Greek Ionian Sea and the Adjacent Gulfs: Ecological Mapping for the Needs of Ecosystem-Based Marine Spatial Management

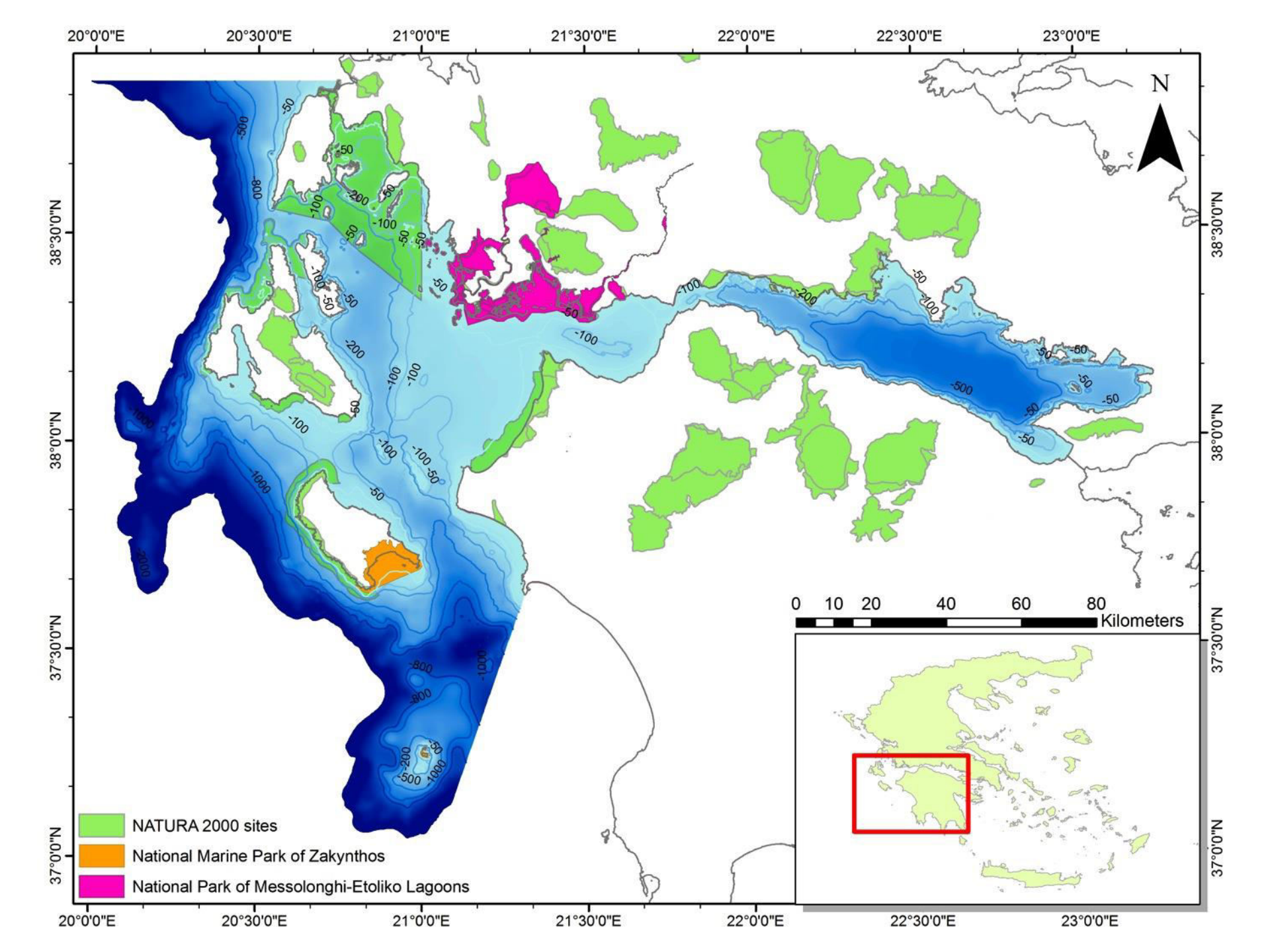
Yiannis Issaris, PhD
Institute of Oceanography
HELLENIC CENTRE FOR MARINE RESEARCH

ECOSYSTEM-BASED MARINE SPATIAL MANAGEMENT

recognises the full web of interactions in the marine environment, taking into account the human activities

INSTEAD OF

looking into specific issues, species and/or ecosystems in isolation


20°0'0"E
20°30'0"E
21°0'0"E
21°30'0"E
22°0'0"E
22°30'0"E
23°0'0"E
38°30'0"N
38°0'0"N
37°30'0"N
37°0'0"N
N
0 10 20 40 60 80
Kilometers
NATURA 2000 sites
National Marine Park of Zakynthos
National Park of Messolonghi-Etoliko Lagoons

