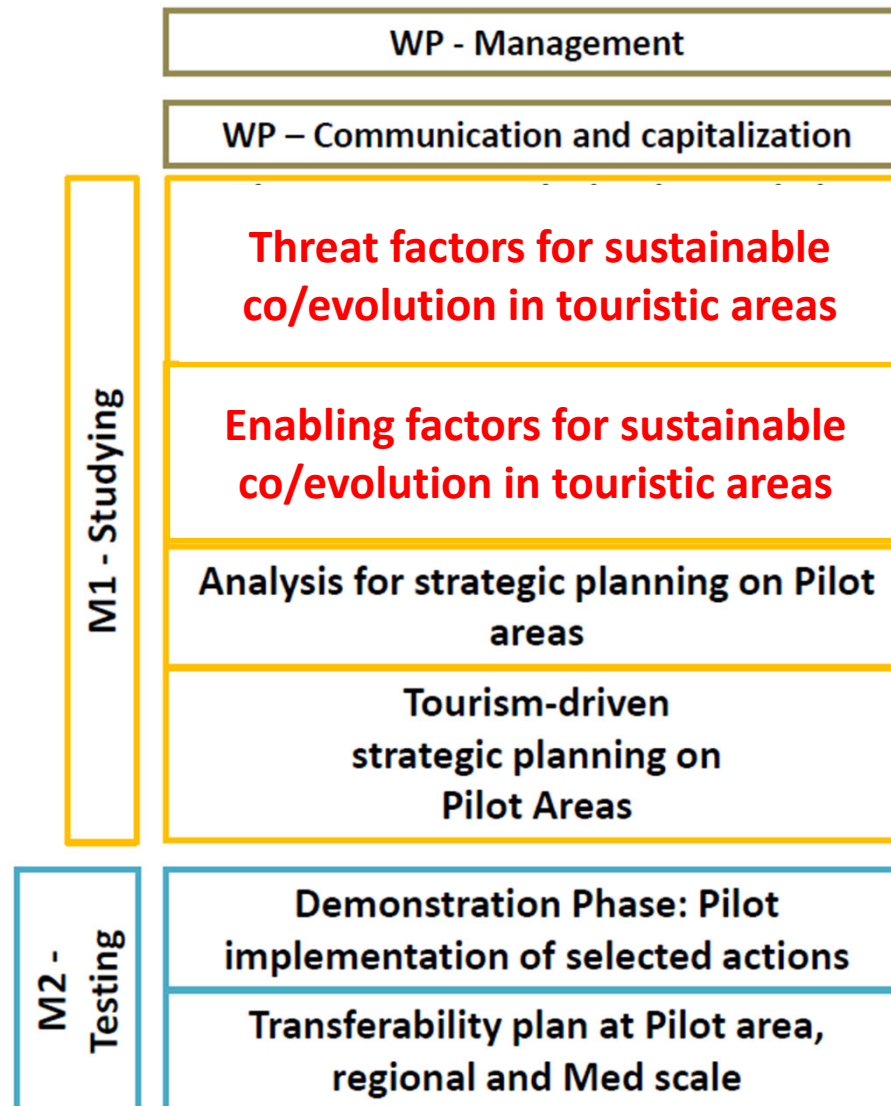
## PROJECT'S AIM

**Analysis of THREATS and ENABLING FACTORS for COASTAL  
SUSTAINABLE tourism to demonstrate through PILOT ACTIONS  
the effectiveness of a ICZM/MSP-based planning process in the  
Mediterranean Basin**

## The MED Project CO-EVOLVE: Partnership



## The MED Project CO-EVOLVE: Structure



## The MED Project CO-EVOLVE: Spatial scale

MED Scale  
(NUTS2-NUTS3)



