Mixed methodologies for transdisciplinary applications: the case study of an urban mediterranean marine protected area (Sicily, Italy)

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Background & Policy

Transdisciplinary Place Based Research and co-participatory management are widely recognized concept for Marine Protected Areas (MPAs) and marine spatial planning processes, while difficult to apply at local level [1,2].

Strategia Nazionale per la Biodiversità (SNB, 2023) [5] call for a more efficient monitoring approach through participatory co-management (specific objective A4.1.L)

European Nature Restoration Law (2024);
European Ocean Pact (2025)

IUCN 30x30 Initiative to protect 30% of marine spaces by 2030:
Protected Marine Areas as a key instrument to achieve the objectives.

The effectiveness of an MPA could benefit from preparatory studies and in-depth transdisciplinary analysis [3,4], especially in urban contexts.
Here we applied mixed methodologies, both qualitative and quantitative, to explore the needs, conflicts and priorities of this urban MPA [7,8]. Preliminary results are reported.
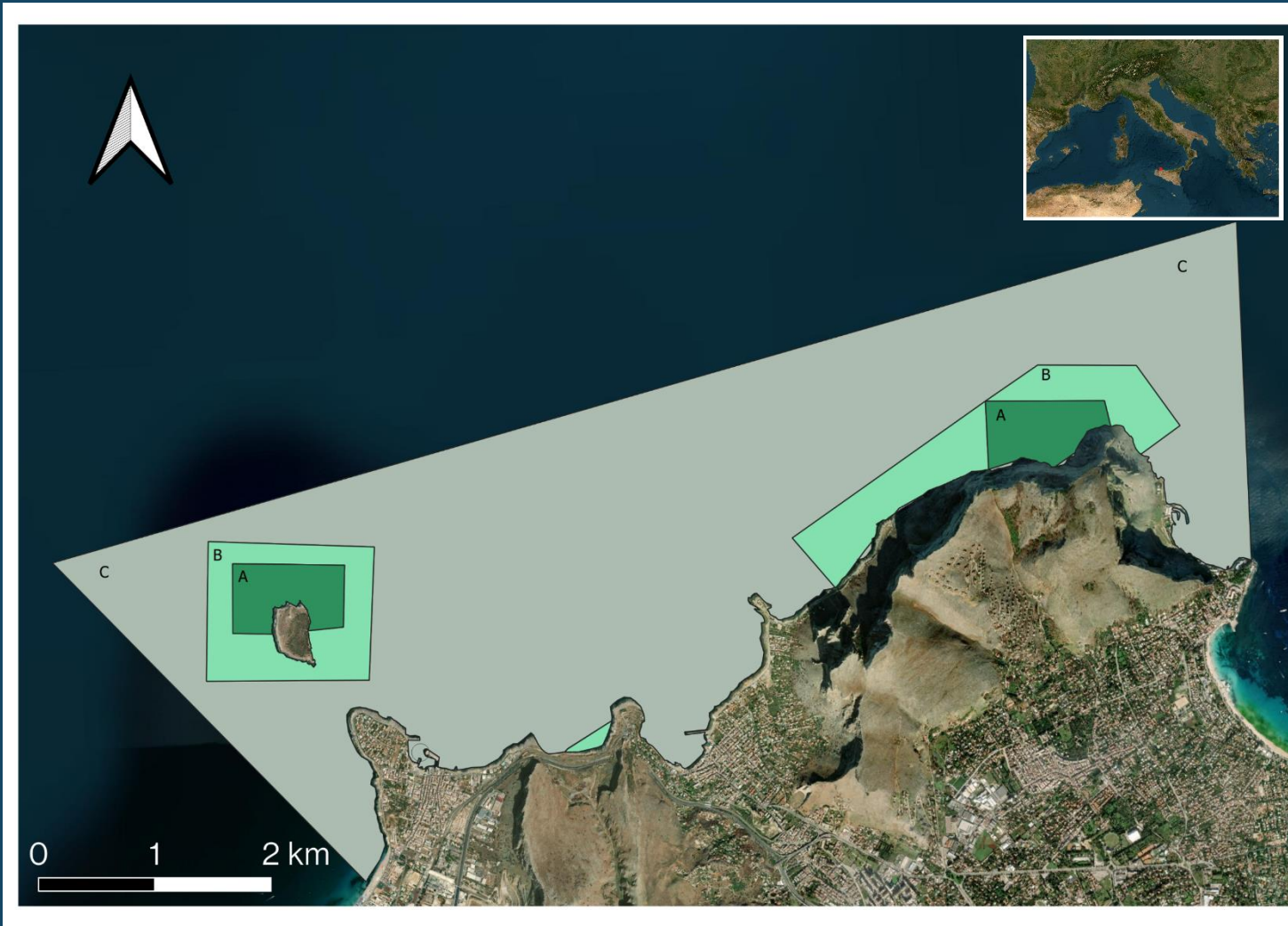
Case study

