

# Act. 2.5.3 SCIENTIFIC WORKSHOP ON ADRIATIC REEFS

## Deliverable D2.5.3

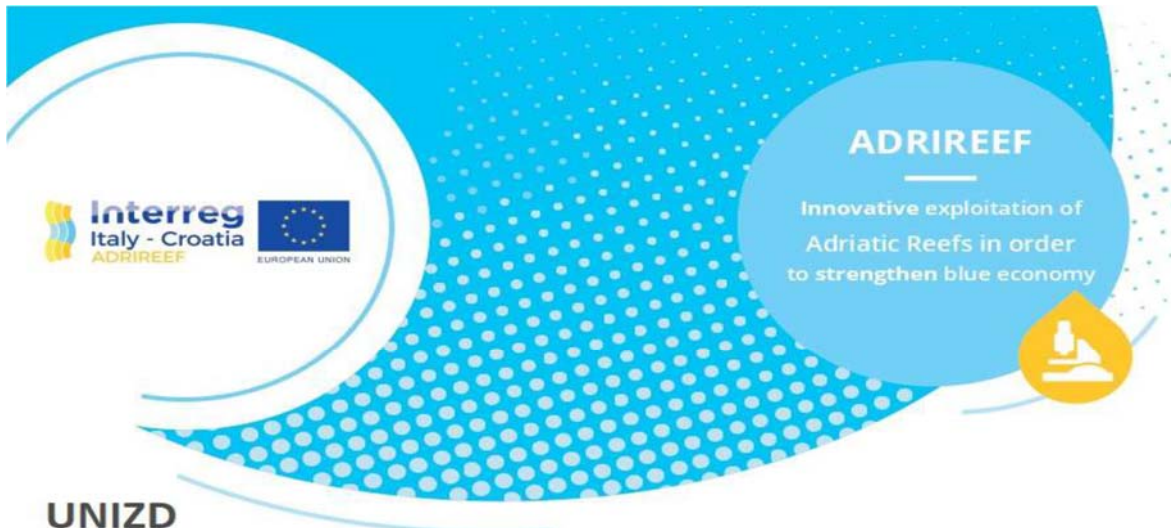
D2.5.3) Workshop in Zadar minutes

The workshop was held in Zadar on October 30th, in the great hall of Zadar University. Due to COVID-19 pandemic it was held online via ZOOM platform for all project partners that are not from Zadar. All other partners and stakeholders were divided into groups, not more than 15 people per group, due to Croatian restriction of maximum 30 people in the room.

A total of around 80 invitations were sent to stakeholders that have interest in the project. The main talking point for stakeholders was the location of Lagnjići reef. The targets were Universities, Scientific Institutes, local stakeholders such as diving centres, boat trip rentals (both fishing and sightseeing), Institutional Stakeholders of Zadar county.

The workshop included three sessions. The first session was more scientific oriented and was about importance of natural reefs in Croatia. The second and third session were presentations of partners on the project and their work done so far. It was mixed with presentations of local stakeholders that have interest in Lagnjići reef, why the reef is important to them and why it can be good for development of Zadar county.

## The formal invitation and Agenda



## UNIZD

is pleased to invite you to the:

### SCIENTIFIC WORKSHOP - INNOVATIVE EXPLOITATION OF ADRIATIC REEFS IN ORDER TO STRENGTHEN BLUE ECONOMY



#### WHEN

30th October 2020 - from 9.30 a.m. to 4 p.m.



#### WHERE

University of Zadar - The Great Hall, Mihovila Pavlinovića 1, 23 000 Zadar

#### EVENT OVERVIEW


The objective of the ADRIREEF project, with almost 3 million euros funded under the European Interreg programme Italy-Croatia 2014-2020, is to provide guidelines for developing sustainable business activities through the exploitation of services and goods the natural rocky habitats and artificial reefs occurring in the Adriatic Sea can offer. In order to do that the project includes a review of existing laws at international, national and local level which regulate the use of natural and artificial rocky habitats, a mapping of the Adriatic natural and artificial reefs, and their classification basing on geophysical and ecological features as well as of current and possible future usages from different stakeholders. The potential of the different reef typologies for the development of sustainable economic activities will be investigated through innovative monitoring technologies with low environmental impact, which will be tested in several Case Studies. The project also foresees the involvement of all categories of stakeholders who can be interested in the management, monitoring, and use of those areas. In this context, the Workshop is aimed to connect scientists and representatives from the public sectors involved in the management of marine areas in order to discuss and identify the optimal ways for sustainable management of Adriatic reefs to increase the local tourism offer as well as to implement other activities (e.g., small scale fisheries, aquaculture).

European Regional Development Fund



<b>09:30 -10:00</b>	Registration
<b>10:00 – 10:10</b>	Opening session ( Prof. dr. sc. Zvezdan Penezić – University of
<b>10:10 – 10:25</b>	ADRIREEF Project presentation (Ana Močević, Zadra Nova)
<b>10:25 – 10:40</b>	Coral reefs in eastern Adriatic and their importance for
<b>10:40– 11:00</b>	Fish communities on coralligenous habitat (Igor Glavičić -
<b>11:00 – 11:15</b>	Kayaking as unique opportunity to experience pilot location
<b>11:15 - 11:30</b>	<b>Coffee break</b>
<b>11:30 – 11:50</b>	University of Rijeka, University of Zadar and IRB – Presentation of
<b>11:50 – 12:00</b>	Sport fishing and importance for the general public – Ante
<b>12:00 – 12:10</b>	Pinna nobilis and importance of shellfish for underwater reefs (dr.
<b>12:10 – 12:20</b>	Presentation of Case Study Paguro wreck (ARPAE)
<b>12:20 – 12:30</b>	Lagnjići shipwreck – starting point for Dugi otok blue economy
<b>12:30 – 13:00</b>	Questions and discussion
<b>13:00 -14:00</b>	<b>Brunch</b>
<b>14:00 – 14:10</b>	The Northwestern part of Dugi otok – Protected landscape – mr.
<b>14:10 – 14:20</b>	RERA
<b>14:20 – 14:30</b>	Sunce
<b>14:40 – 14:50</b>	Presentation of the Case Study Torre Guaceto MPA (ARPA Puglia)
<b>14:50 - 15:00</b>	Presentation of Case Study Trezza San Pietro (INOGS)

Attendance sheet



**List of Participants**  
**ADRIREEF Italy - Croatia**  
**WP 2.5 Scientific Workshop in Adriatic reefs**  
**Friday 30<sup>th</sup> October 2020.**

**VENUE: The Great Hall, University of Zadar, Mihovila Pavlinovića 1, 23 000 Zadar**

N.	Name and Surname:	Organization:	e-mail:	Phone:	Signature:
1.		JU Notve podsc			
2.		POMORSKI FAKULTET			
3.		PFRI			
4.		IBS			



N.	Name and Surname:	Organization:	e-mail:	Phone:	Signature:
5.		IRB			
6.		JANUUS d.o.o.			
7.		DEJSTVO USTAJNIKA MORA 2000 MIJA			
8.		KAYAK ADVENTURE ZD			
9.		JU RERO S.I			
10.		JU RERA S.D.			
11.		SUNCE			
12.		SUNCE			
13.		ZADAR COUNTY			



N.	Name and surname:	Organization:	e-mail:	Phone:	Signature:
14.		UNIZD			
15.		SVUC			
16.		ZADARSKI LIST			
17.		UNIZD			
18.		CIKACIL			
19.		UNIZD			
20.		Zadka Nova			
21.		UNIZD			
22.					





N.	Name and surname:	Organization:	e-mail:	Phone:	Signature:
23.		BANALIS			
24.		ZADRA NOVA			
25.		FEDAL TOURS			
26.		MINISTARSTVO POLJOPRIVREDE			
27.		Zadar Sub			
28.		HARE ZALHATIČIĆ			
29.		Vereniarski fakultet Zagreb			



N.	Name and surname:	Organization:	e-mail:	Phone:	Signature:
30.		Zadar by both			
31.		K-bioptičina			
32.		ŠKO ŽUBAČAC ZADAR			
33.		ŠKO ARBANASI			
34.					
35.		VIVI OBRŌ			
36.					
37.					

Dubravko Pejdo  
UNIZD, Zadar (Croatia)

Chairman

Dubravko Pejdo opened the workshop and introduced the agenda. Presented the speakers and moderate the workshop.



Zvezdan Penezić

**UNIZD – Zadar (Croatia)**

**PRORECTOR**

Zvezdan Penezić is the Prorector of Zadar University. He welcomed all the participants, presented the University of Zadar, talked about history, present and upcoming challenges for the University.



## Session 1

**Ana Močević**

**Zadra Nova – Zadar County Development Agency**

**Project partner**



Ana Močević presented the ADRIREEF project to stakeholders, its importance and benefit for the local community. What is and has been done on the project so far.



# ADRIREEF – Project presentation

ADRIREEF | ZADRA NOVA | Ana Močević

Scientific workshop | Zadar | 30th October 2020

European Regional Development Fund

## ADRIREEF – Innovative exploitation of Adriatic Reefs in order to strengthen blue economy



Priority axis: **Blue innovation**

↓  
Focuses on the enhancing the attractiveness of existing marine resources in order to promote economic development

Duration: 01/12/2018 – 30/05/2021

Total budget: € 2.814.830,00

Project focus

→ **Examine** the potentiality of the Reefs in Adriatic sea in order to strengthen blue economy

→ **Combine innovative actions** with possible socio – economic impacts originated from activities such as aquaculture and tourism, two sectors of Blue economy



## Project objectives

1. To enhance the potential of Adriatic reefs to increase blue economy and so employability
2. To test innovative integrated monitoring systems with low environmental impact
3. To draft recommendations and guidelines for a sustainable exploitation of Adriatic reefs

## Project Partners



OGS National Institute of Oceanography and Experimental Geophysics

MUNICIPALITY OF RAVENNA LEAD PARTNER

ARPAE Emilia Romagna

CNR IRBIM – Istituto per le Risorse Biologiche e le Biotecnologie Marine

ARPA - Puglia

Institute Ruđer Bošković

University of Rijeka – Faculty of Maritime Studies

University of Zadar

Zadar County Development Agency – ZADRA NOVA

Public Institution for coordination and development of Split-Dalmatia County

Ass. For nature, environment and sustainable development

## Work packages

WP1 Project management and coordination of the activities

WP2 Communication activities

WP3 Mapping of Adriatic Reefs from different perspective

WP4 Monitoring of Adriatic Reefs

WP5 Innovative exploitation of Adriatic reefs for Blue economy

## Adrireef Festival

WP2  
Communication activities



Adrireef Festival Vis  
Summer 2021

- The aim of each festival is to disseminate knowledge and experience to enterprises and SMEs, but also associations, about the potentiality of reefs for blue economy

## Stakeholder Survey

WP2  
Communication activities

In line with the AF, in order to collect relevant information from the identified key stakeholders on their approach to innovation, the project sets up an online survey, promoted by PPs via newsletter and direct invitation. The survey is opened for 45 days, provided in English, Italian and Croatian. At the end, a specific report will be drafted and will be part of the final report of the project.

