Marine Spatial Planning in the Aegean Sea for the protection and conservation of biodiversity

Project Overview

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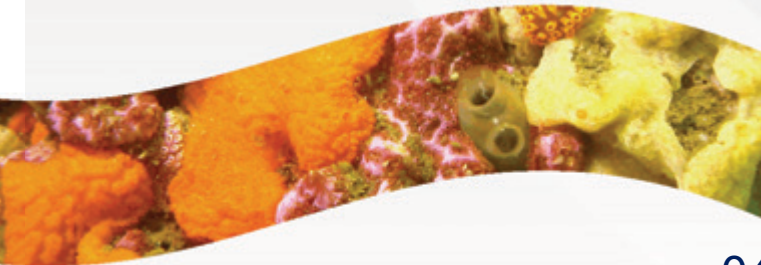
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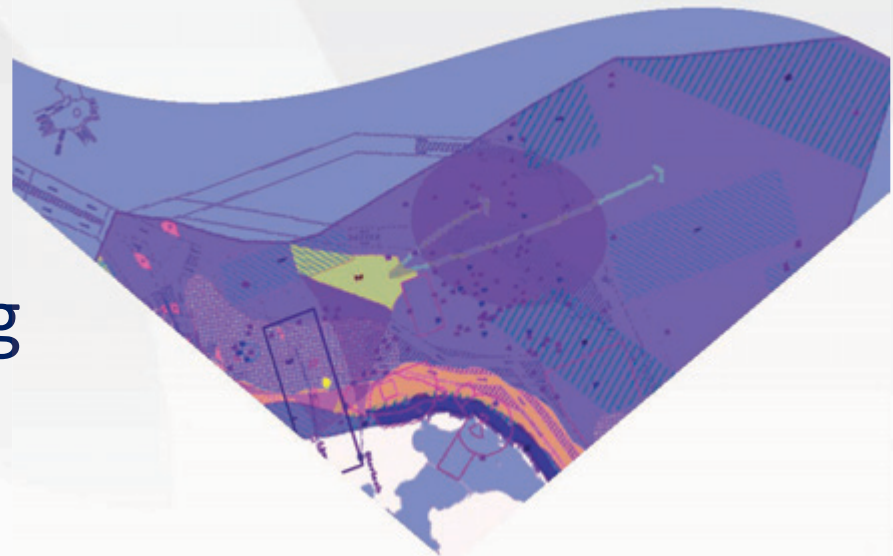
Paraskevi Karachle (HCMR) – WP8

Zakynthos
04-06 December 2015

Background

- Human use of the sea increases

- But the sea is also home to many vulnerable marine habitats & species

- Need for
  Marine Spatial Planning

Main objective

- biodiversity conservation in the Aegean Sea

- within the framework of MSP

- conservation focus protected and sensitive habitats/species

Main objective

main goal

to plan a network of MPAs/management zones

Contribution towards:

- MSP directive (2014/89/EU) – March 2021 deadline

- MSFD directive (2008/56/EC) – strategies, incl. MPA networks

- Habitats and Birds Directives (92/43/EEC & 2009/147/EC)

Maritime Spatial Planning in the Aegean Sea for the conservation and protection of biodiversity

Project overview

WP1: Coordination & Management
U-AEGEAN (HCMR, IMR)

WP2: Mapping ecological features
U-AEGEAN (HCMR, IMR)

WP3: Mapping human activities &
management measures
HCMR (IMR)

WP5: Field work
U-AEGEAN

WP4: Economic valuation
of selected marine
ecosystems
HCMR

WP6: Stakeholder
engagement – Defining
operational objectives
U-AEGEAN (HCMR)

WP7: Planning a MPA network
U-AEGEAN (IMR)

