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Data on Macrovegetation of Sazani Island, Albania

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Abstract
Macrovegetation of Sazani Island has been scarcely studied. This paper presents the results of a study carried out along Sazani Island rocky coast related to investigation and assessment of macroalgae species composition, algal cover and seagrasses, too. Field investigations have been done in four sampling sites on the eastern and western coast of the island. This study revealed the presence of three species of regional and international importance, namely the alga Lithophyllum byssoides, the seagrasses Posidonia oceanica and Zoostera noltei. These species have been considered of a high relevance in Mediterranean level, highlighting the urgent need for conservation measures to protect this area and to implement medium and long-term monitoring of the conservation state through the establishment of monitoring programs for this Marine Protected Area.
Key Words*: macrobenthos, seagrasses, rocky coast, Adriatic Sea.*

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I. Introduction

Sazani Island, with a surface 5.7 km^2, is located in southwestern coast of Albania, in southeastern cost of Adriatic Sea. It has been a military base for decades and due to this the access in the island has been very restricted. Because of this limited access, studies and knowledge on biodiversity of Sazani Island have been very scarce.

Existing information on Sazani Island is very general and has been provided under several rapid and sporadic assessments of coastal benthic communities of Vlora Bay, as well as within the framework of declaration of the Marine Protected Area Karaburun - Sazan (after Kashta & Beqiraj 2010).

There are no previous studies specifically focused on benthic communities of shallow coast of Sazani island, although several studies on benthic habitats of Vlora Bay have been carried out. These studies have provided data on underwater habitat mapping, macrozoobenthos of deeper infralittoral of the Bay, as well as from shallow water of the eastern coast of the bay (Vlora main touristic area) and the western coast (Karaburun Peninsula), as evidenced in Andromede Oceanologie 2016, Beqiraj 2001, Beqiraj & Kasemi 2006, Beqiraj & Kashta 2007, Beqiraj et al. 2008, Beqiraj & Ballesteros 2018, Beqiraj et al., 2019, Fraschetti et al. 2011; Kasemi et al. 2008, Kasemi et al. 2012, Kasemi et al. 2013, Kasemi et al. 2015, Maiorano et al. 2011, Panneta et al. 2009.

Considering the limited knowledge on biodiversity in the intertidal and shallow subtidal habitats of Sazani Island, one of the objectives of this study was to compile a list of macroalgae species distributed along the coast of this island.

Assessments done in this study on species composition and algal cover can be considered of a high relevance, because besides the important role they play for marine biodiversity, they are also related to the definition of priorities for conservation marine and coastal ecosystem in this area, because it is included in the Marine National Park Karaburun – Sazan that has been considered an important MPA in Mediterranean level.

II. Material And Methods

The survey has been carried out during 2012 – 2014, in spring (May) and early autumn (September) each year, in four sampling sites, two on the eastern part and two on the western part of the Sazani island (Figure 1 and Table 1).