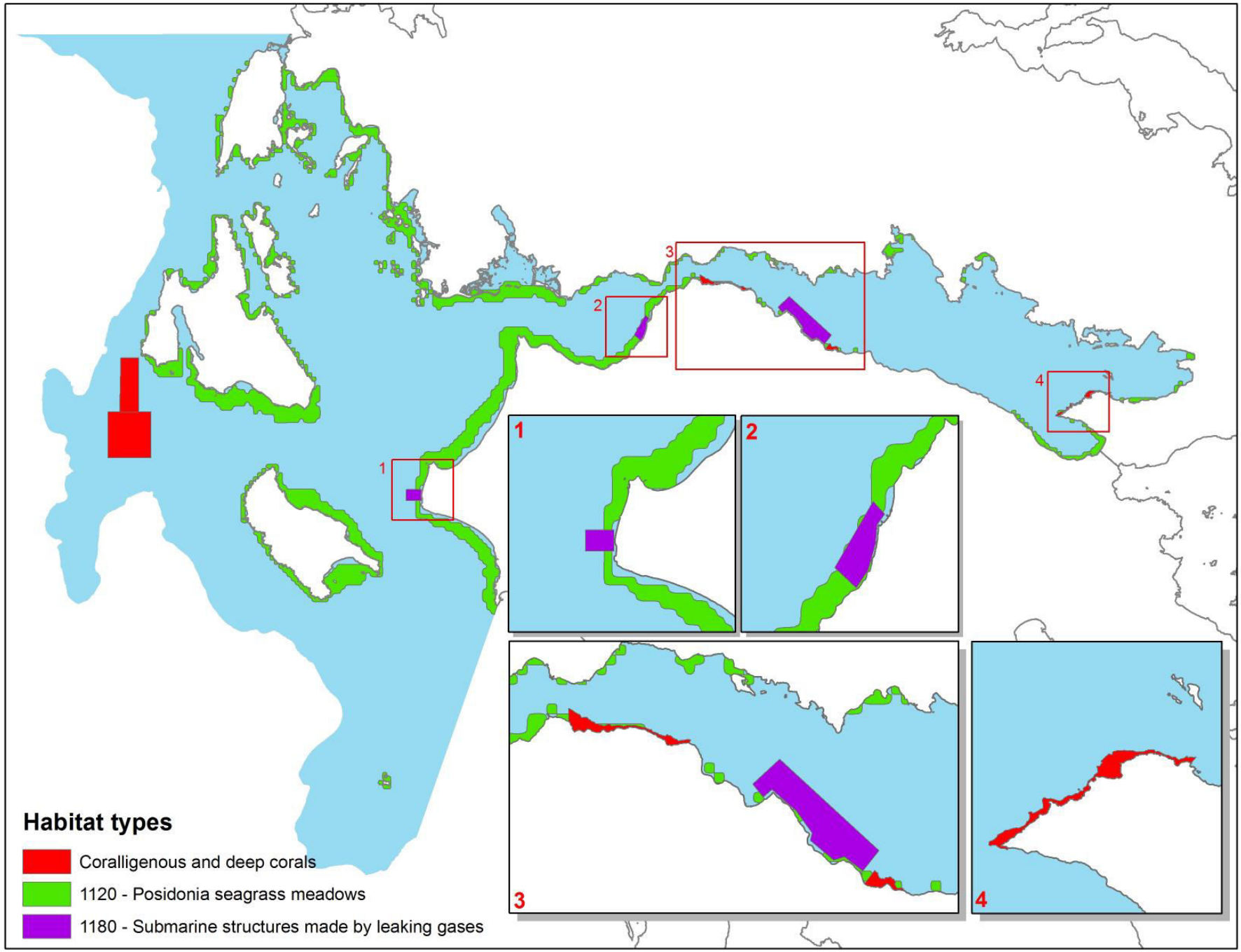
		Habitats Directive	Birds Directive	Barcelona Convention	Bern Convention	Bonn Convention	Greek Red Book
Habitat Types	*Posidonia oceanica* seagrass meadows	*1120					
	Coastal lagoons	*1150					
	Coralligenous and deep corals	1170					
	Submarine structures made by leaking gases	1180					
Species	*Monachus monachus*	*II, IV		II	II	I, II	CR
	Tursiops truncatus	II, IV		II	II		VU
	Stenella cueruleoalba	IV		II	II		VU
	Delphinus delphis	IV		II	II		EN
	Physeter macrocephalus	IV		II	II	IV	EN
	Ziphius cavirostris	IV		II	II		DD
	Caretta caretta	*II, IV		II	II		EN
	Savalia savaglia			II	II		N/A
	Hippocampus spp.			II	II		DD
	Pinna nobilis	IV		II	II		VU
	Phalacrocorax aristotelis desmarestii		I		II		NT
	Calonectris diomedea		I		II		LC