WP8: Dissemination of results
HCMR (U-AEGEAN, IMR)
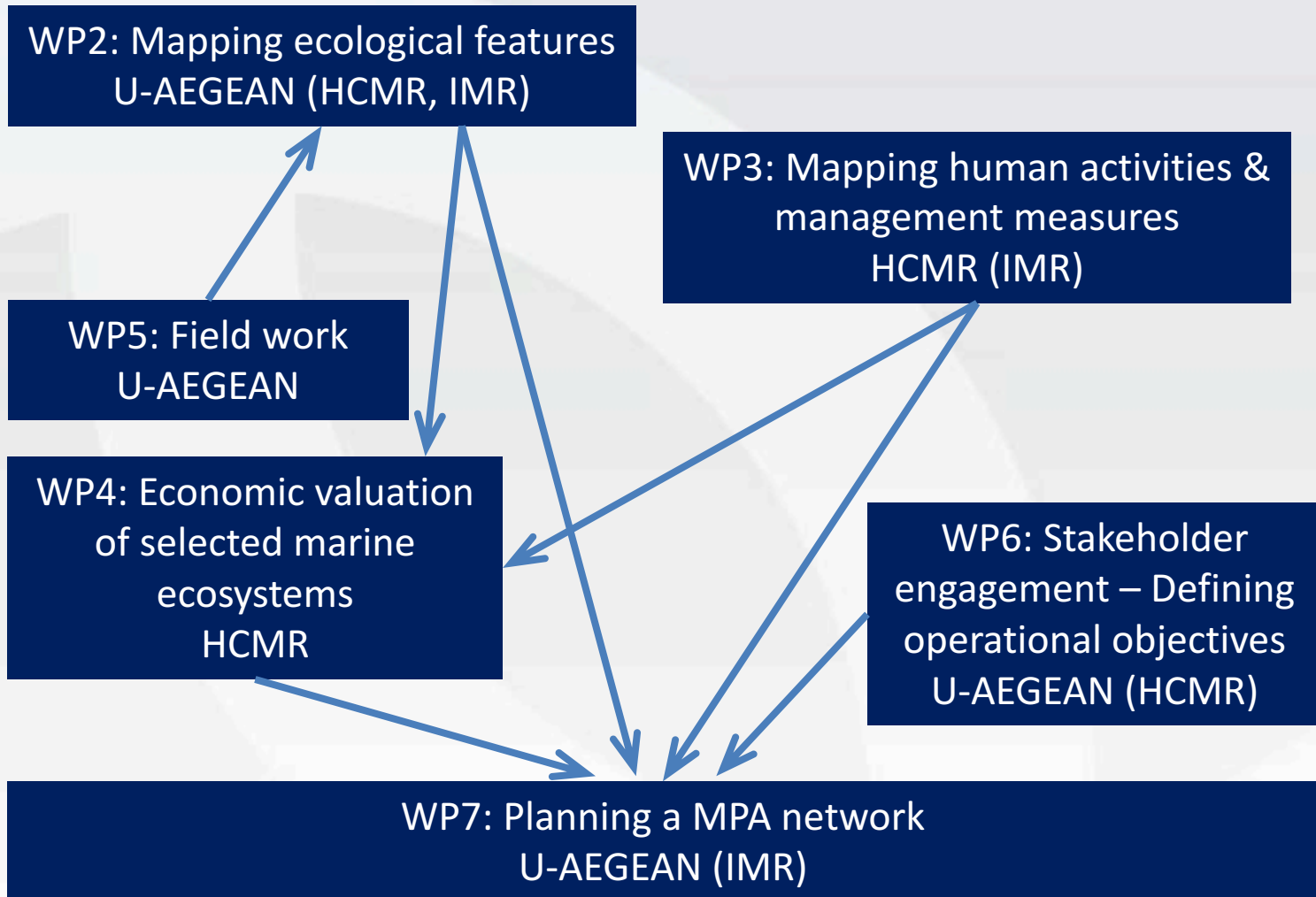
European Economic Area Financial Mechanism 2009-2014

GIS layers of the spatial distribution of:

Habitats

- as in the Habitats Directive

- + additional habitats of conservation value

  Posidonia oceanica beds

  Reefs

  Submarine structures made by leaking gases

  Coastal lagoons

  Marine caves

  Coralligenous communities

Mapping ecological features

GIS layers of the spatial distribution of:

Species

- protected species according to European & national legislation ant international agreements

    all cetaceans

    monk seal *Monachus monachus*

    marine turtle *Caretta caretta*

    fan mussel *Pinna nobilis*

    date mussel *Lithophaga lithophaga*

    sea horses *Hippocampus spp.*

    etc.

WP-2
Mapping ecological features

Approach

- Harmonization and integration of existing information

  – scientific & grey literature, unpublished data, experts etc.

