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# Sharks, skates and rays of the Vlorë County: status & perspectives

Short report from the 1<sup>st</sup> research expedition  
August, 2021



Studies were led by  
Sharklab ADRIA:  
Center for marine and  
freshwater biology

[www.sharklab-adria.org](http://www.sharklab-adria.org)



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Extensive fishery research,  
sonar, ROV monitoring and  
education was conducted in  
partnership with SEEP

[www.seep.al](http://www.seep.al)

The report is for information only and contains only the most basic activities, ob-  
tained results will be primarily published in journals and then to the wider public!





# FIRST RECORD

Pelagic stingray, *Pteroplatytrygon violacea* (Bonaparte, 1832),  
in Albanian seas

The very first record of the Pelagic stingray, *Pteroplatytrygon violacea* (Bonaparte, 1832) (Myliobatiformes: Dasyatidae) was reported through our expedition on the 3<sup>rd</sup> of August 2021 in the Bay of Vlore (Adriatic Sea part).

The record has been published in the New Biological Records, Vol. 10(2): Gajić, A., Ribaj, S. (2021). The first record of the Pelagic stingray, *Pteroplatytrygon violacea* (Bonaparte, 1832) in Albanian seas. *New Biol Rep* 10 (2):109–112.

On the 3<sup>rd</sup> of August 2021, the subadult female stingray specimen was captured by driftnet in Gjiri i Vlorës (40.420205 Lat, 19.479029 Long) at the depth of 25 m and was collected for further examination. Neglecting the condition, it was easily identified based on the morphometric and meristic characteristics and verified using Serena (2005), Gajić (2020). The specimen measured 43.18 WD, 101 cm TL and weighed 2.730 TW and has a broadly rounded snout and a wedge-shaped disc that was much wider than long, with a clearly visible dark purple

coloration despite accelerated decay. A row of thorns was present from the nasal region of the tail spine. The tail was less than twice the total body length with a long lower caudal fin-fold, while no upper finfolds were present. There were 25 rows of the upper teeth and 23 rows of the lower teeth, which is less than previously described. Previous lack of records in Albanian seas is probably not related to the rarity of the species in the area, but more likely to its specific ecology, lack of scientific research and complete lack of proper monitoring in fisheries.



*The female Pelagic stingray recorded in the Bay of Vlore (left)*  
*Andrej A. Gajić conducting the autopsy of Pelagic stingray at the Sazan island (right)*

Photo © E. Karalić  
Sharklab ADRLA



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# FISHERIES

Overfishing, non-selected fisheries and the other important issues in commercial and small-scale fisheries in Albanian seas

Wasteful fishing practices such as uncontrolled fisheries and overfishing are threatening tangible marine ecosystem, endangered species, and also food security in the future.

Within the expedition in the Vlorë County (August) our team conducted extensive analysis based on the bottom trawling and bottom longlines targeting the outer continental shelf and upper slopes up to 500 m deep. Obtained results will be published as original scientific papers, once processed.

Amount of by-catch, the way of catching and processing the fish on boats and the amounts landed might have serious consequences in future.

Marine fishery in Albania is a highly important economic sector, but inland fishery is also significant resource. Fishing activities in Albanian seas are taking place along approximately 380 km of the coastline and up to 12 miles from its baselines. Although the vast majority of fishing efforts are concentrated on the continental shelf, some efforts (especially bottom longlines) are affecting the upper slopes up to 500 m deep. Bottom trawling in the upper slopes generally happens in the hot summer months, while during the winter they fish on the outer and insular shelves. On the Adriatic Sea it extends more than 25 miles, and just less than five miles on the Ionian Sea side. Despite, the data on the catches and especially bycatch is poorly known.

Lack of monitoring and inspections, lack of experts, policy capacities and legislatives, and general weakness in Albanian administration followed by significantly poor awareness are identified as the most important shortcomings in marine fishery management.

An exclusion zone for the small-scale fisheries is defined within the 3 miles, but exist only on the paper and usually is not respected by the commercial fishing vessels. Large-scale fleet such as bottom trawlers sometimes comes closer than 0.5 miles from the coast.

The majority of the Albanian fishing fleet is located in four main ports: Durrësi, Vlora, Saranda and Shëngjini. In 2019, there were 651 entities licensed for fishing activities. The fleet

operates the Sub-Zone 18. We estimated over 10.000 t of capture production in marine fisheries in 2021. Currently, there is absolutely no data on the by-catch nor its survival rates.