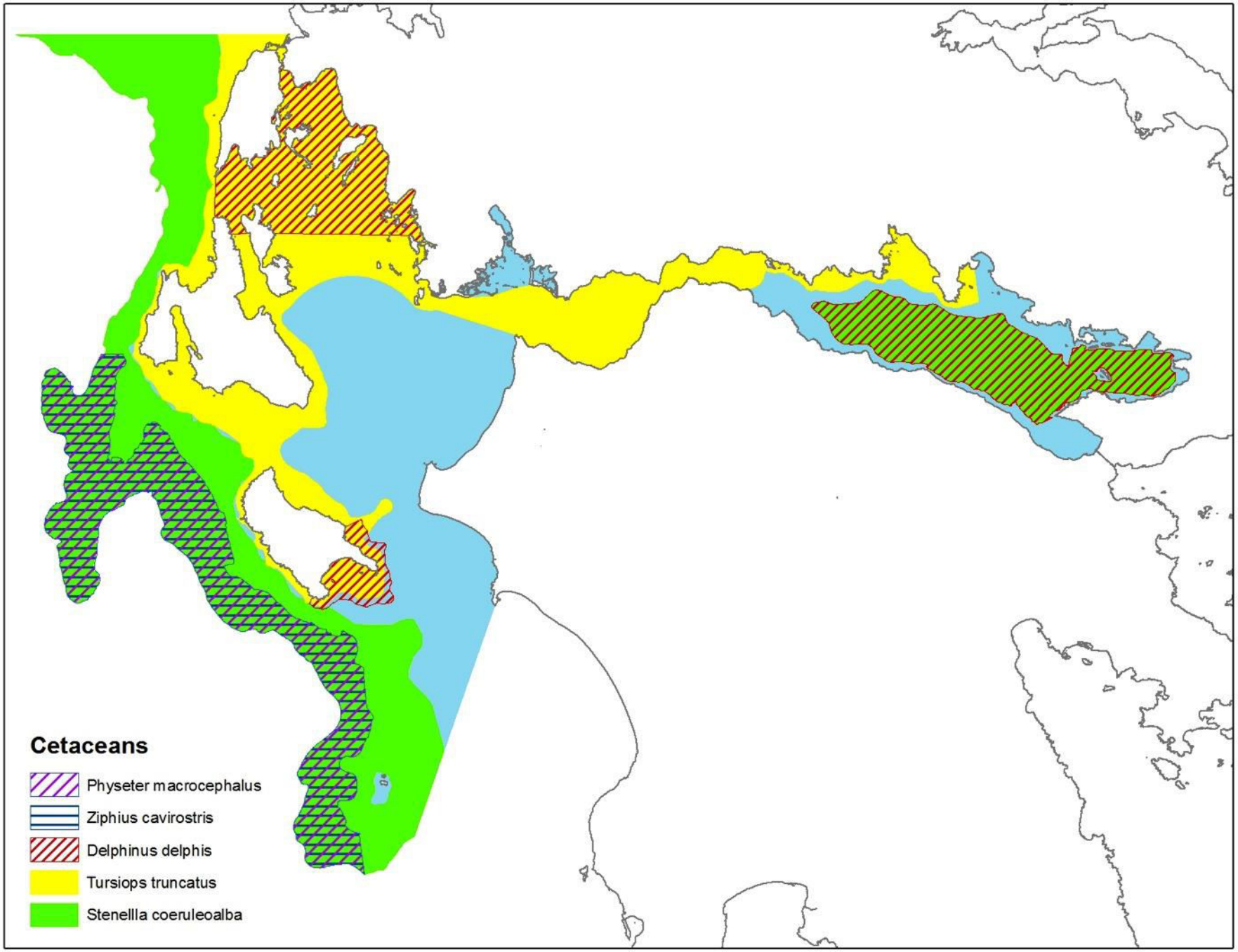
SOCIO-ECONOMIC aspect

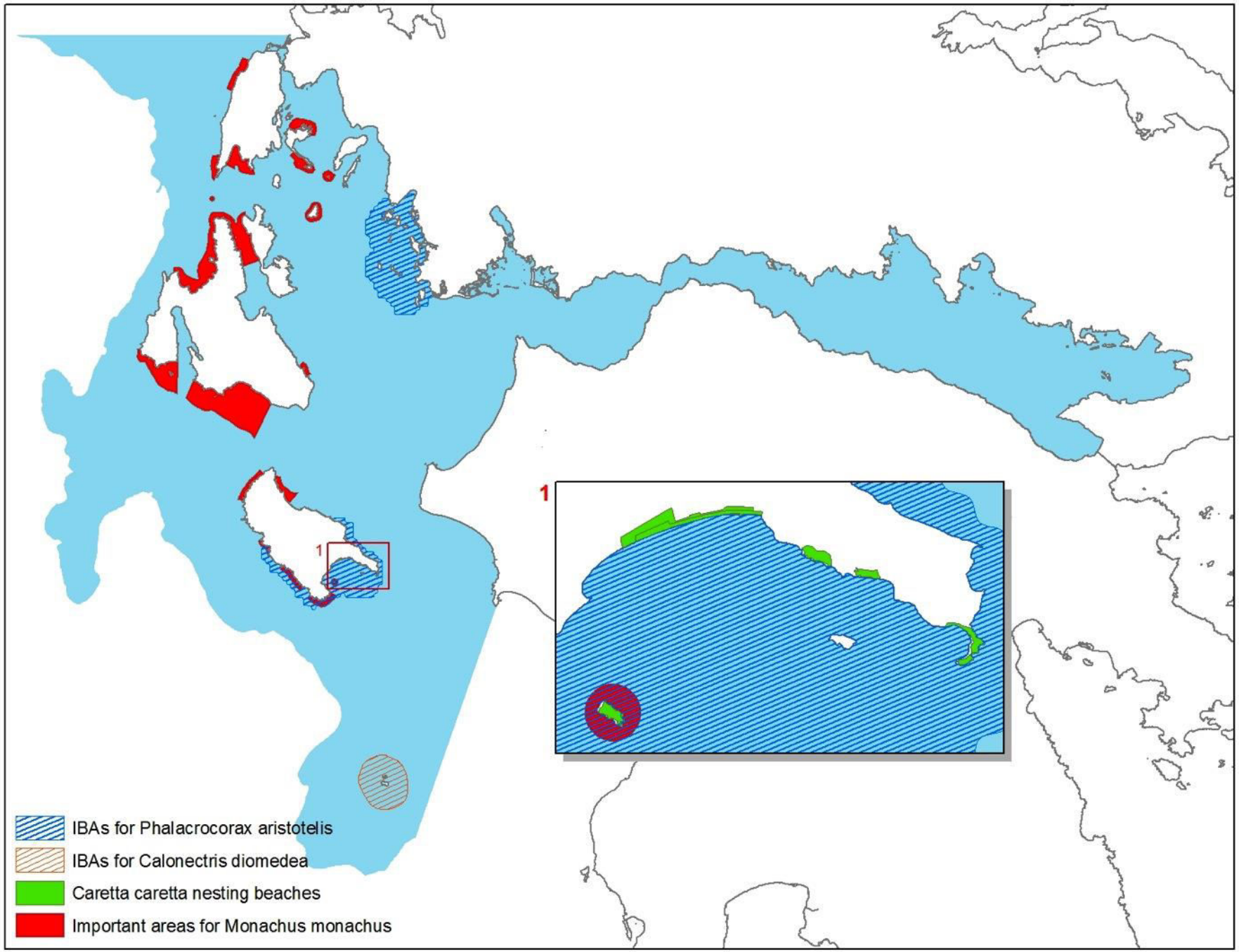
- Fisheries: trawlers, purse seiners, coastal
- Tourism: massive/alternative, marinas, beaches, diving centres
- Industry: industrial waste