! Stakeholder survey is available on the following link  
<https://forms.gle/rCPerVyBFPdsQEX18>

## WP3

Mapping of Adriatic reefs

- **Objective** collect, organize and capitalize all the information produced with independent project and researches, with the aim to obtain a map of the current situation of Adriatic reefs

1. Reefs classification in the cooperation area
2. Legal framework analysis
3. Identification of relevant case studies
4. Identification of technologies for underwater monitoring
5. Stakeholders analysis

## WP4

Monitoring phase of  
Adriatic reefs

This technical WP includes:

- Definition and testing of technologies with low environmental impact for monitoring the Adriatic reefs
- Measurement and evaluation of parameters (physical, chemical and biological) at different case studies
- The results could provide useful informations for any stakeholder interested in the sustainable use of natural and artificial reefs (including issue of sunken ships or reuse offshore extraction platforms)

## WP5

Innovative exploitation of  
Adriatic reefs

Objective - Drafting the main output documents of the project. The PPs will find out the relevant information to be transferred to stakeholders

1. Scientific report of in depth analysis
2. Definition of common guidelines for reef users
3. Definition of recommendations for policy – makers and funding agencies



## Human use of the reefs in the view of Blue Economy

### Tourism -> Diving and snorkling

- Sustainable activity that can provide economic resources not only for local communities but also for the implementation of conservation policies

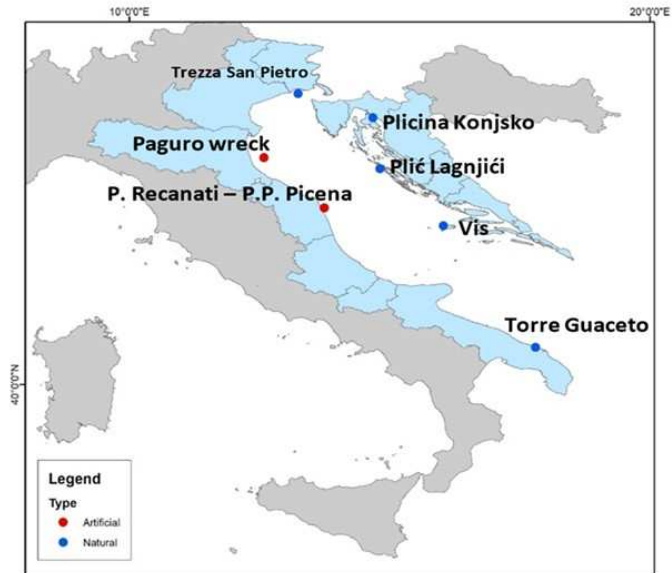
### Fishing -> Professional or recreational

- Necessary adoption of guidelines for sustainable implementation of these activities to help to protect the natural environment and maintain the ecological balance on the reefs

### Citizen science

- Participating in scientific activities and research projects related with the environment and it's biodiversity, taking advantages of new technologies

## Case studies



Thank you!

**Petar Kružić**

**Ruđer Bošković Institute, Zagreb (Croatia)**

**Invited speaker**



Petar Kružić made a presentation about coral reefs in Adriatic Sea, their importance and why they are important for the local community. With increasing pollution and rising sea temperatures it is important to save natural coral reefs as they are nursing home for many species, mainly fish.

# Coral reefs in the eastern Adriatic and their importance for marine communities

Petar Kružić

Faculty of Science, University of Zagreb, Rooseveltov trg 6, 10000 Zagreb



## Classification

*Cladocora caespitosa* (Linnaeus, 1767)

Croatian name: Busenasti koralj, granati zvijezdavic

Phylum: CNIDARIA

Class: ANTHOZOA

Subclass: HEXACORALLIA

Order: SCLERACTINIA

Suborder: FAVIINA

Family: FAVIIDAE

Subfamily: MONTASTREINAE

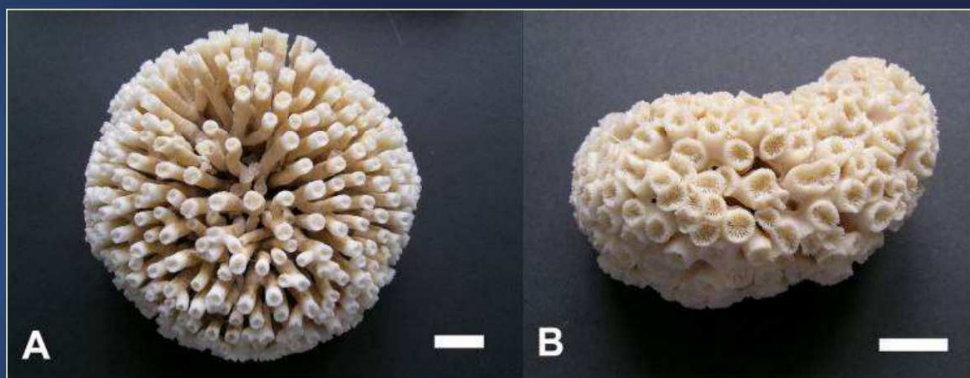
Genus: *Cladocora*



This is a large family with several genera and mostly tropical corals; positive identification of many species is impossible without skeletal examination. Faviids are encrusting or massive with large circular or hexagonal calices and strong septal walls, others are brain-like with indistinct calices within sinuous valleys. Most are tolerant of wave action and occur on shallow reefs.

*Cladocora caespitosa* (Linnaeus, 1767)

Morphology



*Cladocora caespitosa* (Linnaeus, 1767)

Morphology

single colony



field of colonies



coral bank



*Cladocora caespitosa* (Linnaeus, 1767)



Coral bank



*Cladocora caespitosa* (Linnaeus, 1767)

### Biology and ecology



The only coral species in Mediterranean that forms reefs

- Tunisian coast (Zibrowius, 1974, 1980) - 70 m<sup>2</sup>
- Aegean Sea (Laborel, 1961, 1987) - 100 m<sup>2</sup>
- Ligurian Sea (Morri i sur., 1994) - 3,5 m<sup>2</sup>

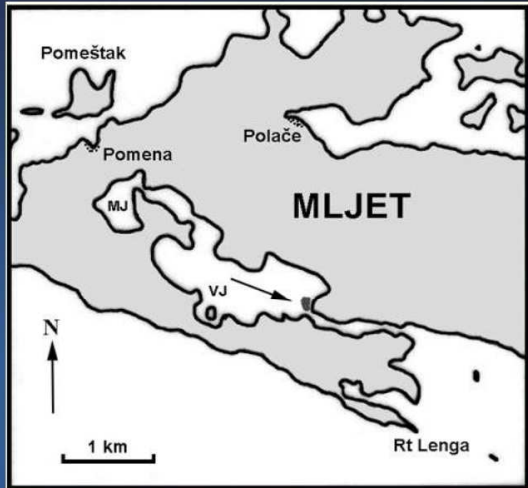
*Cladocora caespitosa* (Linnaeus, 1767)

Distribution



● - colonies   ● - reefs

*Cladocora caespitosa* (Linnaeus, 1767)



Veli most (Veliko jezero, NP Mljet)



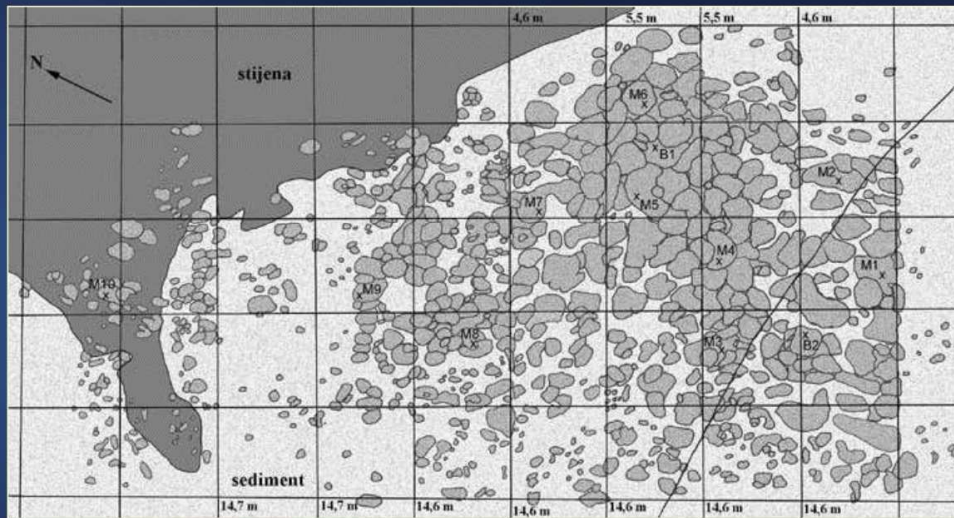
*Cladocora caespitosa* (Linnaeus, 1767)

Veli most (Veliko jezero, NP Mljet)



*Cladocora caespitosa* (Linnaeus, 1767)

Veli most (Veliko jezero, NP Mljet)



Reef area 650 m<sup>2</sup>, 5 to 20 m depth

*Cladocora caespitosa* (Linnaeus, 1767)



Veli most (Veliko jezero, NP Mljet)



*Cladocora caespitosa* (Linnaeus, 1767)

Veli most (Veliko jezero, NP Mljet)





*Cladocora caespitosa* (Linnaeus, 1767)

Veli most (Veliko jezero, NP Mljet)



*Seriola dumerili* (Risso, 1810) Greater amberjack

*Cladocora caespitosa* (Linnaeus, 1767)



Veli most (Veliko jezero, NP Mljet)



*Cladocora caespitosa* (Linnaeus, 1767)

Veli most (Veliko jezero, NP Mljet)

Genus *Epinephelus*



*Cladocora caespitosa* (Linnaeus, 1767)

Veli most (Veliko jezero, NP Mljet)



*Chromis chromis* (Linnaeus, 1758)  
damsel fish or Mediterranean chromis

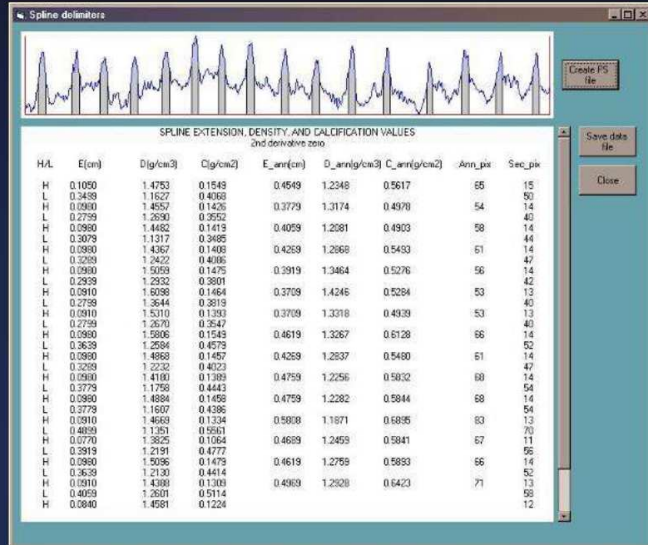
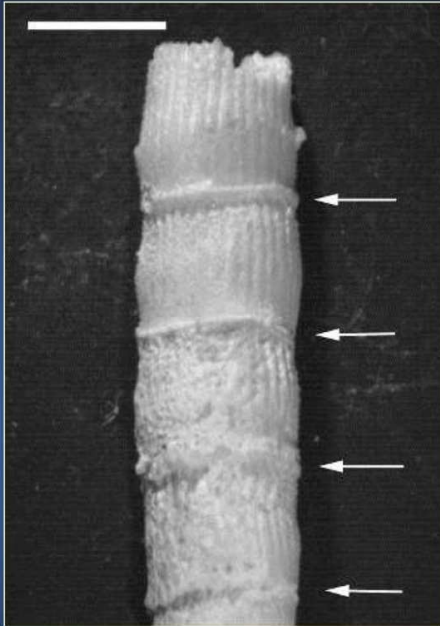
Veli most (Veliko jezero, NP Mljet)



