

## A SPATIAL PRIORITISATION EXERCISE FOR MARINE SPATIAL PLANNING IMPLEMENTATION WITHIN THE NORTH-EAST MPA OF THE MALTESE ISLANDS

Alan Deidun <sup>1\*</sup>, Daniel Fenech <sup>1</sup>, Adam Gauci <sup>1</sup>, Anthony Galea <sup>1</sup> and Aldo Drago <sup>1</sup>  
<sup>1</sup> Department of Geosciences, University of Malta - alan.deidun@um.edu.mt

### Abstract

The cumulative pressure/risk posed to both *Posidonia oceanica* seagrass meadows and maerl beds by ongoing maritime activities as well as the cumulative user-user conflict within the NE MPA were quantified and mapped to serve as a decision-support tool for MPA managers implementing MSP provisions in the area.

**Keywords:** *Marine policy, Marine reserves, Management, Mapping, Malta Channel*

### Introduction

In line with inherent obligations for designated Natura 2000 sites, Malta needs to deliver management plans for its designated Marine Protected Areas, including the North-East MPA. In parallel, Malta needs to comply with obligations emerging from the Marine Spatial Planning Directive, which seeks to implement a spatially-coherent methodology in the management of marine resources. [1] argue that the Maltese islands have significant potential to become a prime case study towards the implementation of MSP provisions within MPAs.

Within this context, our research group is participating within the AMARE project (<https://amare.interreg-med.eu/>), funded within the Interreg MED framework, which aims to deliver adaptive management tools for MPA managers, most notably a web-based geoportal. The geoportal combines Geographic Information Science (GIS) principles and tools to harmonize a relatively large and multi-dimensional datasets, including several themes: administration, biodiversity, elevation, geology, habitats and biotopes, hydrography, monitoring, oceanography, socioeconomic, threats. The tool combines intelligent web maps with graphs, charts, tables, and text to unlock, make accessible and re-usable the data relevant for the management of the MPAs in a coordinated manner. The aims of this study are the semi-quantification and visualisation of the environmental pressures or risk exerted by maritime activities ongoing within the NE MPA on two benthic habitats of conservation importance (*Posidonia oceanica* seagrass meadows and maerl beds) as well as of user-user conflicts within the same domain so as to generate a cumulative impact map.

### Methodology

In order to achieve both study aims, a 1kmx1km grid resolution was selected on the basis of the MPA spatial dimensions as well as a compromise between the need for fine resolution and the feasibility of data volume management. The intensity of a diverse array of maritime activities (e.g. shipping, recreational boating, fishing, aquaculture, SCUBA diving) conducted within the marine area of interest was quantified through a variety of sources (e.g. VMS data for fishing activity, AIS data for shipping and recreational boating activity, geo-referenced locations of existing fish farms for aquaculture gleaned from the AMARE geoportal and diving site popularity surveys with SCUBA centres for diving).

The spatial extent of the two benthic habitats of interest was mapped. The pressure/risk posed to these two habitats by the maritime activities under consideration was weighted on the basis of outputs provided by the iMSE decision-support tool which in turns applies the ODEMM (Options for Delivering Ecosystem-Based Marine Management) pressures of abrasion, nutrient enrichment and smothering, as well as on expert judgement. ODEMM operates by implementing the DPSIR conceptual framework, whose application in environmental management is becoming ubiquitous (Patrício et al., 2016). For instance, a pressure/risk weighting of 2, 3, 4 and 5 was considered for recreational boating, fishing, shipping and aquaculture, respectively, on *P. oceanica* meadows.

Once quantified, the weighted values were translated into separate cumulative pressure/risk maps for *P. oceanica* meadows and for maerl beds after combining habitat distribution maps with weighted pressure/risk value maps. The cumulative impact map was generated by multiplying the intensity of each maritime activity (calculated arbitrarily along a 1-5 score index) ongoing within each grid cell.

### Results

Figure 1 gives the cumulative user-user conflict map for the NE MPA, indicating that the highest conflicts were experienced within the central swathes of the MPA, mainly through the interaction of bunkering, fishing and recreational boating activities within this area.

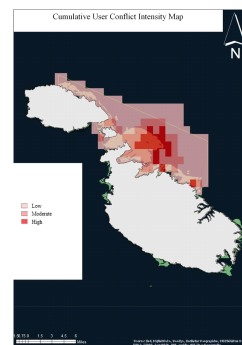


Fig. 1. Cumulative user-user conflict intensity for the NE MPA of the Maltese Islands.

### Discussion and Conclusions

A considerable percentage of the NE MPA warrants the implementation of MSP on the grounds of intense user-user spatial conflicts and user-environment impact risks. Maerl assemblages and *P. oceanica* beds were found to be subject to consistently high cumulative impact values for the majority of their spatial extent within the NE MPA. *P. oceanica*, in particular, exhibited maximum cumulative risk intensity values within bunkering zones and also in close proximity to aquaculture zones, as a result of the theoretically high spatial conflicts observed in some areas of the NE MPA, early stakeholder consultation encompassing the full spectrum of NE MPA users is highlight recommended. Zonation will likely be one of the area-based management tools (ABMT) applied to the NE MPA, as evidenced by the ongoing MPA zoning exercise conducted by ERA, to which the results of this study could feasibly contribute. The outputs of the current study could be further refined by incorporating additional benthic habitats as well as hydrodynamic modelling in order to assess water column impacts of the assessed activities through dispersal and advection of pollutants, for example. By generating pressure/risk and cumulative impact maps, this study has made a contribution towards prioritising those areas within the MPA which warrant the implementation of MSP provisions, such as zonation, to address the same pressures and impacts.

### References

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