- Spatial distribution models

- Satellite data and image processing (*Posidonia* mapping)

- Interviews and questionnaires

Aim ➡ Production of maps

- depicting **spatial overlaps** between human activities and ecosystem components of high conservation importance

- showing **spatial management plans**

- illustrating **cumulative impacts of human activities on ecosystem components** of high conservation importance

Structure

Data collection

Vulnerability assessment

Cumulative impact assessment

1a. Collection of spatiotemporal data for :

- ✓ existing human activities ⎤
- ✓ future human activities ⎦ Drivers
- ✓ management plans and measures

From:

- ✓ International, national & local authorities (ministries, ports etc.)
- ✓ Research centers
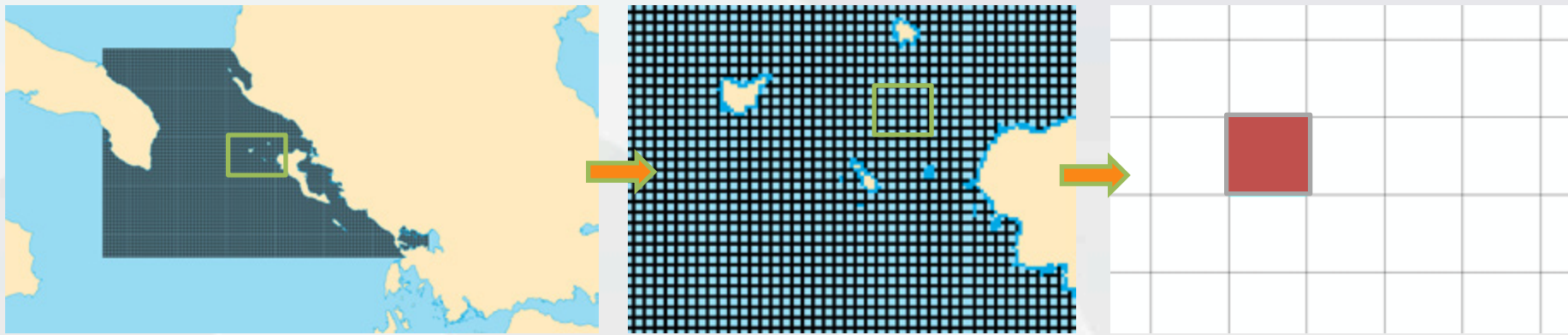- ✓ NGOs
- ✓ Published material
- ✓ Gray literature

1b. Mapping of the collected data; production of maps (highlighting overlapping activities & ecosystems) in ARCGIS environment

WP2

2. Cumulative impact assessment of human activities on ecosystem components

Human activities

Cell values: $[D_1 \ D_2 \ .... \ D_n \ E_1 \ E_2 \ ... \ E_m]$

Ecos. components

cumulative impact scores (I_C) for each 1 km² pixel

$$I_C = \sum_{i=1}^{n} \frac{1}{m} \sum_{j=1}^{m} D_i \times E_j \times \mu_{i,j}$$

Impact weight for antropogenic driver i and ecosystem j

1/m produces an average impact score across ecosystems

Analysis and mapping of human activities, pressures and existing spatial management measures

