Survey of the future Marine Protected Area of Platamuni and the adjacent peninsula of Lustica with emphasis on marine caves as potential habitats of the endangered Mediterranean monk seal

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Introduction

Although the coastline of Montenegro is only about 300 km long, marine ecosystems are still not very well known. Additionally, there are no established Marine Protected Areas (MPAs) yet in the country, although there are some initiatives in that direction. One of the areas planned as a potential MPA by the Ministry of Sustainable Development and Tourism of Montenegro is the area from Cape Platamuni to Cape Žukovac. This area has also been declared as an "Emerald Site" by the same Ministry. Therefore, it is of special interest to carefully survey this area for important habitats and species for future protection according to the regulations of the national and the EU legislation. There are some data from the above

area in reports produced by the Regional Activity Center for Special Protected Areas of UNEP (UNEP/RAC/SPA 2008, 2012) concerning the development of marine and coastal protected areas in Montenegro and also in the report "Start up of the "Katič" MPA in Montenegro and assessment of marine and coastal ecosystems along the coast" by DFS Montenegro Engineering (a cooperation between the Ministry of Environment, Land and Sea of Italy and the Ministry of Sustainable Development and Tourism of Montenegro, 2012). However, these data sets are far from complete.

Aiming at the promotion of the establishment of the future MPA Platamuni in the mentioned area we surveyed the area from Cape Platamuni to Cape Arza (approximately 35 km) to evaluate the presence of marine caves and, in parallel, potential terrestrial habitats of the endangered Mediterranean monk seal, *Monachus monachus* (Map 1). The peninsula of Luštica and the area of Donji Grbalj (where the planned future MPA Platamuni is located) is of similar bio-geomorphology and should be considered as one single marine ecosystem/entity altogether. Therefore, we included in this survey also the neighbouring coastline of Luštica..

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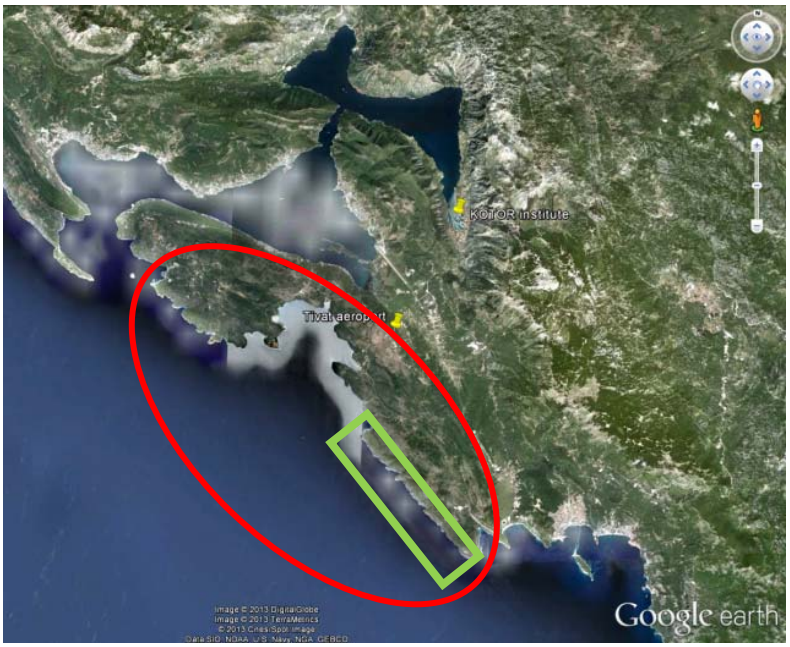
Map. 1. Surveyed area from Cape Arza to Cape Platamuni



surveyed area

planned MPA Platamuni

Marine caves are an important and endangered habitat listed in Annex I of the EU Habitat Directive (92/43/EEC). They are widely acknowledged for their unique biodiversity and constitute a typical feature of the Mediterranean coastline. This particular ecosystem in the Mediterranean Sea is considered a biodiversity hotspot, appearing to be an important biodiversity reservoir of high representativeness and great scientific interest (sponges, plankton, etc.), deserving further detailed study and protection. There are few definitions for marine caves and in some documents there is no precise definition. In general, marine cave

may be considered as naturally formed holes in the rock longer than 5 metres (where a person can enter), completely or just partially submerged. Openings less than 5 metres are hereafter mentioned as “holes”. All these openings are mainly created by the waves' force or by freshwater running into cracks and eroding the rock in millions of years. Sometimes huge caves with stalactites and other beautiful cave rock formations are created.

In sea caves, prevailing conditions differ from those of the open sea: the deeper they are the weaker becomes the waves' force allowing fragile organisms to settle. As sunlight becomes less and less intensive, algae different than those growing in the direct sunlight occupy the space, red algae in the majority. Deeper in the cave, where it is too dark even for red algae, more and more sessile animals such as colourful sponges, marine worms residing in their calcareous tubes and bryozoans with their fragile skeletons occupy the walls. Finally, in the very back of deep sea caves where there is no light at all life can hardly exist at all. The water's temperature inside the marine caves is usually lower and more stable than that in open sea in front the cave. These and other ecological factors in marine caves are similar to the conditions in deep sea waters so sometimes we can find there organisms that generally occur in the deep sea. Typical for all those organisms is the reduction of eyes and a less intensive pigmentation.

Sea caves are a particular ecosystem in the Mediterranean Sea with a unique marine life. Their bottom and sides have specific communities of marine invertebrates and algae while in the water column inside the cave particular species of plankton different than the species in the open sea can be found. Some of the characteristic animals are: the yellow cup-coral (*Leptopsammia pruvoti*), various species of sponges (here the species *Chondrisia reniformis* is completely white), the crustacean *Stenopus spinosus*, Neptunes' lace *Reteporella grimaldii,* the spotted goby *Thorogobius ephippiatus*, sessile polychaetes, bryozoans and many other species.

Marine caves are also habitat for some species of endangered bats. They are also an important habitat for resting and reproduction of the endangered Mediterranean monk seal (*Monachus monachus*). This species of marine mammal is protected by national law and also at the international level by the Barcelona Convention, the Bern Convention, the CITES Convention and the EU Habitat Directive (Annexes II and IV). Unfortunately, no data exist for this species in Montenegro since the 70's when one individual was killed close to Herceg Novi (this case was recorded in a film). Since that time there hasn’t been any other information about the monk seal in Montenegro at all - so the species may have abandoned the coast of the country. However, the status of the monk seal and the available terrestrial habitat i.e. marine caves, are simply unknown along the coast of Montenegro. With respect to the above considerations we decided to include in the survey of marine caves in our study area also the evaluation of potential terrestrial habitats for monk seals.

The Mediterranean monk seal can reach 3 metres in length. Males are usually black on the back, females dark or light grey. It can dive up to about 100 metres chasing octopus and fish. As marine mammals breathing with lungs, monk seals need to come to shore to rest and give birth. The pups are suckled and need to learn to swim and find their own food. Due to the disturbance by man all over the open beaches, monk seals resort to quiet sea caves with a patch of beach. Such caves are thus important for the reproduction and survival of the species.The Mediterranean monk seal is the most endangered marine mammal of the

European Union. It is the only seal species in the Mediterranean and does not exist anywhere else on the planet. In older times, the species' range extended all over the Mediterranean, the Black Sea and N.W. Africa. Today, monk seals have disappeared from Spain, France and the Black Sea while in some areas only a few individuals still exist, among them Croatia with several monk seal sightings throughout the country, Albania and Italy. The total remaining seal population is estimated to be about 500 individuals - approximately half of them in Greek waters, including the Greek Ionian Sea. Areas such as the coasts of Italy, Montenegro and Albania may be recolonized from the Greek Ionian Sea and/or from Croatia since monk seals can travel log distances within days.

Most fishermen all over the Mediterranean traditionally regarded monk seals as enemies and deliberately killed them because of damage incurred to their fishing gear and catch, since seals poach from their nets. Yet, centuries of deliberate killings did not drive the species to extinction. The rapid decline in their population has only become apparent over the last decades. What is to blame? Marine pollution, overfishing and - most importantly - *disturbance of the sea caves by humans and the continual and irreversible destruction of the seal's habitats* are the main additional factors for this rapid decline. Ports, streets, hotels and restorants right at the seaside appear everywhere without almost any planning causing thereby a considerable loss of critical habitat for resting and reproduction.

Additionally, marine caves with rocks and cliffs above the sea level are an excellent biotope for rare sea birds and also for rare or endemic plants such as *Euphorbia dendroides* and *Limonium angustifolium*.

In our national Law on nature protection (Sl. list no. 51/08) it is indicated that "speleological objects" are naturally formed holes in the rock longer than 5m, where a person can enter and their entrance is smaller than their length or depth. Unfortunately there are no adequate regulations neither a "Caves' Register" does exist. The preparation of these regulations is ongoing already for some time now, but in those draft regulations there are no details about marine caves. We hope that the results of this project will help also towards the improvement of existing documents and the creation of an appropriate Marine Caves' Register.

Material and methods

The survey of the coastline from Cape Platamuni to Cape Arza (ca. 35 km) was performed from 16. to 22. September 2013 using the Institute's boat "Nemirna". For the field work, the Institute's diving equipment, underwater cameras, plastic bags and bottles for taking samples was used. On all locations where a cave or a big hole was noted coordinates were taken by GPS Garmin 76 and notes were taken on maps. During the postprocesing of the data collected all locations were stored by Quantum GIS software. For all registered caves/holes the following basic data were noted and organized in tables: number, location name, geographic coordinates, approximate dimensions (in meters), exposition, morphological characteristics, living organisms, date of survey, living organisms in front of the cave/hole. Where details were noted the orientation and position was always noted as looking from the sea at the cave.

Samples of sponges from the Krekavica cave were collected and stored in 70% alcohol until further analysis.

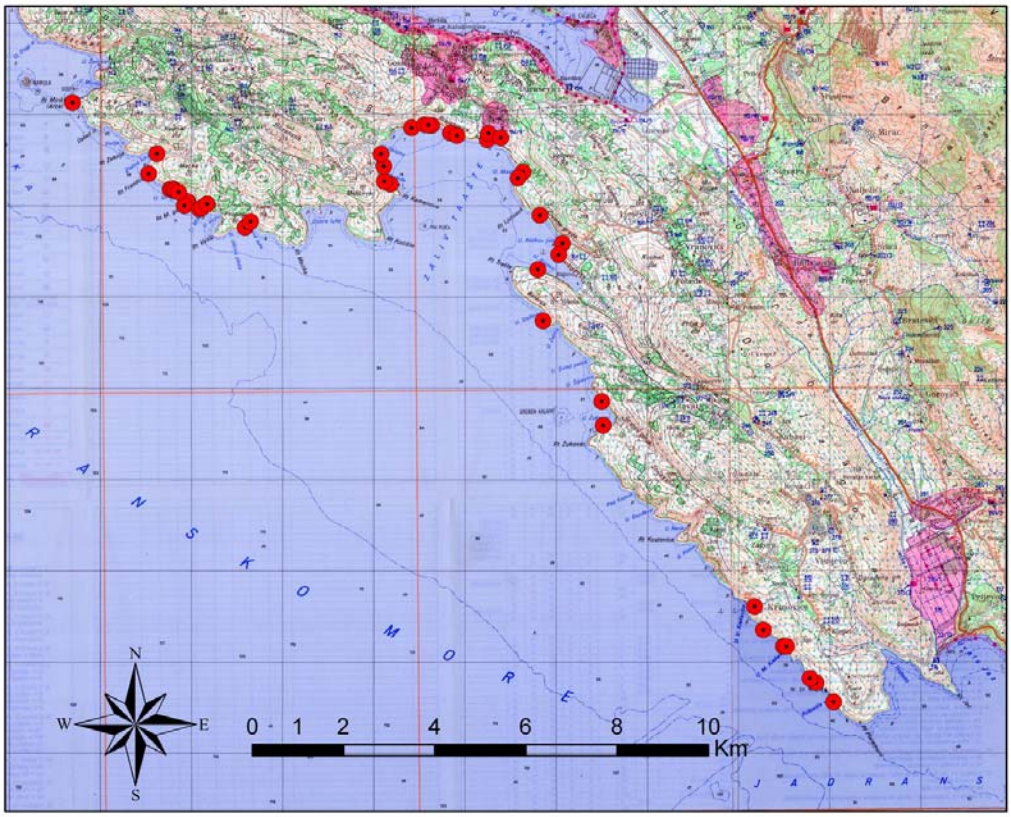
The planned mapping of of algal communities at the surface level (upper mediolittoral) along the coastline using GIS was not performed because of bad weather conditions.

Results

After the field work all data were organized in tables and locations were mapped in Quantum GIS.

We decided to present the data for caves and for holes together (Map 2) because some of the holes are very important as habitat for the monk seal and also for many other species. Altogether, 45 features were registered and 21 of them were 5m long or more thus, they are considered as caves according to the definition given above. One cave had an entrance under water and 11 were suitable as terrestrial habitat for monk seals.

Map 2. Caves and holes in the surveyed area



The distribution of caves along the coastline from Cape Arza to Cape Platamuni -and without taking into account the numerous holes- may be divided into 3 sub-areas: 1. Area of Plava špilja on the peninsula of Luštica; 2. Trašte Bay, and 3. Krekavica area in the southern

part of Donji Grbalj. The positions of these caves are indicated with numbers on map 3.