RESEARCH

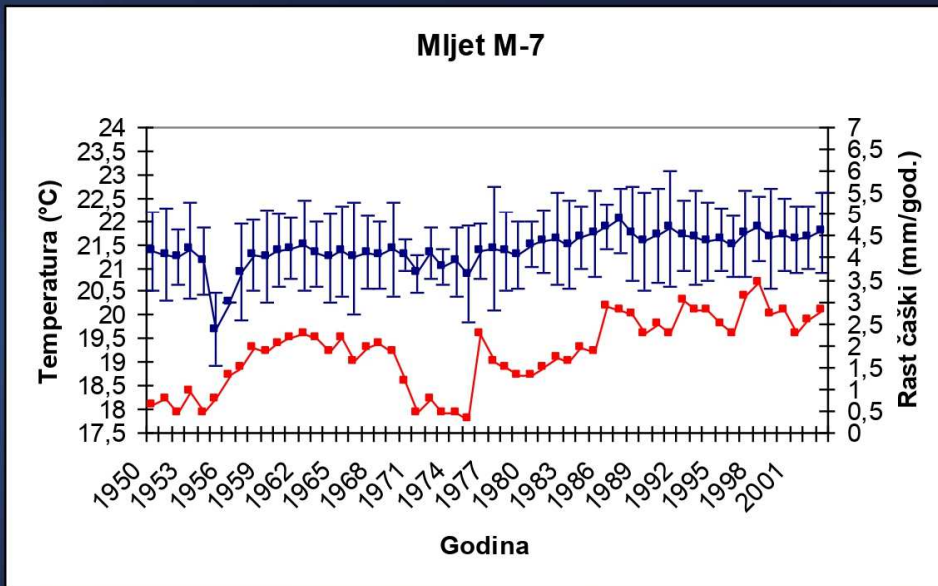


## CORAL GROWTH



## CORAL GROWTH

- Coral growth follow sea temperature rising





CORAL REPRODUCTION

Spawning in *Cladocora caespitosa*



- Veliko jezero
- June 2005

## Threats to corals

- storms
- anthropogenic pressure (collecting, dredging, sedimentation)
- overfishing
- tides
- predators (fish *Sparisoma cretense*)
- coral diseases (bacteria, fungi, protozoa, viruses)
- anthropogenic pollution (high level of nutrients - algal blooms)



## Threats to corals

*Cladocora caespitosa* (Mljet bank)

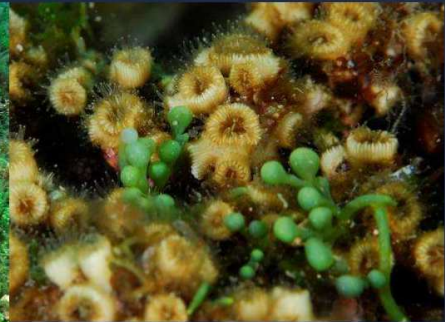


Competition with algae

## Threats to corals

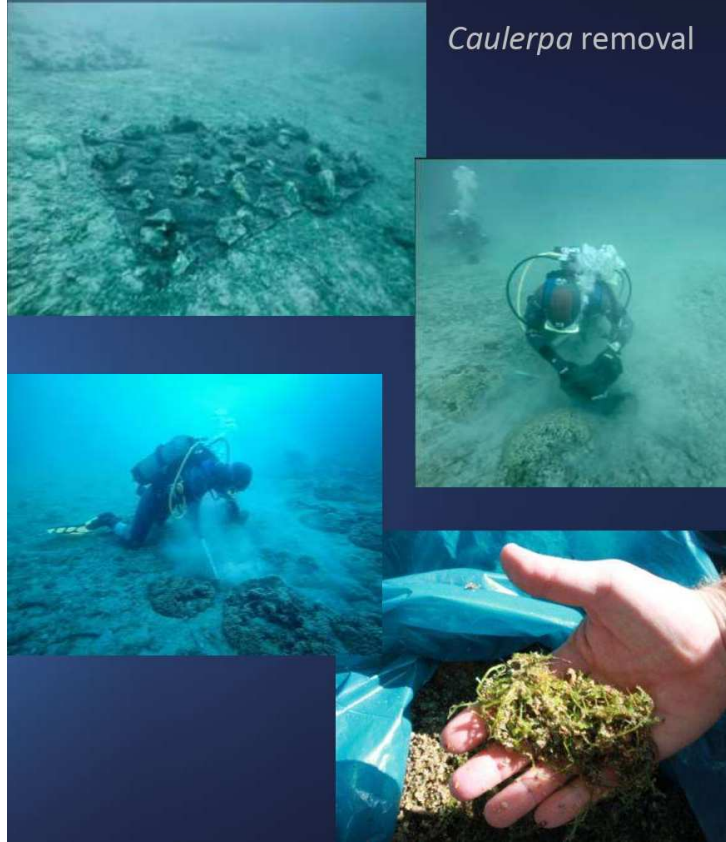
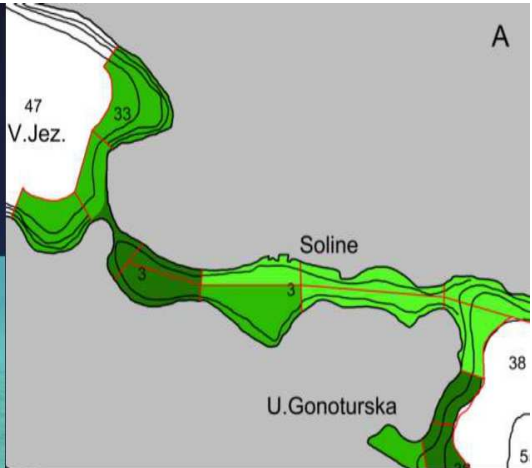
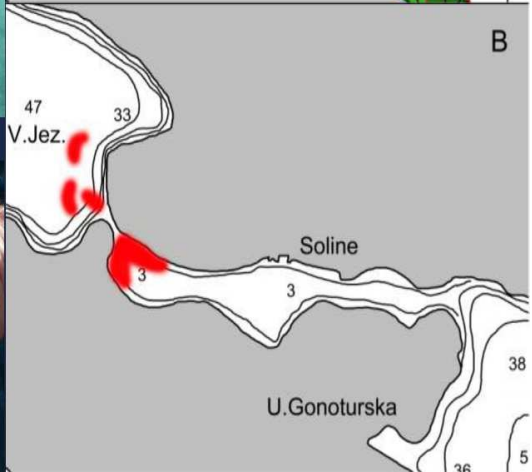
INVASIVE ALGAL SPECIES

*Caulerpa cylindracea* Sonder



**INVASIVE ALGAL SPECIES**

*Caulerpa* removal

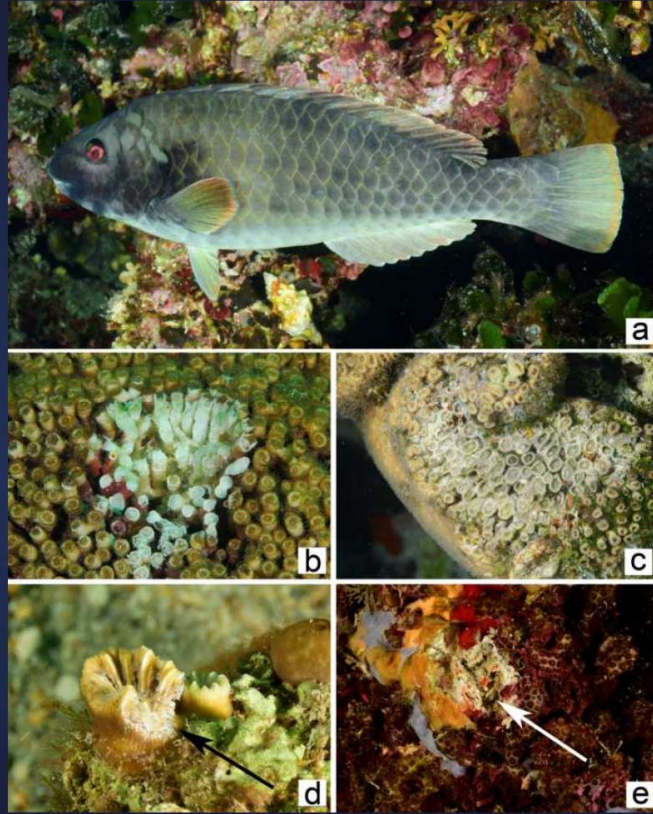
## Threats to corals

### INVASIVE FISH SPECIES

Parrotfish *Sparisoma cretense* (Linnaeus, 1758)



*Sparisoma cretense*



## Threats to corals

- eutrofication



*Cladocora caespitosa*

- anchoring





## Increasing of sea temperature

- bleaching events of coral *Cladocora caespitosa*, with partial or complete bleaching in NP Mljet - 1997., 1999., 2003., 2006., 2009., 2010., 2012., 2014., 2015., 2016., 2017., 2018.
- during summer 2003., about 30% of colonies were partially damaged and 10% of colonies died because of bleaching. All bleaching events were caused by high sea temperatures (up to 30 °C),



## Threats to corals

### WHAT IS CORAL BLEACHING ?



Warmer sea temperatures can result in coral bleaching. When sea is too warm, corals will expel the algae (zooxanthellae) living in their tissues causing the polyp to turn completely transparent. **This is called coral bleaching.** When a polyp bleaches, it is not dead. Corals can survive a bleaching event, but they are under more stress and are subject to mortality.

## Increasing of sea temperature

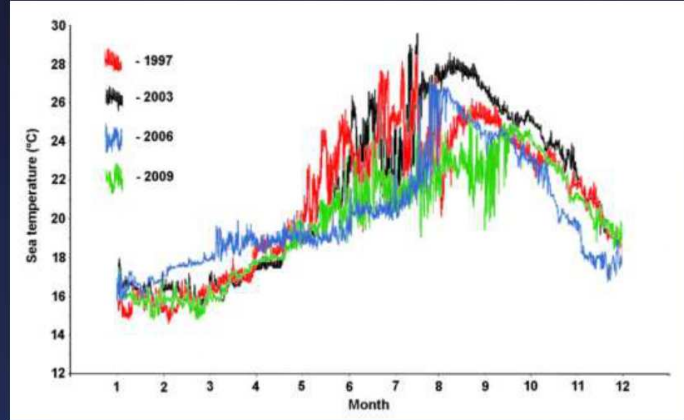


*Cladocora caespitosa*

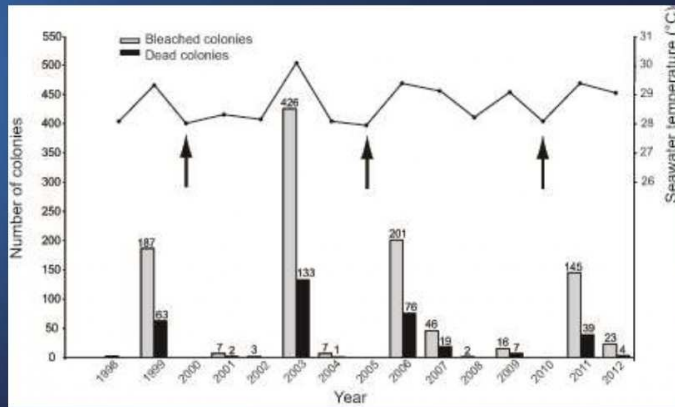
(polyp "bleaching")



NP Mljet (“bleaching”)



Annual sea temperatures (at 10 m depth) from the Mljet bank.