Poor enforcement of the exclusion zones and other legal acts is partly caused by low fines (300 EUR Avg.). Thus, substantially higher fines are needed on the unreported landings of the endangered and protected species, their further distribution. Another issue is observed through the high competitive rates among the fisherman. All our observations are in line with the reports given by FAO, WWF, Greenpeace and other institutions.

The European Union has recommended that Albanian government should fully implement recommendations of the GFCM (General Fisheries Commission for the Mediterranean). Further, Albania is obligated to make full use of the FAO AdriaMed regional project. Beside urgent needs for the amendment of the local laws (especially Red list), stakeholder education and raising the awareness is necessary to save Albanian elasmobranchs.

*Inspecting the landed species exposed in the Radhimë Fishmarket (right).*

*A plausible juvenile specimen of the Longnose skate Dipturus oxyrinchus (Rajiformes: Rajidae) dried in the Radhimë Fishmarket (left)*

*Photos © A. Gajić and E. Karalić / Sharklab ADRIA*







# FISHMARKETS

Detailed survey of the local fish markets in the southern Albania,  
Elasmobranchs and critically endangered species being sold

The vast majority of sharks, skates and rays (including certain endangered and critically endangered species) in Albanian territorial waters are completely unprotected and can be observed in by-catch and even in the fish markets.

Through our expedition, we have enabled two major ports and over 25 fish markets across the Vlore County. Six threatened species were observed in the fish markets, while smoothhounds were observed in 23 of 25 fish markets

Despite the fact that shark meat is not predominantly appreciated in Albania sharks are often sold in fish markets. Beside smoothhounds, critically endangered Blue shark (*Prionace glauca*) and Shortfin Mako shark (*Isurus oxyrinchus*) were observed, alongside with both Thresher shark (*Alopias vulpinus*) and Bigeye Tresher shark (*A. superciliosus*). More than 30 individuals of Bluntnose sixgill sharks (*Hexanchus griseus*) were noted in the past 10 years (Gajić, 2022)

The Black Spotted Smoothound shark, *Mustelus punctulatus* Risso, 1827 was commonly observed in almost every fish market across the Vlorë County. Throughout the expedition, we estimated that more than 80 individuals of *Mustelus spp.* Are being landed each month in Triport (Vlorë). We have established full monitoring of landed elasmobranchs on both trawlers and longlines. Final estimations are to be fully confirmed by the end of 2022.



More than 30 individuals of the Bluntnose sixgill sharks, *Hexanchus griseus* (Bonnaterre, 1788) were landed in Albania during the past decade.



# TRAWL STUDIES

Analysing the commercial species and by-catch within the continental shelves and upper slopes of the Strait of Otranto

Entire Mediterranean Sea is a unique biodiversity hotspot with intense fishing pressures characterized by high by-catch rates of threatened species. This is especially in the territorial waters of developing countries - such as Albania.

There is absolutely no monitoring nor any inspection on trawl fisheries across the Vlore County. Furthermore, there is no available data on the by-catch composition, post-release survival, nor the occurrence of threatened species.



*Eggcase of the Lesser-spotted Cat shark, Scyliorhinus canicula, recorded at 80 m depth.*

*Photo: A. Gajić  
Sharklab ADRLA*



*Insight into the by-catch composition from a trawler fishing on the insular shelf of Sazan at the depth of 120 m*

*Photo: A. Gajić  
Sharklab ADRLA*



The bottom trawl fisheries in Albanian seas are developed mostly on the continental and insular shelves, and to some extent in the upper slopes up to 500 m deep. Large vessels usually fish in the outer shelf targeting decapod crustaceans, such as red shrimp, squids and other cephalopods, and several fish species. Such large vessels operate on various fishing grounds from 80 to 500 m, depending on the season, weather conditions and economic factors. Landings from the continental shelf are considered most important due to biomass composed of the high number of commercially valuable fish

species and cephalopods. The most targeted decapod crustacean in Red shrimp *Aristeomorpha foliacea*. Today, around 40 commercial fishing boats are operating within the Vlorë County. Despite being forbidden by law, trawlers were observed within the Bay of Vlora. Devastating effects of trawlers on the marine ecosystems in Albania have been already emphasized in several reports, but are not studied. Ghost nets from abandoned equipment are also significant problem and are closely related to microplastic. Comprehensive research approach and wider education are urgently needed.