MPA of "Capo Gallo - Isola delle Femmine" [ITA020047]

- Established in 2002

- Located in the metropolitan area of Palermo (PA)

- 2 No-take zones (Zona A)

No definitive governance structure instituted to date [9]. Currently under the administration of a commissioner-led management body.

What are the stakeholders' priorities for the MPA?

Method: Pile-sorting exercise
> initial free listing task
> two rounds of exclusions

Represented: 6 categories
(fishers, researchers, citizens, management bodies, NGOs, goods and services providers)

Results — Priorities identified for the MPA

1. Need for MPA enforcement and control (31%)

2. Integrated monitoring and research activities (13%)

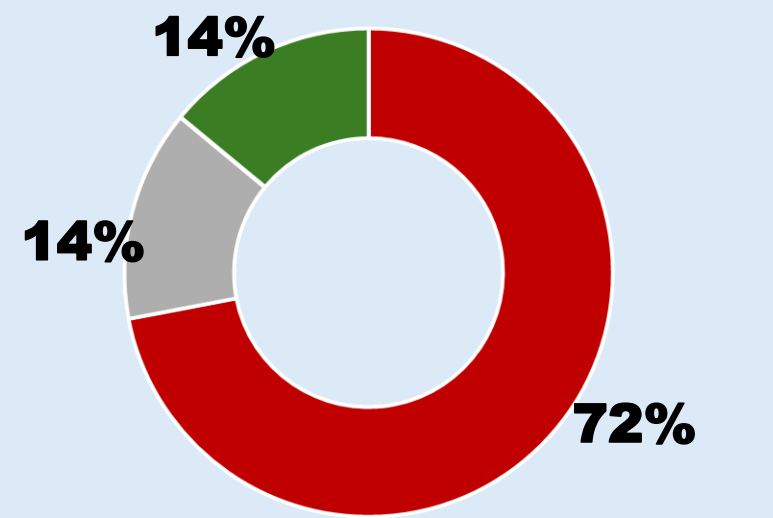3. Local artisanal small scale fisheries activities and products promotion (12%)

How do fishers perceive the MPA?
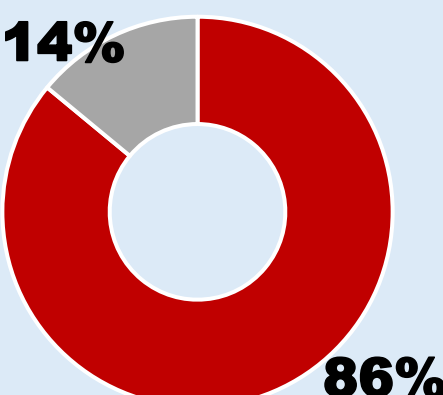
Method: Semi-structured questionnaires

Represented N= 7
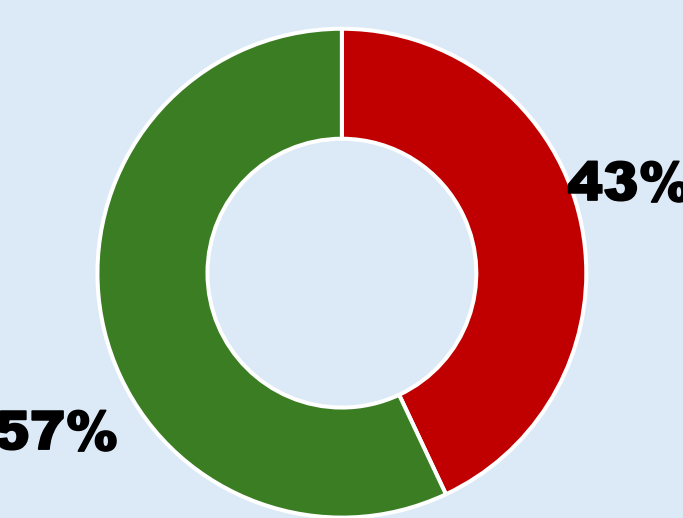
Results

Impact of the MPA on their activity
- 72% Very negatively
- 14% Neutral
- 14% Very positively