Number of damaged and dead colonies of the coral *Cladocora caespitosa* in the National Park Mljet from 1997 to date.



THANK YOU !

**Igor Glavičić**

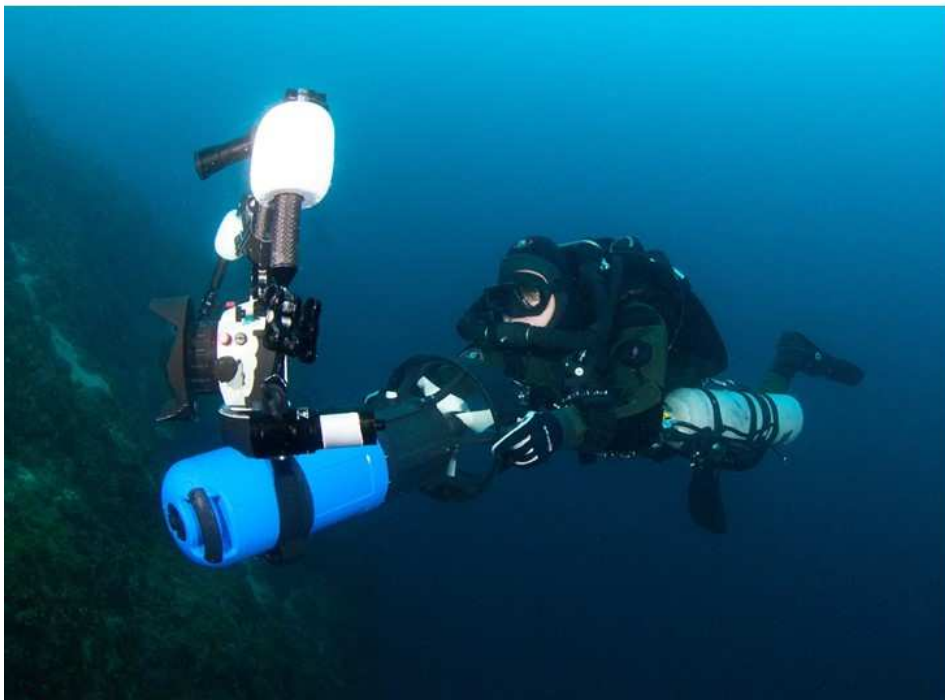
**UniST, Split (Croatia)**

**Invited speaker**



Importance of coralligenous habitat and knowing its structure is very important for local community. Diving centres, recreational fishing clubs and rentals have big potential to use coralligenous habitat for their work and to give added value to tourism. Photo safari is one of the activities that can be made on the habitat but also photos can be used for gallery or street display during the summer season. Also coralligenous habitat is important for academic society and can be a polygon for students learning.

## FISH COMMUNITIES AT CORRALIGEN REEFS IN THE ADRIATIC



DEPARTMENT OF  
MARINE STUDIES,  
UNIVERSITY OF SPLIT

Igor Glavičić

**Mediterranean Sea coralligenous reefs are biodiversity hot spots and are classified as sensitive habitats deserving conservation.** (Costantini et al, 2018, Scientific Reports )



- 2 Different methods (VC and Quadrats)
- Present results from 5 research papers and works in progress





## **UNDERWATER VISUAL CENZUS (UVC):**

Typically used for hyperbentic and epibentic fish

- Underwater visual census (UVC) developed in 1950' in tropical seas while its application in the temperate waters of the Mediterranean started a few decades later.
- The first methods were based on collecting data by observers/divers.
- Different underwater video techniques have been introduced for assessing fish assemblages.
- The increasingly higher resolution and higher performance of every new generation of video cameras and their sensors make the underwater video census more and more promising method.



## UNDERWATER VISUAL CENZUS (UVC):

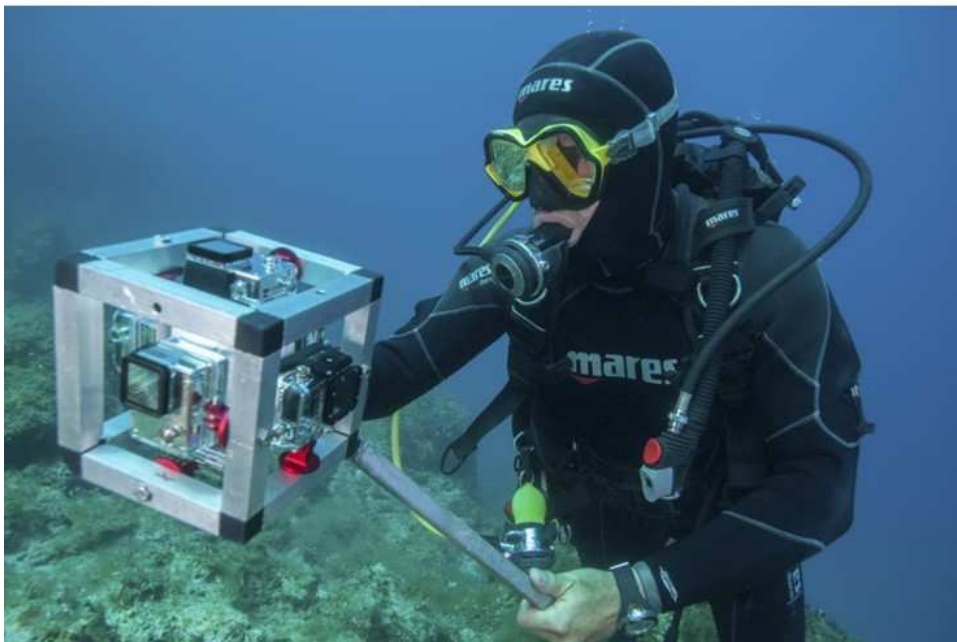
**Goal:** to investigate different underwater video techniques for assessing reef fish communities:

1. Diver operated video (DOV),
2. Diver operated scooter-video system (DOSV),
3. Diver using 6 video cameras  
Virtual reality system (VR).



## Virtual Reality System (VR)

- Observer/diver is using 6 video cameras producing 360° angle video.
- Cameras are arranged to capture footage in every direction.



# How 360 VIDEO WORKS...

© 2015 MIŁOSZ PIERWOLA

**IN NORMAL CINEMA**, footage is filmed in one direction and projected onto a rectangular screen in front of the viewer. Obviously, the camera is limited in that it is not capable of filming in extreme directions including behind the lens. The final footage is projected on a flat screen with the exception of IMAX that produces the effect of peripheral vision by using special lenses that capture a wide angle.

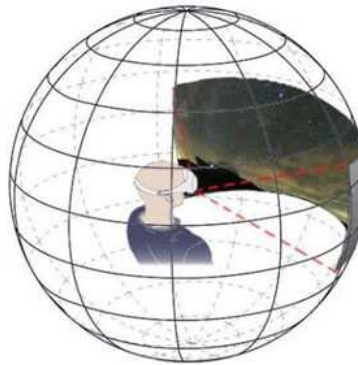
**WITH 360 VIDEO**, cameras are arranged to capture footage in every direction. In post-processing, the footage is "stitched" together and, instead of being projected onto a flat screen, is projected to the outside of a sphere. The point of view of the audience is in the center of the sphere and the viewing area is a 96° **screen** that responds to the viewer's line of sight. If this line of sight changes, the viewing area responds by following; so if the viewer turns their head, the screen turns in the same direction as the footage is playing.

With motion-sensing accelerometer technology, this allows 360 video to respond in real time and give the impression of being inside the movie as if on a rollercoaster.

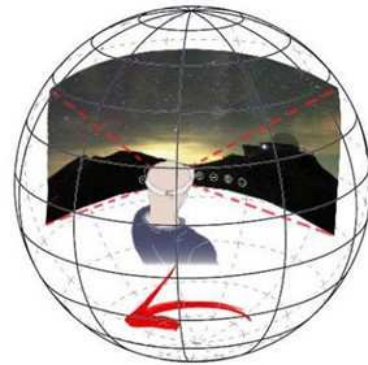
TOTAL COMPILED FOOTAGE



VISIBLE FOOTAGE

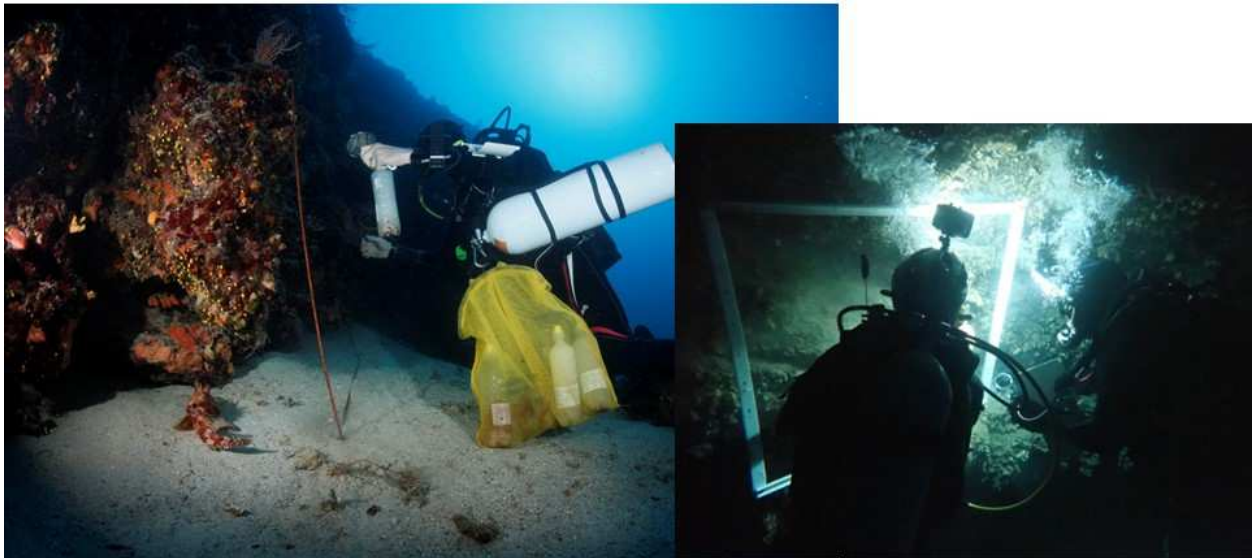


INTERACTIVE MOTION SENSOR



## Quadrats

- Typically used for small, non-motile or slow moving organisms that are reasonably abundant within a manageable quadrat size
- Including cryptobenthic species (hidden in bottom spaces) and cryptic epibenthic species (on the bottom surface, but hard to see)



## Assessing criptobenthic speacies

### Anesthetics/Poisons

- **Poisons** include Rotenone (root of South American plant),  
**Anesthetics**
- Quinaldine – dilute to 10% with EtOH or acetone or isopropanol
  - Hard to get rid of smell

### Application

- Plastic squeeze bottle



## Mixed gas diving

- Maximum depth
  - Air and Nx: 50 m.
  - Trimix: 100 m.