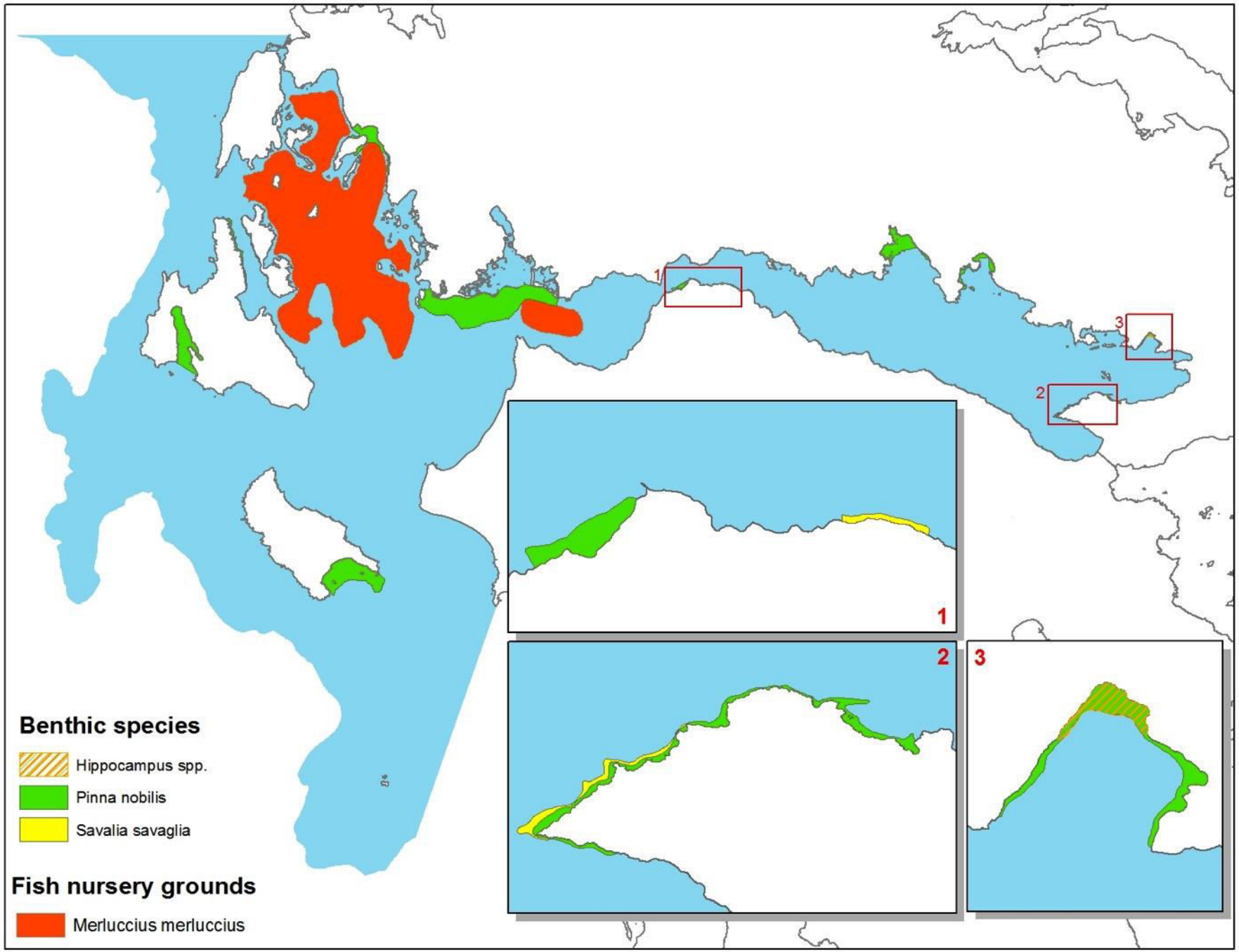
DATA COLLECTION PROCESS

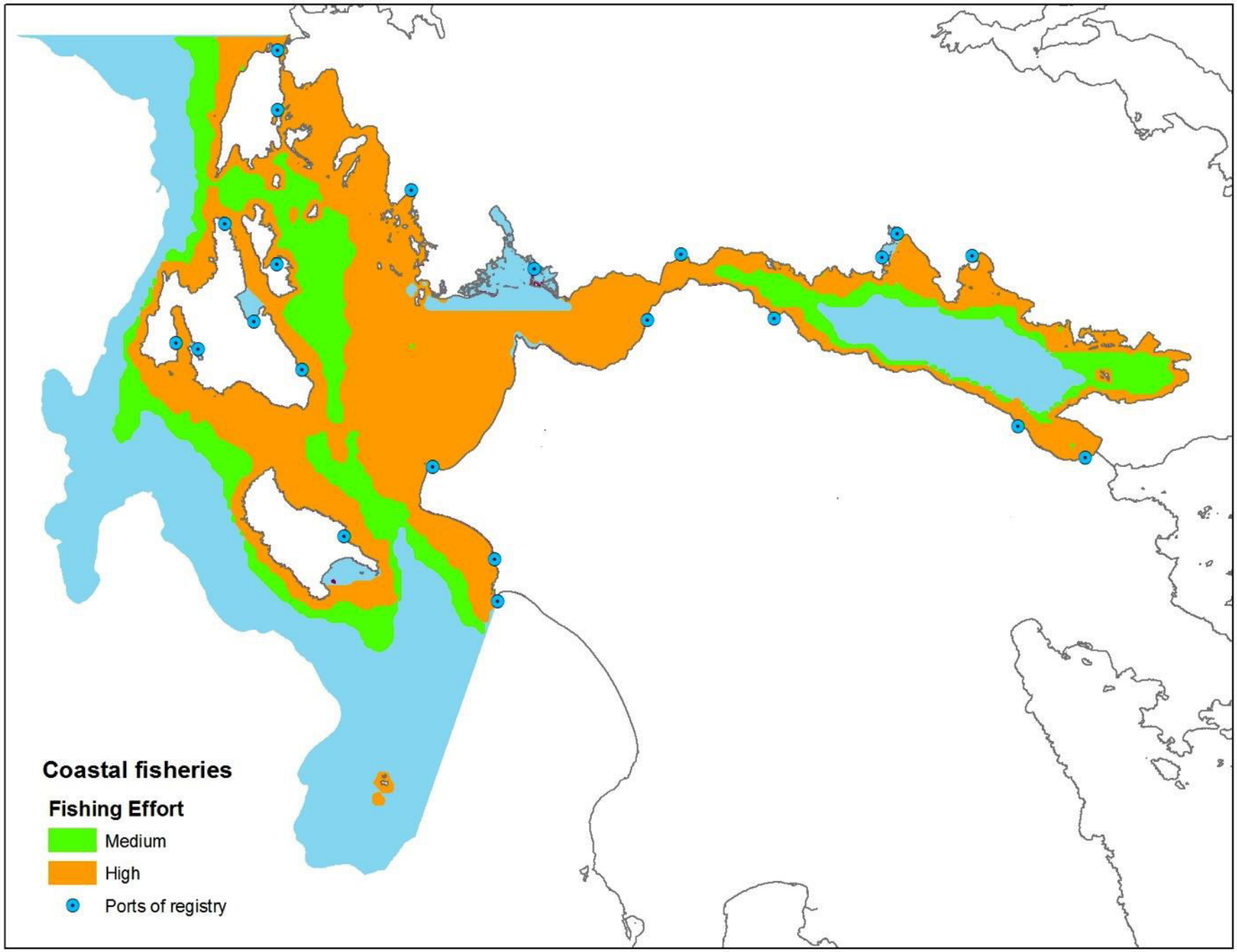
- Data from published scientific papers and results of other research projects in the area
- Existing unpublished data
- Consultation of experts and expert judgement
- Targeted surveys/studies