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# DISEASES

The effects of habitat loss, pollution (microplastics) on elasmobranch health and specific disease development

Through the extensive fishery analysis we have sampled already dead by-catch specimens on the boats for the further pathological and toxicological analysis. Epizootiology of the elasmobranchs in Albanian seas, with the emphasis on the character, ecology and causes of

the outbreak of specific diseases was studied on 10 species through this project. The observed changes were studied using contemporary approaches in the macroscopic pathomorphology and histopathology both common HE stains and special staining, as well.

The studies pointed out different diseases occurring in the free-ranged sharks, skates and rays in Albania. The most affected organs were the liver and kidney, which is aligned within our previous studies in Croatia, Bosnia and Montenegro (Beširović et al., 2018; Gajić, 2020; Gajić et al., 2020). Inflammatory aggregates of the mononuclear cells (dominantly macrophages, and to less extent lymphocytes) were observed diffuse and/or Multifocal across the liver parenchyma in sharks. Further, degenerative changes in renal tubules

were noted, alongside with spleen necrosis, inflammations of the nidamental glands, and other pathological conditions. Remarkably, the tumor was observed in the cardiac stomach of the critically endangered Bull ray (*Aetomylaeus bovinus*) caught at the 120 m depth, few miles off the Sazan island. Mentioned studies are currently undergoing and will be published in peer-review journals once completed. Beside diseases, parasitology was also studied. We have focused on the large marine leech *Pontobdella muricata* and its host among the eagle rays. Findings will be soon published as articles.



Through the 2nd Booster grant and EC Discovery Channel grant, we have conducted the very first qualitative-quantitative analysis of the ingested micro- and nanoplastics in sharks.

*Photo: stomach (cardia and pylorus), intestine (duodenum and ileum) and rectum of M. punctulatus.*

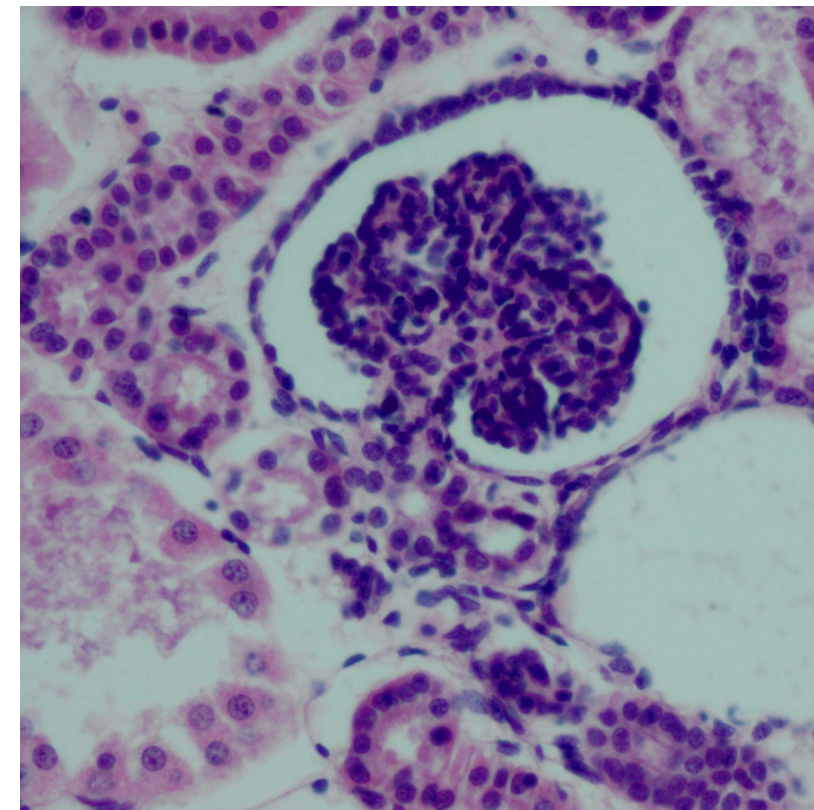


At the autopsies, sharks were opened from the coracoid down to puboischiadic bar, with a double opposite side cut on the both sides to easily access, ligate and isolate target tissue.