- Pp Oxigen
  - **Min: 0,14 bar.**
  - **Max: 1,40 bar on the botom and 1,60 bar at deco.**
- Pp N<sub>2</sub>
  - **Max sugested 3.5 bar**

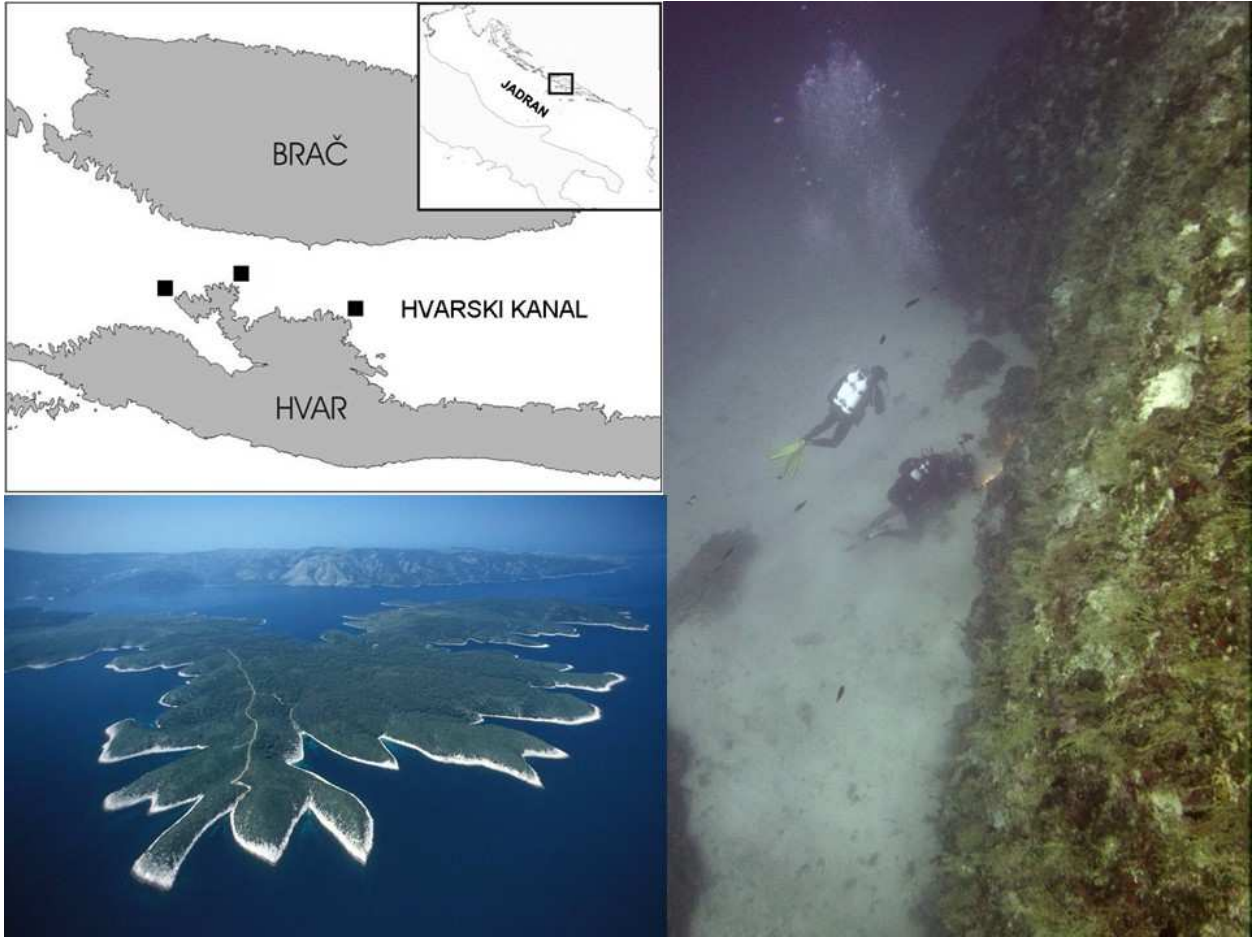


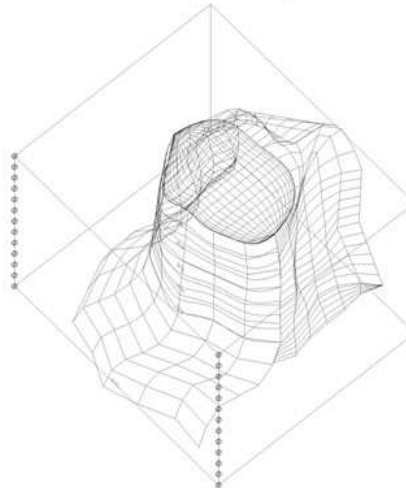
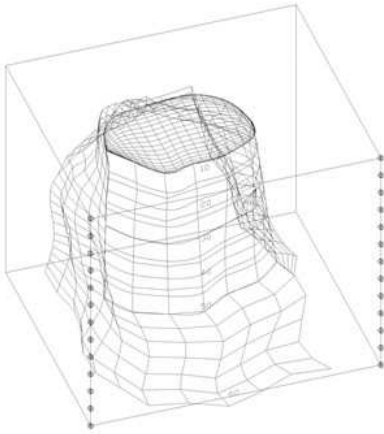
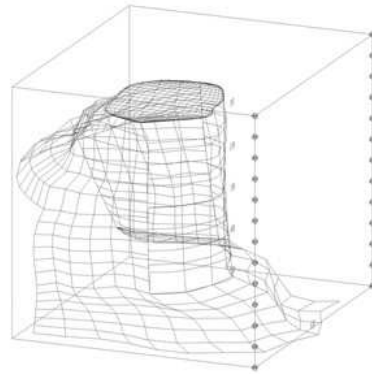
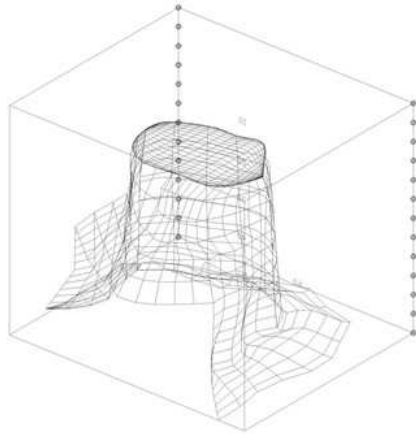
## TX equipment

- SCUBA
- Rebreather



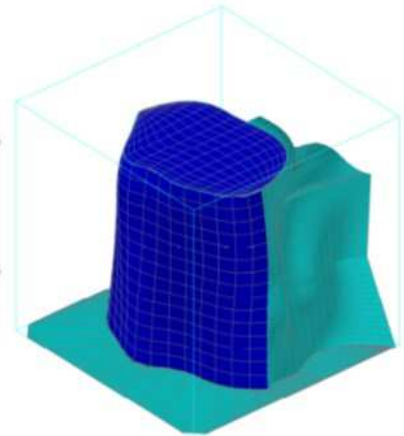






### Computer model:

- ❑ min. depth 9,1 m to max. 65,7 m
- ❑ vertical wall: SE-NW
- ❑ transects, 0-50 m
- ❑ Quadrats 10-60 m



## ***1. A quantitative assessment of the cryptobenthic fish assemblage at deep littoral cliffs in the Mediterranean.***

I. Glavičić, D. Paliska, A. Soldo, M. Kovačić



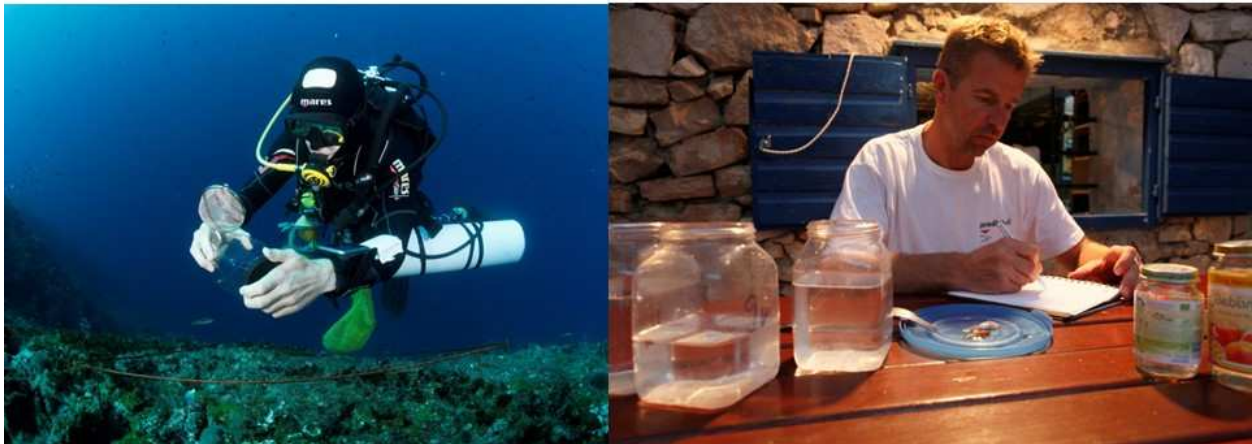
- study provides the first quantitative assessment of cryptobenthic fish species on hard bottoms below 20 m depth by examining
  - Mediterranean underwater reefs with deep vertical cliffs.
  - depths to 45 m
  - 50 x 1m<sup>2</sup>
  - yielded 220 cryptobenthic and 61 epibenthic individuals
  - .
- Three habitat variables (***depth, rocky cliff surface area vs. the bottom of the cliff, and the presence of sand as the bottom substrate***) were identified as significant for species occurrence



## 2. A QUANTITATIVE SAMPLING METHOD FOR ASSESSMENT OF DEEP CRYPTOBENTHIC ICHTHYOFAUNA USING TRIMIX DIVING

I. Glavičić, M. Kovačić

- **4 dives, depth 60-70m**
- The safe, efficient, and relatively simple diving technique for collecting fishes is described and explained.
- total of 16 fish specimens representing four species, i.e., three gobiid and one blenniid species, were collected
- Two of the collected species, *Thorogobius macrolepis* (Kolombatović, 1891) and *Vanneaugobius dollfusi* (Brownell, 1978), are considered rare with very few reported records



### 3. THE FIRST ADRIATIC FINDING OF *SPELEOGOBIOUS LLORISI* (ACTINOPTERYGII: GOBIIFORMES: GOBIIDAE)

M. KOVAČIĆ<sup>1\*</sup> and I. GLAVIČIĆ

**Speleogobius llorisi** (Kovačić,  
*Ordines and Schliewen, 2016*)

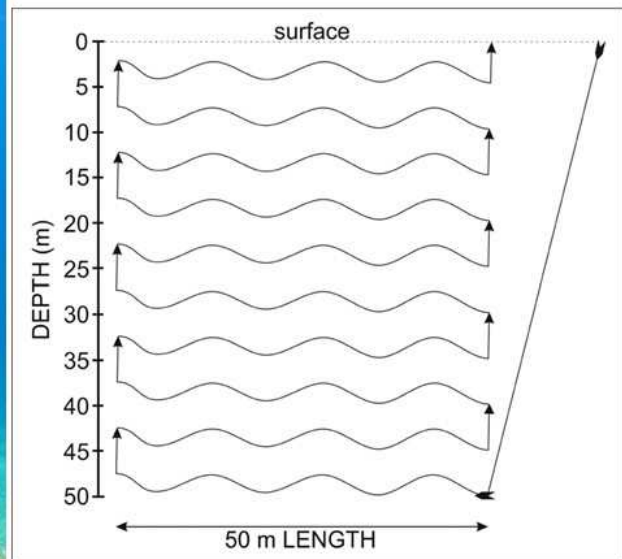


- 2018. two specimens of *S. llorisi* were collected at Cape Tatinja on the north side of the Island of Hvar
- preliminary fieldwork for the quantitative study of Adriatic maerl
- first record of *S. llorisi* in the Adriatic Sea and third in total for this species