MPA conservation actions effectively protect target species, habitats or ecosystems
- 86% Completely disagree
- 14% I don't know

Fishers' support to the MPA
- 43% Very low
- 57% High

Preliminary insights

Ecological field data alone are insufficient to answer Social-Ecological Systems (SES) questions in the MPA analysed - especially if not integrating an ecosystem-based approach into the monitoring [6]. Co-management and participatory governance are complex frameworks that requires extensive resources and long-term vision [2,4,6]: at national level we lack the capacity to implement and decline these frameworks in local contexts.
This can result in an overall low community support for biodiversity conservation measures. Moreover, lack of georeferenced biodiversity inventory and single-zone analysis   can impede to effectively inform future adaptive spatial management and planning.

To what extend scientists have investigated the MPA?

Method: Scoping review

Search string: (("biodiversity" OR "diversity") AND ("Capo Gallo Isola delle Femmine" OR "Capo Gallo OR "Isola delle Femmine"))

Screening — Databases: Google Scholar, Scopus, Web of Science

Initial datset N= 437*

*(GS = 402; Scopus = 9; WoS = 9; Manually added after expert consultation = 17)

→ Excluded N = 300

Reasons for exclusion:
- Duplicates = 24
- Thematic non-inherent = 195
- Different location = 48
- Review = 13
- Others = 20
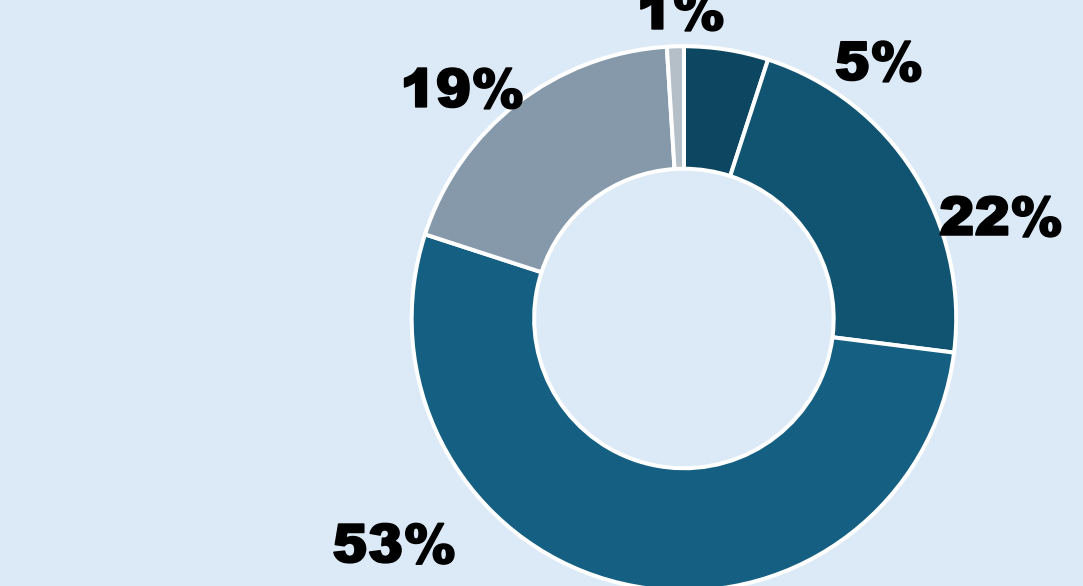
Title & abstract screening N= 137