Melanomacrophage centers (MMC) are considered as sensitive albein non-specific health indicators, and were further explored as biomarkers for water pollution. Meorphometric data on MMC was studied, including the avg. number, avg. volume in  $\mu\text{m}^2$ , and percent occupied area in  $24.000 \mu\text{m}^2$ . Diffe-rences significance for the MMC was statistically evaluated by t-test.

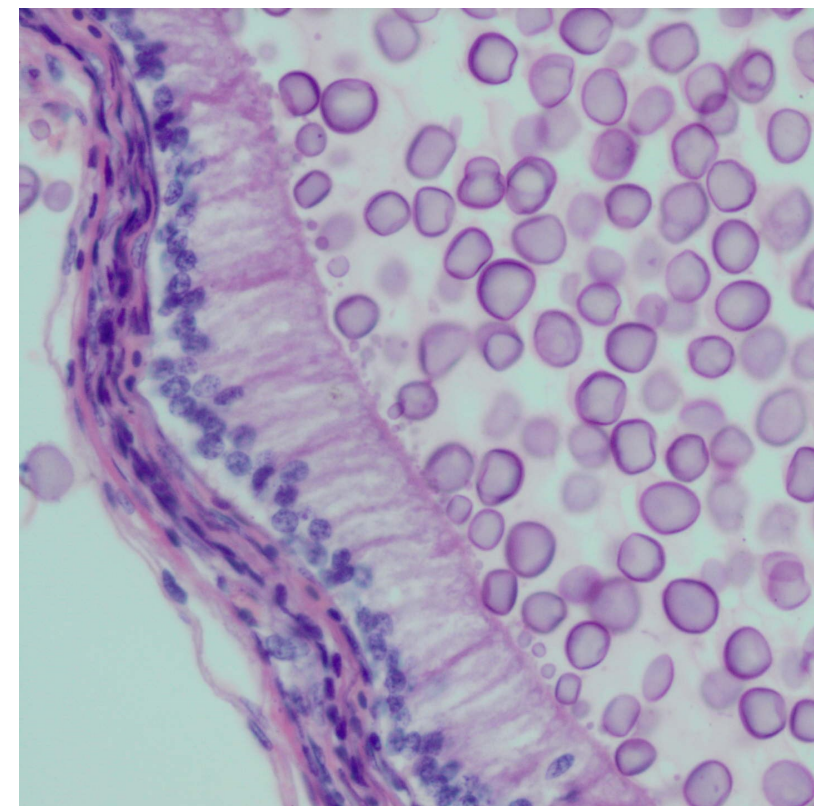
Samples for further histopatology were cut in 20 x 20 mm pieces and were fixed in the 10% neutral buffered formalin, while the each functional part of the digestive system was ligated on the sphincter and isolated carefully to study the presence of micro- and nanoplastics using FT-IR and RAMAN.

Upon the isolation, parts of digestive system were and transferred into separate Erlenmeyer flasks. The biological material was digested and incubated via dilution with filtration, where in 20 ml of 30% Hydrogen peroxide was added per 1 g of wet weight of the tissue and/or content. Samples were further incubated for 12 or 24h at 55 to 65 °C in a bain-marie a type of heated bath, which was covered with alum foil to avoid possible air contaminations. The suspension was filtered through the Macherey-Nagel cellulose filter papers with retention capacity (pore size) of 1 to 2  $\mu\text{m}$  - grades MN 640 de (thickness 200  $\mu\text{m}$ , weight 100 g/m<sup>2</sup>) and MN 619 (thickness 170  $\mu\text{m}$ , weight 75 g/m<sup>2</sup>). Each organ was filtered three to nine times, after which the system was fully cleaned to avoid contaminations. Observed area per filter paper measured 12,262 mm<sup>2</sup>. Plausible microplastic filaments, fragments and pellets were identified using the BestScope Model BS-3010B stereomicroscope and secluded for RAMAN spectroscopy. The smallest unit measures are 1  $\mu\text{m}$  and 1.000  $\mu\text{g}$ .