Map 3. Caves in the surveyed area

1. Area of Plava špilja on Luštica peninsula

2. Trašte Bay

3. Krekavica area in the southern part of Donji Grbalj

During this research we also encountered several protected species, thus contributing to the general knowledge of their biology and ecology and underlining the ecological importance of this area. Of all protected species found inside the caves or close to them we may underline the presence of the following species

(a) Algae and seagrass: *Lithophyllum byssoides, Cystoseira amentacea, Posidonia oceanica* and *Cymodocea nodosa,*

(b) Molluscs: *Pinna nobilis* and *Lithophaga lithophaga*

(c) Coral: *Cladocora cespitosa,*

*(d) P*lants: *Euphorbia dendroides* and *Limonium angustifolium.*

*(e) B*irds:*Ardeola ralloides, Alcedo athis, Phalacrocorax aristotelis, Acciptier gentilis, Corvus corax* and

(f) One bat species *(Chiroptera).*

Data for all surveyed features are presented in separate tables for each one.

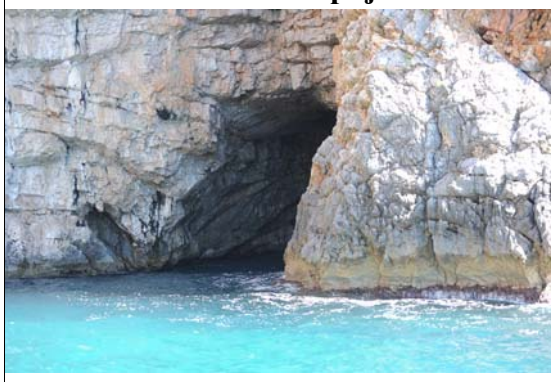
No. 1	location: **Arza**  Foto: Aliki Panou
coordinates	N 42º 23' 27.79" E 18º 34' 14.02"
dimensions	Covered beach 3m wide x 3m high x 4m long
exposition	West
morpho-characteristics	Hole with a rocky beach and pebbles in the back of a small inlet.
Living organisms	Not observed
notes	
date of survey	17. 09. 2013.
In front of the cave	On some boulders there are lots of algae but rocks are barren

No. 5	location: **Zlatna vala**  Foto: Aliki Panou
coordinates	N 42º 22' 51.6" E 18º 35' 34.3"
dimensions	1m wide x 3m high x 5m long (depth of water 1,5-0m; height inside 1,5m)
exposition	West
morpho-characteristics	In the back of the cave there is a small pebble beach about 1 x 1m completely washed by strong waves. The slope of the beach is around 45°.
living organisms	It seems that organisms on the rocky walls of the cave are scarce, but because of strong waves during the survey careful observation was not possible
notes	On the west side of the inlet from the cave in direction to open sea there are 2 underwater holes which should be checked by diving because there is some possibility that they are longer and maybe connected between each other.
date of survey	17. 09. 2013.
In front of the cave	Big rocky blocks and boulders while deeper there is pebble and sand. On the west side of an inlet of 0,5m depth there are algae *Cystoseira amentacea*, *Corallina elongata* and others. Below it is barren sometimes 10m off the coastline. Illegal collecting of *Lithophaga lithophaga* (date shell) is evident. The barren area is not 100% empty of life and has mostly *Padina pavonica*, than *Wrangelia penicillata, Halopteris sp*. etc. and some sea urchins. At 4-5m depth there are approximately 20m^2 covered with the invasive alga *Caulerpa racemosa*. In the middle of the inlet there is a mosaic meadow of seagrass *Posidonia oceanica*.

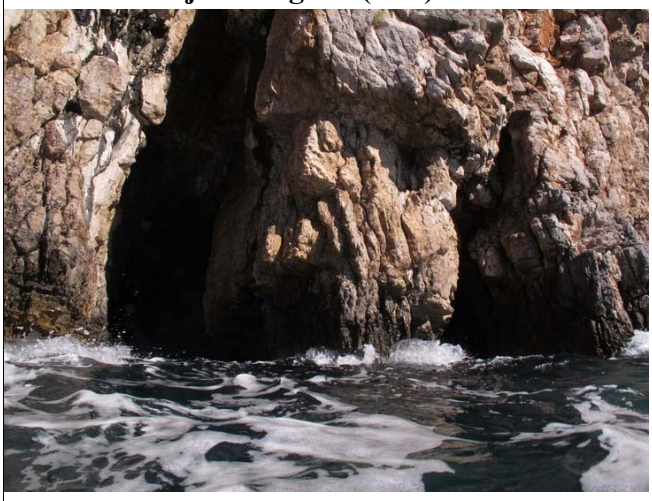
No. 6	location: **rt Franštica**  Foto: Aliki Panou
coordinates	N 42º 22' 41.8" E 18º 35' 25.0"
dimensions	6m wide x 5m high x 30m long (depth of water 3-0m; height inside 7m)
exposition	West
morpho-characteristics	The wide entrance of the cave begins with an approximate width of 15m and a height of 12m. After the entrance in the cave (6m x 5m) there is inside a big space In the back of the cave there is a beach 10m long. In the middle there is a big rocky block deviding the access to the beach into two parts. The slope of the beach is about 30°.
living organisms	It seems that organisms on the rocky walls of the cave are scarce, but because of strong waves during the survey careful observation was not possible.
notes	Good location for monk seals. At the left side of the cave there are 2 small holes and one more on the right side - all should be checked during better sea conditions. This marine cave is marked on the topographic map.
date of survey	18. 09. 2013.
In front of the cave	Rocky blocks, boulders, barren area, sea urchins, *Padina pavonica.* The rest was not possible to observe because of strong waves.

No. 8	location: **Plava špilja**  Foto: Aliki Panou
Coordinates	N 42º 22' 26.36" E 18º 35' 48.34"
Dimensions	Two entrances. The bigger entrance is 8m wide x 7m high x 20m long (depth of water 6m; height inside 25m)
Exposition	West (and east for the smaller entrance)
morpho-characteristics	The cave has two entrances. A part of the cave floor is sandy but mostly it is rocky. There is a inflow of fresh water and some cave rock formations on the walls.
living organisms	Close to the entrances there are many algae and sponges, deeper in the cave assemblages vary and are not very rich. Occasionally there are bats on the cave's walls.
notes	Anthropogenic pressure from touristic boats in summer months is intensive.
date of survey	18. 09. 2013.
In front of the cave	Rocks, boulders, barren area, *Padina pavonica*, *Cystoseira amentacea, Posidonia oceanica, Pinna nobilis,* little sandy areas, few *Lithophyllum byssoides* colonies.

No. 9	location: **close to Plava špilja „niska“**    Fotos: Vesna Mačić
coordinates	N 42º 22' 26.81" E 18º 35' 49.51"
dimensions	4m wide x 1m high x 50m long (height inside 20m)
exposition	South-west
morpho-characteristics	After the entrance the cave is curved on the right side, so the space and the beach of the cave are not under the direct impact of the waves. On the bottom of the cave there is sand around the entrance and big rounded rocks towards the back of the cave. In the back there is a beach about 10m long and 8m wide with a slope of 40° . After this slope the beach has a orizontal part about 2-3m wide. Inflow of fresh water is evident. On the walls there are some cave rock formations .
living organisms	They seem to be not abundant but because of strong waves the situation was not well observed.
notes	Marine life should be checked inside the cave
date of survey	18. 09. 2013.
In front of the cave	Boulders, barren area, *Padina pavonica*, little sandy areas, few *Lithophyllum byssoides*

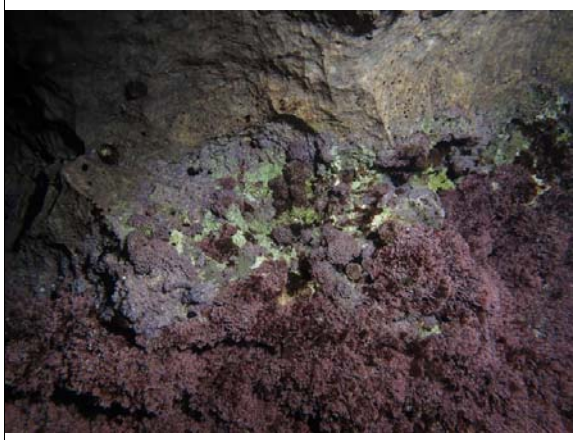
No. 10	location: **close to Plava špilja**  Foto: Aliki Panou  Foto: Vesna Mačić
coordinates	N 42º 22' 26.28" E 18º 35' 52.43"
dimensions	7m wide x 6m high x 17m long (depth of water 2m; height inside 15m)
exposition	West
morpho-characteristics	After the entrance the interior of the cave is high . Close to the back there is a very narrow part difficult to pass through the water. In that narrow part there are very nice, smooth small pools.
living organisms	At the entrance of the cave there are massive *Corallina elongata* assemblages while deeper in the cave there are lots of various sponges and other organisms, while the *Balanomorpha* group seems most abundant.
notes	Living organisms in the cave deserve to be checked better during calm sea.
date of survey	18. 09. 2013.
In front of the cave	Boulders, barren area, *Padina pavonica,* small areas with sand. There are small *Lithophyllum byssoides* assemblages. On the cliffs above the cave there is *Euphorbia dendroides*.

No. 11	location: **Posejdonov grad (big)**  Foto: Vesna Mačić
coordinates	N 42º 22' 16.01" E 18º 36' 04.79"
dimensions	8m wide x 10m high x 7m long
exposition	West
morpho-characteristics	After the big cave entrance it becomes narrow and ends without a beach.
living organisms	At the entrance to the cave there are massive *Corallina elongata* assemblages. They are mixed with other sciafilous algae on the walls of the cave close to the entrance while in deeper zones various sponge assemblages are dominant.
notes	
date of survey	18. 09. 2013.
In front of the cave	Boulders, barren area, *Padina pavonica,* small sandy areas

No. 12	location: **Posejdonov grad (slits)**  Foto: Vesna Mačić
coordinates	N 42º 22' 17.11" E 18º 36' 05.15"
dimensions	1,5m wide x 3m high x 4m long
exposition	West
morpho-characteristics	Two entrances are connected under the sea surface and the holes are ending without a beach.
living organisms	At the holes' entrances there are lots of *Corallina elongacea,* sponges and on the middle wall between the holes there is a *Cladocora caespitosa* colony. Also dark incrusting algae are present inside the holes.
notes	
date of survey	18. 09. 2013.
In front of the cave	Lots of *Corallina elongacea* and few *Lithophyllum byssoides.*

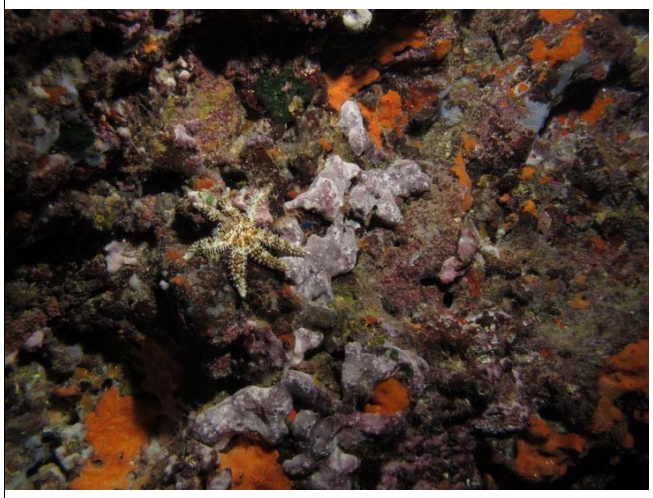
No. 13	location: **Posejdonov grad**  Foto: Vesna Mačić
coordinates	N 42º 22' 17.69" E 18º 36' 04.65"
dimensions	6m wide x 7m high x 3m long
exposition	West
morpho-characteristics	This is an overhang on the coast and there is only a small beach with a slope of 10º.
living organisms	
notes	
date of survey	18. 09. 2013.
In front of the cave	In front of the beach there are boulders with lots of algae but because of the strong waves only *Corallina elongacea* was distinguished.

No. 14	location: **Posejdonov grad (complex right on cape M. Gora)**  Foto: Vesna Mačić
coordinates	N 42º 22' 15.93" E 18º 36' 03.61"
dimensions	1m x 1m x 0,5m ; 2m x 1m x 3m; tunnel 3m x 2m x 3m
exposition	North
morpho-characteristics	Few small holes and siphons which should be checked by diving and under calm sea conditions. Towards the open sea there are siphons known by local divers.
living organisms	It seems that there are many organisms on the walls of the openings but because of the strong waves they could not be checked.
notes	A potential danger for cave organisms could be diving tourism.
date of survey	18. 09. 2013.
In front of the cave	Boulders, *Padina pavonica*, barren area

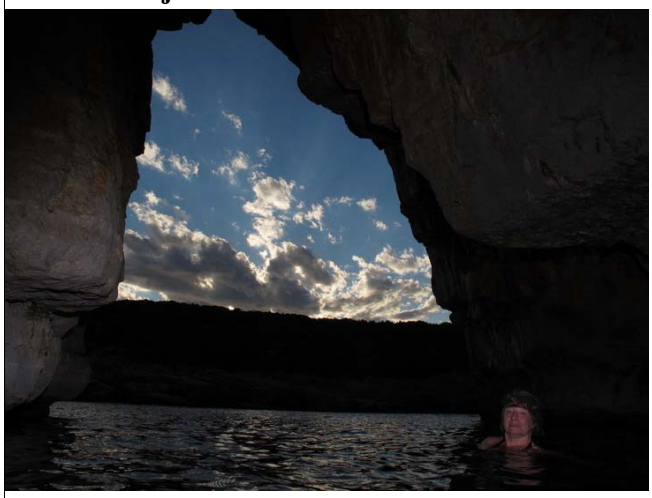
No. 15	location: **"breeding cave" (inlet Veslo west)**   Foto: Vesna Mačić
coordinates	N 42º 22' 12.10" E 18º 36' 14.78"
dimensions	7m wide x 8m high x 7m long
exposition	South-east
morpho-characteristics	In the cave there is a strong noise like „breathing“ because of some underwater channels.
living organisms	On the side walls of the cave there are many sponges while at the beginning of the cave there are massive *Corallina elongata* assemblages, *Jania rubens, s*ome incrusting red algae and others.
notes	Should be checked by diving to explore underwater channels if possible
date of survey	18. 09. 2013.
In front of the cave	*Corallina elongata* and *Jania rubens* are massive but there are also some *Lithophyllum byssoides.* Rocky walls in front of the cave are vertical, 5-10m high. At 0,5-1m depth there are some algae (some *Cystoseira amentacea*) while deeper it is 100% barren with just a few sea urchins.