→ Excluded N = 73

Reasons for exclusion:
- Not biodiversity = 18
- Not inside the MPA = 34
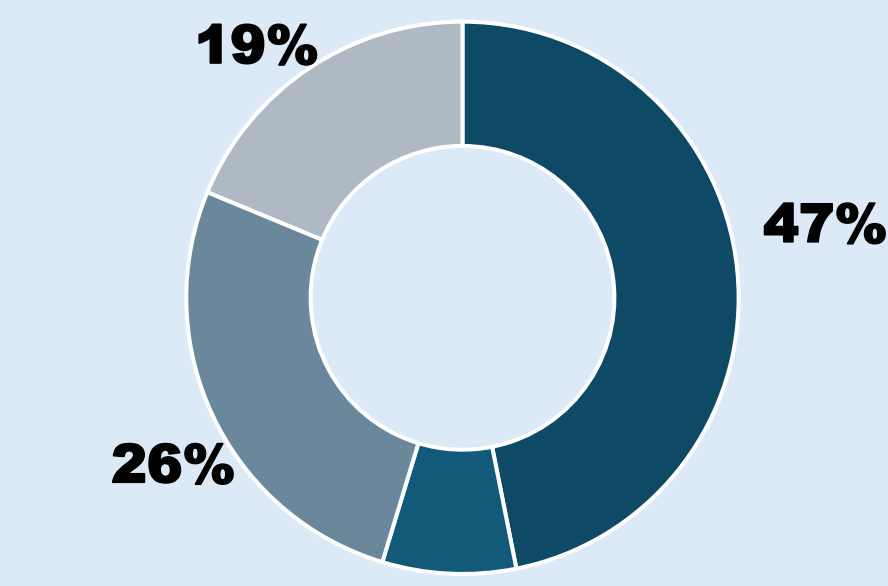- Full text not available = 8
- No original data = 13

Full text screening N= 64

Search runned at 03/07/2025

Results — Increasing trend after 5 years of the MPA

Investigated conservation level
- 53% Single MPA zones
- 22% MPA vs. non-MPA
- 5% Pre-MPA
- 1% Across MPA zones
- 19% Not reported

Approach followed
- 47% Monitoring
- 8% Modelling
- 26% Mesocosm / manipulative
- 19% Multiple approach

