Designing Marine Protected Areas Management Plans: Using Spatial Conservation Prioritization Methods

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Introduction

- Planning and management of Marine Protected Areas (MPAs) is new in Israel
- Only 6 small MPAs were approved along the Israeli Mediterranean coast in the past
- Multiple threats to the marine environment raise the need for wise conservation planning of MPAs to achieve conservation goals

Introduction

- First large MPA was partly approved in May 2014
- 30% of the suggested area was not approved as part of MPA
- 1 year later and the MPA is still not approved
- This MPA (Rosh-Hanikra) is the case study

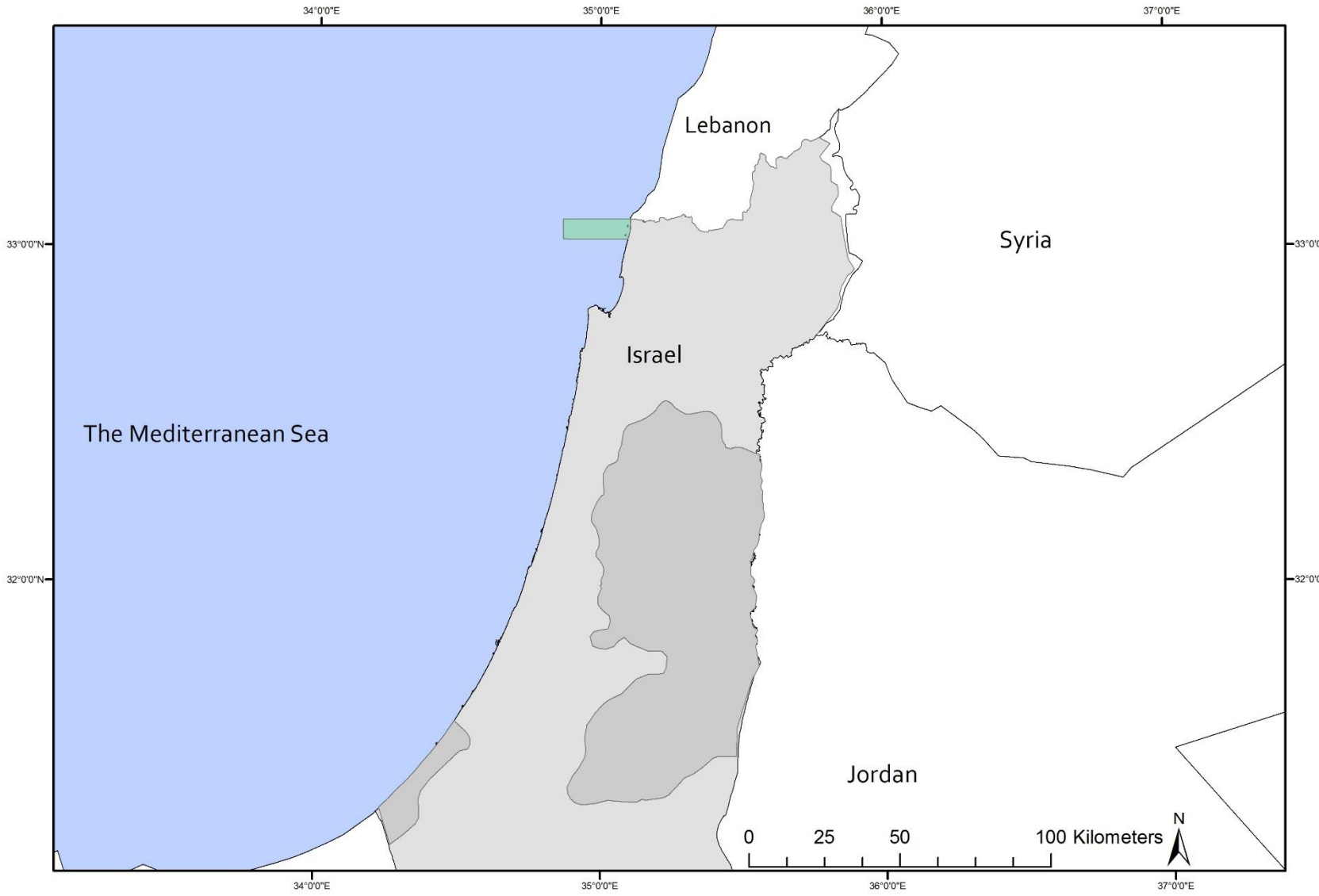
  for this research

Research objectives

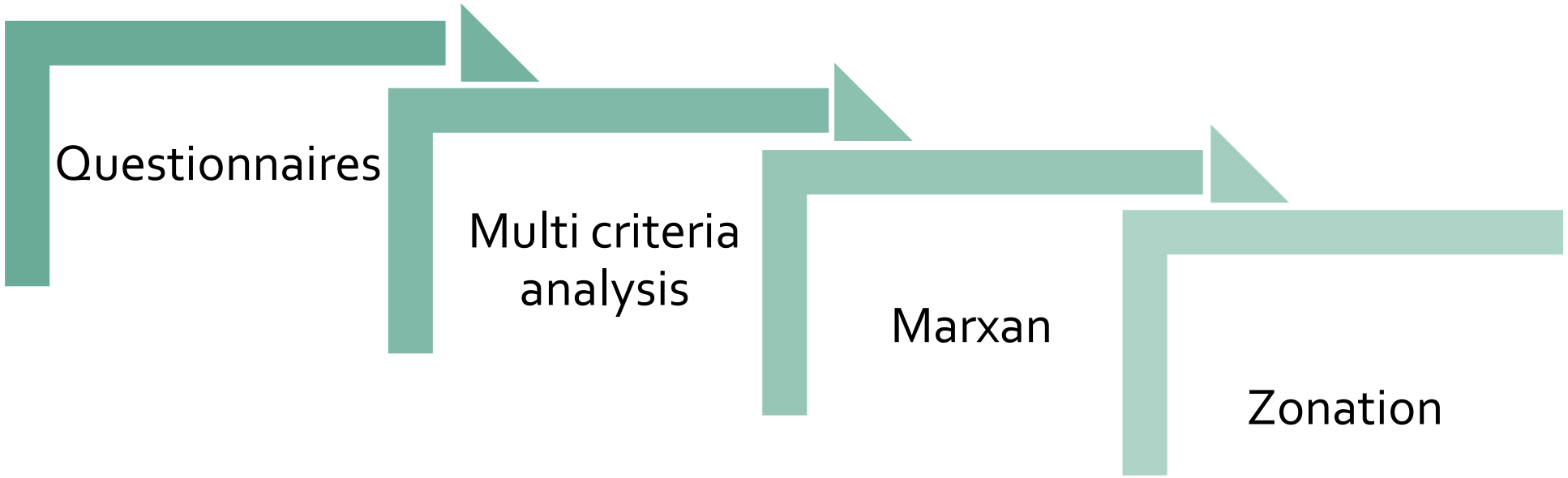
- Applying decision support tools to MPA planning process
- Identifying social factors to incorporate in spatial prioritization during MPA planning process

Methods

- Study area
- Rosh Hanikra reserve
- Existing reserve area is small and close to shore



Methods



Methods

Questionnaires

Stake-holders	Planners and nature conservationists	Marine ecologists	SCUBA diving clubs	Sea sport	Tourists	Reserve employees	Fishermen
n	8	12	7	7	10	7	8

- 3 protection levels:

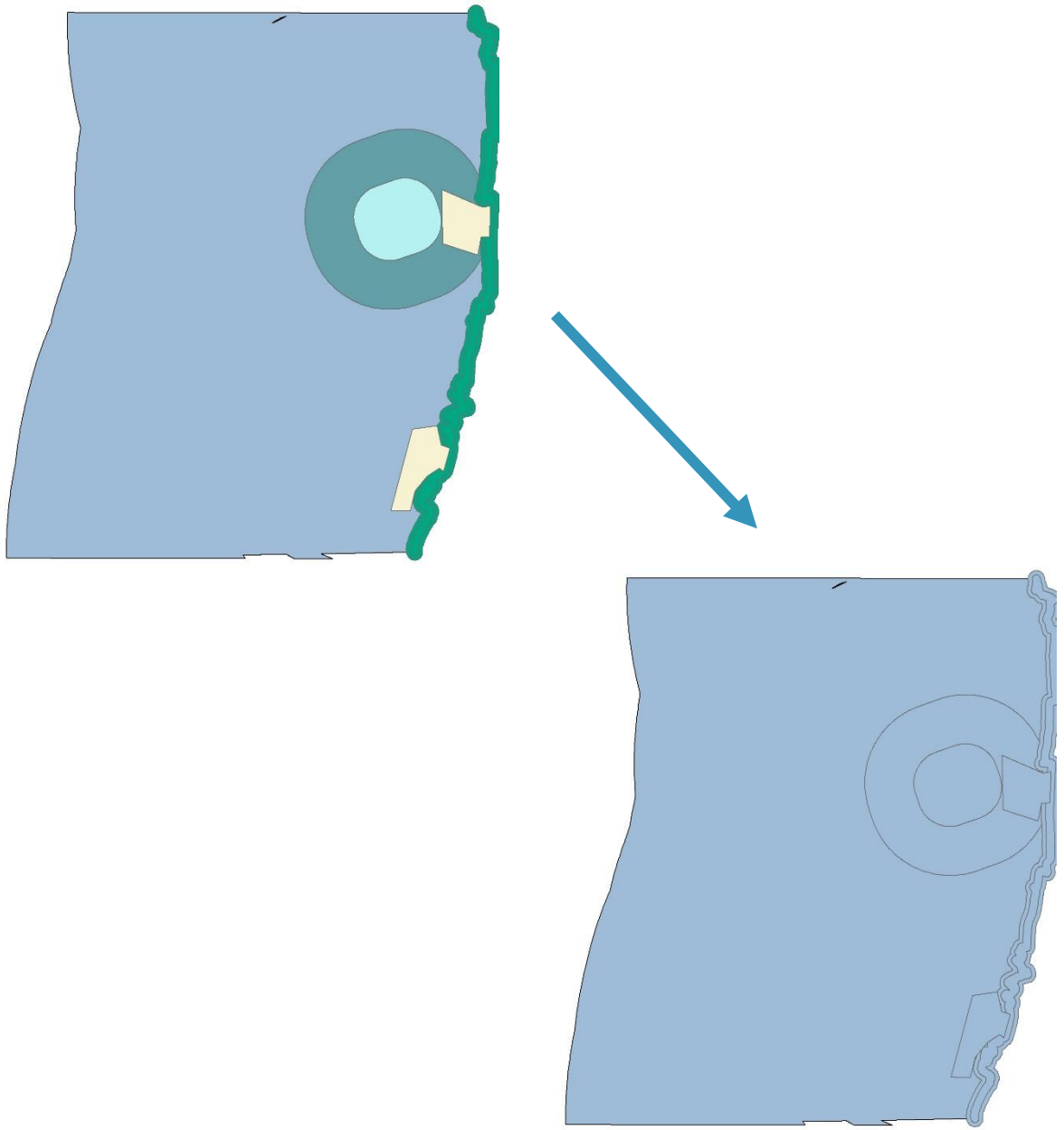
No take	Medium protection	Marine park

- 4 physical attributes:

Marine nature values	Marine landscape values	Cultural values	Commercial values

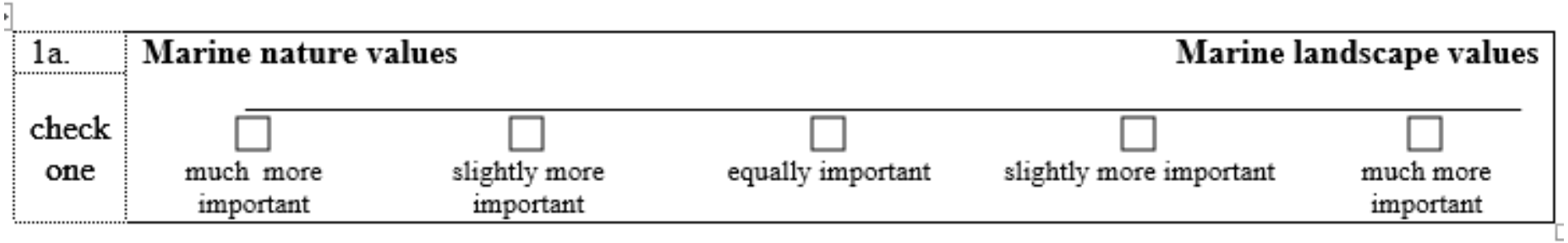
Methods

Physical attribute	Measure
Nature values	Biodiversity
	Unique habitats
Landscape values	Contribution to landscape perception
	Visibility
	Contribution to other landscape values
	Distance from shore
Cultural values	User density
	accessibility
	Cultural importance
	Social importance
Commercial value	Accessibility for commercial activity
	Distance from shore
	Temporal activity (seasonality)