No. 16	location: **u. Veslo (west side)**  Foto: Vesna Mačić
coordinates	N 42º 22' 12.84" E 18º 36' 17.32"
dimensions	1,5m wide x 6m high x 3m long (depth of water 4m; height inside 3m)
exposition	North-east
morpho-characteristics	Very narrow
living organisms	It seems that there are not many organisms but because of strong waves the interior was not well surveyed.
notes	
date of survey	18. 09. 2013.
In front of the cave	Rocks in front of the caves are vertical and just in some places there are many *Corallina elongate* close to the surface while deeper there is a barren area.

No. 17	location**: u. Veslo (bottom of the west side of inlet Veslo)**  Foto: Luigi Bundone
coordinates	N 42º 22' 15.59" E 18º 36' 23.72"
dimensions	4m wide x 2m high x 4m long (in the back there is a beach 3m long)
exposition	South
morpho-characteristics	After the entrance the cave becomes narrower and ends with a beach of pebbles and smooth rocks. The slope of the beach is 30°. Inside the cave, on he bottom there are bigger rocks and pebbles.
living organisms	On the cave's walls there are scarce marine life, but it should be checked during calm sea conditions.
notes	On the east side of this small inlet there are 2 holes which seem to be interesting: possibly they are longer than we could notice so they should be checked by diving during calm sea conditions (N 42º 22' 12.79" E 18º 36' 22.74")
date of survey	18. 09. 2013.
In front of the cave	Boulders, rocks, very dense populations of invasive *Caulerpa reacemosa.*

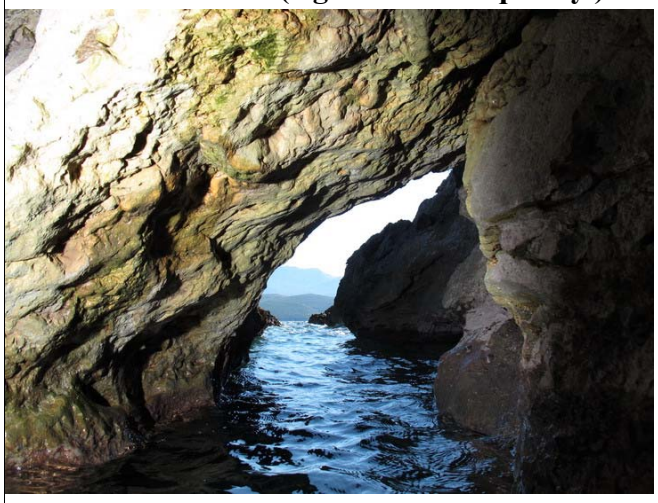
No. 18	location: **between Plava špilja and Posejdonov grad**  Foto: Vesna Mačić  Foto: Vesna Mačić
coordinates	N 42º 22' 24.32" E 18º 35' 56.16"
dimensions	3m wide x 25m high x 10m long (depth of water 4m; height inside 20m)
exposition	South-east
morpho-characteristics	Very deep slit and maybe there is a siphon at the end. Inflow of fresh water is evident.
living organisms	In the cave there are many sponges and representatives of the group *Balanomorpha.* Close to the entrance there are massive assemblages of *Corallina elongata, Jania rubens* and other algae. Inside the cave there are some incrusting alge.
notes	Inner and deeper part of the cave should be checked by diving.
date of survey	18. 09. 2013.
In front of the cave	Boulders, barren area, some sandy parts. Above the cave there is a cliff about 30m high.

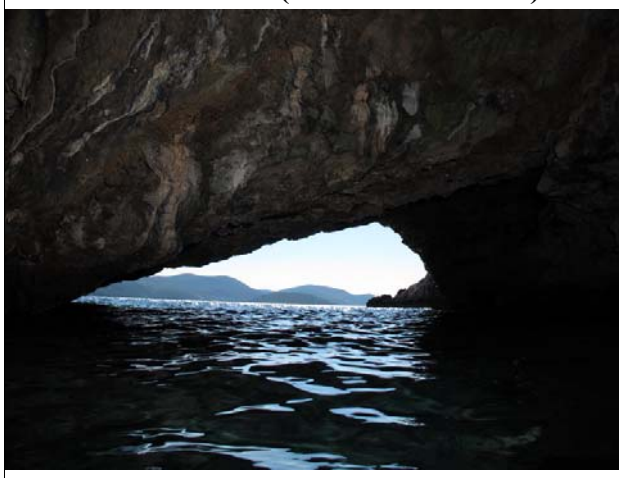
No. 19	location**: u. Tijesna luka (complex)**  Foto: Aliki Panou   Foto: Vesna Mačić Foto: Vesna Mačić
coordinates	N 42º 21' 58.80" E 18º 36' 58.91"
dimensions	5m wide x 8m high x 30m long (depth of water 4-0,5m; height inside 4m)
exposition	South-east
morpho-characteristics	Rocks around the cave are massive, vertical and without vegetation. The cave has 2 channels and at the end of both there is a small rocky platform. There is also a small underwater channel that should be checked by diving. On the walls above the sea there are some cave rock formations .
living organisms	It seems that there are not many organisms on the cave's walls. There are some representatives of the group *Balanomorpha, Patella,* polychaetes , sponges and others.
notes	On the left side of the main entrance (foto) there is another entrance into the cave. Also on the left side few meters further there is a siphon –channel of few meters (foto) and there is possibly an air gap that should be checked by diving.
date of survey	21. 09. 2013.
In front of the cave	Mostly rocky area with few algae and large barren areas.

No. 20	location:. **Tijesna luka**  Foto: Vesna Mačić
coordinates	N 42º 22' 01.4" E 18º 37' 03.9"
dimensions	3m wide x 6m high x 5m long (depth of water 3m; height inside 5m)
exposition	South (south-east)
morpho-characteristics	In the back of the cave there is a narrow slit. Behind this there is a round hole (probably the end of the cave).
living organisms	Not analyzed
notes	Living organisms should be checked
date of survey	21. 09. 2013.
In front of the cave	Not analyzed

No. 21	location**: u. Oblatna (left from the quarry)**  Foto: Vesna Mačić  Foto: Vesna Mačić
coordinates	N 42º 22' 29.11" E 18º 39' 16.55"
dimensions	0,5m wide x 1m high x 3m long (depth of water 1m; height inside 1,5m)
exposition	North
morpho-characteristics	This cave is small and hidden behind big rocks. There are 2 small channel connections with the open sea. On the bottom of the cave there are pebbles and some big rocks.
living organisms	Living organisms are scarce
notes	
date of survey	22. 09. 2013.
In front of the cave	Pebble, dead matte, invasive *Caulerpa racemosa,* some *Cymodocea nodosa*

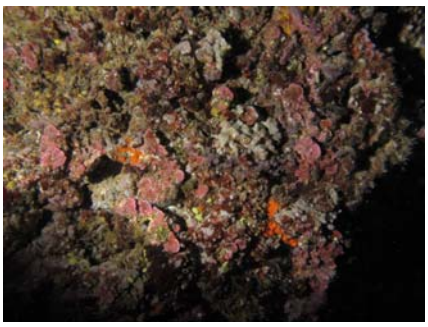
No. 22	location: **u. Oblatna (left from the quarry, rocky block)**  Foto: Vesna Mačić
coordinates	N 42º 22' 30.13" E 18º 36' 58.91"
dimensions	Overhang with a beach 1 x 2m
exposition	Nnorth
morpho-characteristics	The entrance into the small basin is very narrow and in the back of the basin there is a rocky overhang with smooth rocks.
living organisms	Not observed
notes	Very hidden
date of survey	22. 09. 2013.
In front of the cave	Pebble, dead matte, invasive *C. racemosa*

No. 23	location: **u. Oblatna (right from the quarry)**  Foto: Vesna Mačić
coordinates	N 42º 22' 41.73" E 18º 39' 12.27"
dimensions	2m x wide 1,5m high x 4m long (height inside 1,5m) The „beach“ is 20cm
exposition	East
morpho-characteristics	On the roof there are some cave rock formations, fresh water inflow is evident. On the bottom there are pebbles.
living organisms	Medium rich biodiversity on the walls with the dominant groups being sponges and representatives of the *Balanomorpha* group. On the walls above the sea level there there are red incrusting algae.
notes	
date of survey	22. 09. 2013.
In front of the cave	Rocks, barren area with sea urchins, than sandy parts with some *Cymodocea nodosa,* dead matte and invasive *Caulerpa racemosa*

No. 24	location: **u. Oblatna (left from cafe-bar)**  Foto: Vesna Mačić   Fotos: Vesna Mačić
coordinates	N 42º 22' 51.46" E 18º 39' 09.79"
dimensions	10m wide x 3m high x 20m long (height inside 2m, sandy beach 1,5m long x 4m wide)
exposition	East
morpho-characteristics	Wide entrance into the cave - after about 10m it is significantly smaller. On the walls there are some cave rock formations and fresh water inflow is evident. On the left side of the cave there is a small siphon but it doesn't seem to be long. In the back of the cave there is a small sandy beach. The beach begins with a narrow part of 1 x 1m but after that the space is only a few meters high above the beach.
living organisms	At the entrance there are *Peyssonellia rubra,* and some other algae, a small number of sponges and locally many red incrusting algae.
notes	Very good location for monk seals but a potential danger is the crowded beach in the vicinity during the summer months.
date of survey	22. 09. 2013.
In front of the cave	Barren areas and sandy parts with some *Cymodocea nodosa*.

No. 25	location: **Trašte „rupa velika“**  Foto: Vesna Mačić
coordinates	N 42º 23' 08.36" E 18º 39' 39.28"
dimensions	10m wide x 8m high x 3m long
exposition	South
morpho-characteristics	Largely open rock shelter
living organisms	There are lots of organisms probably because of the relatively bright light conditions.
notes	
date of survey	22. 09. 2013.
In front of the cave	Big rocky blocks with some algae and barren areas

No. 26	location: **Trašte „Orascom“ (crane complex)**    Fotos: Vesna Mačić
coordinates	N 42º 23' 10.18" E 18º 39' 59.14"
dimensions	10m wide x 5m high x 25m long (depth of water 4m; height inside 7m)
exposition	South
morpho-characteristics	Entrance into the cave seems to consist of 2 entrances but the middle wall is ending close to the sea surface so that the two entrances above the sea are connected under the sea level. After a big space the cave continues with 2 channels. After one siphon there is possibly a beach but this should be checked. There is evident inflow of fresh water and evident vibration from construction works above the cave (construction of a marina, Orascom).
living organisms	Close to the entrance into the cave there are many algae: deeper inside sponges are dominant. In the back of the cave biodiversity is very low and only some incrusting algae are present above the sea level.
notes	Intensive vibration of the terrain because of the ongoing works for the construction of a marina. This cave most probably will be destroyed in the near future. Probably one of the best caves for monk seals in the area of study.
date of survey	22. 09. 2013.
In front of the cave	Not checked

No. 27	location: **Trašte „Orascom“ ((left side of cranes)**    Fotos: Vesna Mačić
coordinates	N 42º 23' 11.17" E 18º 39' 50.89"
dimensions	4m wide x 5m high x 4m long
exposition	South
morpho-characteristics	Wide open cave with a part of the rock hanging from the roof almost down to the sea level.
living organisms	The cave has relatively bright light conditons and biodiversity is high. There are many incrusting red algae (probably *Mesophyllum alternans*), sponges and others.
notes	
date of survey	22. 09. 2013.
In front of the cave	Not checked

No. 28	location: **Trašte „Orascom“ (middle crane)**  Foto: Vesna Mačić
coordinates	N 42º 23' 09.82" E 18º 39' 54.92"
dimensions	2m wide x 1,5m high x 6m long (height inside 2,5m)
exposition	South
morpho-characteristics	The cave is ending with a rocky platform about 2m x 1,5m with a slope of 25º. The cave's bottom is sandy.
living organisms	Incrusting algae are on the bottom of the cave and there are many individuals of the *Balanomorpha* group. Close to the entrance into the cave there are many sponges and at the entrance *Corallina elongata* is dominant.
notes	It will probably be destroyed by the ongoing marina construction (Orascom)
date of survey	22. 09. 2013.
In front of the cave	Not checked

No. 29	location: **Trašte (left from suede tube)**  Foto: Vesna Mačić
coordinates	N 42º 23' 02.14" E 18º 40' 24.38"
dimensions	2m wide x 1,5m high x 3m long
exposition	South
morpho-characteristics	The roof is partially collapsed
living organisms	Biodiversity is poor and mostly represented by incrusting algae
notes	
date of survey	22. 09. 2013.
In front of the cave	Not checked

