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COMPARATIVE DATA ON MACROZOOBENTHOS COMMUNITY BETWEEN EASTERN AND WESTERN COASTS OF SAZANI ISLAND, ALBANIA

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ABSTRACT This paper is focused on analysing the difference in distribution, composition and abundance of benthic invertebrates' populations of the rocky coast of Sazan Island (south western Albania), between its eastern and western sides. This study was carried out during 2012-2014, sampling in shallow water. A total of 56 species of benthic macroinvertebrates were recorded. Species composition and their abundance were compared between the four sampling sites and between the two sampling seasons, spring and autumn. Degree of coast exposure and level of environmental impacts seem to be the main factors regarding the difference in species composition and quantitative characteristics of macrozoobenthic community between the eastern and western coasts of the island.

KEYWORDS : benthic invertebrates, rocky coast, Adriatic Sea

INTRODUCTION

Sazani Island is situated in south western coast of Albania, north of Karaburun Peninsula, at the most southeaster corner of the Adriatic Sea. Its western coast is characterized by high vertical cliffs.

On the eastern side, the coastline is low and consists of layers ruffle steep limestone that plunges into the sea. Biological diversity is relatively high in the marine waters of the area, with rare species of flora and fauna and highly developed coastal and benthic habitats with a typical Mediterranean physiognomy.

Since Sazani Island has been an isolated area for a long time, due to military restrictions, the studies and knowledge on its marine biodiversity are limited.

Most of them are 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 Sazan-Karaburun (after Kashta & Beqiraj 2009).

The eastern part of the Island represents a worst environmental and ecological state of benthic macroinvertebrates' populations, comparing with the western coast. This reflects the impact from human activities in the whole area, related to fishery and pollution in a long-term, as well as tourism more recently.

This study is among few contributions on knowledge of macrozoobenthic community of the rocky coasts of Sazani Island, aiming to give data on species distribution, quantitative characteristics, seasonal variations and stability of the macrozoobenthic populations, in a comparative way between western and eastern sides of the island.

Materials And Methods

Four sites were selected as sampling sites at the rocky coast of Sazani island, of which two on the eastern side and the two others on the western side of the island. In each site three sampling transects were carried out, at a distance 50 m from each – other.

The sampling has been conducted during spring and early autumn in 2012 - 2014 in very shallow water, including the supralittoral, midlittoral and upper limit of infralittoral (Figure 1).

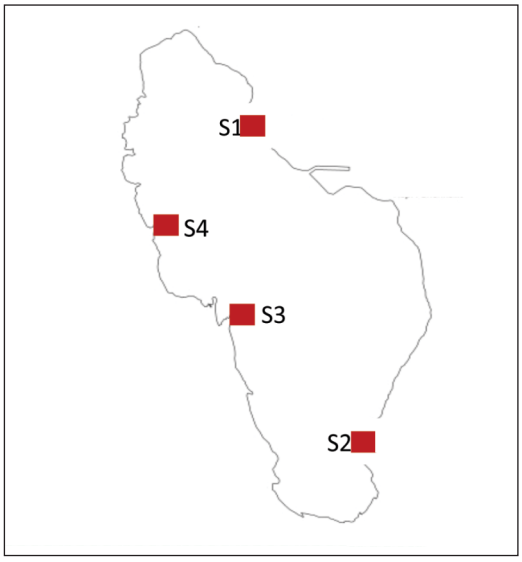

Fig. 1: Sazani Island With The Sampling Sites (s1, S2, S3, S4)

The samples were taken through standard methods for benthic sampling in hard bottoms, within a frame 50 x 50 cm for the quantitative assessment, after the methods of Schlieper (1976), Cattaneo et al. (1978), Drago et al. (1980) and Zenetos et al. 2000. For each sampling site a total of 18 samples has been taken in each season, so 72 samples in total per season. It has been evaluated the species composition in each site, abundance of each species in each sampling site and in each season. The abundance has been counted as the number of individuals of each species within the frame sample.

The similarity coefficient Sokal & Sneath (i) $i = s / s + 2 (u+v)$, after Blanc et al. (1976) has been used for assessing the similarity of species between sampling sites.

Identification of species and taxonomic nomenclature has been based on Cossignani (1992), Clemam Checklist of European Marine Molluscs, D'Angello & Gargiullo (1991), Fauchald (1977), Gianuzzi-Savelli et al. (1994, 1997, 1999, 2001, 2003), Millard (2001), Mojetta & Ghissoti (1994), Pope & Goto (1991, 1993), Riedl (1991), Trainito 2004.