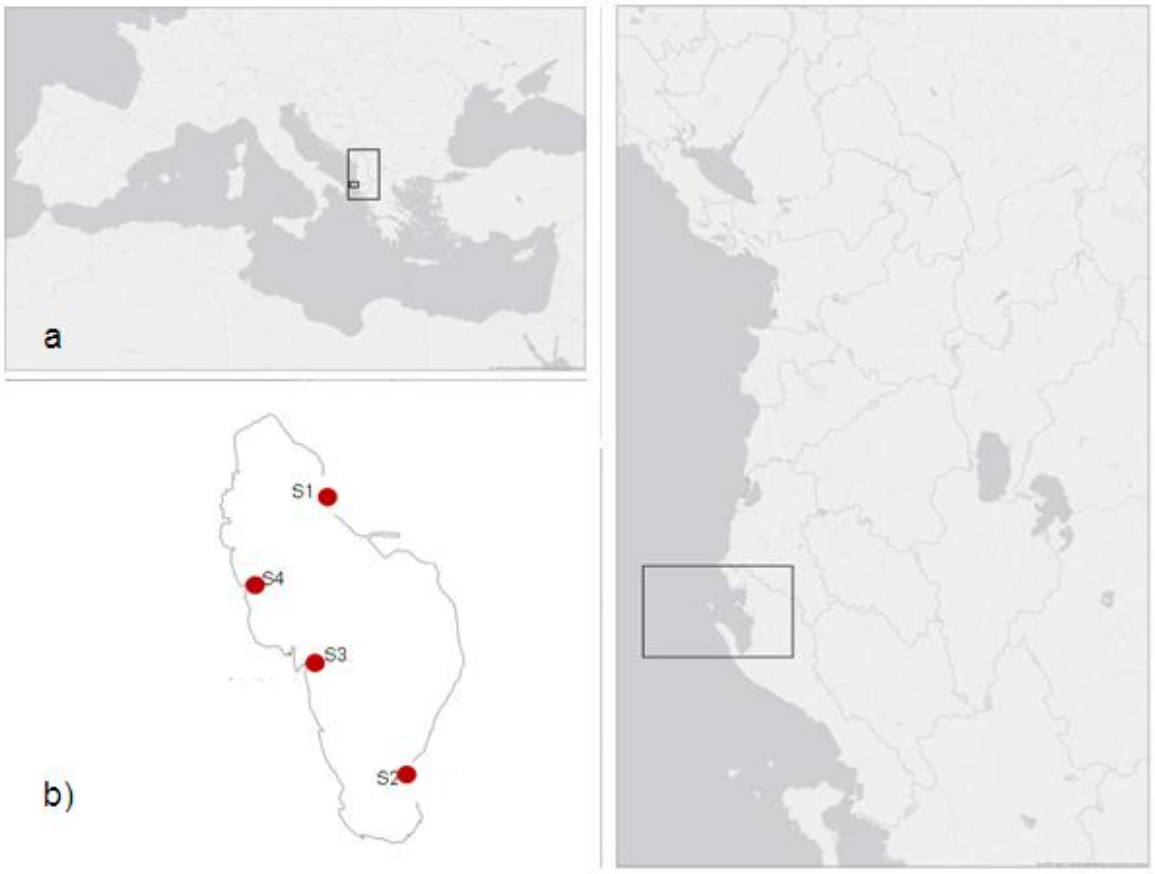

Figure 1: a)Location of Sazani Island (map source: Tomas-Vives 2015); b) Google map of Sazani Island showing the sampling sites S1,S2, S3, S4

Table 1. Site number and coordinates of sampling sites in Sazani Island.

Site number	Location	Coordinates
S1	East coast	N 40°30'25.17"; E 19°16'34.04"
S2	East coast	N40°28'49.00"N 19°17'12.01"
S3	West coast	N 40°29'26.80"; E 19°16'28.58"
S3	West coast	N 40°29'53.89"; E 19°16'2.50"

Sampling was conducted in shallow water, in supralittoral, midlittoral and upper limit of infralittoral.

The two sites on the western coast (S3 and S4) are highly exposed to the waves, facing the open sea, while the two sites on the eastern coast (S1 and S2) are more sheltered, facing the mainland. Eastern coast of the island is affected by pollution of Vlora Bay in general, including tourism, urban pollution and industrial pollution. This pollution is originated mainly from Vlora city, Vlora touristic area, the passenger harbour, the fishery harbour, the Petrolifera and the thermo-power plant, all situated on the eastern coast of the bay.

During this survey it was conducted a benthic sampling in hard bottoms for a quantitative assessment, after the methods of Schlieper (1976), Cattaneo et al. (1978), Drago et al. (1980) and Zenetos et al. 2000. Algal cover (in percentage) has been evaluated in all sampling sites. A comparison between sampling sites on the eastern and western part has been conducted regarding the differences in algal cover, macroalgae species number, as well as species number of benthic invertebrates sheltered in algal cover.

Identification of macroalgae and seagrass was based on atlases, identification keys, monographs and other relevant publications, referring to Cerrano et al. (2004), Mojetta & Ghisotti (1994), Riedl (2010), Trainito (2011).

It was aimed to go to the lowest possible level with taxa identification, and we were able to go species level in most cases, except one taxa that remained at genus level, out of 29 taxa of macrovegetation (algae and seagrasses) that were recorded in total.

Taxonomic classification of macroalgae has followed the system of WoRMS (World Register of Marine Species).

III. Results And Discussion

In this study 29 species have been found in macrovegetation of Sazani coast, of which 27 were algae (seaweeds) and 2 were plants (seagrasses). The full list of species and their systematic position is shown in Table 2.