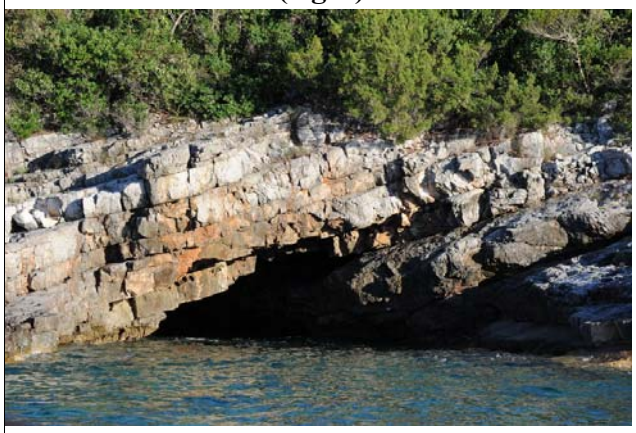
No. 30	location: **Trašte (right from suege tube)**   Fotos: Vesna Mačić
coordinates	N 42º 22' 59.94" E 18º 40' 29.00"
dimensions	2m wide x 2m high x 4m long
exposition	South
morpho-characteristics	Very exposed to waves from the south
living organisms	Incrusting algae are the most common species and they are covering a big area, especially close to the back of the cave.. At the entrance much more sponges and other organisms.
notes	The possible presence of an underwater channel should be checked by diving.
date of survey	22. 09. 2013.
In front of the cave	Not checked

No. 31	location: **Plavi horizonti (left)**  Foto: Vesna Mačić
coordinates	N 42º 22' 59.73" E 18º 40' 53.08"
dimensions	"pool" e 1m wide x 2,5m long . Depth 1m
exposition	South
morpho-characteristics	This pools is connected with the open sea through an underwater channel. Possibly there are more underwater channels. On the bottom there are pebbles.
living organisms	The border of the pool is full of *Corallina elongata*
notes	Should be checked by diving for possible underwater channels
date of survey	19. 09. 2013.
In front of the cave	Not observed

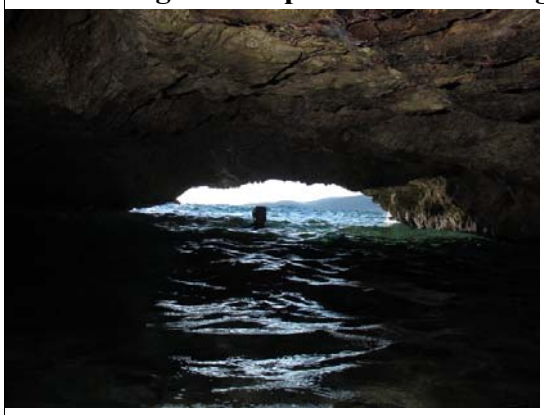
No. 32	location: **Plavi horizonti (left)**  Foto: Vesna Mačić
coordinates	N 42º 23' 04.33" E 18º 40' 52.89"
dimensions	2m wide x 1m high x 5m long
exposition	South-east
morpho-characteristics	Small cave with 2 siphons connected with the open sea and with a small beach 3m long and 1,5m wide.
living organisms	Scarce
notes	During summer the cave is under anthropogenic pressure
date of survey	19. 09. 2013
In front of the cave	Pebbles and further deeper sand

No. 33	location: **Plavi horizonti (right side)**  Foto: Luigi Bundone
coordinates	N 42º 23' 00.86" E 18º 41' 05.36"
dimensions	7m wide x 4m high x 3m long
exposition	South-west
morpho-characteristics	Rock shelter, above the cave there is macchia. Inside the cave there is a channel connecting the cave with another 1,5 x 1,5m pebble beach beside.
living organisms	Not observed because of strong waves
notes	Deeper in the inlet Plavi horizonti there are two more overhangs with beaches of few meters each. Closer to the open sea there is a slit 8m deep which ends with a 1m pebble beach. During summer high anthropogenic pressure.
date of survey	19. 09. 2013.
In front of the cave	Boulders and sand

No. 34	location: **Maslinada (complex)**  Foto: Aliki Panou
coordinates	N 42º 22' 35" E 18º 41' 25.5"
dimensions	4m wide x 1m high x 5m long
exposition	South-west
morpho-characteristics	Close to the cave, on the left side, there are some smaller holes which are 1m x 1m, 2m x 1m and 2m x 2m. Some of the small holes are connected under the sea level. On the right side of the cave there is a small pebble beach.
living organisms	Low biodiversity
notes	Good location for monk seals
date of survey	20. 09. 2013.
In front of the cave	*Ulvales* at the entrance into the cave, boulders, *Dasicladus, Padina, Wrangelia,* barren areas, some *Posidonia oceanica*

No. 35	location: **Maslinada (right)**  Foto: Aliki Panou
coordinates	N 42º 22' 32.2" E 18º 41' 17.3"
dimensions	2m wide x 2m high x 4m long
exposition	West
morpho-characteristics	In n the back of the cave there is a 1 m pebble beach
living organisms	Biodiversity on the walls is very low
notes	
date of survey	20. 09. 2013.
In front of the cave	Not checked because of fishing activity in the surroundings

No. 36	location: **slit close to Bigova**  Foto: Vesna Mačić
coordinates	N 42º 22' 05.36" E 18º 41' 42.54"
dimensions	0,5m wide x 2m hogh x 2m long
exposition	South-west
morpho-characteristics	Small slit and on the bottom there are pebbles
living organisms	Not observed
notes	
date of survey	20. 09. 2013.
In front of the cave	Not observed

No. 37	location: **Bigova complex close to the big rock shelter**   Fotos: Vesna Mačić
coordinates	N 42º 21' 45.30" E 18º 42' 03.23"
dimensions	3m wide x 1m high x 7m long (depth of water 1m)
exposition	North-west
morpho-characteristics	On the right side of the cave there is a big hole 15m wide x 10m high x 5m long with a beach 12m long x 0,5(1)m wide. In front of the cave there is a big rock emerging from the water
living organisms	Biodiversity is low but there are some sponges and incrusting algae
notes	The whole complex is an important location for monk seals.
date of survey	20. 09. 2013.
In front of the cave	Pebbles and few big boulders emerging from the sea. Lots of sciafilous algae like *Peyssonellia sp. Sphaerococcus coronophifolius,* while on bigger boulders there are barren areas.

No. 38	location: **Bigova complex (Club Med Bat)**   Fotos: Aliki Panou   Foto: Vesna Mačić Foto: Dušan Varda
coordinates	N 42º 21' 43,2" E 18º 41' 59,9"
dimensions	2m wide x 2m high x 25m long (depth of the water 0,5-1,5m; height inside 15m)
exposition	West
morpho-characteristics	After the small entrance there is a big space with many cave rock formations on the roof and the walls. On the left side of the cave there is a small pebble beach 1,5m x 1m.
living organisms	Bats are numerous. Marine life was not observed.
notes	On the right side of this cave there is a small hole 3m x 2m x 3m and in the back there is a small beach 2m x 1m. On the left side of the cave there is a slit and maybe a siphon that should be checked by diving.
date of survey	20. 09. 2013.
In front of the cave	Boulders with few algae and barren area. Of the algae the most common are: *Peyssonellia rubra* and *Sphaerococcus coronophifolius*, also *Palmophyllum crassum* and other incrusting algae.

No. 39	location: **Bigova (south side)**  Foto: Aliki Panou
coordinates	N 42º 21' 27'38" E 18º 41' 37.84"
dimensions	
exposition	North
morpho-characteristics	Not observed
living organisms	Not observed
notes	Not entered - should be checked
date of survey	
In front of the cave	Not observed

No. 40	location: **Krekavica cave**  Foto: Vesna Mačić
coordinates	N 42º 17' 02.59" E 18º 45' 24.77"
dimensions	15m wide x 8m high x 15m long (depth of water 30m; height inside 4m)
exposition	South
morpho-characteristics	The cave is widely open to the south and the walls inside the cave in the water are vertical down to 30m depth. On the bottom and in a small area in front of the entrance there is sand. On the left side of the cave there is a cubical boulder creating almost an underwater bridge. Further inside the cave there is no air gap. On the right side, a part of the vertical rock divides the space so that one can enter the cave also from the smaller hole. Behind this part on the right side it is completely dark .
living organisms	Extremely high biodiversity. The most abundant organisms are various species of sponges but also many other polychaetes, bryozoans, crustaceans and others.
notes	This is the location with the richest cave biodiversity observed so far.
date of survey	21. 09. 2013.
In front of the cave	Above the cave there are high vertical cliffs where some endemic plants were observed. For example, *Euphorbia dendroides* is very abundant. Also the area is suitable for some protected bird species.

No. 41	Location: **close to Sv. Nikola**  Foto: Vesna Mačić
coordinates	N 42º 16' 18.53" E 18º 46' 20.10"
dimensions	2m wide x 3m high x 2m long
exposition	West
morpho-characteristics	Just a hole without any important characteristics
living organisms	Abundant assemblages of *Cortalinales* specially at the entrance. Maybe in the past there were trottoirs of *Lithophyllum*.
notes	
date of survey	21. 09. 2013.
In front of the cave	Very steep rocky area, there are small *Lithophyllum* assemblages in front of the entrance.

No. 42	location: **close to Sv. Nikola dibble slit**  Foto: Aliki Panou
coordinates	N 42º 16' 31.7" E 18º 46' 01.5"
dimensions	1m wide x 1,5m high x 4m long
exposition	West
morpho-characteristics	On the right side of the slit there is a hole connecting the open sea with this cave .
living organisms	Some *Corallina* but in general low biodiversity
notes	
date of survey	21. 09. 2013.
In front of the cave	*Corallina* and small *Lithophyllum*

No. 43	location: **close to Sv. Nikola**  Foto: Aliki Panou
coordinates	N 42º 16' 32.20" E 18º 46' 01.82"
dimensions	1m wide x 7m high x 7m long (depth of the water 7m; height inside 5m)
exposition	West
morpho-characteristics	The slit is very high and there are vertical high cliffs above.
living organisms	Not observed well. There are some *Corallina* colonies
notes	Marine life should be checked
date of survey	21. 09. 2013.
In front of the cave	Some *Lithophyllum* colonies, vertical rocks, barren area, but should be checked better

No. 44	Location**: close to Krekavice cave (right side)**  Foto: Aliki Panou
coordinates	N 42º 17' 02.40" E 18º 45' 26.21"
dimensions	2m wide x 1m high x 3,5m long (depth of seawater 7,5m; height inside 1m)
exposition	South (south-west)
morpho-characteristics	Small hole with overhanging rocks.
living organisms	High biodiversity with lots of sponges and other organisms.
notes	
date of survey	21. 09. 2013.
In front of the cave	In front of the entrance there are rocks with barren areas with few sea urchins.

No. 45	location: **Saletova cave**  Foto: Vesna Mačić
coordinates	N 42º 17' 14.75" E 18º 45' 04.64"
dimensions	Entrance is under the water surface. The cave is approximately 25m wide x 25m long (depth of water 5m; height inside 25m; the beach consists of of rocks and boulders: slope 40°)
exposition	West
morpho-characteristics	The beach inside the cave is geologically young and consist of sharp rocks and boulders crashed down recently. On the surface of the water inside the cave there is fresh water. In the water there are submerged big boulders. Close to the entrance in the cave and in some parts of the bottom there is very fine sand.
living organisms	Biodiversity is not high - most abundant are *Annelids* with white calcified tubes. There are some anemones, *Apogon imberbis*, *Thorogobius ephippiatus,* plankton copepods and others.
notes	Interesting polychaetes with long tubes almost in line (not curved), and small polychaetes in white tubes. The cave's walls are of specific consistency.
date of survey	21. 09. 2013.
In front of the cave	At the entrance *Peyssonellia rubra*, incrusting red algae, sciafilous, *Apogon imberbis*.

No. 46	location: **u. Velika Krekavica komplex**  Foto: Vesna Mačić   Foto: Dušan Varda Foto: Vesna Mačić
coordinates	N 42º 17' 26.31" E 18º 45' 03.78"
dimensions	1m wide x 2m high x 5m long (depth of water 1m x height inside 2m) 2m wide x 2m high x 7m long (depth of water 1m x height inside 1m)
exposition	South
morpho-characteristics	On the left side of the inlet Krekavica there are two small caves close to each other. Close to them there is a small pebble beach with overhanging rocks and in the very back of the inlet there is also a rather steep pebble beach. On the right side of the inlet there is another small beach. Fresh water inflow inside the caves is evident.
living organisms	Bright light conditions in the caves, so there are some *Corallina, Patella,* few species of sponges, *Peyssonellia rubra,* incrusting red algae and others. In deeper parts of the cave there are less organisms but still not scarce.
notes	This complex is very important for monk seals and also a nursery area for fish, especially groupers. Within the entire area of the planned establishment of an MPA this is probably the most important location. It is also important to note that there is no road access to the small beach and anthropogenic touristic impact is very low. A problem might be the planned setting of an electricity cable from Montenegro to Italy. On the other hand, the presence of the cable may lead to a better control of the access to this area.

date of survey	20. 09. 2013.
In front of the cave	In front the caves there are some boulders with *Cystoseira compressa* and some *C. amentacea.* There is lot of *Jania, Corallina* and some others. Few young *Ephinephelus cosate* and *E. marginatus,* small *Scorpenae sp.*, *Mullus surmuletus* and small blue fish. Barren area on the rocks with just few sea urchins.