Results And Discussions

In this study 56 species of benthic macroinvertebrates have

been recorded, which belong to 11 large groups. The largest number of species has been found for Gastropoda with 20 species. The full list of recorded species is given in the Appendix.

Species number for each large taxa is in the following:

Demospongiae	2	Annelida	8
Cnidaria	3	Malacostraca	11
Nematoda	1	Thecostraca	3
Polyplachophora	1	Echinodermata	4
Gastropoda	20	Sipuncula	1
Bivalvia	2		

Taking into account that the sampling has been done in very shallow water and the studied area represents a small area, the number of species can be considered as relatively high compared to many other shallow rocky coast of the Adriatic in Albania. However, this number can be considered low, compared to the number of macroinvertebrate species reported for Vlora Bay, situated on the eastern side of Sazani (referring to publications Kasemi & Beqiraj (2006), Kasemi et al (2008), Kasemi et al. (2012), Kasemi et al. (2013); Kasemi et al.(2015). One reason for the lower species diversity in Sazani island might be related to the high exposure of the coast, especially on the western side of the island.

The highest number of species has been recorded for sampling site S1 with a dominance of molluscs among other species of cnidarians, nematodes, annelids, crustaceans and sipunculids. The lowest number of species has been recorded in sampling site S4. This might be related to the high coast exposure to the waves.

Species number and abundance of benthic invertebrates has also been compared between two seasons. A lower number of species has been recorded in spring. Sampling site S2 represented the lowest number of species between all sampling sites during spring season. This might be related to the low algal cover in this site. In general, even for the dominant large taxa in number of species, the abundance has been low. This might be indicator of environmental degradation of Sazani coasts.

A higher abundance has been recorded for gastropods and crustaceans, especially in autumn season. This might be related to a lower inter specific competition, as it has been recorded a lower number of species in this season.

The highest number of species, with a total of 42 species, has been recorded in the sampling site S1, while the lowest number of species has been recorded in sampling site S4 with only 11 species (Figure 2).

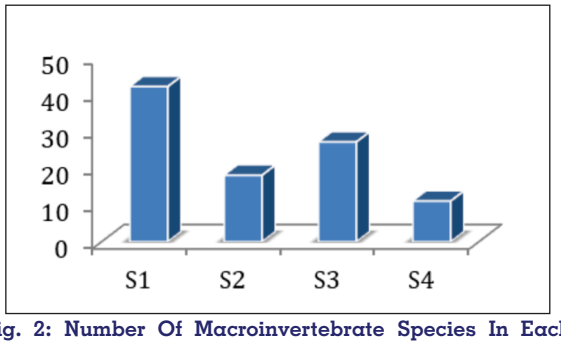

Fig. 2: Number Of Macroinvertebrate Species In Each Sampling Site.

Almost a uniform distribution among all sampling sites and seasons was recorded for the chthamalid *Microeuraphia depressa*. Large distribution of this colonial species in Sazani coast, as well as predominance of patellid and trochid gastropods in the abundance of macrozoobenthic community might be related to their high resistance to sea wave hits and to water level oscillation at supralittoral – midlittoral border and midlittoral – infralittoral border.

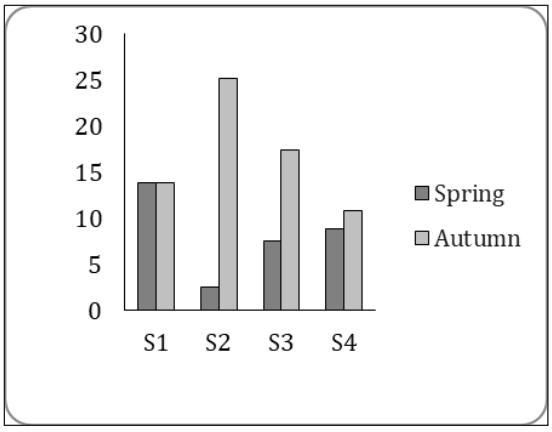

Fig. 3: Average Abundance Of Benthic Macroinvertebrates Species In All Sampling Sites

Coefficient of species similarity (Sokal & Sneath) between sampling sites (Table 1) has shown low to medium similarity in each of the sampling season.