European Economic Area Financial Mechanism 2009-2014

Impact weights will be estimated using expert judgment to quantify vulnerability of ecosystems to human drivers of ecological change
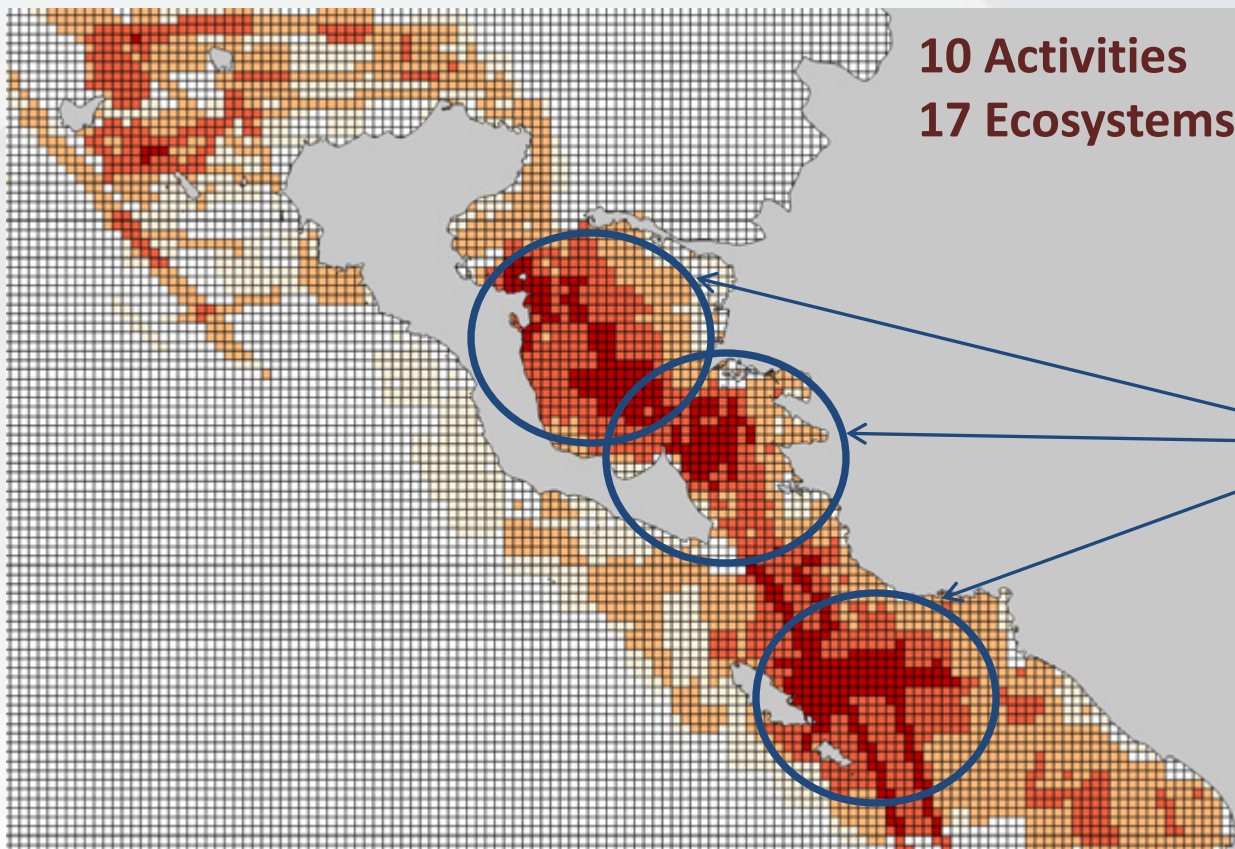
Vulnerability measures				
Scale	Frequency	Functional impact	Resistance	Recovery time