No. 47	location: **u. Žukovica „veliki porat“ (right side)**  Foto: Aliki Panou
coordinates	N 42º 19' 35.60" E 18º 42' 41.43"
dimensions	Covered beach 2 m wide x 2 m high x 2m long
exposition	North
morpho-characteristics	The pebble beach is covered by a rocky overhang
living organisms	Not observed
notes	Few meters further there are some private houses – possibly anthropogenic impact
date of survey	20. 09. 2013.
In front of the cave	Not observed

No. 48	location**: u. Žukovica (left side)**  Foto: Aliki Panou
coordinates	N 42º 19' 48.48" E 18º 42' 44.25"
dimensions	2m wide x 2m high x 2m long
exposition	South-west
morpho-characteristics	Bigger hole, nothing special
living organisms	
notes	Fresh water inflow is evident
date of survey	20. 09. 2013.
In front of the cave	Not observed

No. 49	location: **rt Slatnica**  Foto: Vesna Mačić
coordinates	N 42º 20' 49.60" E 18º 41' 44.63"
dimensions	1,5m wide x 1,5m high x 3m long
exposition	West
morpho-characteristics	Rocky hole with overhangs
living organisms	Low biodiversity
notes	
date of survey	20. 09. 2013.
In front of the cave	Barren area on the rocks.

CONCLUSIONS

In the area from Cape Arza to Cape Platamuni we registered 21 marine caves from which one has an underwater entrance and 11 locations are suitable as terrestrial habitat for monk seals. Only few marine caves have a relatively deep submerged area (up to 30m depth): most of them are only a few meters deep. In some of the marine caves there is a small pebble or sandy beach. In some caves there are cave rock formations .Beside the marine caves we registered also 24 holes which are less than 5m long, but still important for monk seals or some other rare and endangered species. All together, in the area from Cape Arza to Cape Platamuni we regitered 45 marine caves and holes/slits.

During this survey we didn't find any evidence of monk seal presence but some good habitats for the species were registered. The best area with marine caves and also habitats for monk seals in the planned MPA Platamuni is the area of the Krekavica cave and the Krekavica inlet.

Altogether, in the surveyed area the following 7 marine protected species were registered : *Lithophyllum byssoides, Cystoseira amentacea, Posidonia oceanica, Cymodocea nodosa, Pinna nobilis, Cladocora cespitosa* and *Lithophaga lithophaga.* Additionnally, 2 species of protected plants were noted, namely *Euphorbia dendroides* and *Limonium angustifolium,* 5 species of protected birds, namely *Ardeola ralloides, Alcedo athis, Phalacrocorax aristotelis, Acciptier gentilis* and *Corvus corax;* and one protected bat species *(Chiroptera).*

Our data can be used for the urgently needed creation of a Cave's Register but also s a basis for future research and protection measures.

Because of bad weather condition during the first days of our survey some locations were just noted as potentially interesting and should be checked in the future.

One of the outputs of this project was the issue of 2.600 printed brochures on marine caves and monk seals (in Annex I). These brochures were issued aiming at the information of the local public and raising their awarenes about the impornatce of marine caves and endangered species depending on this type of habitat, monk seals in particular. They are being distributed in the schools of the municipalities of Kotor, Tivat and Herceg Novi to which the surveyed area belongs.

After the survey some preliminary results were communicated to the public media and publications of 8 media reports are listed in Annex II.

This report will be delivered in English and Serbian language to Jugopetrol AD Kotor as the sponsor of the project and also to the following authorities: Ministry of Sustainable Development and Tourism, Ministry of Agriculture and Rural Development, Ministry of Science, Agency for the Environment and Morsko Dobro Agency.

Last but not least, the results of this project will be useful for the various groups of stakeholders.

We believe that this donation of Jugopetrol AD Kotor to the Institute of Marine Biology is an excellent example for investing in science and the protection of our environment. Once again we would like to thank Jugopetrol AD Kotor, expecting that our cooperation will be continued and hopefully be a source of inspiration for other donors.

Annex I

Mediterranean Center for Environmental Monitoring

MedCEM

Mediteranski Centar za Ekološki Monitoring

Archipelagos

περιβάλλον και ανάπτυξη

environment and development

EKO

Dragi prijatelji,

zajednički smo ostvarili napredak u cilju zaštite morske životne sredine tako što smo pažljivo pregledali obalu od rta Arza do rta Platamuni, istražujući morske pećine i eventualno prisustvo tuljana koji su ugrožene komponente morskog ekosistema. Na ovom području se nalazi najljepši i netaknuti dio obale naše zemlje, a nadležne institucije u jednom dijelu ove oblasti planiraju i stvaranje Zaštićenog područja u moru.

Efikasna zaštita će biti obezbijeđena samo ako i vi podržite naše napore i podržite kreiranje Zaštićenog područja u moru, ako izbjegavate ulaženje u morske pećine i remećenje njihovih krhkih ekosistema. Takođe, možete Institutu za biologiju mora prijaviti viđanje zaštićenih vrsta sisara (delfina, tuljana) sa informacijama o vremenu, lokaciji, boji, posebnim oznakama ili ponašanju. Zajedno možemo sačuvati ova dragocjena blaga prirode.

Uništavanje prirode je lako.
Zaštita je teška i skupa
-ali vrijedi truda.
Oporavak prirode sutra može biti nemoguć!

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Institute za biologiju mora Kotor (IBMK), Dobrota b.b. 85330 Kotor, Crna Gora
E-mail: ibmk@ibmk.org Website: www.ibmk.org
Institut za biologiju mora je osnovan 1961.g. Sada je dio Univerziteta Crne Gore i jedina institucija u zemlji koja se bavi naučnim istraživanjem i zaštitom morske životne sredine. Istraživanja najčešće imaju ekološki karakter i posebna pažnja se posvećuje Bokokotorskom zalivu i Južnom Jadranu.

Mediteranski Centar za Ekološki Monitoring (MedCEM),
I. Milutinovića 7, Sutomore, Crna Gora
NVO MedCEM okuplja grupu profesionalaca različitih struka.
Sa našim mladim članovima, eksperti za očuvanje mora i relevantne institucije dijele viziju da Crna Gora primjenjuje međunarodne konvencije i savremene standarde u očuvanju morskih ekosistema i biodiverziteta Skadarskog jezera.

Archipelagos – environment and development (životna sredina i razvoj),
GR-145 61 Kifissia, Grčka. E-mail: archipelagosgr@yahoo.gr
«Archipelagos – environment and development» je neprofitna NVO osnovana 1991.g. Naši naučnici i članovi su aktivni u oblasti prostornog planiranja, očuvanja i upravljanja prirodnom, morskom i kopnenom, životnom sredinom, a imamo i dugogodišnje iskustvo u očuvanju tuljana.

Jugopetrol AD Kotor, Trg Mata Petrovića 2, 85330 Kotor, Crna Gora
Vodeća naftna kompanija u Crnoj Gori
Član Hellenic Petroleum Grupe

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Fotografije: Vesna Mačić, Dušan Varda, Luigi Bundone, Aliki Panou, arhiv MedCEM-a

τυπογραφείο [χαλαμπαρδάκη] /// tatypografeio.gr

October 2013

Jugopetrol AD Kotor

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MORSKE PEĆINE I TULJANI

dragocjeno blago naše prirode

Projekat Platamuni -Arza
budućnost za morske vrste i staništa

MORSKE PEĆINE - skriveni dragulji naše obale

Morske pećine su prirodno formirane šupljine u stijenama u koje može ući čovjek, duže od 5m a koje se nalaze ispod morske površine ili su djelimično potopljene. Ovi otvori su uglavnom stvoreni radom talasa i slatke vode koja protiče kroz pukotine i erodira stijene tokom miliona godina. Ponekad se stvaraju ogromne pećine sa stalaktitima i drugim pećinskim ukrasima, a u nekim slučajevima krov pećine kolabira pa nastaje mala uvala gdje se na bočnim zidovima mogu vidjeti pećinski ukrasi.

U morskim pećinama vladaju mnogo drugačiji uslovi spoljašnje sredine u odnosu na otvoreno more. Što su pećine dublje manja je količina svjetlosti koja u njih prodire i postaje slabija jačina talasa. Tako se na ulazu u pećine sreću alge koje inače naseljavaju veće dubine, tj. prilagođene su životu sa manjom količinom svjetlosti, a u dubokoj unutrašnjosti pećina gdje ne dopire svjetlost nema ni algi. Dublje u pećinama gdje je veoma tamno, na zidovima pećina ima sesilnih organizama kao što su raznovrsni sunđeri, crvi u kalcifikovanim cjevčicama i mahovnjaci sa krhkim skeletima. Pećine se karakterišu i temperaturom vode koja je niža i stabilnija nego u plićim područjima mora. Ovi i drugi ekološki faktori u pećinama zapravo odgovaraju staništima u dubokom moru, te nije rijetkost da se u pećinama nalaze organizmi koji tipično naseljavaju velike dubine. Za sve te organizme glavna karakteristika je redukcija očiju i smanjena pigmentacija.

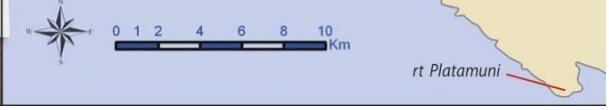
Morske pećine su poseban ekosistem u Sredozemlju sa jedinstvenim živim svijetom i smatraju se mjestom visokog biodiverziteta. Njihova dna i stjenovite strane imaju specifične zajednice mnogih morskih beskičmenjaka, a u slobodnoj vodi su najbrojniji razni planktonski račići. Tako npr. pećine su dom za žutu čašku (*Leptopsammia pruvoti*), brojne raznobojne sunđere od kojih je npr. sunđer *Chondrosia reniformis* u tamnim pećinama potpuno bijele boje, pećinsku kozicu (*Stenopus spinosus*), neptunovu čipku (*Reteporella grimaldii*) leopard glavoča (*Thorogobius ephippiatus*), sesilne polihete, mahovnjake i mnoge druge.

Morske pećine takođe nude stanište za ugrožene vrste slijepih miševa i one su važno stanište za kritično ugrožene tuljane koji se u pećinama odmaraju i razmnožavaju. Osim toga stjenovita obala karsta je stanište za mnoge rijetke ptice, insekte i endemske biljke kao što su npr. drvenasta mlečika (*Euphorbia dendroides*) i mrižica (*Limonium angustifolium*).

Prema tome, morske pećine, osim svoje ljepote su i važan rezervoar biodiverziteta tipičnog za Sredozemlje i od velikog su naučnog interesa, pa zaslužuju dalja detaljnija istraživanja i zaštitu.

Zaštićena Područja u Moru (ZPM) postoje širom cijelog svijeta da bi pomogla zaštitu morskog biodiverziteta. Nažalost Crna Gora je gotovo jedina zemlja u Sredozemlju koja još uvijek nema nijedno ZPM. Cilj ovog projekta je da pomogne osnivanje ZPM u jednom od gotovo netaknutih djelova naše obale tako što će obezbijediti neophodne podatke o morskim pećinama i tuljanima. Prema EU Direktivi o staništima i mnogim međunarodnim konvencijama oni su strogo zaštićeni, a tuljani su zaštićeni i prema nacionalnoj legislativi.

Tokom našeg istraživanja registrovali smo 20-tak pećina i veliki broj manjih šupljina, mapirali njihove pozicije i stvorili detaljnu kolekciju fotografija, što do sada nije rađeno. Takođe smo konstatovali lokaciju važnu za mrijest i rast kernji, kao i rijetke vrste ptica: vodomar, fendak, jastreb, gavran. Iako nismo našli tuljane, staništa za njih su prilično dobra, pa ako se obezbijedi očuvanje tih njihovih posljednjih utočišta, moguće je očekivati da dođe do rekolonizacije iz susjednih zemalja.



SREDOZEMNI TULJAN-najrjeđi tuljan u svijetu

Sredozemni tuljan, foka ili morska medvedica (*Monachus monachus*) je jedan od najugroženijih morskih sisara na svijetu. To je jedina vrsta tuljana u Sredozemlju i ne postoji nigdje drugo na planeti. U prošlosti tuljani su bili rasprostranjeni po cijelom Sredozemlju, Crnom moru i sjevero-zapadnoj Africi. Međutim, oni su sada nestali iz Španije, Francuske i iz Crnog mora, dok u nekim područjima Hrvatske, Albanije i Italije postoji još samo nekoliko jedinki. U Crnoj Gori poslednje dokumentovano viđanje tuljana je bilo 70-tih godina prošlog vijeka kada je jedna jedinka ubijena u okolini Herceg Novog.