Mediterranean Basin

Local Scale



12 Pilot Areas



## THREATS AND ENABLING FACTORS FOR SUSTAINABLE COASTAL TOURISM



### THREATS

LITTORALIZATION  
ECOSYSTEM POLLUTION  
CLIMATE CHANGE  
COASTAL EROSION  
TOURISM CARRYING CAPACITY

VS

### ENABLING FACTORS

ECOSYSTEM PROTECTION  
GOVERNANCE  
COASTAL PROTECTION  
TRANSPORT ACCESSIBILITY  
WATER SUPPLY

## THREATS AND ENABLING FACTORS FOR SUSTAINABLE COASTAL TOURISM



### THREATS

LITTORALIZATION

ECOSYSTEM POLLUTION

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ECOSYSTEM PROTECTION

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TRANSPORT ACCESSIBILITY

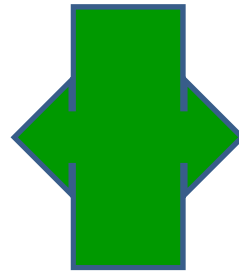
WATER SUPPLY

## ECOSYSTEM POLLUTION & ECOSYSTEM PROTECTION FOR SUSTAINABLE COASTAL TOURISM

THREAT

### ECOSYSTEM POLLUTION

- ✓ LIGHT POLLUTION
- ✓ NOISE POLLUTION
- ✓ WATER POLLUTION
- ✓ WASTE PRODUCTION
- ✓ ARTIFICIALIZATION



ENABLING FACTOR

### ECOSYSTEM PROTECTION

- ✓ PROTECTED HABITATS & SPECIES
- ✓ MANAGEMENT PLANS  
FOR NATURA 2000 SITES
- ✓ RECYCLING EFFORT
- ✓ ECOSYSTEM BENEFIT SUPPLY

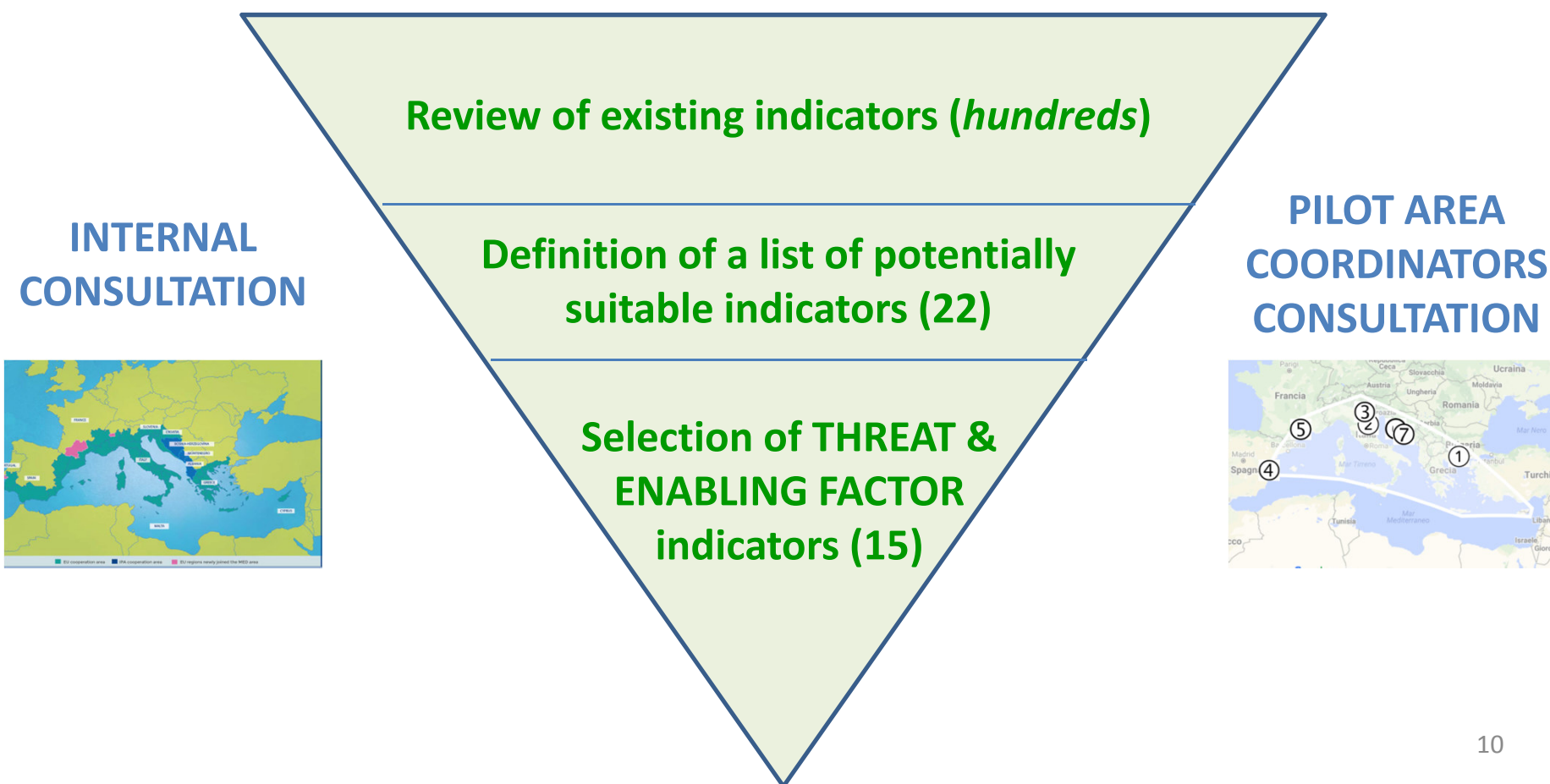
How to develop **INDICATORS** for these factors  
**adequate** at both spatial scales?