*Proximal tubule, Bowman's capsule and Glomerulus in the functional unit of the sharks kidney. The network of small capillaries (glomerulus) is clearly visible on the slide. HE*

*Photo: A. Gajić  
Sharklab ADRLA*



*Histological section of the oocyte in the late vitellogenic stage of the Lesser-spotted catshark (Scyliorhinus canicula), HE, HPF*

*Photo: A. Gajić  
Sharklab ADRLA*





# HABITAT MAPPING

Sonar and ROV mapping of the continental shelves of the southern Adriatic and northern Ionian sea

Environmental monitoring in the continental and insular shelves of the north Ionian and south Adriatic seas was performed using highly sophisticated ROV and sonar. Visuals and physicochemical measurements were conducted up to 100 to 150 m deep.

We have used the Trident OpenROV manufactured by Sofar Ocean Technologies headquartered in San Francisco, CA. The ROV is equipped with HD camera recording video footage of 1080p at 30 fps, and work capacity between -2°C and +45°C outside temp.

Target habitats up to 100 m deep were filmed at five selected localities within the Karaburun-Sazan Marine Park, the only MPA in Albanian territorial waters. The Park is located on the eastern shore of the Strait of Otranto and present the meeting point between the Adriatic and Ionian Sea. It is characterized has rich biodiversity which inhabits steep cliffs, giant caves, rocky reefs and soft sandy bottoms at the deeper parts. Despite, the biodiversity of the marine fauna is not well understood and significant lack of data was stated by the state Agency for protected areas.