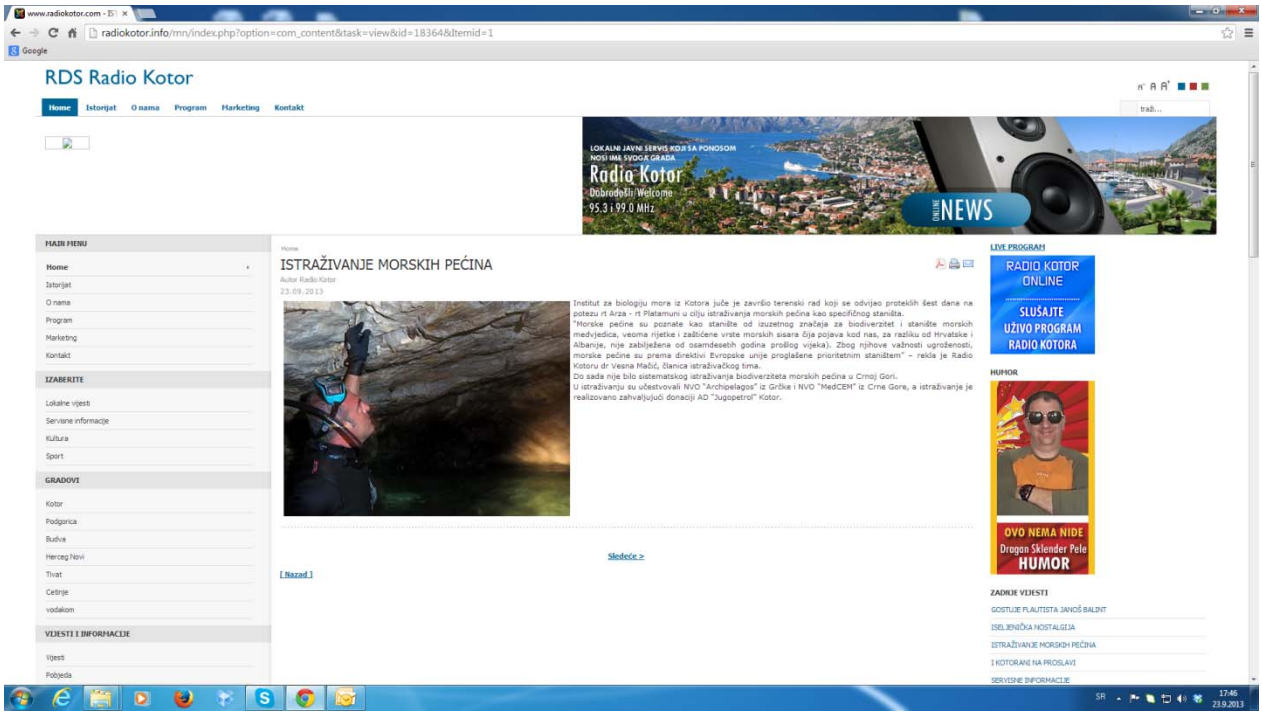
Procjenjuje se da populacija tuljana broji ukupno oko 500 jedinki – od kojih oko polovina živi u Grčkim vodama, uključujući i Jonsko more, pa je repopulacija susjednih područja u Jadranskom moru moguća jer tuljani tokom dana mogu preplivati velike razdaljine.

Tuljani mogu doseći 3m dužine. Roneći za plenom, ribama i hobotnicama, mogu da zarone do oko 100m. Mužijaci su obično crni na leđima, a ženke tamno ili svjetlije sive boje. To su morski sisari i dišu plućima pa im je neophodno da izađu na obalu gdje se odmaraju i rađaju mlade. Mladi u početku života sisaju, uče plivati i nalaziti hranu. Zbog raznih ljudskih aktivnosti na obali tuljani se povlače u mirne morske pećine koje u unutrašnjosti imaju plaže. Zbog toga su ovakve pećine veoma važne za razmnožavanje i opstanak vrste.

Ribari su oduvijek tuljane smatrali za neprijatelje i često su ih ubijali zbog štete koju su im tuljani pravili na ribarskim mrežama i ulovljenoj ribi. I pored toga, vjekovima ubijani tuljani nisu bili istrijebljeni. Međutim, u poslednjih nekoliko decenija je konstatovano rapidno opadanje njihovih populacija. Koji je razlog? Zagađenje mora, prelov i najvažnije – uznemiravanje morskih pećina od strane ljudi, te neprestano i nepovratno uništavanje tuljanovih staništa. Drugim riječima luke, ulice, hoteli i restorani su nastajali na samoj obali bez ikakvog planiranja. A gdje onda da se sklone tuljani?

Zašto mi zapravo trebamo tuljane? Tuljani su simbol očuvanog Sredozemlja, a naša korist je indirektna. Nestanak nekih vrsta, a pogotovo velikih predatora kao što su tuljani izaziva niz lančanih promjena, koje utiču ne samo na morski ekosistem nego i na čovjeka. Zato je očuvanje biodiverziteta obaveza svih nas. Molimo vas nemojte tražiti tuljane po morskim pećinama jer su oni veoma plašljivi i zbog uznemiravanja mogu napustiti tu lokaciju. Ako ih primijetite posmatrajte ih iz daljine, probajte zabilježiti ili snimiti što više detalja i javite nam.

Annex II


www.radiokotor.com
radiokotor.info/mn/index.php?option=com_content&task=view&id=18364&Itemid=1
RDS Radio Kotor
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Istorijat
O nama
Program
Marketing
Kontakt
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Herceg Novi
Tivat
Cetinje
vodakom
VIJESTI I INFORMACIJE
Vijesti
Pobjeda
ISTRAŽIVANJE MORSKIH PEĆINA
Autor Radio Kotor
23.09.2013
Institut za biologiju mora iz Kotora juče je završio terenski rad koji se odvijao proteklih šest dana na potezu rt Arza - rt Platamuni u cilju istraživanja morskih pećina kao specifičnog staništa.
"Morske pećine su poznate kao stanište od izuzetnog značaja za biodiverzitet i stanište morskih medvjedica, veoma rijetke i zaštićene vrste morskih sisara čija pojava kod nas, za razliku od Hrvatske i Albanije, nije zabilježena od osamdesetih godina prošlog vijeka). Zbog njihove važnosti ugroženosti, morske pećine su prema direktivi Evropske unije proglašene prioritetnim staništem" – rekla je Radio Kotoru dr Vesna Mačić, članica istraživačkog tima.
Do sada nije bilo sistematskog istraživanja biodiverziteta morskih pećina u Crnoj Gori.
U istraživanju su učestvovali NVO "Archipelagos" iz Grčke i NVO "MedCEM" iz Crne Gore, a istraživanje je realizovano zahvaljujući donaciji AD "Jugopetrol" Kotor.
Sledeće >
[Nazad]
LIVE PROGRAM
RADIO KOTOR ONLINE
SLUŠAJTE UŽIVO PROGRAM RADIO KOTORA
HUMOR
OVO NEMA NIDE
Dragan Sklender Pele
HUMOR
ZADNJE VIJESTI
GOSTUJE FLAUTISTA JANOŠ BALINT
ISELJENIČKA NOSTALGIJA
ISTRAŽIVANJE MORSKIH PEĆINA
I KOTORANI NA PROSLAVI
SERVISNE INFORMACIJE
SR
17:46
23.9.2013

http://www.portalanalitika.me/drustvo/vijesti/116713-istraivanje-morskim-peina-traganje-za-medvjedicom-rijetkom-stanovnicom-jadrana

Istraživanje morskih pećina: Traganje za medvjedicom, rijetkom stanovnicom Jadrana

25. septembar 2013.

Share

Da su morske pećine kod nas još uvijek neistražena staništa potvrđuju nova istraživanja Instituta za biologiju mora iz Kotora. Njihovi stručnjaci, sa kolegama iz inostranstva, proteklih su dana istraživali pećine od rta Arza do rta Plantamuni, kao mjesta od izuzetnog značaja za biodiverzitet i stanište morske medvjedice. Riječ je o veoma rijetkoj i zaštićenoj vrsti morskih sisara, koja kod nas nije zabilježena od 80-tih godina prošlog vijeka, a viđena je u Hrvatskoj i Albaniji.

Dr Vesna Mačić iz Instituta za biologiju mora kaže da su pećine prema direktivi EU proglašene za prioritetno stanište, jer su važne za biodiverzitet, a s druge strane ugrožene zbog ogromne gradnje na obali i antropogenog uticaja.

Kada je riječ o izuzetno rijetkoj vrsti morskoj medvjedici, čija pojava prava senzacija, dr **Vesna Mačić** kaže za *Portal Analitika* da kod nas jako dugo nije zabilježeno njeno prisustvo.

Sjeća se kaže da iz 1974. godine postoji snimak medvjedice koja je kod Herceg Novog uhvaćena i čak ubijena.

„Od tada nemamo zvanične podatke da je viđena, ali ima priča da su je ribari primjetili. Naravno, bez fotografija to uzimamo sa izvjesnom rezervom, kaže Mačić.

Ona objašnjava da je riječ o izuzetno rijetkoj životinji i zato ne čudi što kada je primjete to postaje prava senzacija.

U Hrvatskoj je jako dugo niko nije vidio, a posljednjih par godina bilo je nekoliko prijava da je viđena čak sa mladuncima, što raduje sve koji rade na zaštiti te vrste.

„Morska medvjedica traži specifična staništa, potebne su joj pećine i to one koje imaju unutra malu plažu na kojoj može da se odmori. To su sisari koji traže mir, a mi sada imamo uzurpiranu obalu i one jednostavno gube staništa. Inače su malobrojne i traže posebno mirna mjesta. U Hrvatskoj takvih mjesta ima mnogo više, njihova je obala velika, i najvjervatnije je to razlog što je tamo primjećena. Također, medvjedica ima u Albaniji i Grčkoj, i zato ih vjerovatno ima i kod nas. One sigurno ovuda prolaze jer preplivavaju ogromna rastojanja i moguće je da se kod nas odmaraju“, kaže Mačić.

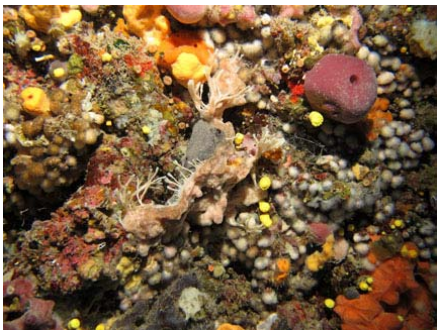
Sagovornica *Portala Analitika* naglašava da je interes istraživača da što više ljudi sazna o medvjedici i da, ukoliko je primjeti, fotografiše. Važno je, kaže, da znaju da kada je vide da joj se previše ne približavaju, što isto važi i za delfine i kornjače. Bitno nam je da imamo informacije, ali da životinje ne budu ugrožene prisustvom čovjeka.

Mačić naglašava da je za istraživače bilo važno da obiđu teren od Plantamuna do rta Arze, da vide koliko ima pećina, i do sada su, kaže, obišli samo one kojima se vidi ulaz sa mora.

-Za istraživanje pod morem nam treba mnogo više vremena, ljudi i novca. Planirano je da potez od Plantamuna do Bigove bude zaštićena zona u moru. Posebno je važno da na takvim mjestima znamo što imamo, a u uvali Trašte postoje takođe pećine zanimljive za istraživače, sa malim plažama. Problem je što se tamo gradi intenzivno i što će ta staništa biti uništena, kaže Mačić.

Ona ističe da će podatke sa terena sistematizovati i predati Agenciji za životnu sredinu, a pripremiće se i kratke brošure o pećinama i medvjedicama. Ove brošure će biti distribuirane

prije svega u opštinama Kotor, Tivat i Herceg Novi, jer je istraživanje rađeno u tim opštinama.



Nadamo se da je ovo samo početak jednog većeg istraživanja morskih pećina i da će biti nastavljeno u ovom kao i u drugim područjima naše obale, kaže dr Vesna Mačić.

U istraživanju su učestvovali **Aliki Panou** i **Luigi Bundone** iz NVO Archipelagos iz Grčke i **Dušan Varda** iz NVO MedCEM iz Crne Gore.

Naša sagovornica na kraju napominje da zahvalnost duguju firmi Jugopetrol Kotor, koja je finansirala istraživanje morskih pećina.

S.K.

http://skalaradio.com/2013/09/25/more-je-bogatstvo-svih-nas/

SKALA RADIO
Najpopularniji radio u Boki
102 MHz i 92,7 MHz

10:47 | 25. sep 2013.

More je bogatstvo svih nas

more i život u njemu

Vesna Mačić

Povodoma dana zaštite obale i mora, kao i održivog upravljanja ovim resursima prilka je da se više razmišlja o uticajima čovjeka na naše more koje je još uvijek puno raznovrsnog života i mnogih tajni, kazala je za Skala radio dr Vesna Mačić, naučna radnica u kotorskom Institutu za biologiju mora.

Crna Gora imajoš uvijek veoma lijepu obalu iako mnogo više urbanizovanu nego što bi trebalo i bez reda u izgradnji, mišljenja je Mačićeva, iako kako kaže nije protiv ekonomskog, turističkog i bilo kakvog razvoja razvoja, ali s mjerom i u skladu sa ambijentom.

Sve ono što se dešava na obali ima uticaja i na more kao i sve one aktivnosti koje se odvijaju na samom moru, kaže Mačićeva.

Ona podsjeća na aktivnosti u bokeljskim opštinama i Budvi na prečišćavanju i odvođenju otpadnih voda što je za pohvalu, jer je Bokokotorski zaliv veoma ugrožen sa ogromnom količinom otpadnih voda i evidentne su velike promjene na morskom dnu.

“Povlače se neki organizmi koji su tu živjeli stotinama godina, što ukazuje na velike promjene životne sredine. Komunalne otpadne vode, sve veći broj velikih kruzera i jahti kao i raznoraznih barki i plovila prisutnih u zalivu Boke Kotorske utiču na živi svijet u moru, pogotovo što je prisutan i veliki broj ilegalnih aktivnosti, kao što je izlivanje otpadnih voda bez prečišćavanja, izlivanja sa brodova. Sve to dospijeva u more i sve to živi organizmi moraju da istrpe”, objašnjava Mačićeva.

Ona podsjeća na nedavno terensko istraživanje morskih pećina stručnjaka Instituta zavoda za biologiju mora iz Kotora u saradnji sa dvije NVO iz Grčke i Crne Gore na potezu od rta Arza do rta Platamuna.