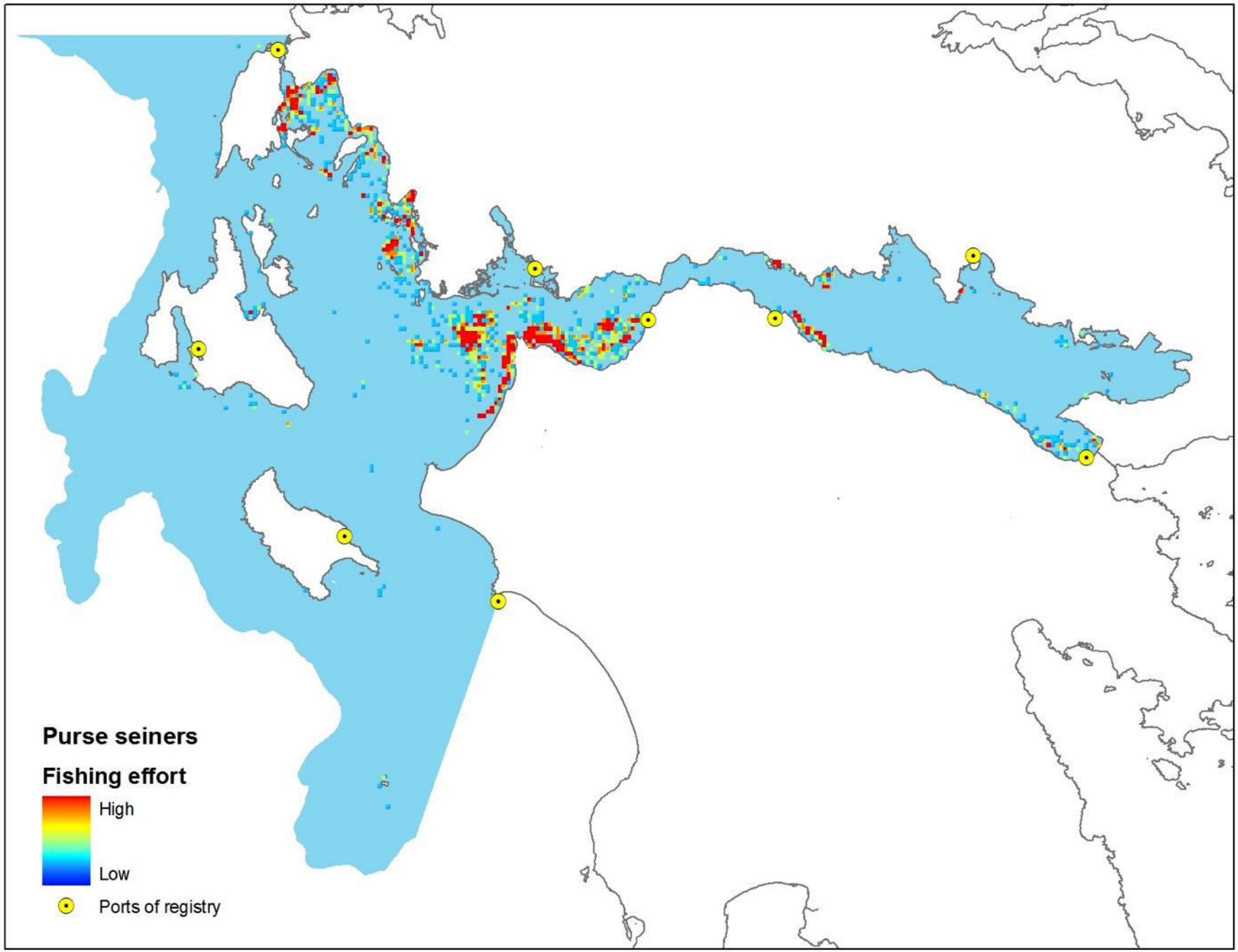

Habitat types
Coralligenous and deep corals
1120 - Posidonia seagrass meadows
1180 - Submarine structures made by leaking gases
1
2
3
4

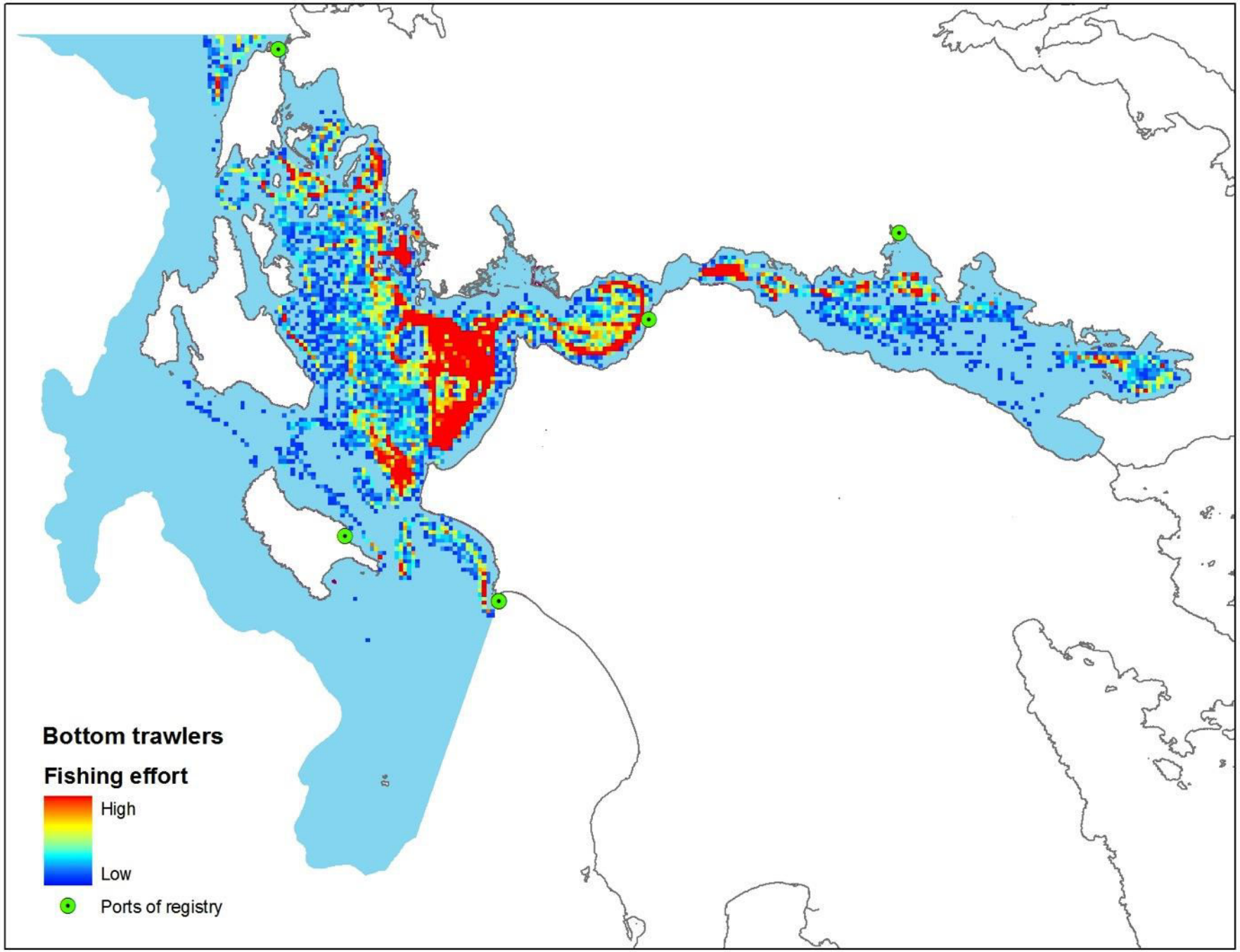

Cetaceans
Physeter macrocephalus
Ziphius cavirostris
Delphinus delphis
Tursiops truncatus
Stenellla coeruleoalba