# **ECOSYSTEM POLLUTION & ECOSYSTEM PROTECTION INDICATORS FOR SUSTAINABLE COASTAL TOURISM: *METHODOLOGY (1)***

- 1. Review of existing indicators**
- 2. Definition of a list of potentially suitable indicators**
- 3. Selection of indicators based on data availability**

## ECOSYSTEM POLLUTION & ECOSYSTEM PROTECTION INDICATORS FOR SUSTAINABLE COASTAL TOURISM: *METHODOLOGY (2)*



# 1. Review of existing indicators

## ETIS indicators

European Tourism Indicator System (EU Commission, 2016)

- ✓ Toolkit for sustainable destination management
- ✓ 43 core indicators cover the fundamental aspects of sustainability monitoring
- ✓ Supplementary indicators?

## EcAp indicators

Ecosystem Approach indicators of IMAP (UNEP/MED 2016)

- ✓ Common indicators in relation to ecological objectives
- ✓ Applied to achieve Good Environmental Status (GES)
- ✓ No explicit relation to tourism

## 2. Definition of a list of potentially suitable indicators

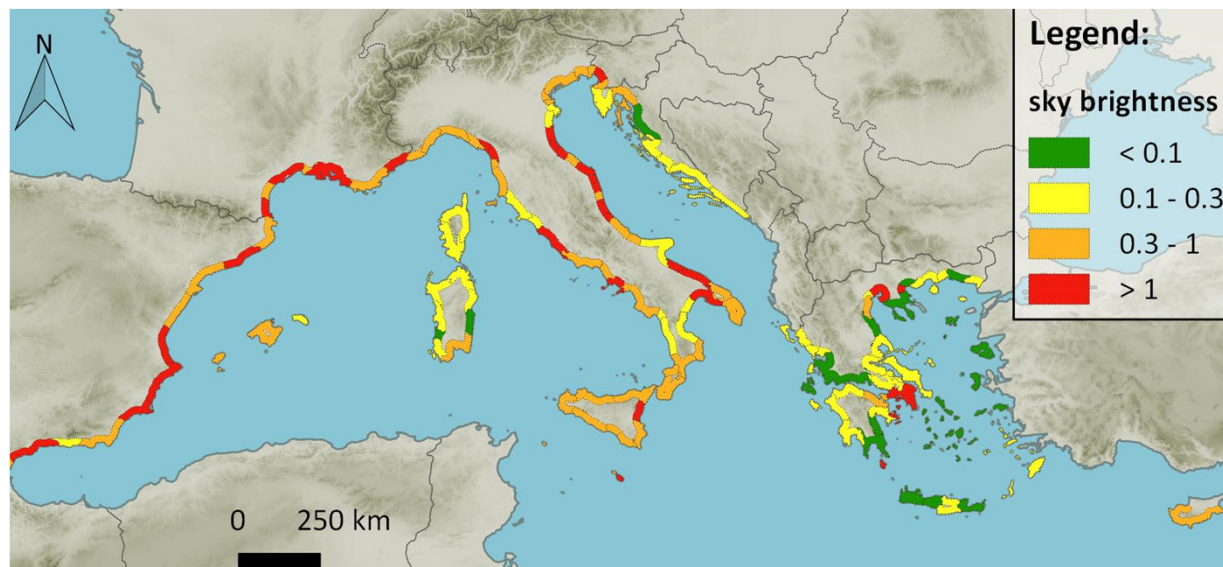
Category	Indicator	Data requests to Pilot Area Coordinator
<b>Light pollution</b>	Artificial sky brightness	Data on measurements of artificial sky brightness at local or regional or national level
<b>Waste</b>	Volume of litter collected per given length of shoreline (ETIS)	Volume of litter collected per given length of shoreline (if not available, any data on local marine litter collected/estimated)
<b>Water pollution</b>	Level of contamination per 100 ml (fecal coliforms)	Level of contamination per 100 ml; if not available, data about eutrophication; OR, qualitative data on water quality

### 3. Selection of indicators based on data availability

THREAT Category	EcAp indicator	ETIS core indicator	CO-EVOLVE Indicator
Artificialization	/	/	Artificial land cover surface (airports, roads, industry and urban areas) over total surface
Solid Waste	/	Waste production per tourist night compared to general population waste production per person (kg)	Unitary waste production compared to overnight stays
Ecosystem degradation and fragmentation	/	/	Natural land cover surface over artificial land cover surface
Water pollution	Concentration of key harmful contaminants measured in the relevant matrix	/	Bathing water quality
Noise pollution	/	/	N. people exposed to road noise over 55 dB
Light pollution	/	/	Artificial sky brightness
Eutrophication	/	/	TRIX index