Ovaj posao je u potpunosti finanirao kotorski Jugopetrol uz zahvalnost i poziv ostalima da pomognu istraživanje i očuvanje našeg mora, naglasila je dr Mačić.
Pomenuto područje je prilično očuvano i potpuno predstavlja prirodnu obalu koja je veoma bogata raznovrsnim biljnim i životinskim svijetom kako u obalnom dijelu tako i u podmorju, i takva područje se moraju zaštititi.
"Crna Gora je u obavezi da zaštiti bar 10 odsto obale, a do sada nemamo ni jedno zaštićeno područje u moru. Pripremljena je dokumentacija za proglašavanje zaštićene zone kod Petrovca, ali se ništa još nije uradilo jer nije jasno ko će da upravlja tim zaštićenim piodručjem, da li će to da bude Morsko dobro, ministarstvo, opština. To su stvari koje se odugovlače, a koje su našoj zemlji neophodne. Naučnici iz cijelog svijeta su zaključili da zaštićene zone u moru predstavljaju oazu gdje se živi svijet u moru nesmetano razmnožava i mlađ i određen dio organizama se sa tih područja preliva u susjedna i praktično se na prirodni način obogaćuje prirodna sredina. Stoga je neophodno da se osnuju zaštićene zone kako bi imali barem neke djelove našeg mora koji nijesu pod veoma intenzivnim antropogenim uticajem" navela je ona.
Mačićeva vjeruje da će biti još projekta za očuvanje životne sredine i da će oni biti uspješniji jer do sada mnogi savjeti iz Instituta za biologiju mora često ostaju bez konkretnih aktivnosti kako od strane lokalne uoprave tako i sa nivoa nadležnih ministarstava.
Uz bolju koordinaciju bilo bi više uspjeha jer je more bogatstvo svih nas i svi građani moraju da vode računa o moru i njegovom živom svijetu, poručila je dr Mačić.

Reportaža

Izložba "

U organizaciji
Hercegovine,
autora Predra
posljednje po
prikazan je ko

Od medvjedice ni traga: Istraživači iz tri države

ISTRAŽIVANJE PODMORSKIH PEĆINA NA LUŠTICI

Tražili morskog čovika

Grupa ekologa iz Beograda, Venecije, Atine, uz pomoć Instituta za biologiju mora iz Kotora i pod pokroviteljstvom „Jugopetrola", privela je kraju jednonedjeljno istraživanje crnogorskog podmorja. Cilj je bio da se nađu moguće lokacije, odnosno pećine na Luštici, od Platamuna do Arze, u kojima bi mogla da obitava morska medvjedica.

B. DAŠIĆ
Bar

Luštica moguća zona: Dušan Varda u pećini

Morska medvjedica, u narodu poznata kao tuljan, a u Dalmaciji je zovu morski čovik, spada u šest najugroženijih vrsta sisara na Zemlji.

– Ova vrsta sisara je od 18. vijeka istrijebljena, jer su je ljudi ubijali ne zbog jela, nego zbog kože i sala, a u stara vremena je praktično živjela na svim krajevima Mediterana. Danas je svedena na svega 500–600 živih primjeraka u Turskoj i Grčkoj, kao i na Kabo Blanku, gdje je najveća kolonija. Smatra se da je pred izumiranjem i da je taj broj nedovoljan da bi se genetski razmnožavala. Posljednja morska medvjedica je u Jadranu istrijebljena početkom sedamdesetih godina u Igalu – kaže Dušan Varda iz Beograda, rukovodilac Mediteranskog centra za ekološki monitoring (MEDCEM) koji je vodio ovo istraživanje.

Bilo je priča da je 1994. jedna morska medvjedica videna u Sutomoru i Petrovcu, a istog ljeta i u Hrvatskoj, dodaje Varda. Ona za jedan dan može bez problema da prepliva 40 milja, a može i da spava u vodi. Interesovanje za nju je u naučnom svijetu probuđeno, jer je prije šest godina jedna snimljena u Hrvatskoj, onda je krenula priča o tome kako je videna i druga, da bi se na kraju čulo i da je jedna morska medvjedica ušla u kanale Venecije, što je krajnje neobično.

– U Hrvatskoj je ova vrsta naročito bila prisutna na Biševu gdje je Plava špilja, ona voli između ostalog zaklonjene pećine koje imaju podvodni ulaz, gdje može da izroni i gdje ima mala plažica, to joj je idealno za mlade, i gdje god ima takvih pećina, to njima odgovara kao stanište. To što se pojavila u Hrvatskoj, smatra se da je prošla pored Crne Gore, pored Albanije, spavala je možda na Velikoj plaži, lovila, šetala se crnogorskom obalom – kaže Dušan Varda.

Po novom ekološkom konceptu zaštićenih vrsta Crna Gora se može smatrati koridorom kojim prolazi morska medvjedica i sada bi trebalo zaštiti taj prolaz. Kako nikada do sada u Crnoj Gori nije rađeno takvo istraživanje, kotorski „Jugopetrol", koji je u vlasništvu „Helenik petroleuma", finansirao je ovo ispitivanje, jer su Grci vodeći u svijetu za zaštitu morskih medvjedica.

U ekipu su pored Varde i Vesne Mačić sa kotorskog Instituta, okupljeni i glavni stručnjak Grkinja Aliki Panou, iz NVO Archipelagos, koja se već decenijama bavi zaštitom medvjedica, i Italijan Luidi Bundone iz Venecije.

Istraživači su brodom Instituta obišli svaki metar obale Luštice prema otvorenom moru, zagledali u svaku rupu tražeći mjesta koja odgovaraju morskoj medvjedici.

– Ocjene tih lokacija su prilično povoljne, Luidi je dao ocjenu između devet i deset, Aliki između sedam i osam, tako da je Luštica visoko kotirana kao moguća zona za morsku medvjedicu – zaključuje Varda.

TULJANOVA PEĆINA IZA KASTELA

Dušan Varda kaže da se u Petrovcu, odmah iza Kastela, nalazi Tuljanova pećina koja je dobila ime tako što su dvojica lokalnih ribara prije nešto manje od jednog vijeka tu uhvatili morsku medvjedicu. Zatim su je, dodaje Varda, kao cirkusku atrakciju vodali po cijeloj Jugoslaviji.

http://www.radiodux.me/naslovnica/4166-istraili-morske-peine-od-arze-do-paltamuna

ISTRAŽILI MORSKE PEĆINE OD ARZE DO PLATAMUNA

Srijeda, 02 Listopad 2013 12:09

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Kotor 2. listopada 2013. (Radio Dux) - Stručnjaci Instituta za biologiju mora iz Kotora sa kolegama iz NVO "Archipelagos" iz Grčke i NVO "MedCEM" iz Crne Gore, završili su ovih dana terenski rad – preliminarno istraživanje morskih pećina na obali od rta Arza na sjeveru do rta Platamuni na jugu. Morske pećine su poznate kao stanište od izuzetnog značaja za biodiverzitet i potencijalno su stanište morskih medvjedica, veoma rijetke i zaštićene vrste morskih sisara.

Sredozemna medvjedica jedan je od najugroženijih morskih sisara, te vjerovatno najrijeđi tuljan na svijetu. Broj preživjelih predstavnika ove vrste procjenjuje se na ukupno svega 500-600 jedinki koje uglavnom žive u dvije veće populacije - jednoj u području sjeveroistočnog Mediterana (Grčka, Turska, Kipar) i drugoj u području sjeveroistočnog Atlantika (Cap Blanc uz obale zapadne Afrike i Mauritanije i otočje Desertas u arhipelagu Madeire). Na žalost, u drugim dijelovima nekadašnjeg područja obitavanja ove vrste ona se može smatrati regionalno izumrlom vrstom.

U Hrvatskoj je u pospljednje vrijeme primijećeno prisustvo par promjeraka ovog tuljana, a ima ga povremeno i u Albaniji, te nešto češće u Grčkoj. Imajući u vidu takvu situaciju, stručnjaci Instituta za biologiju mora iz Kotora pretpostavljaju da se sredozemne medvjedice u svom kretanju duž našeg dijal obale Jadrana možda povremeno i ovdje kraće zadržavaju radi odmora. Stoga je preliminarno istraživanje morskih pećina na području Donjeg Grblja i Luštice bio prvi korak kako bi se dobila šira slika o broju i karakteristikama pećina koje su povoljne za boravak sredozemnih medvjedica.

Prema riječima dr Vesne Mačić iz kotorskog Instituta za biologiju mora, da bi sredozemne medvjedice boravile u njima, pećine moraju biti izolovane, daleko od ljudskih aktivnosti, a poželjno je da u sebi imaju i malo žalo – plažu na kome se tuljani mogu odmoriti. Iako tragovci konkretnog prisustva ovog sisara nisu pronadjeni, situacija je ipak takva da ima nade da se sredozemne mevjedice mogu povremeno naći i na našoj obali, ali je za to potrebno sačuvati što više morskih pećina kao za njih najpovoljnijeg prirodsnog staništa.

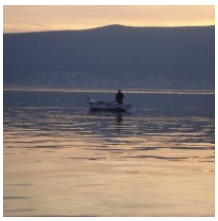
Do sada inače, nije bilo sistematskog istraživanja biodiverziteta morskih pećina u Crnoj Gori, pa su i na ovim preliminarnim pregledima tih lokaliteta, otkrivene zanimljive stvari zbog

specifčnih okolnosti koje vladaju u tim staništima - smanjene vidljivosti i smanjenog hidrodinamizma. Dr Mačić naglašava da se tako već na ulazu u pećine mogu naći neke vrste algi koje inače, rastu isključivo na 30-40 metara dubine mora. U pećinama inače, ima vrlo malo pokretne faune, ali su ta staništa zato bogata različitim vrstama filtratornih organizama - sundjera i briozoa. Znanstvenici su sada uzeli uzorke brojnih vrsta sundjera koje će detaljno analizirati u narednom period u saradnji sa kolegama iz inozemstva.

S.L.

Audio: dr Vesna Macic, Institut za biologiju mora Kotor (ZAHVALA JUGOPETROLU)

Audio: Dragan Srdoc, ribar iz Kotora

-    
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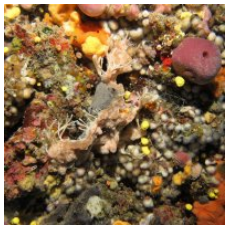
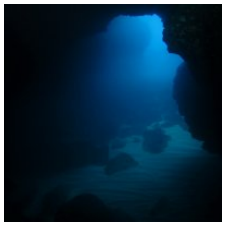
-    

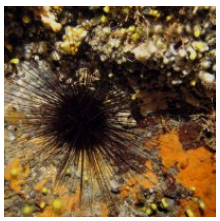
-    

Foto: S.L.

http://skalaradio.com/2013/10/08/najugrozeniji-zasticeni-sisari-morske-medvjedice-u-bokokotorskom-zalivu/

12:53 | 8. oct 2013.

Najugroženiji zaštićeni sisari, morske medvjedice u Bokokotorskom zalivu

morska medvjedica

dr Vesna Mačić

Istraživanje na području od rta Platamuni do rta Arza je urađeno od strane Instituta za biologiju mora i nevladinih organizacija Mediterananski centar za monitoring Medcem i Argipelagos iz Grčke.

Projekat istraživanja morskih pećina je bio finansiran od strane kotorskog "Jugopetrola", kazala je za Skala radio dr Vesna Mačić, naučna radnica u kotorskom Institutu za biologiju mora.

Ono što je bio cilj je da se na pomenutom području istraže lokacije koje su morske pećine pogodne za život morskih medvjedica.

Radi se o najugroženijem i najrijeđem sisaru Mediterana i zaštitećenoj vrsti.

Morske pećine su takođe zaštićeno prioritetno stanište prema direktivi Evropske Unije o staništima, a kako do sada uopšte nije izučavan ovaj dio morskih staništa kod nas, radi se o početku istraživanja i ono što je bitno da napomenemo, kaže dr Mačić, već u prvom istraživanju nađeno je nekoliko lokacija koje su pogodne za život morskih medvjedica.

One u unutrašnjosti imaju male plaže gdje mogu da se odmaraju i da borave neko kraće vrijeme.

Cilj je da se tačno utvrde koja su to mjesta koja odgovaraju naseljavanju ovih morskih sisara, kao i mnogih drugih organizama koja se nalaze samo u morskim pećinama.

Dr Mačić se nada da će se u daljem periodu malo više pozabaviti ovim istraživanjem i da će o tome informisati javnost.

Ona se takođe nada da će sljedećeg mjeseca uraditi brošure o morskim pećinama i morskim medvjedicama, a nakon kompletno urađenog izvještaja javnost će biti informisana o tome, kazala je dr Mačić.

UGROŽENE VRSTE: Stručnjaci Instituta za biologiju mora završili preliminarno istraživanje morskih pećina u Luštici i Donjem Grblju

Mjesta ima, ali ne i medvjedica

Tivat - Stručnjaci Instituta za biologiju mora iz Kotora, sa kolegama iz NVO "Archipelagos" iz Grčke i NVO "MedCEM" iz Crne Gore, završili su preliminarno istraživanje morskih pećina na obali od rta Arza na sjeveru do rta Platamuni na jugu.