Table 2: The list of species recorded in macrovegetation of Sazani Island

No.	TAXA
	CHROMISTA
	Ochrophyta
	Phaeophyceae
	Sargassaceae
1	*Sargassum vulgare* C.Agardh, 1820
2	*Cystoseira mediterranea* Sauvageau, 1912
3	*Cystoseira amentacea* (C.Agardh) Bory de Saint-Vincent, 1832
4	*Cystoseira compressa* (Esper) Gerloff & Nizamuddin, 1975
5	*Cystoseira crinita* Duby, 1830
	Dictyotaceae
6	*Dictyota sp*. J.V.Lamouroux, 1809
7	*Dictyopteris polypodioides* (A.P.De Candolle) J.V.Lamouroux, 1809
8	*Dictyopteris polypodioides* (*Dictyopteris membranacea*) (A.P.De Candolle) J.V.Lamouroux, 1809
9	*Padina pavonica* (Linnaeus) Thivy, 1960
	Stypocaulaceae
10	*Halopteris scoparia* (Linnaeus) Sauvageau, 1904
11	*Halopteris filicina* (Grateloup) Kützing, 1843
	Ulvophyceae
12	*Flabelia petiolata* (Turra) Nizamuddin, 1987
13	*Codium coralloides* (Kützing) P.C.Silva,1960
	Cutleriaceae
14	*Cutleria multifida* (Turner) Greville, 1830
	PLANTAE
	Rhodophyta
	Florideophyceae
	Ceramiaceae
15	*Ceramium virgatum* Roth, 1797
	Corallinaceae
16	*Amphiroa cryptarthrodia* Zanardini,1844 rigida
17	*Corallina sp*. Linnaeus, 1758
18	*Jania rubens* (Linnaeus) J.V.Lamouroux, 1816
19	*Titanoderma throcanter* (Bory de Saint-Vincent) Benhisounne, Boudouresque, Perret-Boudouresque & Verlaque, 2002
20	*Lithophylum tortuosum* (Esper) Foslie, 1900
21	*Lithophyllum byssoides* (Lamarck) Foslie, 1900
	Rhodomelaceae
22	*Laurencia* J.V.Lamouroux, 1813
	Halymeniaceae
23	*Halymenia latifolia* P.Crouan & H.Crouan ex Kützing 1866
	Chlorophyta
	Ulvophyceae
	Ulvaceae
24	*Ulva rigida* C.Agardh, 1823
	Codiaceae
25	*Codium bursa* (Olivi) C.Agardh, 1817
26	*Codium corraloides* (Kützing) P.C.Silva, 1960
	Cladophoraceae
27	*Cladophora vagabunda* (Linnaeus) Hoek, 1963
	Tracheophyta
	Posidoniaceae
28	*Posidonia oceanica* (Linnaeus) Delile, 1813
	Zosteraceae
29	*Zostera noltei* Hornemann, 1832

From the Chromista kingdom there were identified 14 taxa belonging to:
Ochrophyta phylum:14 species, part of Phaeophyceae class represented by F. Sargassaceae (5 species), Dictyotaceae family with 4 species, Stypocaulaceae family with 2 species, Ulvophyceae family with 2 species and Culteriaceae with only one species.
This systematic group represents the largest number of species identified during the whole period of this study.
From the Plantae kingdom there were identified 15 taxa belonging to:
Rhodophyta phylum with 9 species, part of Florideophyceae class represented by Ceramiaceae family with 1 species identified, Corallinaceae (6 species), Rhodomelaceae (1 specie), Halymeniaceae (1 species).
Chlorophyta phylum with 6 species, part of Ulvophyceae and Tracheophyta class.
Ulvophyceae is represented by Ulvaceae family (1 species), Codiaceae (2 species), Cladophoraceae (1 species),
Tracheophyta class is represented by Posidoniaceae and Zoosteraceae families, represented by one species each.

From this class (Tracheophyta) is worthy to note the presence of seagrass *Posidonia oceanica*, an endemic species of the Mediterranean Sea. This species has been considered as a habitat, too, of special importance, and included in the lists of the Annex II of Barcelona Protocol, the Bern Convention and the Habitats Directive 92/43 / EEC of 21.5.1992. This species has also been included in the IUCN Red List, as a globally threatened species, with the status LC (least concern), as well as in the list of important habitats in the Mediterranean after SPAMI (Specially Protected Areas of Mediterranean Importance).