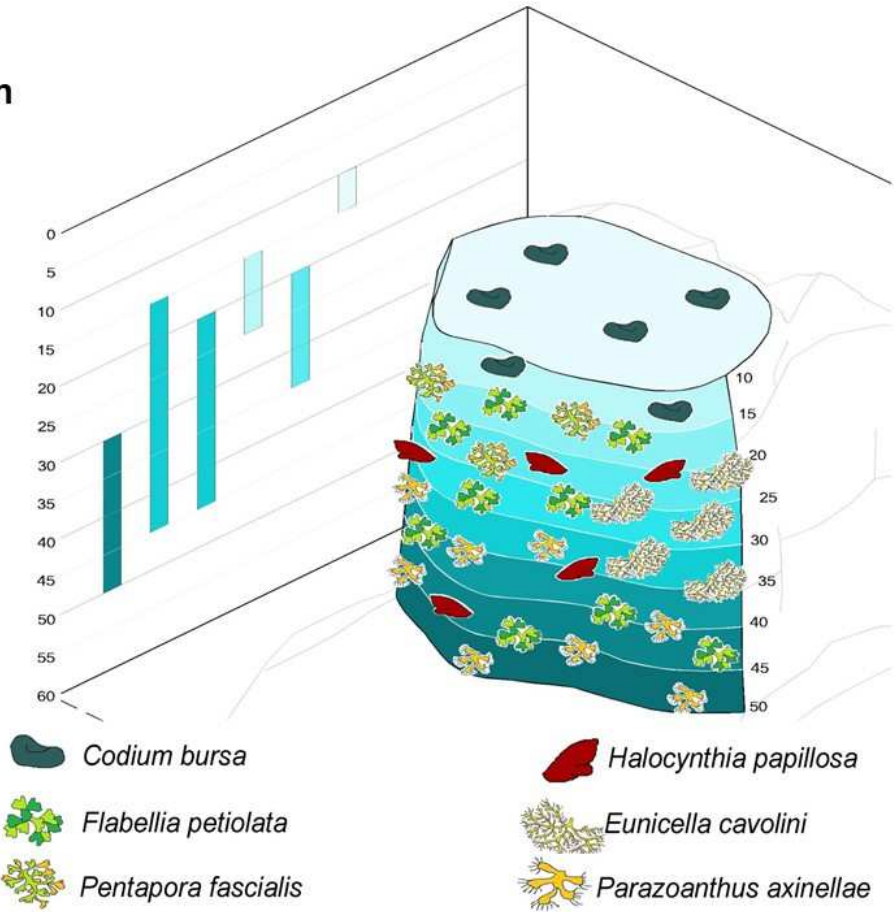
## 4. Underwater Visual Census of Deeper Vertical Rocky Reefs.

A. Soldo, I. Glavičić

Paper describes the Deep Vertical Transect (DVT) method as a safe and effective method for assessing fish in waters up to 50 m of depth.



**Depth distribution of the dominant species covering reef transect.**





- Two experienced divers/observers
- Transect method: 24 transects, 50 m x 5 m (height/depth)

**The results of 51 recorded species, yielded 41 considered as reef-associated and 10 as occasional.**



This suggests that underwater steep coralligenous reefs are marine biodiversity hotspots. They may be considered to represent a distinctive marine subecosystem, possessing its own food chain, with the depth, in relation to temperature, as the most important factor responsible for the diversity of fish assemblages within this habitat.

## REEF COVER:

### ➤ **Coralligenous:**

hard substrate of biogenic origin mainly produced by the accumulation of calcareous encrusting algae growing in dim light condition.

### **Dominant cover species:**

- ❑ **green algae** (Chlorophyta)  
*Codium bursa* and *Flabellia petiolata*,
- ❑ **bryozoan** (Bryozoa)  
*Pentapora fascialis*,
- ❑ **ascidian** (Ascidiacea)  
*Halocynthia papillosa*,
- ❑ **corals** (Anthozoa)  
*Eunicella cavolini* and *Parazoanthus axinellae*



❑ common two-banded seabream, *Diplodus vulgaris* : dominant by number and total weight



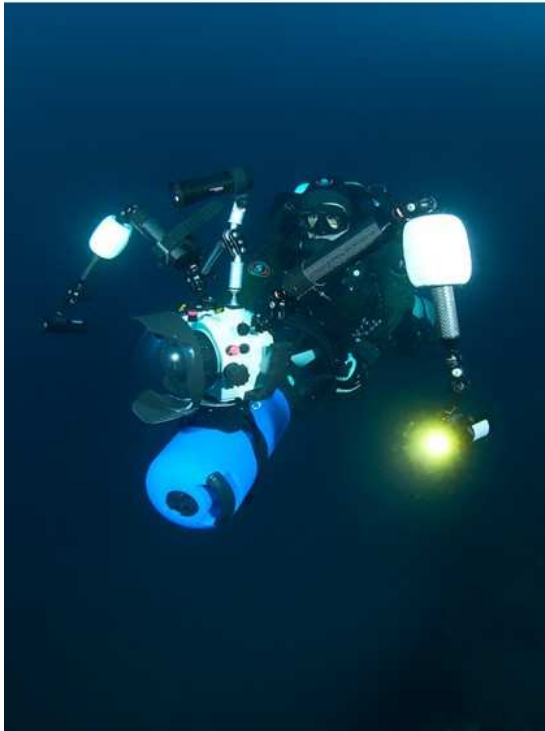
❑ damselfish, *Chromis chromis*  
observed in all transects, 16 - 27 °C



❑ Mediterranean rainbow wrasse, *Coris julis*,  
All transects except 0 – 8 m

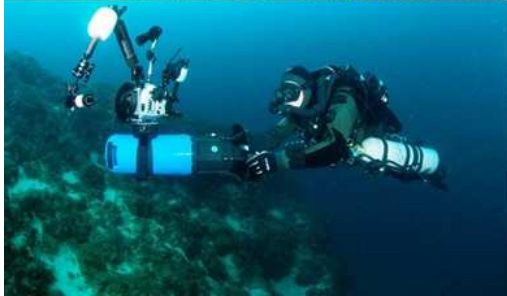
## ***5. Reef fish assemblage changes along depth gradient revealed by video on underwater scooter method***

***scooter method*** Igor Glavičić<sup>1</sup>, M. Kovačić<sup>2</sup>, D. Paliska<sup>3</sup>, Dani Laslo<sup>4</sup>



- Video on underwater scooter method combined with the rebreather diving
- Visual census study from 8 to 50 m depth
- 102 video transects, 25 m long, 2m wide
- Thirty one fish species were recorded
- Three environmental variables, depth, zoocover and eastern position, were identified as highly significant for species occurrence
- A significant difference was found in the fish assemblage structure among orientations, depths and inclinations

Divers used the rebreather equipment JJ-CCR (Closed circuit rebreather) and the scooter Suex Model: XJOY7. Camera was Canon EOS 5D MK II. The used lens Canon EF 17-40/4L USM, 17mm lens has diagonal angle of view 104 degrees.



## Cryptobenthic fish species

*Odondebuenia balearica*



*Thorogobius ephippiatus*



*Speleogobius trigloides*



*Gobius kolombatovici*

Colobus kolombatovici

## CONCLUSION

1. new diving techniques to approach to habitats and spend there enough time to collect fish or data,
2. combined with combined methods of collecting data and specimens to cover as well as possible entire species richness and fish diversity in the habitat e.g. uvc and square collecting and
3. decrease the time spent in diving and increase the quality of gathered data by innovative combination like video from scooter or vr.
4. thus, results could provide information that can be compared to data collected in other Mediterranean areas to validate the usefulness of the UVC method and its applicability for coralligenous habitats across the Mediterranean basin

## **FUTURE INVESTIGATIONS:**

- BIOMASS**
- FISH – HABITAT RELATION**
- FISH – TEMPERATURE RELATION**
- FISH – DEPTH RELATION**
  
- SEASONAL CHANGES**







# Questions

dreamstime.com

Thank you 😊



## Filip Vulić

### Kayak and Bike Adventure, Zadar (Croatia)

#### Local Stakeholder

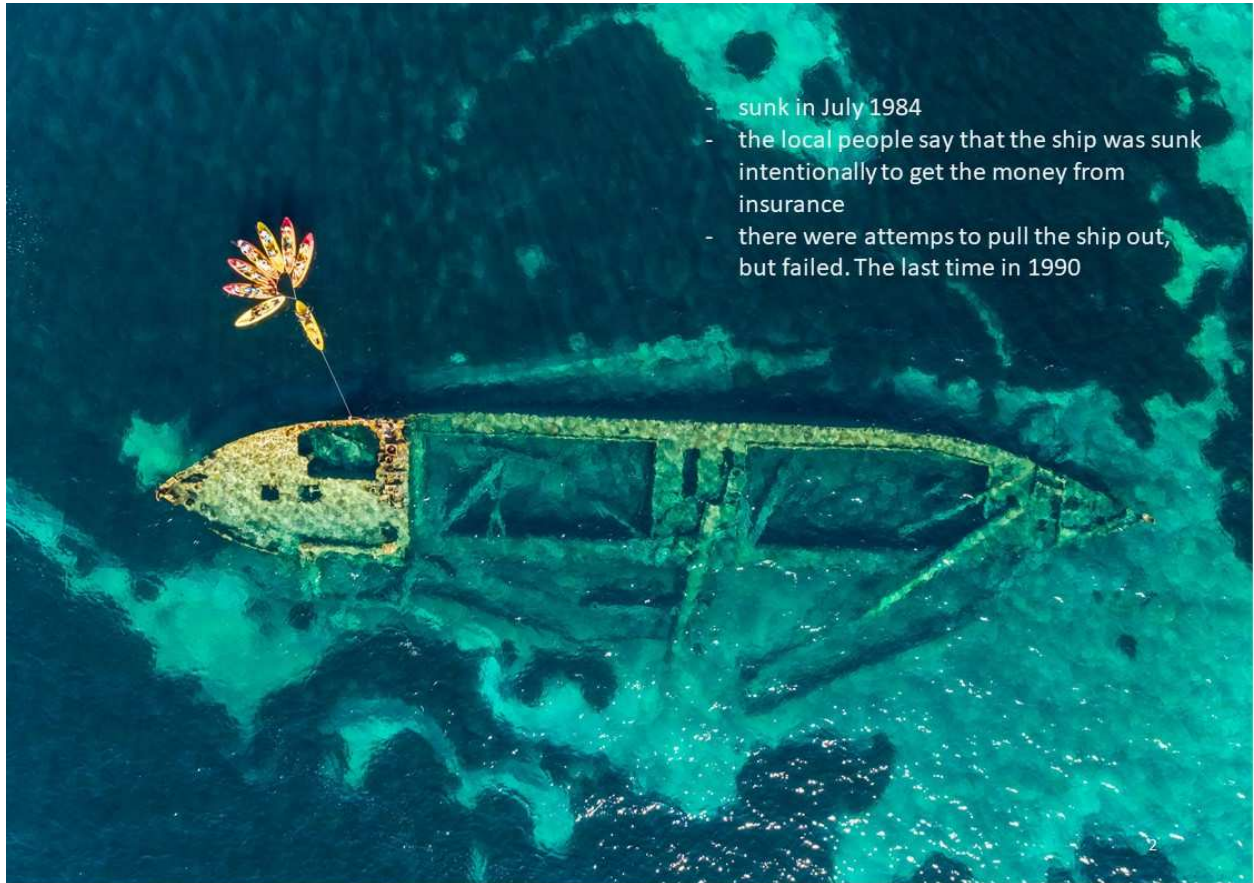
Kayaking is one of the activities that has increased over the years in Mediterranean and has found its way to Croatia too. Sea kayaking is very popular and Lagnjići reef present a great opportunity for local rentals, especially on the island of Dugi otok.