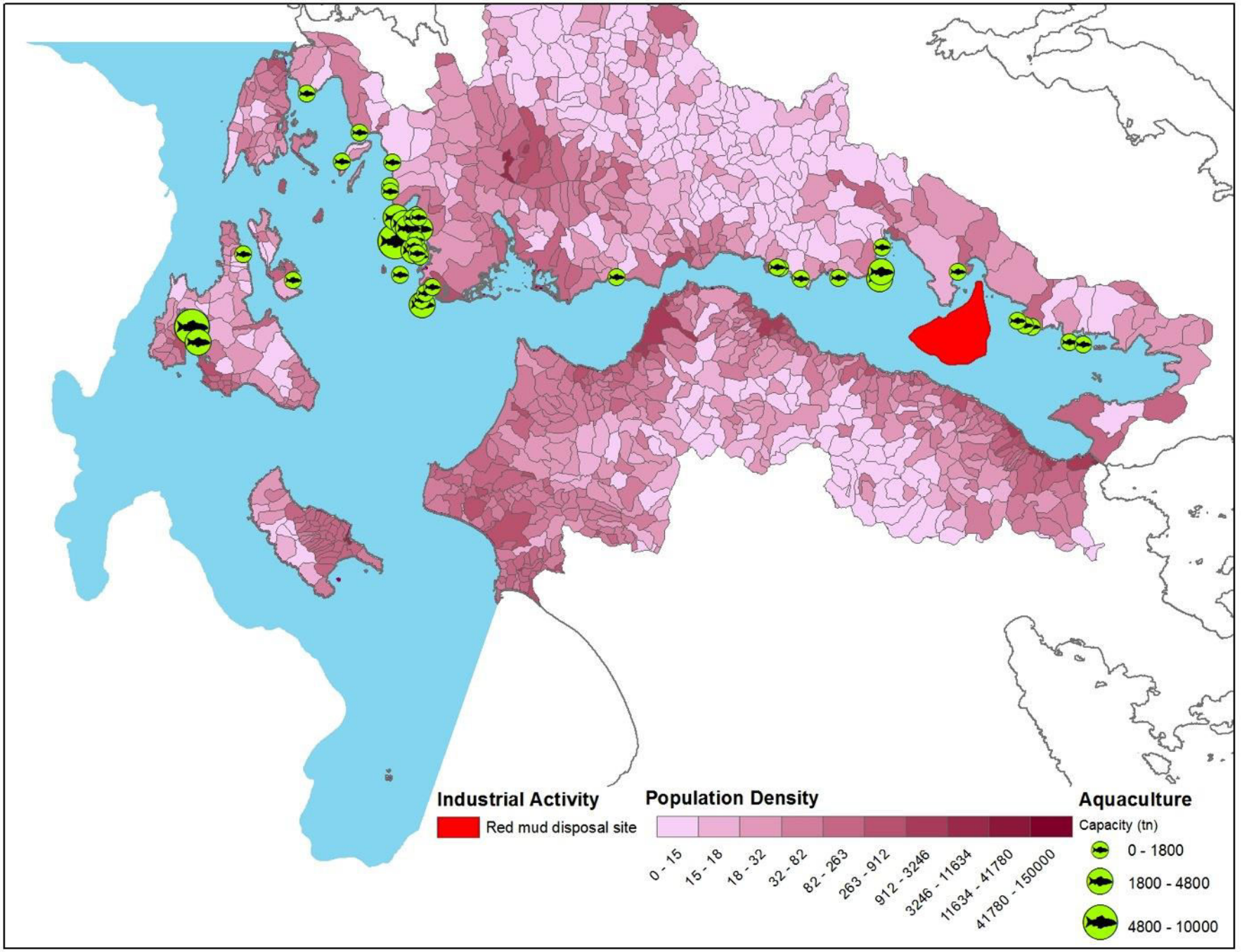

1
1
IBAs for Phalacrocorax aristotelis
IBAs for Calonectris diomedea
Caretta caretta nesting beaches
Important areas for Monachus monachus