Table 2: Coefficient Of Species Similarity (sokal & Sneath) Between Sampling Sites On Each Season

Season	Spring				Autumn			
Sampling site	S1	S2	S3	S4	S1	S2	S3	S4
S1		9%	21%	11%		26%	19%	17%
S2	9%		14%	38%	26%		17%	9%
S3	21%	14%		18%	19%	17%		29%
S4	11%	38%	18%		17%	9%	29%	

The difference in species composition, quantitative characteristics and degree of stability of the macrozoobenthic population is evident between eastern and western coast of Sazani island. This seems to be related to differences in the degree of coast exposure between the two sides, where the western side of the island has a much higher exposure. Additionally, two sides of the island have also differences regarding the environmental impact, where the eastern side is more impacted from tourist activities. After a closure for decades as a military base with extremely limited access, the eastern coast of Sazani island has already been opened to tourism activities that are significantly increasing year by year.

TAXA	S1	S2	S3	S4
	Species' presence			
PORIFERA				
Demospongiae				
Cliona viridis (Schmidt, 1862)				*
Sycon elegans (Bowerbank, 1845)	*		*	*
CNIDARIA				
Anthozoa				
Actinia equina (Linnaeus, 1758)			*	
Anemonia viridis (Forskål, 1775)	*			
Hydrozoa				
Stylactaria inermis (Hydractinia inermis) (Allman, 1872)	*			
Steromphala rarilineata (Michaud, 1829)	*			
Steromphala adansonii (Payraudeau, 1826)		*		
NEMATODA				
Enoplea				
Enoplus meridionalis Steiner, 1921	*		*	
MOLLUSCA				
Polyplacophora				
Rhyssoplax olivaceus Spengler, 1797		*		
Gastropoda				

Patella caerulea Linnaeus, 1758	*	*	*	*
Patella rustica Linnaeus, 1758	*	*	*	
Steromphala umbilicaris (Linnaeus, 1758)		*		
Steromphala adriatica Philippi, 1844		*		
Gibbula turbinoides (Deshayes, 1835)	*			
Gibbula sp. Risso, 1826		*		
Phorcus articulates (*Monodonta articulata)* Lamarck, 1822	*	*	*	
Phorcus richardi (Gibbula richardi) (Payraudeau, 1826)	*			
Phorcus turbinatus (Born, 1778)	*	*	*	*
Melarhaphe neritoides Linnaeus, 1758	*	*	*	*
Columbella rustica (Linnaeus, 1758)	*		*	
Pisania striata Gmelin, 1791	*	*	*	
Aplus dorbignyi (Payraudeau, 1826)	*			
Stramonita haemastoma (Linnaeus, 1767)		*		
Cerithium vulgatum Bruguière, 1792	*			
Bittium reticulatum (da Costa, 1778)	*			
Aplysia fasciata Poiret, 1789	*			
Vermetus sp. Daudin, 1800	*	*		
Bivalvia				
Mytilus galloprovincialis Lamarck, 1819	*		*	*
Lithophaga lithophaga (Linnaeus, 1758)	*			
ANNELIDA				
Polychaeta				
Serpula vermicularis Linnaeus, 1767	*	*	*	*
Eulalia viridis (Linnaeus, 1767)			*	
Hediste diversicolor (O.F.Müller, 1776)			*	
*Nereis pelagic*a Linnaeus, 1758	*		*	*
Syllis variegata, Grube, 1860			*	
Hesione splendida Savigny in Lamarck, 1818			*	
Arenicola marina (Linnaeus, 1758)	*			
Clitellata				
Branchellion torpedinis Savigny, 1822	*		*	
ARTHROPODA				
Malacostraca				
Ligia italica Fabricius, 1798	*	*	*	
Tylos ponticus Soika, 1956	*		*	
Pachygrapsus marmoratus (Fabricius, 1787)	*	*	*	
Acanthonyx lunulatus (Risso, 1816)	*			
Eriphia verrucosa (Forskål, 1775)	*			
Gammarus sp. Fabricius, 1775	*		*	
Squilla mantis (Linnaeus, 1758)	*		*	
Sphaeroma serratum (Fabricius, 1787)			*	
Cymodoce truncata Leach, 1814	*			
Tanais sp. Latreille, 1831	*			
Pagurus sp. J.C. Fabricius, 1775	*			
Thecostraca				
Microeuraphia depressa (Poli, 1791)	*	*	*	*
Chthamalus stellatus Poli, 1791	*			
*Balanus sp.*Costa, 1778	*		*	*
ECHINODERMATA				
Asteroidea				
Echinaster (Echinaster) sepositus (Retzius, 1783)	*			
Echinoidea				
Arbacia lixula (Linnaeus, 1758)	*	*		*
Coscinasterias tenuispina (Lamarck, 1816)	*			
Spatangus purpureus O.F. Müller, 1776	*			
SIPUNCULA				
Sipunculidea				
Sipunculus (Sipunculus) nudus Linnaeus, 1766			*	

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