+
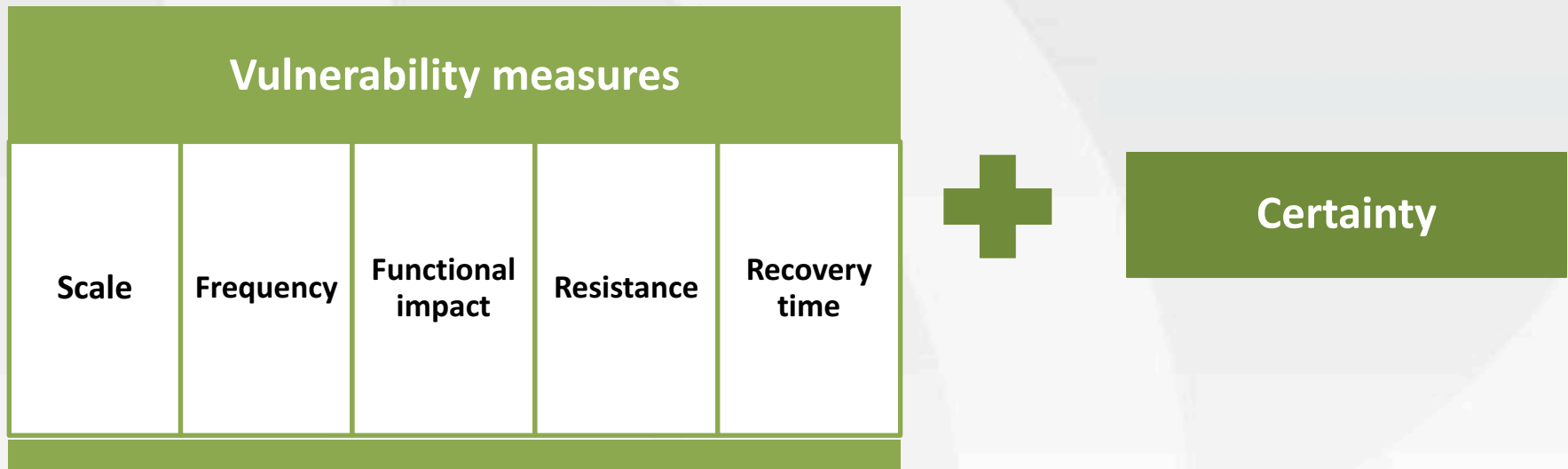
Certainty

The use of expert judgment instead of direct empirical assessments to calculate impact weights greatly increases uncertainty

expected outputs

10 Activities
17 Ecosystems

**ADRIPLAN
(DG MARE project)**

2013-2015

Hot spot areas of cumulative impacts

Aims

- Assess the value of ecosystem goods and services derived from the marine environment of the Aegean Sea

- Assess the degradation cost of the marine environment

Valuation of marine ecosystems in the framework of Directive 2014/89/EU

Methodology ⇨ Benefit Transfer (BT) method

- used to estimate economic values for ES by transferring **_existing values_** from studies already completed in another **_similar_** location and/or context

  EXAMPLE

  Values for recreation or biodiversity in a particular location may be provided by adapting existing values from a study conducted in another location

- used when it is <u>costly</u> and/or <u>time is limited</u> to collect primary data through an original valuation study

- accuracy depends on the <u>initial study</u>, while challenges arise due to <u>complex nature</u> of ecosystems, ES provision, context and differing socio-economic factors

New data collection - field work

Aim

- collection of data to confirm / controlled low reliability data
- verification of spatial distribution models
- visual / sampling confirmation with field data (ground-truth) for remote sensing analysis

Purpose

- reliability of information collected in WP2
- validity of spatial distribution models
- accuracy assessment of satellite image analysis

New data collection - field work

Methodology

Autonomous diving

– presence, population density, coverage or abundance of selected species and habitats

Aerial photography

– drone mapping to confirm the presence of selected species and habitats

Side scan sonar

– high resolution for the spatial mapping of different habitats

Bythometer

Drop camera

Aim

- Determination of operational targets for:
    - the proposed Network of Marine Protected Areas (NetMPAs)
    - the related Marine (Conservation) Spatial Planning (MSP)

      in accordance to
    - European Legislation (Directives) and International Policies always in close collaboration with
    - Local, Regional and National Stakeholders

Effective & Useful Business Plans

- **Concrete**: clear definition so no chance for misunderstanding by the Stakeholders
- **Countable**: physical environmental/anthropogenic pressures easy to be recorded for development of indices necessary to judge changes
- **Applicable**: easy to apply and not conflict among them
- **Realistic**: easy to achieve aims with 'realistic' budget
- **Time constrained**: keep a tight (and not to much long) programme for application

Methodology

- Selection of key-Stakeholders – Establishment of the project Stakeholder Platform
  - Administrative (Government: Central/Regional)
  - End-users (Local/Public)
- Interaction according to the business plan
- Organized stakeholder meetings
  - 1 with Administrative
  - 3-4 with End-users

Systematic Conservation Planning

SCP involves working through a **structured, transparent and defensible** process of decision making.