## RESULTS - LIGHT POLLUTION

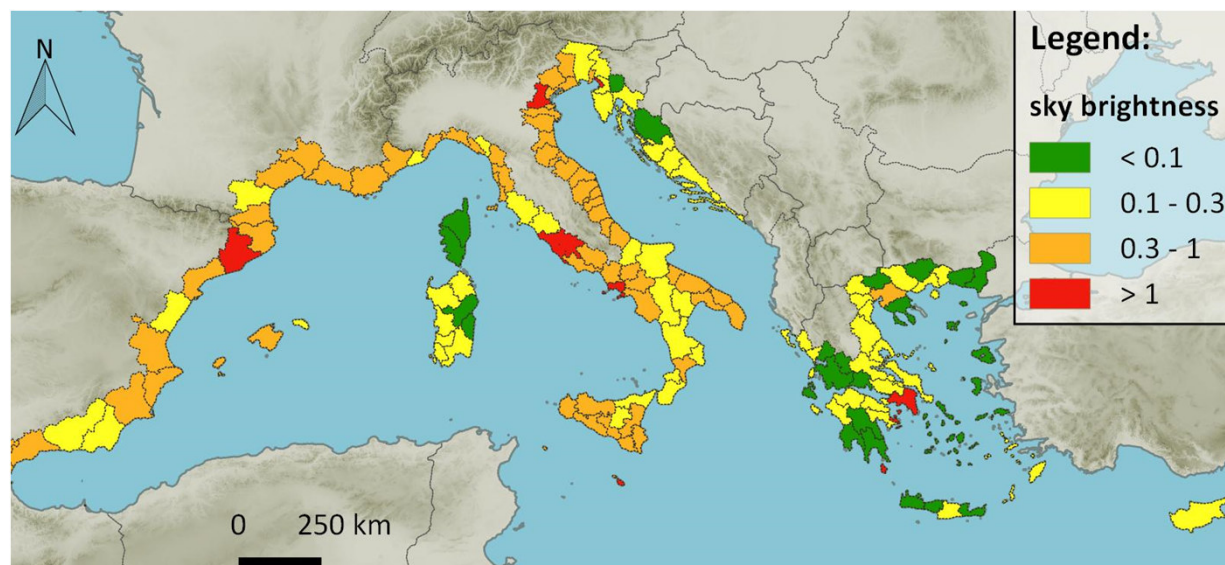
### PILOT AREA SCALE



Indicator:  
Artificial sky  
brightness  
(simulated zenith  
radiance) in mcd/m<sup>2</sup>

(Falchi et al. 2016)