## Kayak Adventure Zadar

- since 2014
- specialized in organising kayak tours
- 4-6 employees







3

- there are strong gusts of south wind in this area, so ship sinks deeper and deeper
- in last 7 years, 2 masts fell, part of rear deck collapse...







## Session 2

**Vlado Frančić UniRI, Rijeka, (Croatia)**

**Sandi Orlić IRB, Zagreb, (Croatia)**

**Dubravko Pejdo UniZD, Zadar, (Croatia)**

### Project partners



Presentation of all case studies in Croatia. The work that has been done and one that has to be done, purchase of the equipment, results and dissemination of the project to general public.



# PROJECT ACTIVITIES

## ADRIREEF

University of Rijeka, Faculty of Maritime Studies  
University of Zadar, Office for science, projects and  
technology transfer  
Institute Ruđer Bošković

Scientific workshop, Zadar 30<sup>th</sup> October 2020

European Regional Development Fund



## MAIN ACTIVITIES

Participation at Kick-off meeting in  
Ravenna (01/2019)



Participation at Festival in Ravenna  
(08/2019)



## MAIN ACTIVITIES

Partners meeting in Rijeka  
(11/2019)

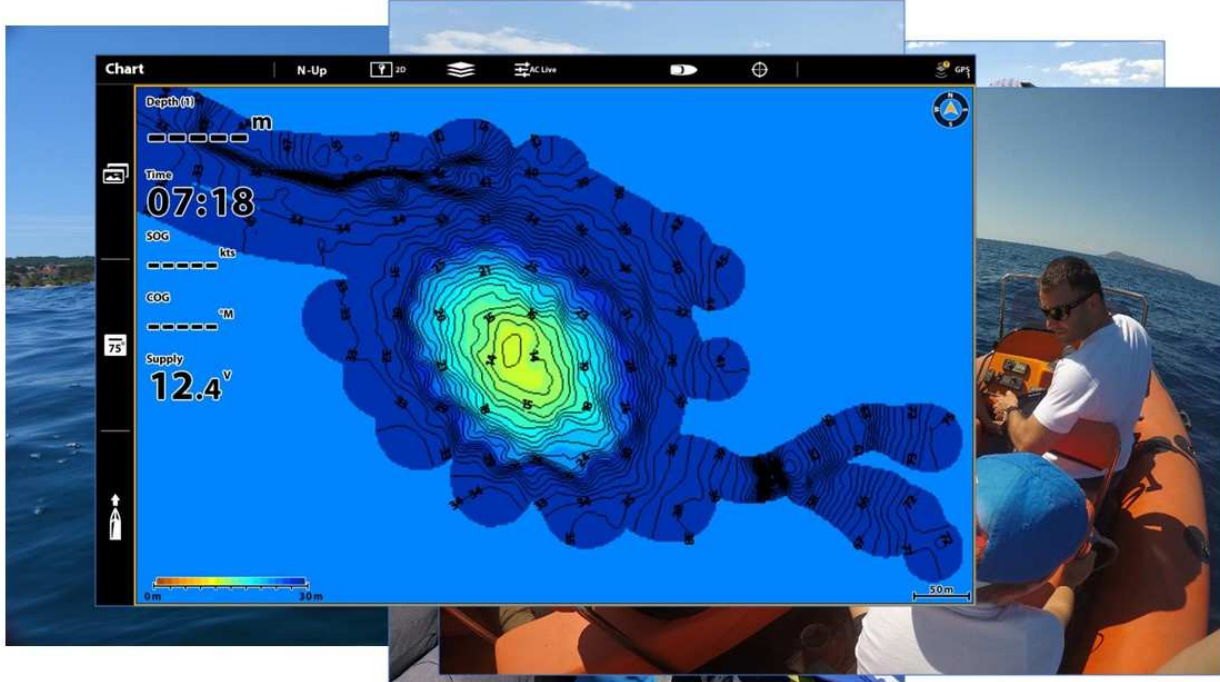


Participation at Scientific workshop in  
Ancona (12/2019)



## MAIN ACTIVITIES

Monitoring activities at natural reefs Plićina Konjsko, Lagnići and Seget (island of Vis)



# WP3 - MAPPING OF ADRIATIC REEFS FROM DIFFERENT PERSPECTIVES

✓ Finalised

## PFRI activities

Activity 1 – Reefs Classification in the cooperation area

- Deliverable 3.1.1. Definition of reefs' categories
- Deliverable 3.1.2. Data collection



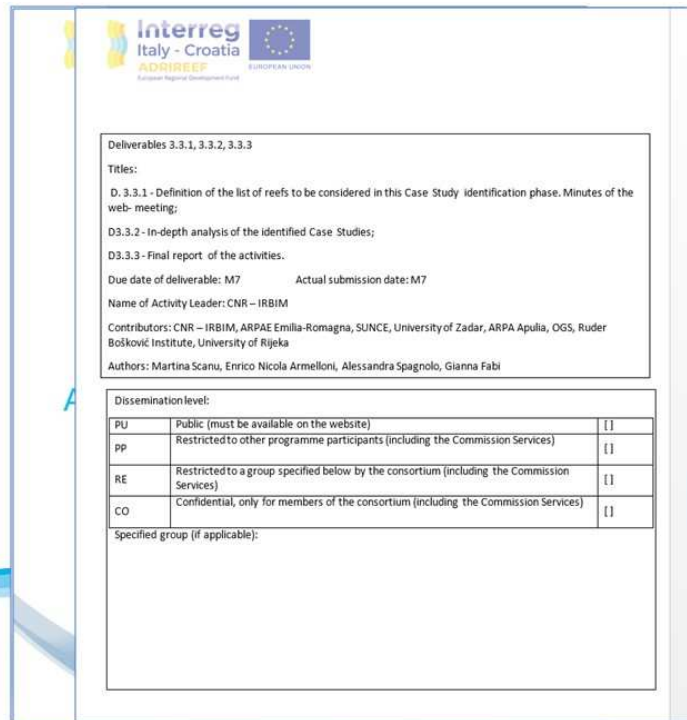
## WP3 - MAPPING OF ADRIATIC REEFS FROM DIFFERENT PERSPECTIVES

✓ Finalised

### PFRI activities

Activity 3.2 – Analysis of legal framework

- Deliverable 3.2. Legal framework
- Deliverable 3.3. Identification of relevant Case Studies



Interreg Italy - Croatia ADRIREEF EUROPEAN UNION

Deliverables 3.3.1, 3.3.2, 3.3.3

**Titles:**

D. 3.3.1 - Definition of the list of reefs to be considered in this Case Study identification phase. Minutes of the web-meeting;

D3.3.2 - In-depth analysis of the identified Case Studies;

D3.3.3 - Final report of the activities.

Due date of deliverable: M7 Actual submission date: M7

Name of Activity Leader: CNR – IRBIM

Contributors: CNR – IRBIM, ARPAE Emilia-Romagna, SUNCE, University of Zadar, ARPA Apulia, OGS, Ruder Bošković Institute, University of Rijeka

Authors: Martina Scani, Enrico Nicola Armelloni, Alessandra Spagnolo, Gianna Fabi

Dissemination level:		
PU	Public (must be available on the website)	[ ]
PP	Restricted to other programme participants (including the Commission Services)	[ ]
RE	Restricted to a group specified below by the consortium (including the Commission Services)	[ ]
CO	Confidential, only for members of the consortium (including the Commission Services)	[ ]

Specified group (if applicable):

## WP4 MONITORING PHASE OF ADRIATIC REEFS

### EQUIPMENT - UniRI

Side scan sonar Humminbird Solix 12 CHIRP MSI+  
GPS G2 + software Autochart Pro



Underwater drone model Blueeye Pioneer



Diving equipment





## WP4 MONITORING PHASE OF ADRIATIC REEFS

### EQUIPMENT - UniZD

Side scan sonar Humminbird Helix 12 CHIRP MSI+  
GPS G3, Autochart Pro+ Minn kotta electrical motor



European Regional Development Fund

Aerial drone DJ Mavic PRO II



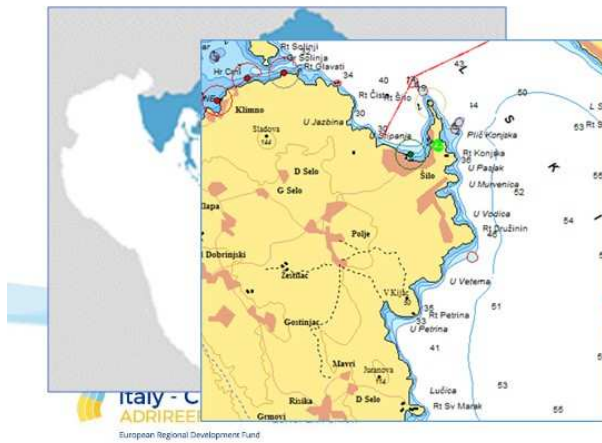
Underwater drone model Chasing - Gladius mini



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### PLIĆINA KONJSKO – Monitoring site

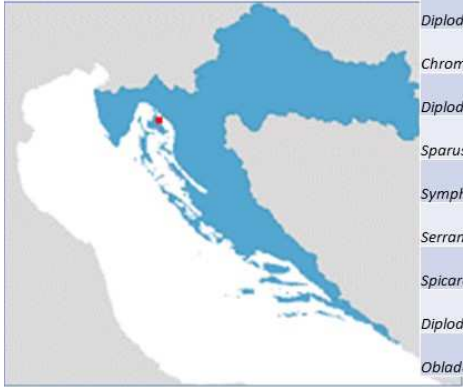
- Objective - identify ecological and economic aspects of the reef as well as its morphological, biological and physical features
- Location – northern part of the Adriatic sea, close to the north-eastern coastline of the island Krk on western side of Vinodol Channel.