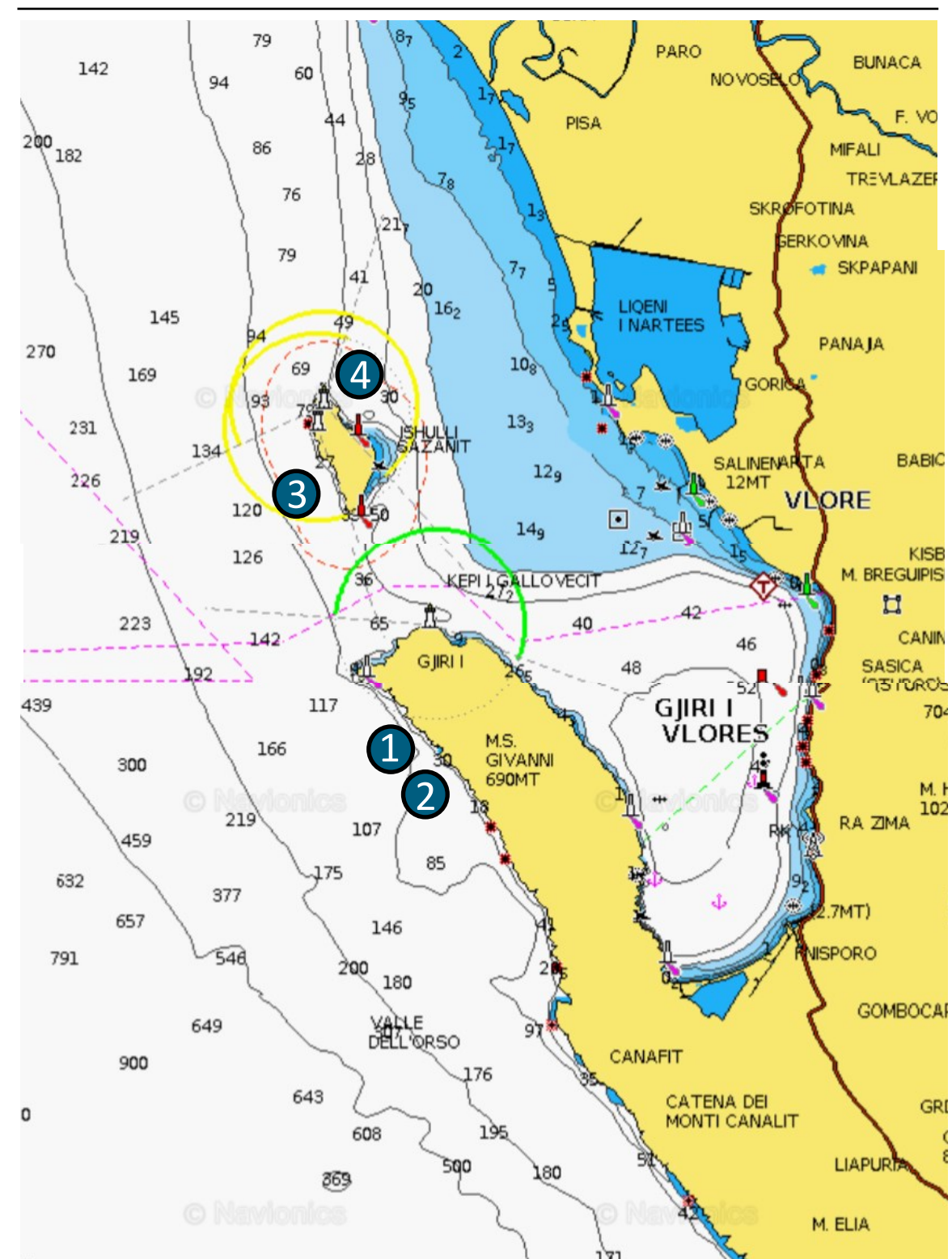
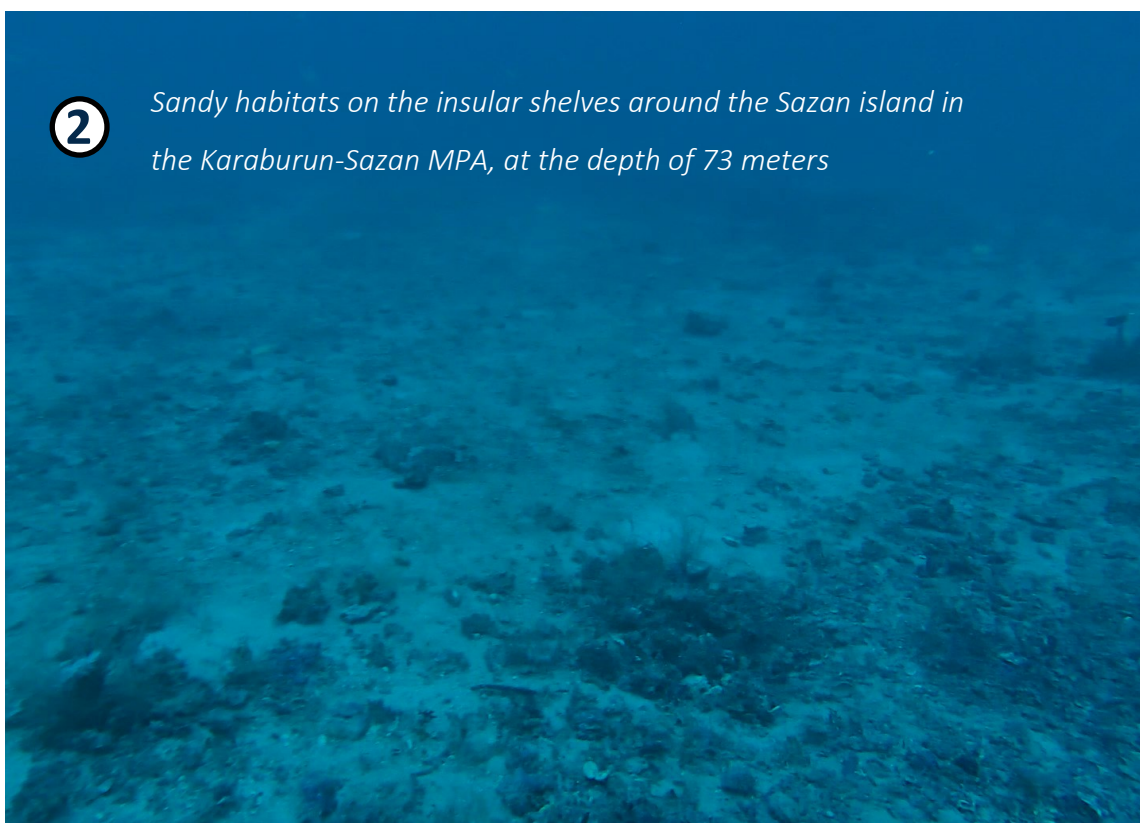
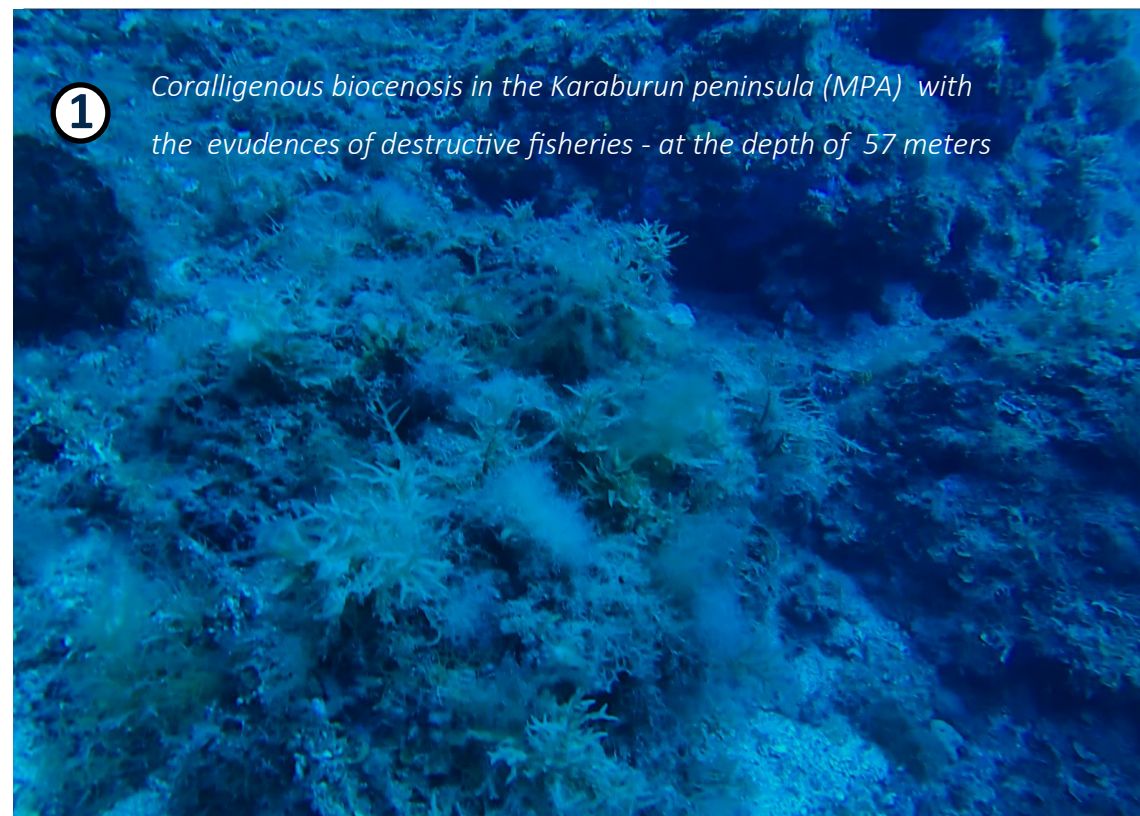
Open waters are important part of the habitat for large pelagic and highly migratory shark species, of which many are critically endangered - including Blue shark (*Prionace glauca*), Mako shark (*Isurus oxyrinchus*). Further, bathydeme-rsal habitats are also important for numerous highly threatened species such as Angular rough shark (*Oxynotus centrina*), Gulper shark (*Centrophorus granulosus* and/or *Centrophorus uyato*) - and some less-know species such as Kite-fin shark (*Dalatias licha*). Beside sharks, monk seal seek refuge in the inaccessible caves and canyons of the Park.