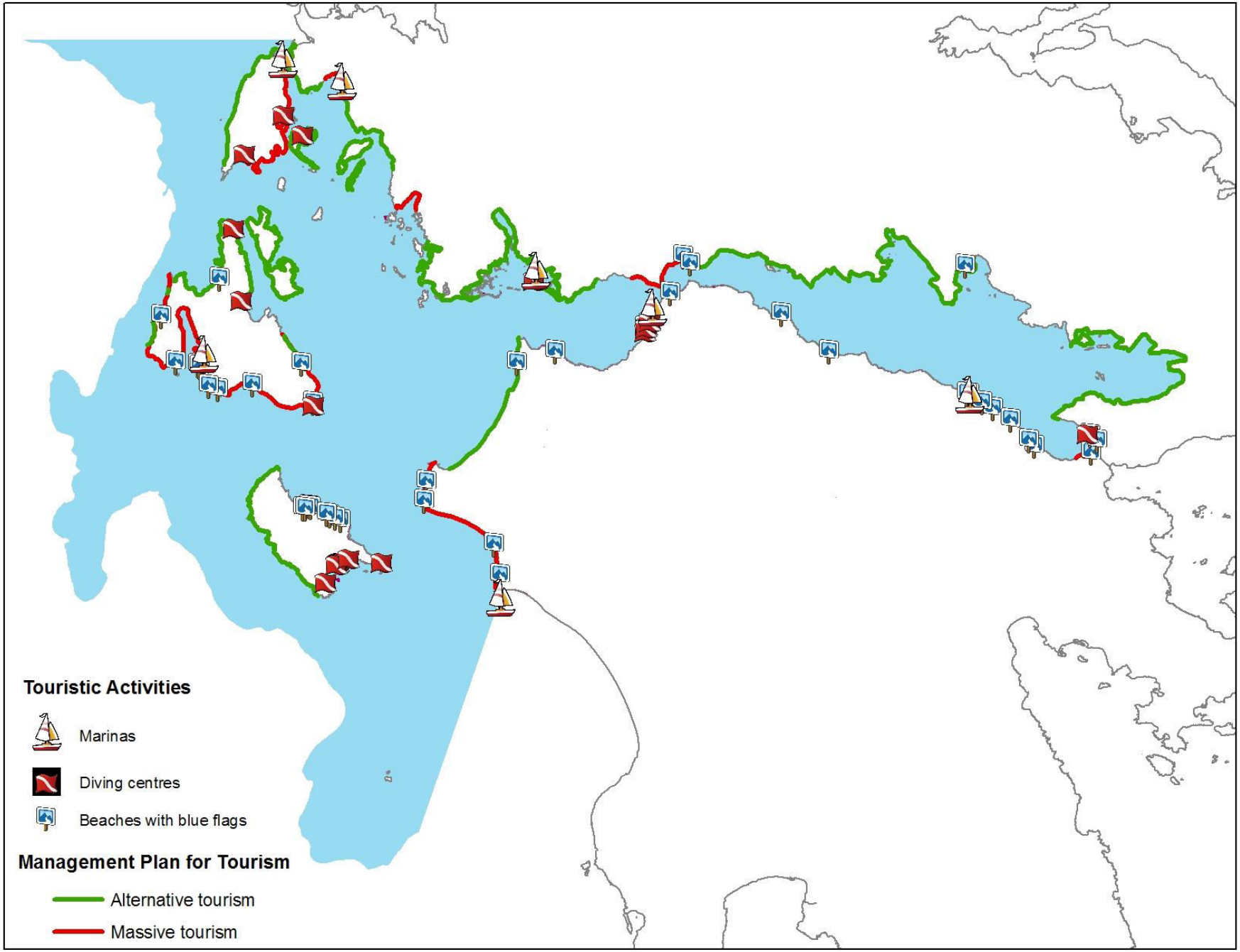

1
2
3
1
2
3
Benthic species
Hippocampus spp.
Pinna nobilis
Savalia savaglia
Fish nursery grounds
Merluccius merluccius


Coastal fisheries
Fishing Effort
Medium
High
Ports of registry


Purse seiners
Fishing effort
High
Low
Ports of registry


Bottom trawlers
Fishing effort
High
Low
Ports of registry


Industrial Activity
Red mud disposal site
Population Density
0 - 15
15 - 18
18 - 32
32 - 82
82 - 263
263 - 912
912 - 3246
3246 - 11634
11634 - 41780
41780 - 150000
Aquaculture
Capacity (tn)
0 - 1800
1800 - 4800
4800 - 10000


Touristic Activities
Marinas
Diving centres
Beaches with blue flags
Management Plan for Tourism
Alternative tourism
Massive tourism

CONCLUSIONS

- Lack of data, issues of quality and spatial distribution
- Overlap of ecologically important areas for protected species with areas that are important for fisheries – conflicts of interest
- Great need for management plans (with adaptive management)

Lack of data should not be used as an excuse for non-action, especially when the issue of conserving threatened species and habitats is concerned!

Monitoring and **E**valuation of **S**patially **M**anaged **A**reas

MESMA

The EU FP7 project MESMA focused on marine spatial planning and produced integrated management tools (concepts, models and guidelines) for Monitoring, Evaluation and implementation of Spatially Managed marine Areas, based on European collaboration.

MESMA supplied innovative methods and integrated strategies for governments, local authorities, stakeholders, and other managerial bodies for planning and decision making at different local, national, and European scales, for sustainable development of European seas.

www.mesma.org

Mediterranean Marine Science
Indexed in WoS (Web of Science, ISI Thomson) and SCOPUS
The journal is available on line at http://www.medit-mar-sc.net

Research Article

Ecological mapping and data quality assessment for the needs of ecosystem-based marine spatial management: case study Greek Ionian Sea and the adjacent gulfs

Y. ISSARIS[1,2], S. KATSANEVAKIS[2,3], M. PANTAZI[2], V. VASSILOPOULOU[2], P. PANAYOTIDIS[4], S. KAVADAS[5], A. KOKKALI[2], M. SALOMIDI[6], A. FRANTZIS[6], A. PANOU[6], D. DAMALAS[2,7], D. KLAOUDATOS[8], D. SAKELLARIOU[9], V. DRAKOPOULOU[3], C. KYRIAKIDOU[3], I. MAINA[3], J. FRIC[3], C. SMITH[3], S. GIAKOUMI[2] and G. KARRIS[9]

[1]Institute of Marine Biological Resources, Hellenic Centre for Marine Research, Ag. Kosmas, Greece
[2]Sector of Zoology and Marine Biology, Department of Biology, University of Athens, Zografos, Greece
[3]European Commission, Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy
[4]Institute of Oceanography, Hellenic Centre for Marine Research, Anavyssos, Greece
[5]Pelagos Cetacean Research Institute, Vouliagmeni, Greece
[6]Archipelagos – environment and development, Kifissia, Greece
[7]European Commission, Joint Research Centre, Institute for the Protection and Security of the Citizen, Ispra, Italy
[8]Hellenic Ornithological Society, Athens, Greece
[9]Department of Environmental Technology and Ecology, TEI of the Ionian Islands, Zakynthos Island, Greece

Corresponding author: yiannis@yissaris.com

Received: 30 April 2012; Accepted: 2 November 2012; Published on line: 19 November 2012

Abstract

Mapping of ecosystem components (natural and socioeconomic) is a prerequisite for ecosystem-based marine spatial management (EB-MSM). To initiate the process of EB-MSM in the Greek Ionian Sea and the adjacent gulfs, the main relevant ecosystem components were mapped based on existing spatial information and expert judgment. The natural components mapped included habitat types and species targeted for conservation, according to national and European legislation and international agreements. Main human activities/pressures related to fisheries, aquaculture, tourism, and industry were also mapped. In order to assess the quality of data used to map ecosystem components and therefore take into consideration the inherent uncertainty, an assessment of 5 semi-quantitative data indicators based on a pedigree matrix was conducted. Through this qualitative approach we gained information related to the sources, acquisition and verification procedures, statistical properties, and temporal & geographical correlation, along with the collection process quality of the ecosystem components under study. A substantial overlapping between ecological features and human activities was identified, confirming the need for a well-planned approach to marine space management, in order to mitigate conflicts for marine resources and conserve marine ecosystems and their associated goods and services.

