

compiled in the frames of the Balkan-Med, “Mo.Na: Monuments in Nature” project, a set of recommended management measures that can help towards achieving this goal is hereby set forth:

- ▶ Reduce, to the point of elimination, further coastal development,
- ▶ Mitigate urban and agricultural pollution at the watershed scale,
- ▶ Apply sound waste management within a circular economy context,
- ▶ Eliminate illegal fishing practices and set sounder fisheries management in appropriately selected areas with strictly protected (no-take) marine zones,
- ▶ Restore natural marine predator populations to control both indigenous and non-indigenous invasive species,
- ▶ Control anchoring through ecological safe moorings, particularly over seagrass beds and other sensitive biogenic habitats,
- ▶ Increase Ocean Literacy through educational programmes to enhance awareness of marine diversity and its significant importance in maintaining quality of life and natural resilience to climate change.

Instead of an epilogue

Considering the ubiquity and commonality of pressures on marine ecosystems across the Mediterranean, the above recommendations are pertinent to all “Mo.Na” pilot sites and well beyond.

Although further and more explicit scientific research is needed to deepen our understanding of these poorly studied marine ecosystems, large-scale marine habitat maps based on models and targeted groundtruthing surveys, despite indeed some limitations, still offer valuable insights in highlighting importance and threats otherwise typically neglected in coastal planning processes.

- ▶ More about the “Mo.Na” project:
<https://www.monumentnature.com>

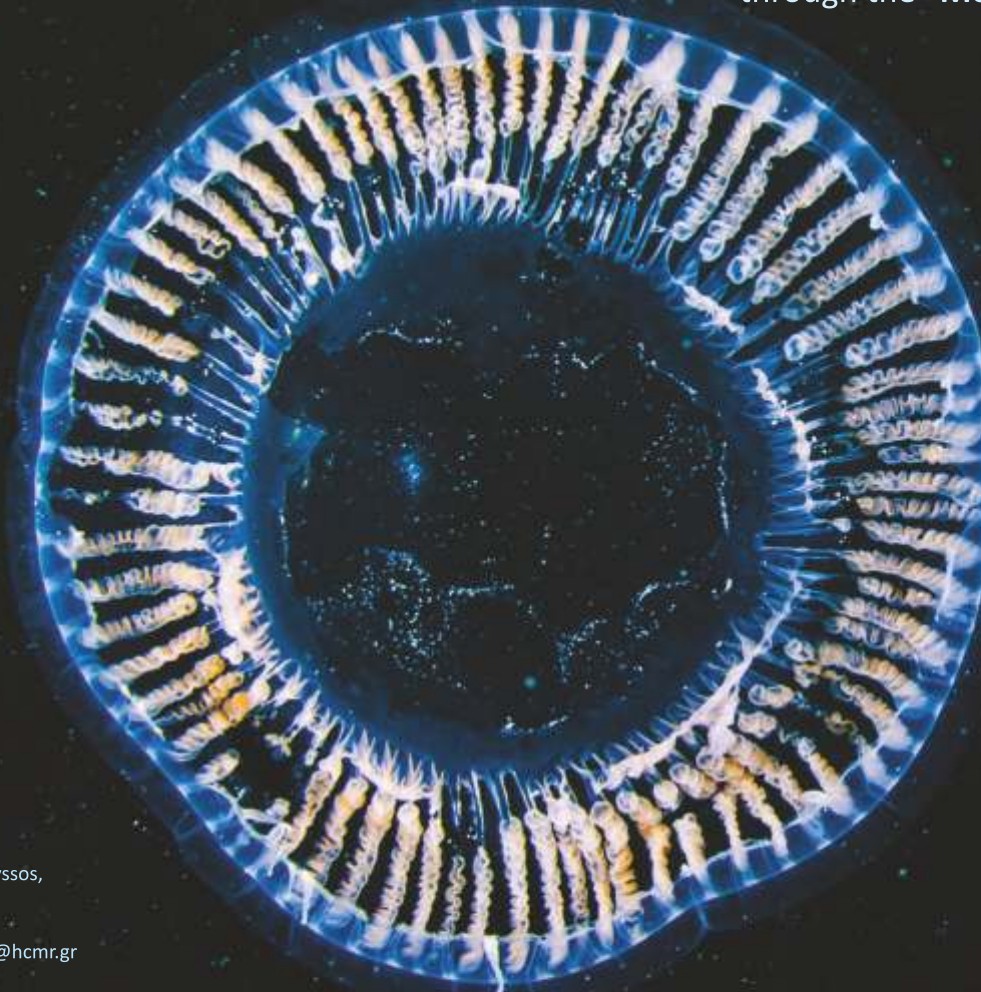
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Interreg 
Balkan-Mediterranean
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The underwater
natural heritage
in Nessebar, Butrint,
and Santorini Island
through the “Mo.Na project”
perspective.