### NUTS3 SCALE

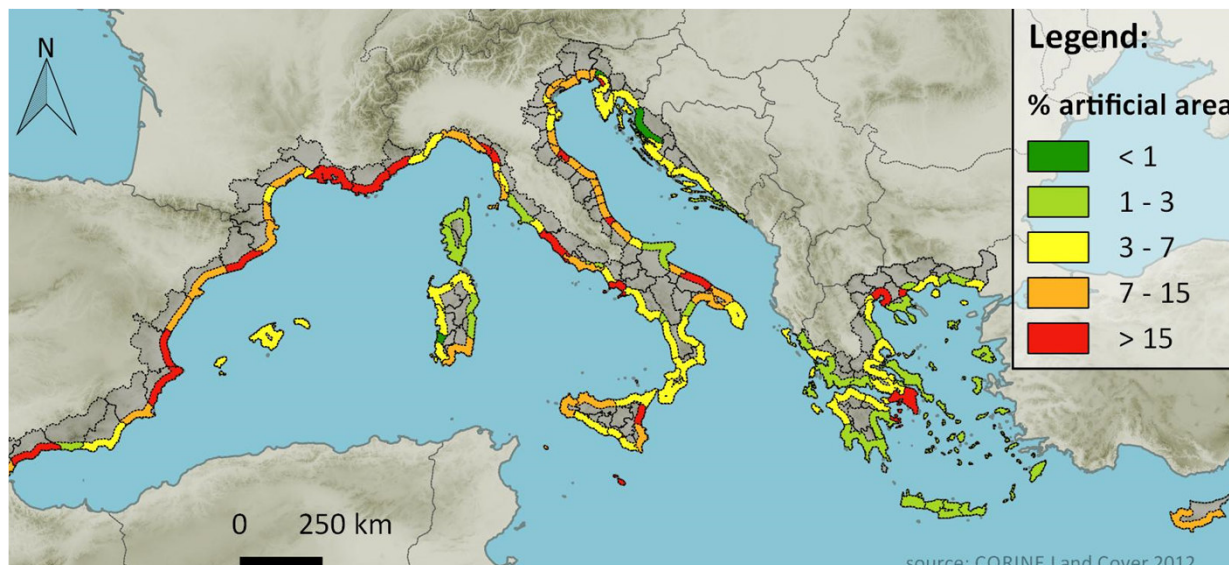


LIGHT POLLUTION  
IS WORSE ALONG  
COASTLINE THAN  
AT NUTS3 LEVEL



## RESULTS - ARTIFICIALIZATION

### PILOT AREA SCALE

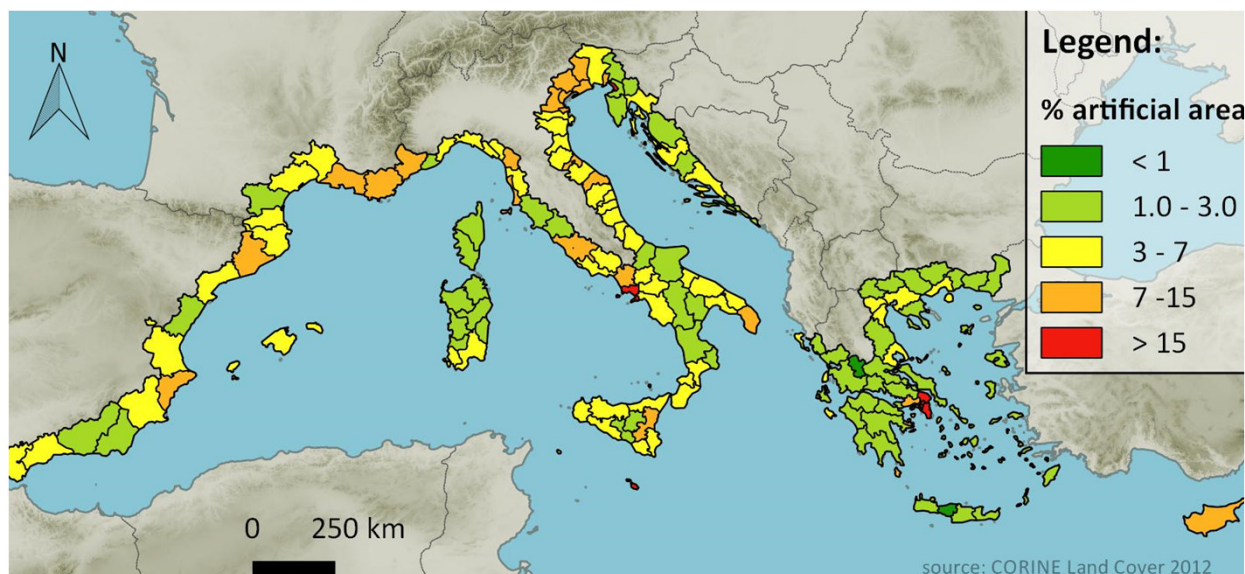


Indicator:

Percentage of artificial  
land cover classes with  
respect to total surface

(Corine Land Cover 2012)