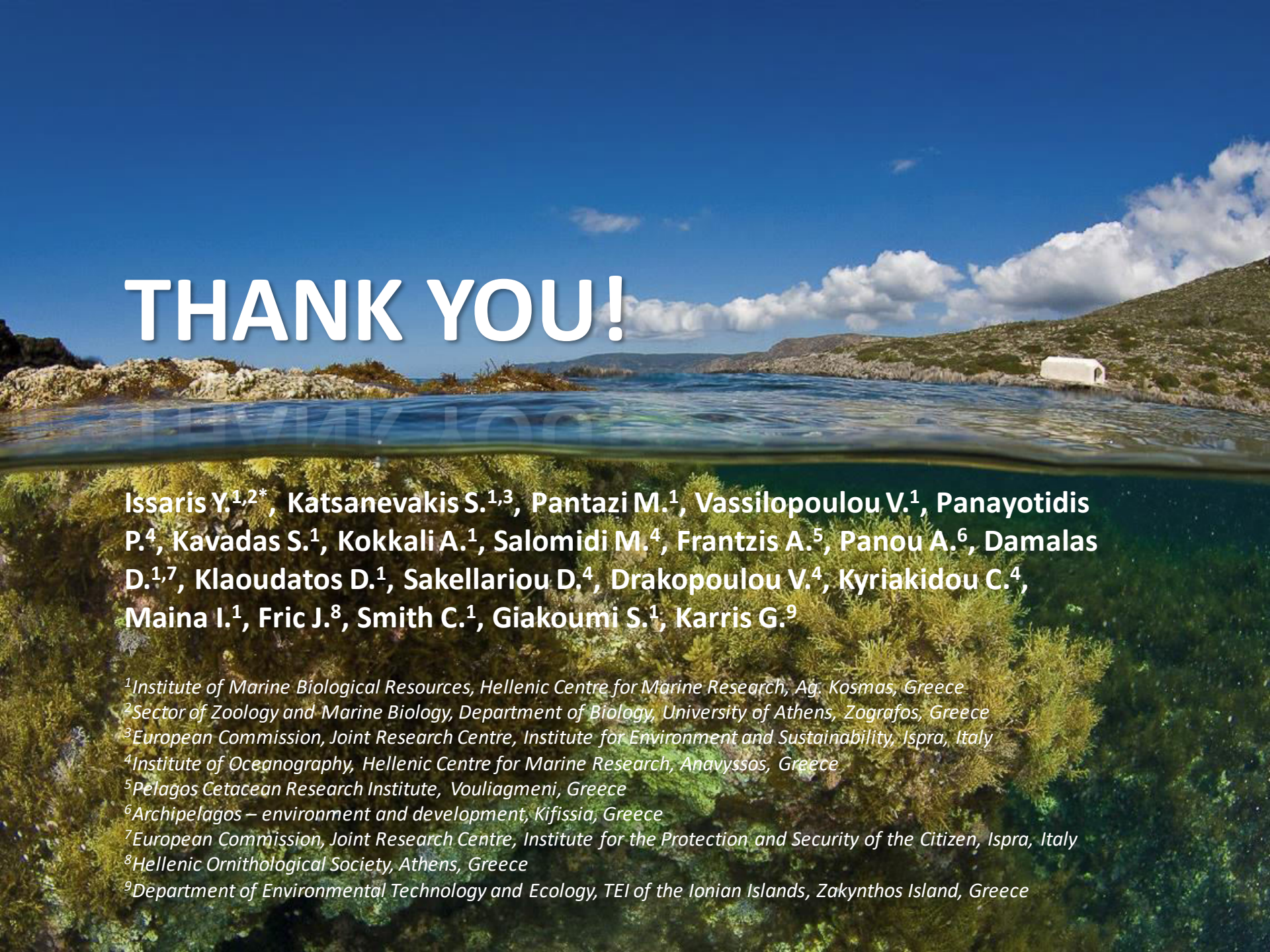
Keywords: ecosystem components, marine spatial planning, conservation, human uses, quality assessment, uncertainty, Ionian Sea.

Introduction

Much of the rapid economic and technological development of the last century has been achieved to the detriment of natural systems and the sustainability of resources and ecosystem functioning. The marine environment, in particular, has been heavily affected by anthropogenic activities, which have caused widespread degradation of marine habitats, depletion of resources and loss of biodiversity at ecosystem, species and genes level (Halpern *et al*., 2008). Fisheries, aquaculture, coastal defence systems, shipping, offshore wind farms, the gas and oil industry, tourism activities, and the need for marine conservation all compete for the same valuable space and resources. Now, more than ever, a well planned approach to marine spatial management is required in order to maintain marine ecosystems in a healthy, productive and resilient condition, so that they can provide goods and services to satisfy human needs.

Conventional sectoral management and piecemeal governance are considered all the less appropriate in pursuit of sustainable development, as the interaction between activities and their cumulative impacts are ignored (Halpern *et al*., 2008; Foley *et al*., 2010). Ecosystem-based marine spatial management (EB-MSM) is a place-based environmental management approach that recognizes the full array of interactions within a marine ecosystem, including humans, rather than considering single issues, species or ecosystem services in isolation (Katsanevakis *et al*., 2011). The definition and mapping

Issaris *et al*., Med. Mar. Sci. 13(2), 2012, 297-311



THANK YOU!

Issaris Y.[1,2*], Katsanevakis S.[1,3], Pantazi M.[1], Vassilopoulou V.[1], Panayotidis P.[4], Kavadas S.[1], Kokkali A.[1], Salomidi M.[4], Frantzis A.[5], Panou A.[6], Damalas D.[1,7], Klaoudatos D.[1], Sakellariou D.[4], Drakopoulou V.[4], Kyriakidou C.[4], Maina I.[1], Fric J.[8], Smith C.[1], Giakoumi S.[1], Karris G.[9]

[1]Institute of Marine Biological Resources, Hellenic Centre for Marine Research, Ag. Kosmas, Greece
[2]Sector of Zoology and Marine Biology, Department of Biology, University of Athens, Zografos, Greece
[3]European Commission, Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy
[4]Institute of Oceanography, Hellenic Centre for Marine Research, Anavyssos, Greece
[5]Pelagos Cetacean Research Institute, Vouliagmeni, Greece
[6]Archipelagos – environment and development, Kifissia, Greece
[7]European Commission, Joint Research Centre, Institute for the Protection and Security of the Citizen, Ispra, Italy
[8]Hellenic Ornithological Society, Athens, Greece
[9]Department of Environmental Technology and Ecology, TEI of the Ionian Islands, Zakynthos Island, Greece