



European Center for Byzantine and Post-Byzantine Monuments

Mo.Na: Monuments in Nature: A Creative Co-existence

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Edited by Flora Karagianni, Sapfo Tanou

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Coastal Marine Habitats in Nessebar, Bulgaria

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Within the frame of the Interreg BalkanMed Project “MoNa”, a marine habitat survey, targeting the area between the Nessebar old town and the coastal front of Ravda in Bulgaria, was designed by the Hellenic Centre for Marine Research and conducted by local experts, in two field missions that took place between 8 and 23 November 2020.

The study area is within the limits of the Natura 2000 SCI “BG00005774 Aheloy-Ravda-Nessebar”. Although information on marine habitat types’ distribution in the area is available through the EMODNET Data Portal, this has been mostly produced by modelling coupled with only limited groundtruthing effort. In

this light, the MoNa survey design focused on complementing and updating this information with more extensive *in situ* data.

Specifically, a drop camera survey was conducted between the Cape Acrotiria and the port of Ravda, in order to investigate marine areas where, according to local marine experts, the existing habitat characterisation was of high uncertainty (fig. 1). Additionally, scuba diving autopsies along transects were conducted at selected sites, in order to further characterise the biotic communities of the area, as well as to record the presence of protected and alien species, or signs of anthropogenic pressures.

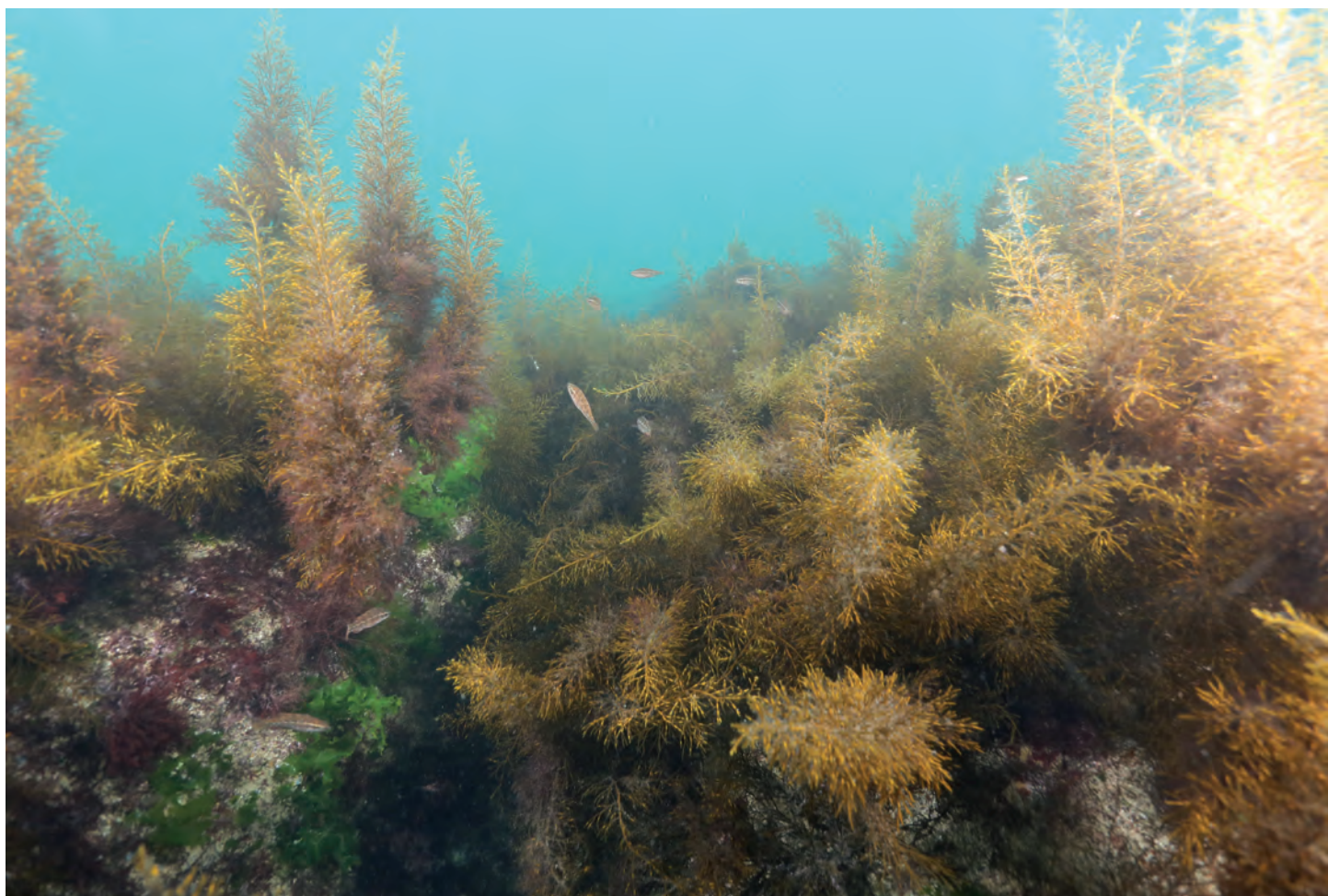
Fig. 1 Map of the habitat survey field activities conducted in the coastal marine area between Nessebar and Ravda, Bulgaria



Rocky reefs (Habitat Type 1170) are the dominant HT of the shallow zone between 0 and 12 m around the Nessebar peninsula, Cape Acrotiria and the coastal zone around Ravda (figs. 2-5).