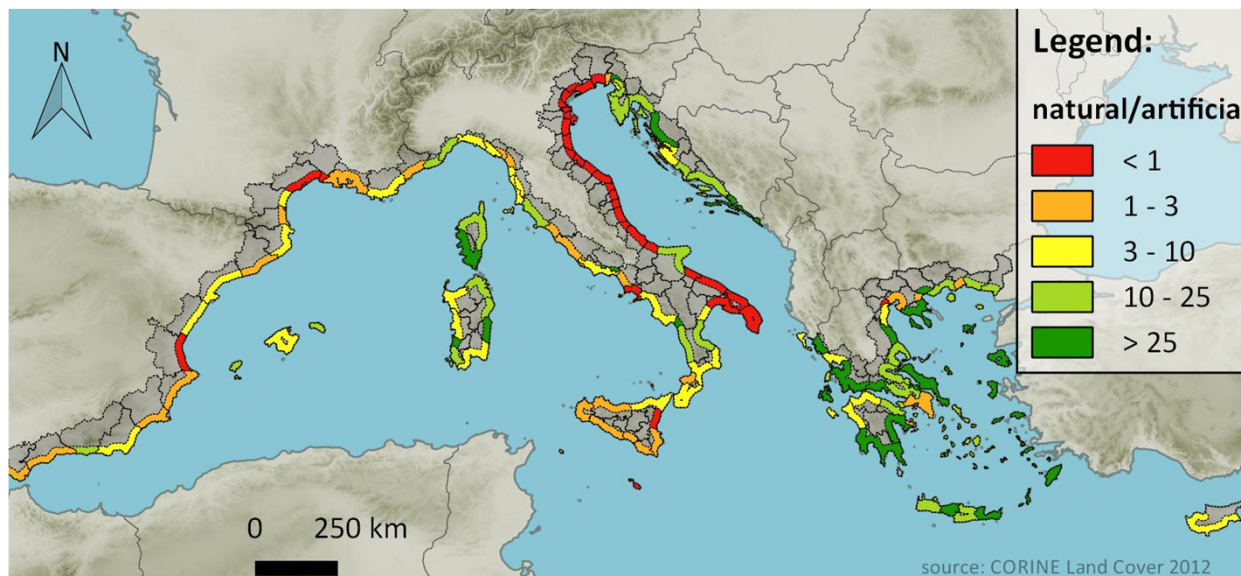
### NUTS3 SCALE



ARTIFICIALIZATION  
IS WORSE ALONG  
COASTLINE THAN  
AT NUTS3 LEVEL

## RESULTS - HABITAT LOSS

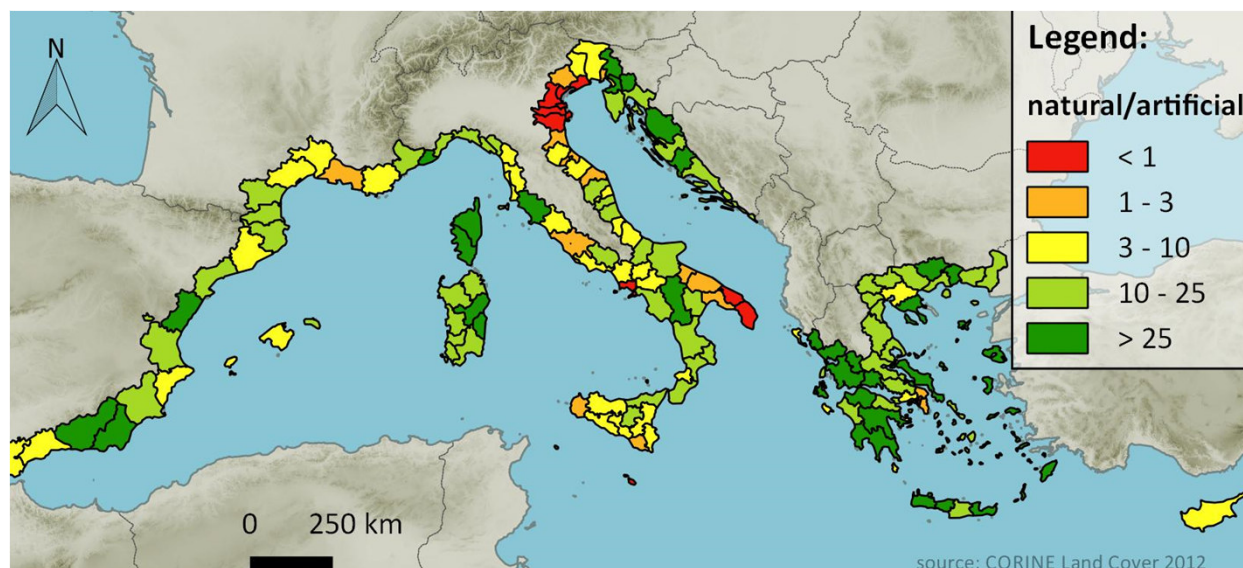
### PILOT AREA SCALE



Indicator:  
Natural land cover  
classes/Artificial land  
cover classes

(Corine Land Cover 2012)

### NUTS3 SCALE



HABITAT LOSS IS  
LESS AFFECTED BY  
SCALE THAN THE  
PREVIOUS  
INDICATORS

## DEVELOPING PROPER INDICATORS FOR MEDITERRANEAN COASTAL TOURISM SUSTAINABILITY: **DISCUSSION**

- ✓ **WE ADDRESSED THE CHALLENGE OF CHOOSING AND POPULATING INDICATORS FOR THREATS AND ENABLING FACTORS VALID AT TWO SPATIAL SCALES**
- ✓ **THE CHOSEN INDICATORS CAN BE INTEGRATED INTO ETIS SUSTAINABILITY TOOLKIT FOR COASTAL TOURISM MONITORING**
- ✓ **MORE EFFORTS NEEDED TO PRODUCE VALUABLE INFORMATION TO SUPPORT THE INDICATORS AT BOTH SPATIAL SCALES**



# THANK YOU FOR YOUR ATTENTION!

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