Connectivity

Adequacy

Representativeness

Efficiency

European Economic Area Financial Mechanism 2009-2014

Stages in planning

- Clear definition of **conservation features** and **surrogates**

- The setting of explicit **goals**

- Recognition of the contribution of **existing protected areas**

- Explicit **methods** for designing/locating reserves

- Explicit **criteria** for implementing conservation actions

- Explicit **mechanisms** to ensure persistence of conservation features

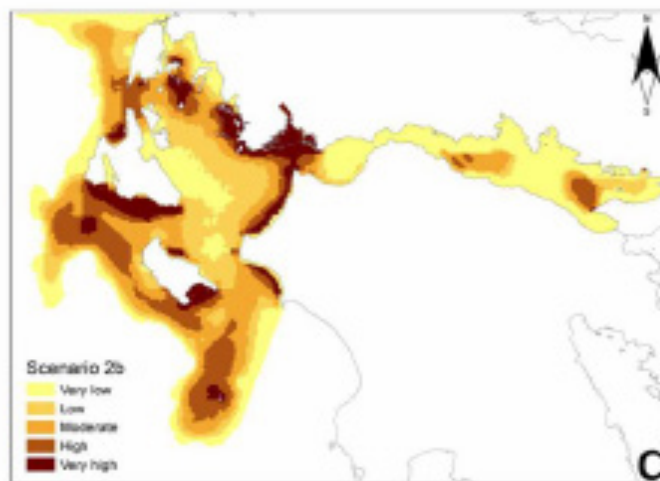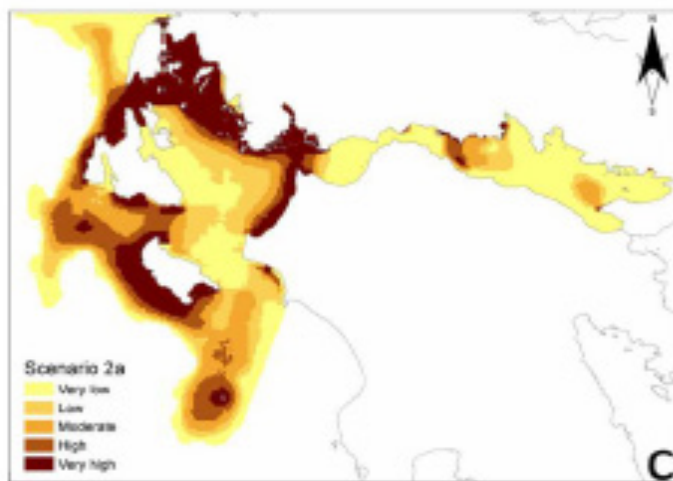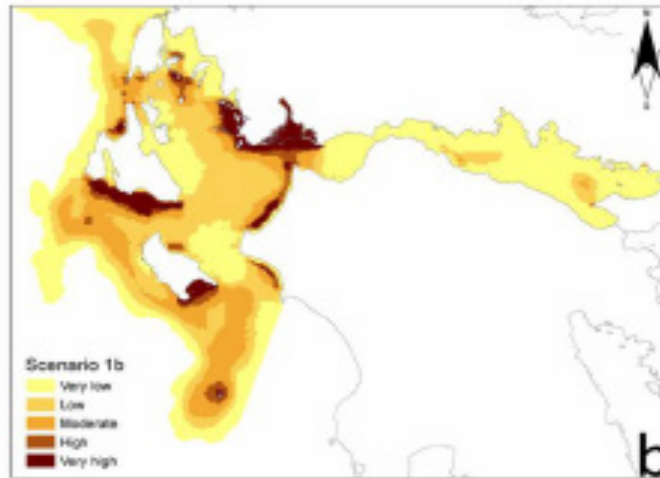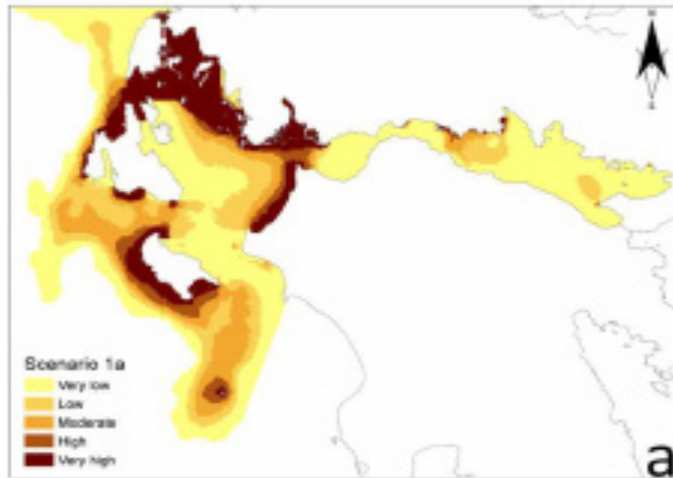Margules and Pressey 2000, Nature

Methodological tools

MARXAN

- Identifies priority areas
- Identifies MPA networks

MARXAN WITH ZONES

- Zones conservation areas with different levels of protection
- Zones for multiple uses

MARXAN: Greek Ionian Sea and adjacent gulfs

Ionian Sea case study

Priority areas selected

Giakoumi et al. 2012, Aquatic Conservation: Marine & Freshwater Ecosystems

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Thank you for your attention