*Andrej Gajić and  
Simo Ribaj during  
ROV studies and  
sonar mapping and  
sampling in the  
northern Ionian Sea.*

*Photo © E. Karalić  
Sharklab ADRIA*







*Overview of the selected localities for ROV monitoring, habitat and sonar bottom 3D mapping visualized on the nautical chart provided by Navionics.*





# HABITAT MAPPING

Discovering the key habitats for shark, skates and rays  
in Karaburun-Sazan national marine park

Karaburun-Sazan Marine Park is the only marine protected area in Albania, and is listed as IUCN Category II and is protected through The Law of the Protected Areas. Despite the legal protection, entire area is poorly managed and is under different heavy pressures.

The Park lies on the meeting point of the Adriatic and Ionian seas and was extensively studied throughout our first expedition in August 2021. Total explored area was almost 10.000 ha, of which 8.000 ha on the sea off Karaburun and about 2.000 ha of the Sazan.

Our field research was based on the diving, ROV and sonar - with several different approaches to ensure the best results in terms of habitat monitoring and mapping. Entire Park is biodiversity hotspot and is rich in different habitats such as rocky reefs, corraligenous habitats, underwater caves, meadows of *Posidonia oceanica* and many more. Archeological remains under water was also observed at several explored sites. Several invasive species were also observed in large quantities.