Cystoseira (=Gongolaria) *barbata* 'forests' were the most abundant macroalgal communities of the sublittoral rocky reefs around Nessebar and Ravda. They were found along all transects at depths between 1-2 and 9-10 m, usually intermixed with patches of green (*Ulva rigida*) and red (*Gelidium spinosum*, *Gelidium latifolium*, *Ceramium virgatum*) macroalgae. Large schools of *Symphodus tinca* were observed in the *Cystoseira* thickets, which is the preferred habitat for this fish. The *Cystoseira* 'forests' were also the preferred habitat of the crab *Eriphia verrucosa*.





Figs. 2-5 Typical aspects of shallow well-lit rocky reefs in the study area



Interestingly, *Cystoseira barbata* was also observed to have colonized and grown over the submerged fortifications along the eastern coast of Nessebar peninsula, which in 2017 had been completely scraped-off and uncovered by the Bulgarian Centre for Underwater Archaeology¹.

Patches of the red sciaphilic macroalgae *Apoglossum rusci-folium* and *Phyllophora crista* were observed at the lower end of the reefs, on the southern and eastern sides of the Nessebar peninsula between 8-12 m depth (figs. 6-7).

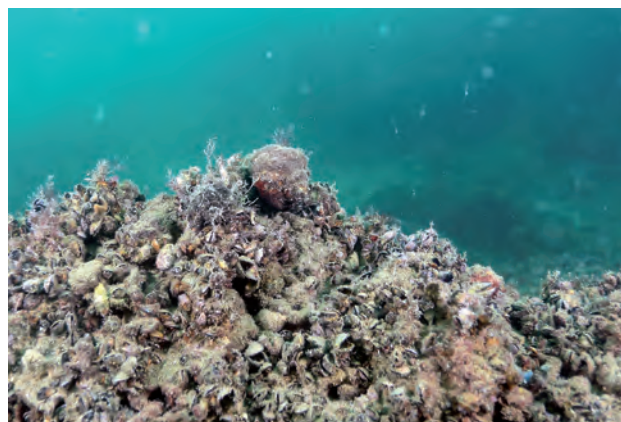


Figs. 6-7 Sciaphilic vegetation on vertical rocky outcrops of Nessebar



Previous surveys in the area by Berov² recorded extensive and well-developed infra- and circalittoral rocky reefs colonized by *Mytilus galloprovincialis* mussels. During the current survey only small patches of young black mussels (0–1-year size class) under predatory pressure from the Rapa Whelk (*Rapana venosa*) invasive snail were observed (figs. 8-9).

Figs. 8-9 Rapa Whelks feeding on mussels, Nessebar peninsula



1. CUA 2017.
2. Berov 2017.

As in many other locations on the Bulgarian Black Sea coast, the Rapa Whelk is continuously preying upon the black mussel colonies and gradually reducing their biomass and range of distribution³.

In terms of absolute cover and extent, infralittoral and circalittoral sands (Habitat Type 1110) dominate the marine area north of Nessebar, as well as most of the rest of the study area in depths greater than 10 m (figs. 10-15). The majority of the areas classified as HT 1110 are not occupied by seagrass meadows but are rather inhabited by infaunal communities. These include various bivalve-dominated zoobenthic communities in sands of varying grain size and organic matter contents down to 10-12 m depth, but also local colonies of the mud shrimp *Upogebia pusilla* in muddy sediments below 12 m depth, found mostly north of Nessebar.



3. Berov et al. 2020.



Figs. 10-15 Typical aspects of shallow soft bottoms of the study area



As previously reported by Todorova et al.⁴, multiple seagrass species are present in the shallow parts of the study area, specifically *Zostera noltei*, *Zostera marina*, and the brackish water species *Zannichellia palustris* (figs. 16-17). The most important area for seagrasses in the area seems to be just west of the Cape Acrotiria, where two large *Zostera* sp. meadows currently cover an area of about 43 hectares, as estimated using satellite imagery. It is interesting to note that the extent of these seagrass beds seems to have expanded massively (more than 60%) during the last 15 years, probably due to the improvement of the ecological state of the waters in the area, after the construction of the wastewater treatment plant collecting waste waters from the towns of Ravda, Nessebar and nearby resort hotels.

These seagrass meadows present the typical for the Black Sea "mixed" species composition, with *Z. noltei* dominating the shallow areas between 1-3 m depth, followed by a "mixed" community of *Z. noltei* with *Z. marina* and *Zannichellia palustris* between 3-5 m depth, and continuing down to about 7 m depth in a monospecific form comprising *Z. marina*.

Figs. 16-17 A mosaic of seagrass beds and brown *macroalgae* dominated rocks in Ravda



4. Todorova et al. 2012.