Morske pećine su poznate kao stanište od izuzetnog značaja za biodiverzitet i potencijalno su stanište morskih (sredozemnih) medvjedica, veoma rijetke i zaštićene vrste morskih sisara. Sredozemna medvjedica jedan je od najugroženijih morskih sisara, te vjerovatno najrjeđi tuljan na svijetu. Broj preživjelih predstavnika te vrste procjenjuje se na svega 500 do 600 jedinki koje uglavnom žive u dvije veće populacije - jednoj na području sjeveroistočnog Mediterana (Grčka, Turska, Kipar) i drugoj na području sjeveroistočnog Atlantika (Cap Blanc uz obale zapadne Afrike i Mauritanije i ostrva Desertas u arhipelagu Madeira). Nažalost, u drugim dijelovima Sredozemlja, gdje je nekada medvjedica bila široko rasprostranjena, danas gotovo da je nema. U Hrvatskoj je u posljednje vrijeme primijećeno prisustvo nekoliko primjeraka tog tuljana, a ima ga povremeno i u Albaniji, te nešto češće u Grčkoj.

Foto: INSTITUT ZA BIOLOGIJU MORA KOTOR

Stručnjaci pretpostavljaju da tuljani „svrate" i do nas: Jedna od pećina

Naučnike impresionirala brojnost raznih vrsta sunđera i briozoa

Imajući u vidu takvu situaciju, stručnjaci Instituta za biologiju mora iz Kotora pretpostavljaju da se sredozemne medvjedice u kretanju duž našeg dijela obale Jadrana možda povremeno i tu kraće zadržavaju radi odmora. Stoga je preliminarno istraživanje morskih pećina na području Donjeg Grblja i Luštice bio prvi korak, kako bi se dobila šira slika o broju i karakteristikama pećina koje su povoljne za boravak sredozemnih medvjedica.

"Istraživanja živog svijeta i morskih pećina kod nas do sada nijesu rađena, pa smo se opredijelili da to uradimo u pećinama koje se nalaze na obali od rta Platamuni do rta Arza. Imajući u vidu ideju da se dio obale od Platamuna do Bigove u budućnosti proglasi za zaštićenu zonu, te činjenicu da je geološki taj dio sličan sa obalom sjeverno od Bigove prema Arzi, odradili smo preliminarno ispitivanje morskih pećina na tom potezu Donjeg Grblja i Luštice, posebno zbog činjenice da su morske pećine jedno od prioritetnih staništa i po direktivi EU o staništima", kazala je za "Vijesti" rukovodilac istraživanja dr **Vesna Mačić** iz Instituta za biologiju mora iz Kotora.

Tokom višednevnog terenskog rada koji je sponzorisala kompanija "Jugopetrol" iz Kotora, stručnjaci iz Crne Gore i Grčke pregledali su sve pećine koje imaju ulaz nad vodom, posebno one u kojima postoje mala morska žala – šljunkovite plaže na kojima bi sredozemne medvjedice mogle da se smjeste i odmore.

"Iako konkretne tragove prisustva sredozemne medvjedice nijesmo našli, postoji nada da te vrste sisara ima i kod nas, jer smo otkrili nekoliko za nju odgovarajućih pećina. S obzirom na to da je *sredozemna medvjedica u Hrvatskoj u posljednjih nekoliko* godina više puta viđana, a da su poznata njena naselja u Grčkoj i Albaniji, vjerovatno je da se povremeno kraće zadržava i na našoj obali, prolazeći pored nje od Egeja i Otranta ka sjevernom dijelu Jadrana i obrnuto. Sada znamo koje su to lokacije koje na ovom dijelu obale mogu odgovarati toj vrlo ugroženoj vrsti koja inače, traži izolovana i zaštićena mjesta u blizini kojih ima dovoljno hrane i gdje nema prevelikih ljudskih aktivnosti koje je uznemiravaju", kazala je Mačić.

Ona je dodala da imamo pećina koje bi mogle da budu naseljene, samo što treba da ta staništa očuvamo.

S.LUKOVIĆ

Foto: INSTITUT ZA BIOLOGIJU MORA KOTOR

Pregledali sve pećine koje imaju ulaz nad vodom: Mačić

MALOBROJNA staništa ugrožava čovjek

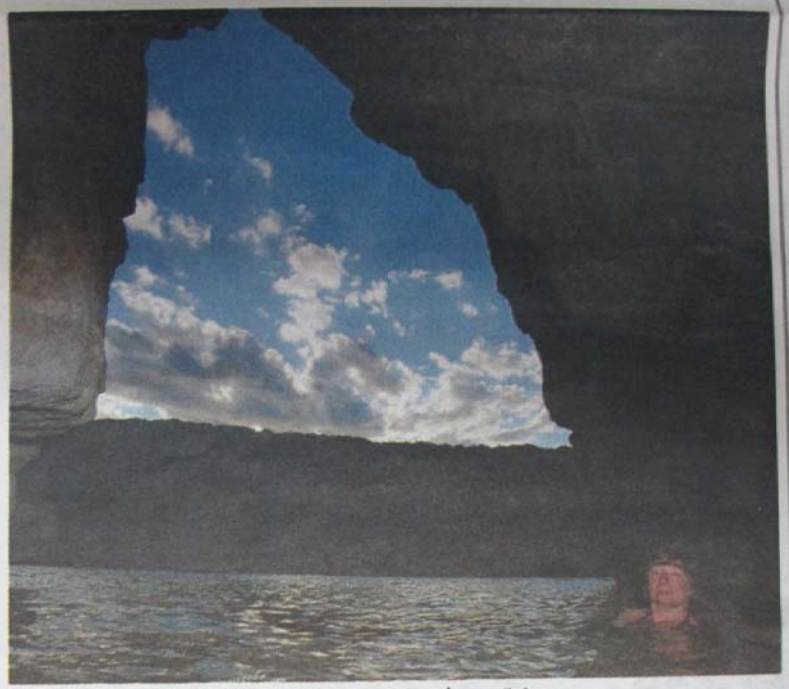
Ističući da su u posljednjoj misiji "tek zagrebli površinu" kada je u pitanju istraživanje živog svijeta u morskim pećinama, dr Mačić je istakla da ta relativno malobrojna staništa čovjek ugrožava svojim aktivnostima – prvenstveno sve izraženijom gradnjom na samoj obali.

"Na primjer, u zalivu Trašte, gdje 'Orascom' treba da gradi hotele, vile, marine i ostalo ima nekoliko vrlo zanimljivih pećina koje na prvi pogled ne izgledaju tako, jer se sa mora gotovo i ne vide. Kada se, međutim, uđe u njih, ima daljih kanala koji se račvaju, čak i unutrašnjih plaža koje bi bile vrlo povoljne za sredozemne medvjedice. Vjerovatno će, nažalost, ta staništa izgradnjom biti uništena, ali je bitno da barem znamo šta imamo tu i na drugim mjestima, pa da ova preostala staništa koja neće biti uništena, bolje čuvamo", istakla je Mačić.

Ona je dodala da su morske pećine zbog prirodnih uslova koji u njima vladaju – smanjene svjetlosti i smanjenog hidrodinamizma, vrlo interesantna staništa.

"Tako se na ulazu pećina, na samo nekoliko metara dubine, mogu naći neke vrste algi koje u otvorenom moru rastu samo na 30 do 40 metara dubine. Iako u pećinama ima malo pokretne faune, naučnike je impresionirala brojnost raznih vrsta sunđera i briozoa koje se nalaze u tim staništima. Uzeli smo uzorke i nadamo se da ćemo, u daljoj saradnji sa međunarodnim institucijama, uspjeti malo više da se time pozabavimo", kazala je dr Mačić.

PROJEKAT: Stručnjaci proučavali podmorje od Arze do Platamuna



Pripremiće i kratke brošure: Sa istraživanja u morskoj pećini FOTO: Institut za biologiju mora

Potraga za medvedicama

Kotor – Ekipa Instituta za biologiju mora istraživala je na potezu od rta Arza do rta Platamuni morske pećine, poznate kao stanište od izuzetnog značaja za biodiverzitet i morske medvedice, veoma rijetku i zaštićenu vrstu morskih sisara, koja u Crnoj Gori nije zabilježena od osamdesetih godina prošlog vijeka.

"Zbog važnosti morskih pećina za biodiverzitet i njihove ugroženosti zbog izgradnje raznih vrsta infrastruktura na obali i antropogenog uticaja, morske pećine su prema EU direktivi proglašene za prioritetno stanište. Ipak, i pored svega toga, do sada nije bilo sistematskog istraživanja biodiverziteta morskih pećina, pa ovo predstavlja prvi korak u tom smislu. U istraživanju su učestvovali **Aliki Panou** i **Luigi Bundone** iz NVO 'Archipelagos' iz Grčke i **Dušan Varda** iz NVO 'MedCEM' iz Crne Gore. Istraživanje je ostvareno zahvaljujući donaciji AD 'Jugopetrol' u Kotoru", piše u saopštenju instituta, koje je potpisala **Vesna Mačić**.

Kako se navodi, nakon dobijanja rezultata, predaće ih Agenciji za životnu sredinu, a pripremiće i kratke brošure na temu morskih pećina i morskih medvedica.

"Ove brošure će biti distribuirane, prije svega, u opštinama Kotor, Tivat i Herceg Novi, gdje je istraživanje i rađeno, a nadamo se da je ovo samo početak opširnijeg istraživanja morskih pećina kako u ovom, tako i na drugim područjima naše obale", zaključuje se u saopštenju.

I.K.

ОД БИГОВЕ ДО ПЛАТАМУНА НАУЧНИЦИ РЕГИСТРОВАЛИ НЕКОЛИКО ЛОКАЦИЈА ПОГОДНИХ ЗА ЖИВОТ МОРСКИХ МЕДВЈЕДИЦА

Угрожену врсту заштитити од човјека

■ Губитком тако важне врсте, која практично представља врх ланца исхране, мијењају се ствари у природи, а једини природни непријатељ морске медвједице је човјек, каже Душан Варда

КОТОР – Црна Гора мора да заштити морске пећине погодне за живот морских медвједица, најугроженијих и најређих сисара Медитерана и заштићене врсте, упозорила је биолог **Аликн Пану** из грчке НВО „Архнипелагос".

Уз др **Весну Мачић**, научника которског Института за биологију мора, и **Душана Варду**, из Медитеранског центра за еколошки мониторинг (МедЦем), Пану је учествовала у недавном истраживању на потезу од рта Платамуни до рта Арза са циљем да се истраже локације погодне за живот морских медвједица.

Истраживали подморје: Варда, Пану и др Мачић

У првом истраживању те врсте спроведеном у Црној Гори пронађено је неколико спиља које у унутрашњости имају мале плаже где медвједице могу да се одмарају и да бораве краће вријеме.

Морске пећине су иначе због важности за биодиверзитет и њихове угрожености изградњом разних врста инфраструктуре на обали и антропогеног утицаја, према директиви Европске уније, проглашене за приоритетно станиште.

Уз напомену да је циљ био да се тачно утврде мјеста која одговарају насељавању ових морских сисара, Пану, која активно рони више од тридесет година, истиче да су пронађене пећине различитих облика и карактеристика у генерално добром стању.

– Област од Бигове до Платамуна је предивно поручје јер обала није угрожена изградњом објеката, нити од стране туриста, а под водом има много потпуно нетакнутих пећина које би такве требало и да остану – изјавила је она за „Дан", додајући да је „највећи дио посла одрађен на дах, са дисаљком".

Морска медвједица је један од шест најугроженијих сисара на свијету, а остало је само око 500 јединки које живе искључиво на Медитерану. Душан Варда из „МедЦема" подсјећа да је медвједица последњи пут код нас виђена 1974. године када су је у Игалу ухватили купачи, а већ сјутрадан је нађена удављена плутајући у заливу. Од тада није документована у Јадрану, да би се прије седам-осам година поновно појавила у Хрватској.

Морска медвједица

– Својевремено је та популација у Јадрану била неупоредиво већа. Губитком тако важне врсте, која практично представља врх ланца исхране, мијењају се ствари у природи. Једини природни непријатељ морске медвједице је човјек. У контексту израде нових еколошких мрежа Црна Гора се сматра коридором за њен пролазак. Јер када је планирала ка Хрватској, морала је да проплива поред наше обале, што значи да је ту провела пар дана спавајући по плажама, и у пећинама. Информације које сада покушавамо да прикупимо су важне, јер о тој фоки, тузину односно морској медвједици, нема никаквих информација за Црну Гору где ће се, могуће је, једнога дана поново појавити и населити – сматра Варда.

Истраживачи су иначе у појединим спиљама пронашли и слијепе мишеве, такође заштићену врсту, што је битно будући да се регион од Платамуна до Жукотице, планира за заштићену зону у мору чиме би се, како објашњава др Весна Мачић, омогућио опоравак живог свијета под водом, тачније више размножавање рибе.

– Проблем је што рибари дове мале рибе, тако да заштићена зона устварі служи као акваријум у којем се риба несметано размножава и расте. Уколико желимо да будемо еколошка држава, онда би требало да знамо што имамо у мору и да чувамо оно што је специфично – поручује Мачићева.

Б.М

Прави штету рибарима

Медвједица се храни великом количином рибе, па рибарима не одговара јер им прави штету тиме што цијепа мрежне и поједе доста улова. Она код нас не налази одговарајуће станиште, јер, како Мачићева појашњава, не одговарају јој чести проласци бродова и ремећење са обале.

– Дневно прелази велику путању и иде гдје јој је љепше. Последњих година су у Хрватској регистровали неколико појава медвједице, али тамо има стотине острва и она може да нађе мјесто које јој одговара. У пећинама које смо сада истраживали је специфичност што је мрачно и што ту живе организми који иначе живе на 50 метара дубине (у пећинама живе на десет метара) попут неких сунђера, чије узорке смо узели и пробаћемо да одредимо њихове врсте – рекла је др Мачић.

Аликн Пану истраживала подводне пећине