Methods

Questionnaires



1a.	Marine nature values				Marine landscape values
check one	☐ much more important	☐ slightly more important	☐ equally important	☐ slightly more important	☐ much more important

- 3 protection levels:

No take	Medium protection	Marine park

- 4 physical attributes:

Marine nature values	Marine landscape values	Cultural values	Commercial values

- Calculating values weights for each protection level using Eigenvector

Methods

Multi criteria analysis

	e_{j1}	e_{j2}	e_{j3}	Σ
e_{j1}	0	$sng(e_{j1} - e_{j2})$		
e_{j2}	$sng(e_{j2} - e_{j1})$	0		
e_{j3}	$sng(e_{j3} - e_{j1})$	$sng(e_{j3} - e_{j2})$	0	
e_{j4}				
e_{j5}				

- Cell size in grid = 25x25 m, Approximately 160k cells
- Final grade is assigned to each cell based on the following:

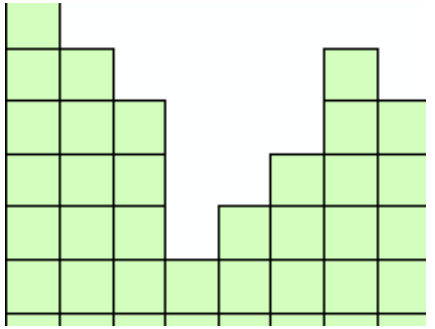
$$C_{jik} = \sum W_k * \sum sng(e_{ji} - e_{ji'})$$

C_{jik} = final concordance score

k = the scenario (No take zone/ medium protected zone/ marine park)

e_{ji} = value of observation j for observation i

$sng(e_{ji} - e_{ji'})$ = 1/0/-1



Methods

Marxan

- Cell size in grid = 25x25 m
- Marxan with Zones- allows zoning of the planned MPA
- Nature features (marxan input) are similar to the 4 physical attributes
- Zones are similar to the protection levels and conservation priorities defined using the eigenvector weights