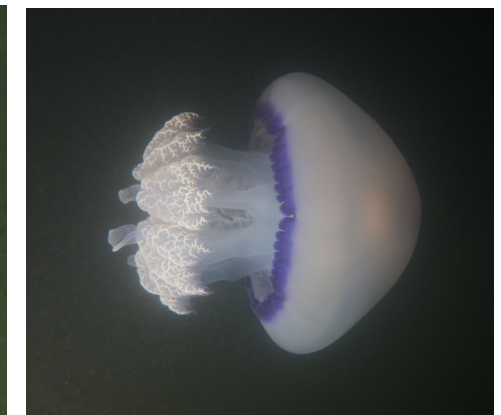
Coralogenic algae, a circular biogenic formation, which can extend locally to more than a meter in width, was present in the mediolitoral phase along the western shores of Karaburun, Sazan Island and within the Canal area. Numerous unreachable caves and canyons are ideal habitat for very rare Monk seal (*Monachus monachus*). Area is also considered as an important migratory corridor for sea turtles from their shelters on the island of Zakynthos in Greece (to the coast of Patok, Albania).





Observed underwater fauna were diverse and abundant, especially in the western part of the channel and around the island of Sazan. Most observed fish species near the coast were *Diplodus sargus*, *Diplodus vulgaris*, *Diplodus annularis*, *Spicara maena*, *Merluccius merluccius*, *Serranus cabrilla*, and *Thalassoma pavo*. Waters deeper than 70 m were characterized with very abundant *Merluccius merluccius* and *Mullus surmulletus*. Forkbeard (*Phycis phycis*) was observed in the deep pits, among other fish.

Large pelagic species such as Ocean sunfish (*Mola mola*) were also recorded during our field surveys. Sponges are represented with *Geodia cydonium*, *Hippospongia communis*, *Spongia officinalis* and some rarely *Petrobiona massiliana*. Numerous bivalve and gastropod species were observed, of which the most significant are *Pinna nobilis*, *Lithophaga lithophaga*, *Zonaria pyrum*, and *Charonia tritonis*. Cephalopod species were very abundant in both coastal and deeper habitats off the Karaburun and Sazan.



Despite being listed among the marine species of international interest within the Karaburun-Sazan area, we have not observed Precious coral (*Corallium rubrum*). Important species of crustaceans were observed, including *Scyllarides latus*, *Scyllarus arctus* and *Maja squinado*. Echinoderms *Paracentrotus lividus* and *Ophidiaster ophidianus* were abundant, together with many other species. No sea turtles nor cetaceans were observed, nor reported to us, during the expedition in Karaburun-Sazan MPA.

The first expedition revealed abundant populations of potential prey for mesopredatory and apex shark, skates and rays. No significant predatory species were observed. The park has enough resources to sustain population of several threatened elasmobranch species which were observed and to provide an important corridor for migratory species as well. Such rich habitats which are not significantly affected by predatory species might be an important breeding ground as well.



# CAPACITY BUILDING

Interactive workshops for biologists and students, stakeholder engagement raising the awareness campaigns

Changing the human behaviour towards the sharks is identified as key for overall conservation success (Simpfendorfer et al., 2021; Niella et al, 2021). Furthermore, it is necessary to enhance the higher education in the deve-

loping countries and to empower the next generation of experts and conservationists. Thus, one of our primary goals was to conduct the interactive workshops with biology professors and (under)graduate students in Vlorë.



In direct partnership with SEEP (Social Education and Environmental Protection) we have conducted a series of interactive workshops in the fields of:

- (1) Taxonomy and systematics, and proper species identification
- (2) Methodology of the fishery analysis and underwater field studies
- (3) Understanding the effects of micro and nanoplastics and pollution
- (4) IUCN assessments and how to develop, propose and advocate the effective conservation measures.

Although, regardless of the great coastline, unfortunately no attention is given to the marine biology in Albanian education. Thus, despite the general ignorance, especially when it comes to the sharks - we were very surprised by the interest of participants to learn more and contribute to conservation. More than 50 trainees passed our initial interactive workshops in Vlorë in August 2021. Thus, we are planning to return and to continue the necessary capacity building and to start the raising awareness campaign for the wider public at the beginning of 2022, most likely late January or February.