Target of the investigation
- Single species: 25% Protected, 12% Non-protected, 8% Non-indigenous
- Multiple species: 28%
- Single habitat: 17% Protected, 2% Non-protected
- Multiple habitat: 8%
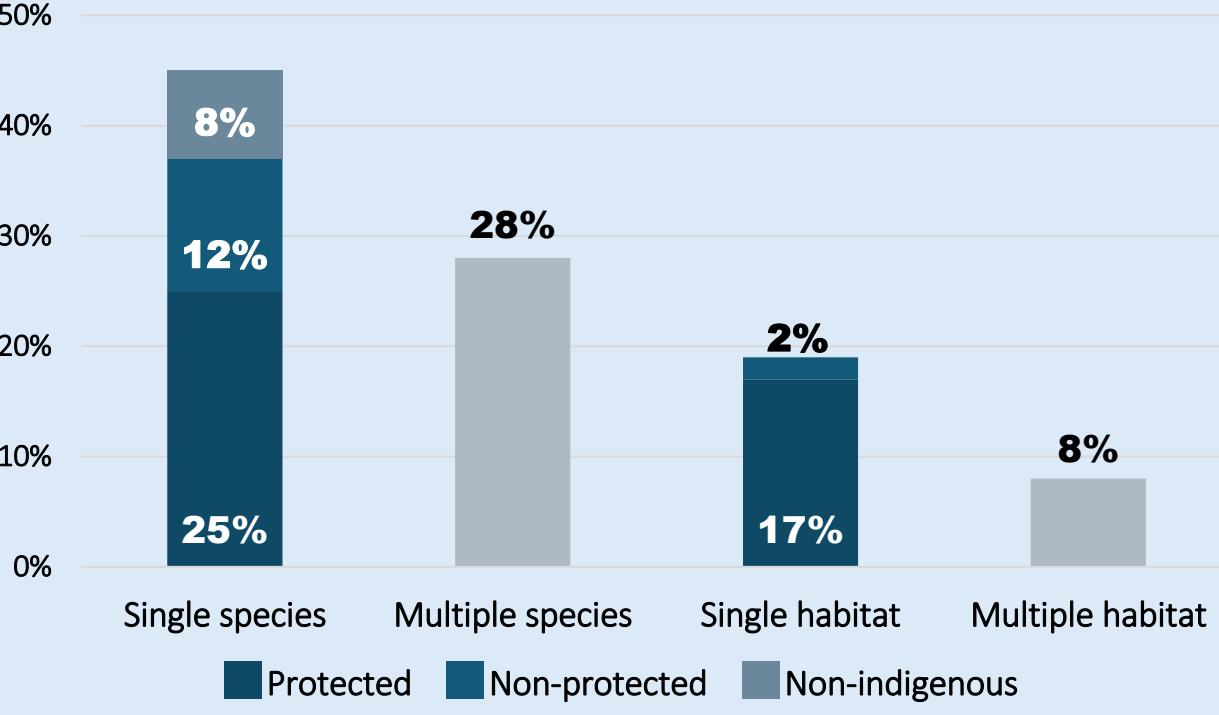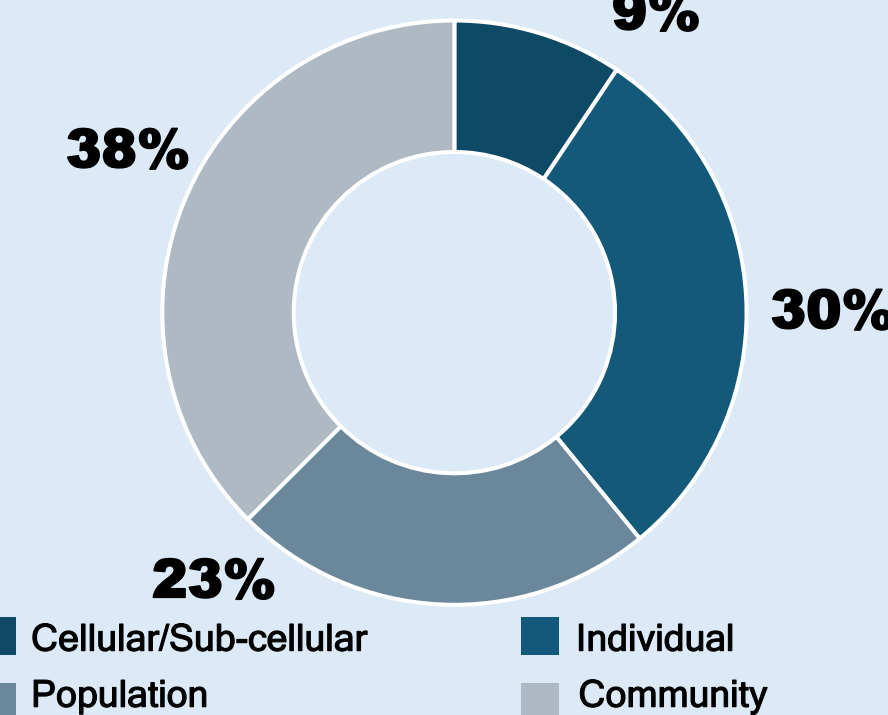
Response level
- 9% Cellular/Sub-cellular
- 30% Individual
- 23% Population
- 38% Community

[1]Pennino et al. (2021) The Missing Layers: Integrating Sociocultural Values Into Marine Spatial Planning. *Frontiers in Marine Science, 8.* [2]Xu et al. (2022) Global Trends and Prospects of Community Participation in Marine Protected Areas: A Bibliometric Analysis. *Sustainability, 16*(17), 7772. [3]Trimble & Berkes (2013). Participatory research towards co-management: Lessons from artisanal fisheries in coastal Uruguay. *Journal of Environmental Management*, 128, 768–778. [4]Lopes et al. (2025). Unintended and overlooked consequences of exclusionary marine conservation. *ICES Journal of Marine Science, 82*(1), fsae190. [5]Ministero dell'Ambiente e della Sicurezza Energetica (2023) Strategia Nazionale Biodiversità 2030 (DM N. 252/2023). [6]Lombard et al. (2023). Principles for transformative ocean governance. *Nature Sustainability, 6*(12), 1587–1599. [7]Bryman (2015) *Social Research Methods* (5a ed.) OUP Oxford. [8]Biggs et al. (2021) *The Routledge Handbook of Research Methods for Social-Ecological Systems* (1a ed.). Routledge. [9]Ministero dell'Ambiente e della Tutela del Territorio e del Mare. (2021). *Strategia Nazionale per la Biodiversità 2011-2020.*