In the present study *Posidonia* meadow has been recorded on the eastern coast of the Island only. Patches of *Posidonia* were also present on the western coast, on rocks in deeper water, as the western coast of Sazani is very steep, even reaching 30 m depth immediately below the coastline in some areas. On the eastern side the *Posidonia* meadow has a limited extension, with the upper limit of 4.5 m and the lower depth of 16 m. The cover is relatively high, while the shoot density varies from low to medium.

The highest number of macroalgae species, 17, was found in sampling site S1 during spring season. In this site, in the same season, it has also been recorded the largest number of benthic macroinvertebrates, with a total of 40 species. This is expected, since the algal cover represents an important habitat for benthic macroinvertebrates, supporting a high diversity of species and a high abundance.

Despite the higher number of species in the site S1 on eastern coast, the algal cover was higher on western coast of the island, with 70%, compared to the cover on eastern coast with 50%. This might be due to better water quality and lower impact from human activity on the western coast. It has also been noted a difference in algal cover between sampling sites S3 and S4, where the S3 represents a higher algal cover with 85%, while in S4 the cover was 70% This might be related to the Vjosa river discharges that affects negatively the water quality on the sampling site S4, transporting a high quantity of sediments (Pano, 2015).

The lowest number of macroalgae species was recorded in the sampling site S2 during spring season, with the lowest number of benthic macroinvertebrates species also (2 species) (Fig.2).

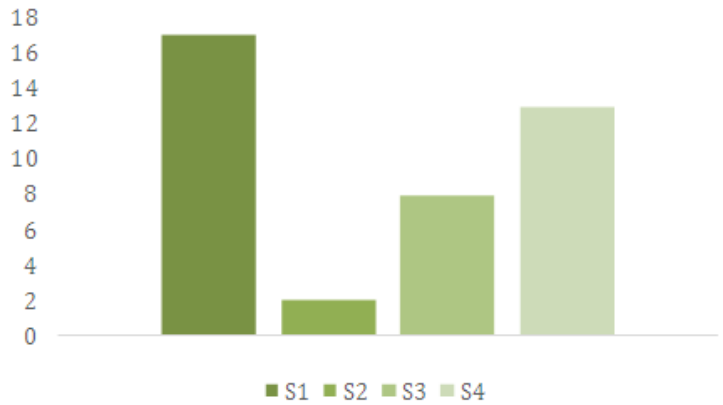

Figure 2: Number of macroalgae species for each sampling site in spring season

Algae cover 85% has been recorded in the sampling site S3, represented by *Lithophylum, Jania* and *Laurencia*. "Trottoirs" of *Lithophylum* were developed in this site, as well as *Cystoseira, Dyctiota* and *Corallina* (Fig. 3).

Figure 3: "Trottoirs" of *Lithophyllum* in sampling site S3

A difference in algal cover and also in species composition has been evident between seasons, too. The highest number of species and the highest algal cover has been recorded in spring season in all sampling sites. (Fig. 4)

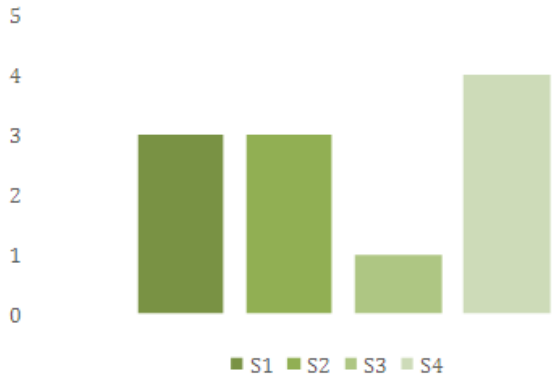

Figure 4: Number of macroalgae species for each sampling site in autumn season

Another important seagrass species, *Zostera noltei,* was found in the studied area. This species is known as highly productive and important for coastal ecosystems. It was recorded on the south-eastern part of Sazani Island, near the sampling site S1 in spring season. Absence of *Zostera* in other parts of the island might be related to its sensitivity to eutrophication, because of direct human impact and reduced water quality. This species is also highly affected by shading (Van Lent et al. 1991).

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