“Mo.Na: Monuments in Nature”


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At a glance

In the frames of the Mo.Na Project, Marine Habitat Types surrounding important historical and archaeological sites in Greece, Albania and Bulgaria were put in focus with a view to record the presence and the distribution of ecologically significant marine components and identify current pressures that may compromise their valuable, though often scarcely perceived, Ecosystem Services.

Three case study areas

Three pilot coastal sites of exceptional cultural and environmental interest were addressed: **Butrint** in Albania, **Nessebar** in Bulgaria, and **Santorini Caldera** in Greece. Critical marine habitats and their associated biodiversity were surveyed to assess their ecological state and produce large-scale marine habitat maps.

Ecological Assessment: STATE & PRESSURES

All sites presented natural features of high conservation importance, but also several signs of minor to considerable degradation.



Rich *Cymodocea nodosa* beds of the Vivari Channel

Butrint Lagoon and Adjacent Coasts, Albania

Sea-urchin overgrazing, non-indigenous species, and various types of marine litter were recorded across the study area, while uncontrolled coastal development, uncontrolled anchoring, illegal date mussel (*Lithophaga lithophaga*)

fishing, and ghost fishing gear were mostly detected in the bay of Ksamil and the adjacent marine coasts. Organic pollution/turbidity was particularly pronounced in Butrint, restricting macroflora's lower limit in only a couple metres depth. Massive necrosis of a reportedly large population of the Mediterranean endemic fan mussel *Pinna nobilis* previously characterizing the *Cymodocea nodosa* meadows at the mouth of Butrint was also confirmed, following the wider Mediterranean alarming trend.

photo: Dimitar Berov



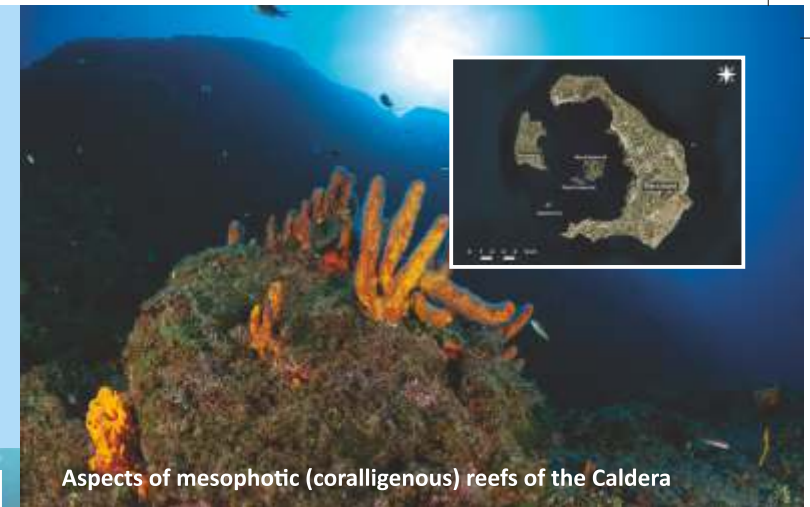
Lush algal forests on shallow rocky reefs of Nessebar and Ravda

Nessebar – Ravda, Bulgaria

Although the study area presented several indicators of Good Environmental Status suggesting significant pollution mitigation within the last decade, uncontrolled coastal development, marine litter, ghost fishing gear, as well as increasing invasibility of the non-indigenous Rapa whelk (*Rapana venosa*), were identified as persistent pressures in this area.

Santorini Caldera, Greece

While this highly oligotrophic marine area only presents minor indications of organic pollution, non-indigenous species, barren reefs (due to overfished and highly disrupted food webs), ghost fishing gear, and massive mortality of *Pinna nobilis* were identified as the most important and widespread pressures. More locally, uncontrolled anchoring and arbitrary placement of numerous non-ecological-safe



Aspects of mesophotic (coralligenous) reefs of the Caldera

moorings, were identified as the most acute pressure on Caldera's *Posidonia oceanica* meadows.

Pressure	Study Area		
	Butrint & adjacent coasts	Nessebar Ravda	Santorini Caldera
Coastal constructions	↑	↑	↑
Non-indigenous species	↑	↑	↑
Species extinction / food web disruption	↑	↑	↑
Habitat destruction	↑	-	↑
Coastal pollution	↑	↓	↑
Marine litter / lost fishing gear	↑	-	↑

In situ identified anthropogenic pressures and trends:
(↑ for increasing, ↓ for decreasing, - for stable)

Recommended Management Measures

Lack of concrete conservation objectives and targeted management measures has led to significant degradation of marine natural heritage in recent times, even at areas of exceptional conservation interest as is the case of the “Mo.Na” pilot sites.

Coastal cultural landscapes can serve as a powerful leverage for pursuing and enhancing marine environmental protection. To do so, up-to-date habitat mapping and ecological health assessment are prerequisite to any sound decision making.

Based on a spatial and attribute ecological dataset