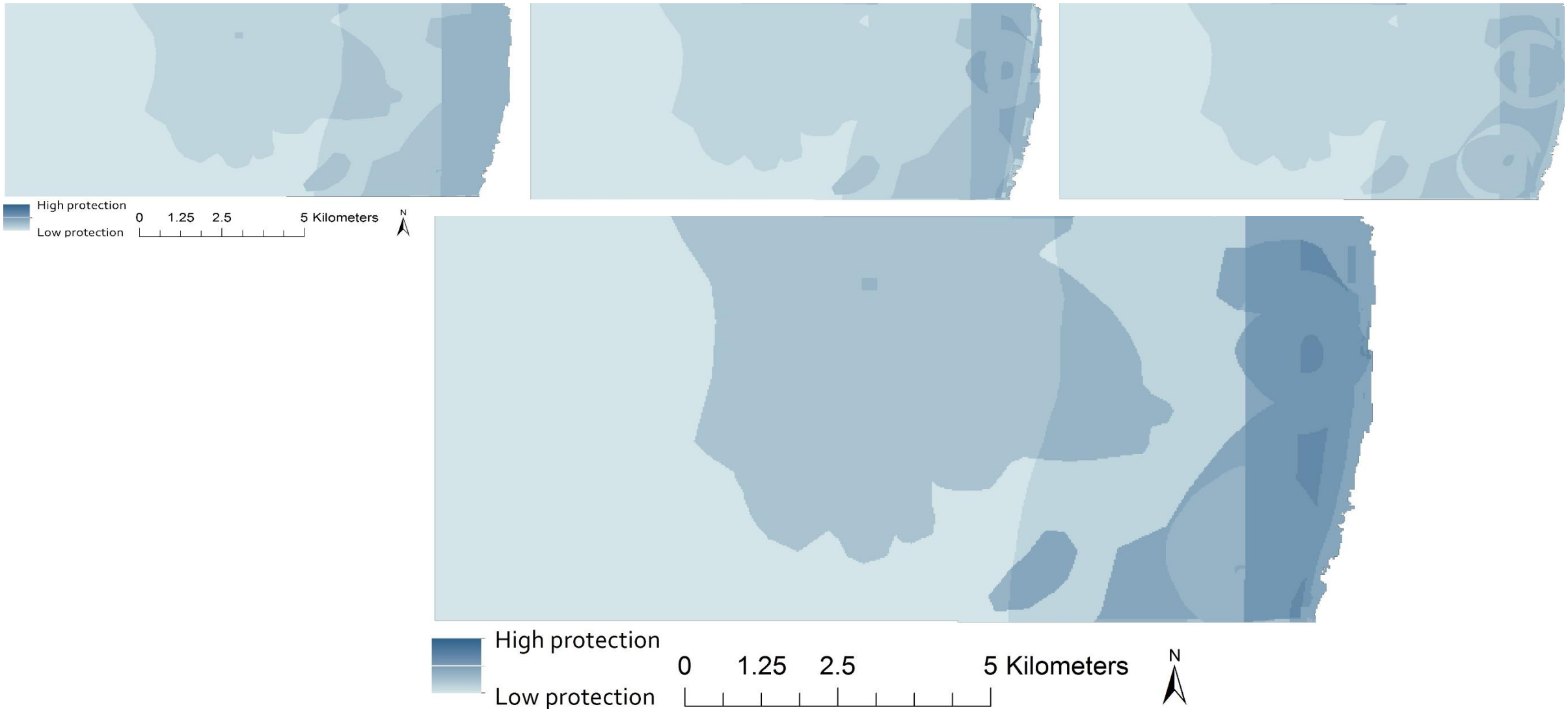
Results

Multi criteria analysis

No take scenario	Medium protection	Marine park

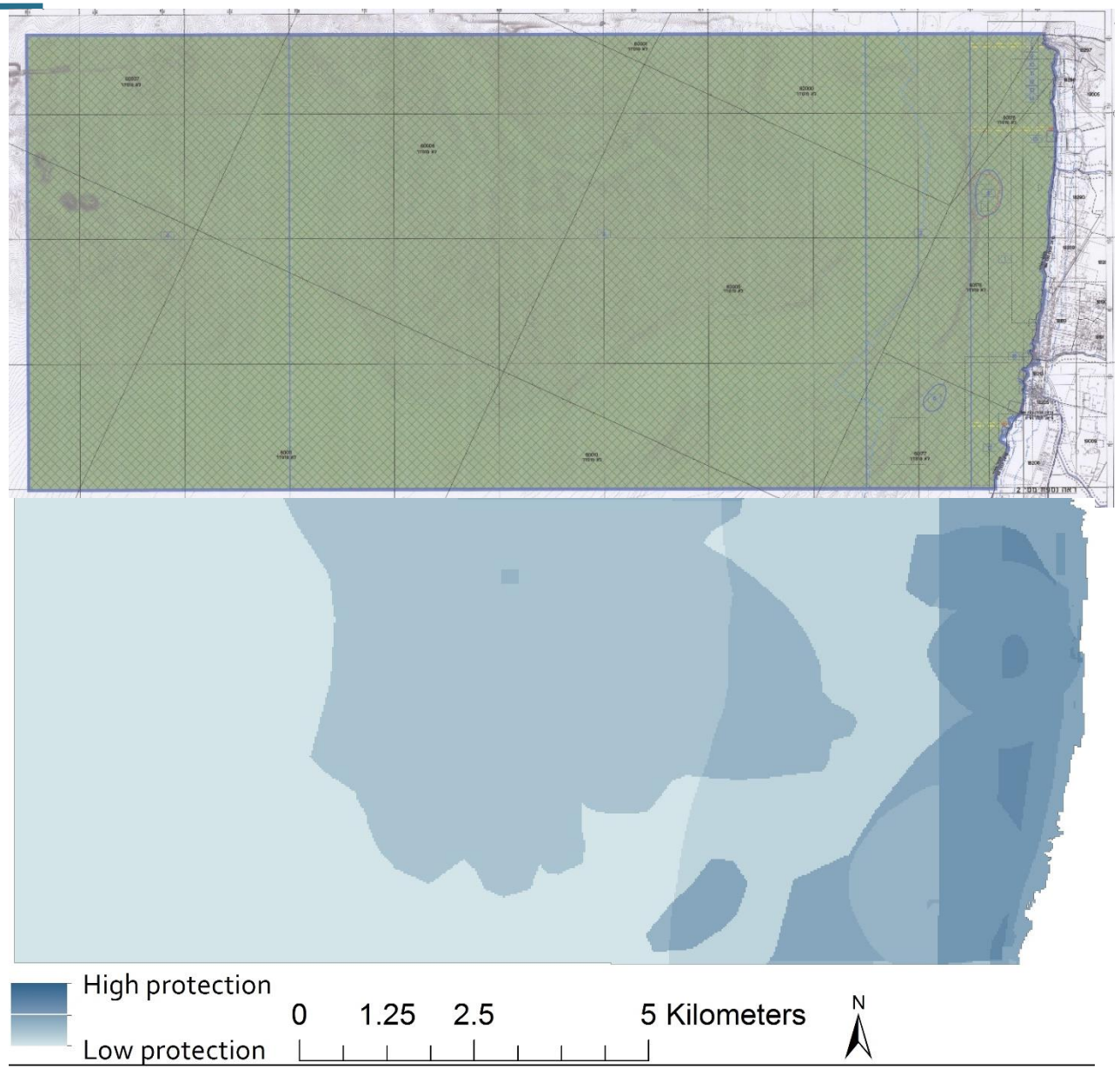
Results- Multi criteria analysis

No take scenario	Medium protection	Marine park



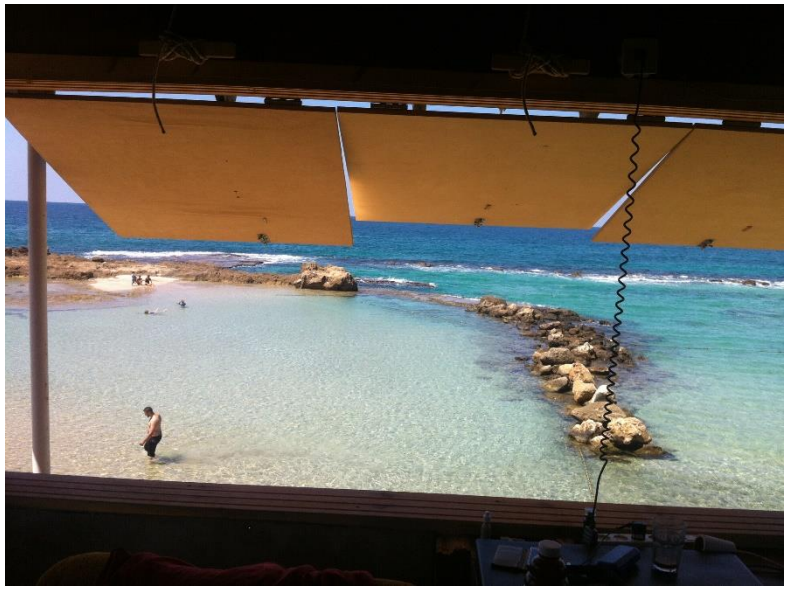
Discussion

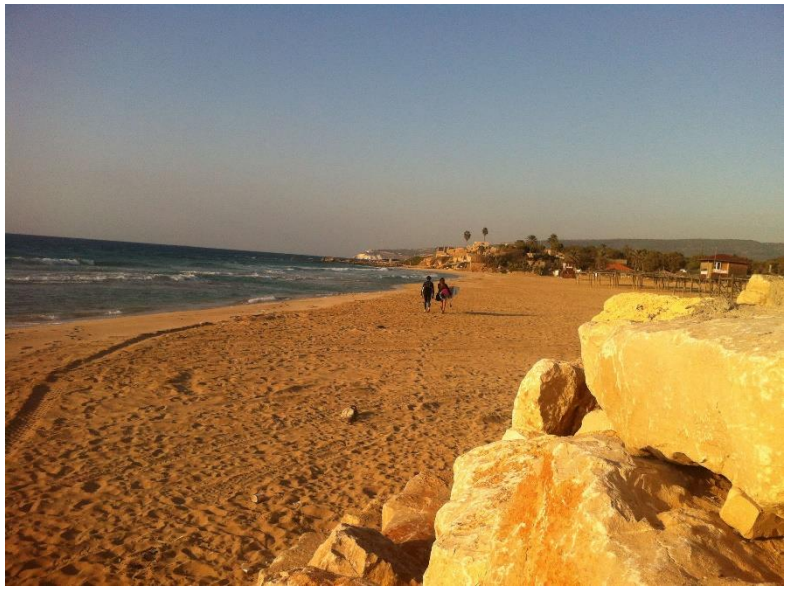
- Zoning- should include habitat characteristics and human uses
- Missing habitat characteristics brought to random trimming of MPA area
- Mapping dilemmas….



Conclusions

- Zoning of MPA enhances marine conservation opportunities while allowing more human activities
- When using decision support tools social factors should be included to allow adaptive management of the MPA
- Using decision support tools is fundamental when planning MPA





Acknowledgments

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