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### PLIĆINA KONJSKO – Monitoring site

- 11 fish species – methods BRUV, UVC and drone
- 2 high density species – *Boops boops* and *Chromis chromis*



NAME	DENSITY
<i>Boops boops</i>	H
<i>Coris julis</i>	M
<i>Diplodus vulgaris</i>	H
<i>Chromis chromis</i>	H
<i>Diplodus annularis</i>	L
<i>Sparus aurata</i>	L
<i>Symphodus tinca</i>	L
<i>Serranus scriba</i>	L
<i>Spicara maena</i>	M
<i>Diplodus puntazzo</i>	L
<i>Oblada melanura</i>	M

## WP4 MONITORING PHASE OF ADRIATIC REEFS

### FISH POPULATION



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### Vele i Male Lagne – Monitoring site

- Natural reef with a shipwreck
- Location – central Adriatic, NW side of Dugi otok



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### Vele i Male Lagne – Monitoring site

- Vertebrates – 31+ fish species
- Mollusca – Bivalvia (3) – Cephalopoda (2)
- Crustacea (3)

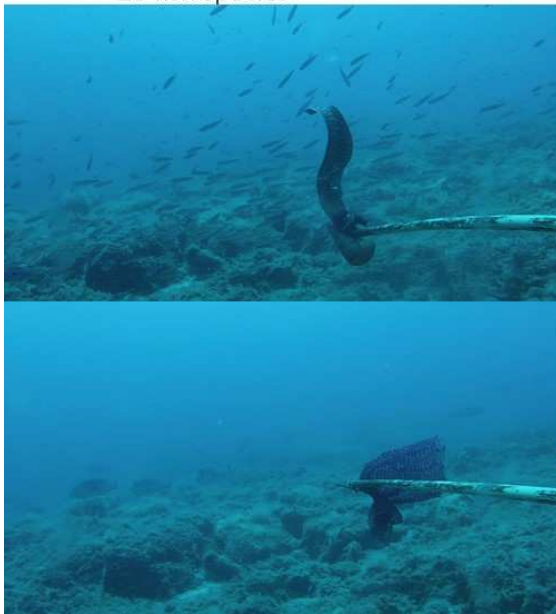


NAME	DENSITY
<i>Boops boops</i>	H
<i>Chromis chromis</i>	H
<i>Conger conger</i>	L
<i>Coris julis</i>	M
<i>Dentex dentex</i>	L
<i>Diplodus annularis</i>	L
<i>Diplodus puntazzo</i>	L
<i>Diplodus sargus</i>	M
<i>Diplodus vulgaris</i>	H
<i>Epinephelus marginatus</i>	L
<i>Labrus merula</i>	L
<i>Labrus viridis</i>	L
<i>Mugilidae spp.</i>	M
<i>Mullus surmulatus</i>	M
<i>Muraena helena</i>	L
<i>Oblada melanura</i>	H
<i>Phycis phycis</i>	L
<i>Sarda sarda</i>	M
<i>Sarpa salpa</i>	H
<i>Sciaenops ocellatus</i>	M
<i>Scorpaena notata</i>	L
<i>Scorpaena scrofa</i>	L
<i>Seriola dumerili</i>	L
<i>Serranus scriba</i>	L
<i>Sparus aurata</i>	L
<i>Spicara maena</i>	M
<i>Spicara smaris</i>	H
<i>Spondylisoma cantharus</i>	M
<i>Symphodus mediterraneus</i>	L
<i>Symphodus tinca</i>	L

## WP4 MONITORING PHASE OF ADRIATIC REEFS

### Plić Seget – Monitoring site








- 23 fish species



NAME	DENSITY
<i>Boops boops</i>	H
<i>Chromis chromis</i>	H
<i>Coris julis</i>	M
<i>Dentex dentex</i>	H
<i>Diplodus sargus</i>	M
<i>Diplodus vulgaris</i>	L
<i>Epinephelus marginatus</i>	L
<i>Muraena helena</i>	M
<i>Oblada melanura</i>	H
<i>Phycis phycis</i>	L
<i>Sarda sarda</i>	M
<i>Sarpa salpa</i>	H
<i>Scarpaena scrofa</i>	L
<i>Seriola dumerili</i>	M
<i>Serranus cabrilla</i>	M
<i>Serranus scriba</i>	L
<i>Sparisoma cretense</i>	L
<i>Sparus aurata</i>	L
<i>Sphyaena sphyraena</i>	H
<i>Spicara maena</i>	M
<i>Spicara smaris</i>	H
<i>Spondyliosoma cantharus</i>	M
<i>Symphodus tinca</i>	L

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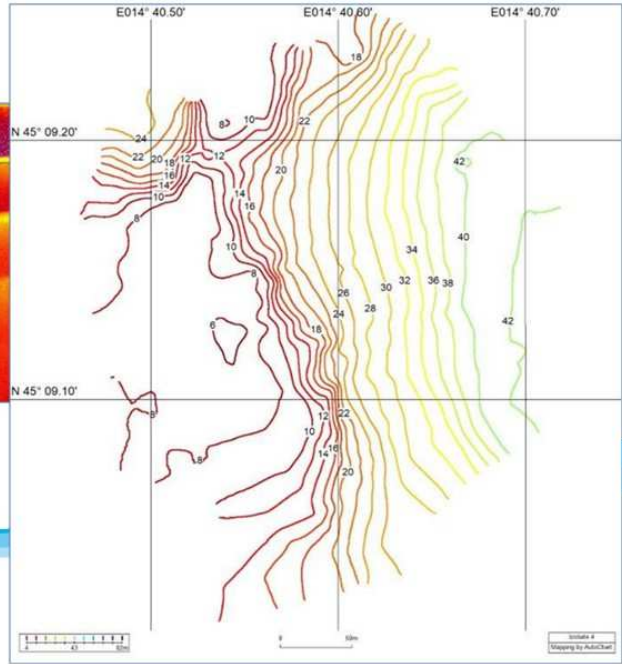
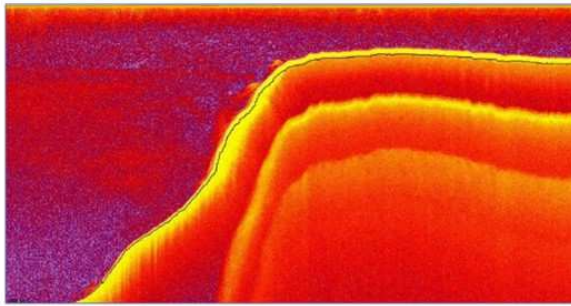
## WP4 MONITORING PHASE OF ADRIATIC REEFS

<p>    </p> <p style="text-align: center;"> <b>Work Package 4.2.</b>        Monitoring case studies in Croatia - <u>Pličina Konjsko</u> </p> <div style="text-align: center;">  </div> <p style="text-align: center;">Rijeka, 2020.</p> <p style="text-align: center;"> <small>European Regional Development Fund</small> </p> <p style="text-align: center;"> <small>www.italy-croatia.eu/interreg</small> </p>	<p>Markup Area</p>	<p>    </p> <p style="text-align: center;">Content:</p> <table border="0"> <tr> <td>1</td> <td>INTRODUCTION</td> <td>3</td> </tr> <tr> <td>2</td> <td>GEOMORPHOLOGICAL MAPPING</td> <td>4</td> </tr> <tr> <td>2.1</td> <td>DESCRIPTION OF MORPHOLOGICAL FEATURES OF THE REEF</td> <td>4</td> </tr> <tr> <td>2.2</td> <td>PRODUCTION OF MAPS USEFUL FOR PLANNING THE OTHER INVESTIGATIONS</td> <td>4</td> </tr> <tr> <td>3</td> <td>WATER COLUMN PARAMETERS</td> <td>5</td> </tr> <tr> <td>3.1</td> <td>CHARACTERIZATION OF THE WATER COLUMN AND DISPERSION OF POLLUTANTS</td> <td>5</td> </tr> <tr> <td>3.2</td> <td>TO PROVIDE INFORMATION TO DIVERS ON OCEANOGRAPHIC STATUS</td> <td>5</td> </tr> <tr> <td>4</td> <td>BENTHIC COMMUNITY SETTLED ON THE REEF AND SEDIMENTS</td> <td>6</td> </tr> <tr> <td>4.1</td> <td>DESCRIBE THE COMMUNITY STATUS IN TERMS OF SPECIES ASSEMBLAGES AND COVERAGE</td> <td>6</td> </tr> <tr> <td>4.2</td> <td>PROVIDE INFORMATION TO DIVERS</td> <td>6</td> </tr> <tr> <td>5</td> <td>FISH ASSEMBLAGE</td> <td>7</td> </tr> <tr> <td>5.1</td> <td>DESCRIBE THE FISH POPULATION IN TERMS OF SPECIES COMPOSITION AND ABUNDANCE TO PROVIDE INFORMATION (E.G. DIVING, RECREATIONAL AND PROFESSIONAL FISHERIES) WITH UPDATED INFORMATION ON THE FISH ASSEMBLAGE</td> <td>7</td> </tr> <tr> <td>5.2</td> <td>EVALUATE THE EFFECTIVENESS OF THE MANUALLY OPERATED VEHICLE (MOV) AND BRUVY TO DESCRIBE THE FISH COMMUNITIES</td> <td>7</td> </tr> <tr> <td>6</td> <td>ENVIRONMENTAL LOAD</td> <td>8</td> </tr> <tr> <td>6.1</td> <td>EVALUATION OF HUMAN LOAD: NUMBER OF VISITORS, NUMBER OF DIVES, NUMBER OF FISHING BOATS AND ASSOCIATED ACTIVITIES, TOURIST PRESSURE IN SURROUNDING AREAS, GEAR AND PASSENGER TRAFFIC IN THE SURROUNDING AREAS</td> <td>8</td> </tr> <tr> <td>6.2</td> <td>EVALUATION OF PHYSICAL DAMAGE QUANTITIES AND TYPE ON THE SEAFLOOR</td> <td>8</td> </tr> <tr> <td>7</td> <td>CONCLUSION</td> <td>9</td> </tr> </table> <p style="text-align: center;"> <small>European Regional Development Fund</small> </p> <p style="text-align: right;">1</p>	1	INTRODUCTION	3	2	GEOMORPHOLOGICAL MAPPING	4	2.1	DESCRIPTION OF MORPHOLOGICAL FEATURES OF THE REEF	4	2.2	PRODUCTION OF MAPS USEFUL FOR PLANNING THE OTHER INVESTIGATIONS	4	3	WATER COLUMN PARAMETERS	5	3.1	CHARACTERIZATION OF THE WATER COLUMN AND DISPERSION OF POLLUTANTS	5	3.2	TO PROVIDE INFORMATION TO DIVERS ON OCEANOGRAPHIC STATUS	5	4	BENTHIC COMMUNITY SETTLED ON THE REEF AND SEDIMENTS	6	4.1	DESCRIBE THE COMMUNITY STATUS IN TERMS OF SPECIES ASSEMBLAGES AND COVERAGE	6	4.2	PROVIDE INFORMATION TO DIVERS	6	5	FISH ASSEMBLAGE	7	5.1	DESCRIBE THE FISH POPULATION IN TERMS OF SPECIES COMPOSITION AND ABUNDANCE TO PROVIDE INFORMATION (E.G. DIVING, RECREATIONAL AND PROFESSIONAL FISHERIES) WITH UPDATED INFORMATION ON THE FISH ASSEMBLAGE	7	5.2	EVALUATE THE EFFECTIVENESS OF THE MANUALLY OPERATED VEHICLE (MOV) AND BRUVY TO DESCRIBE THE FISH COMMUNITIES	7	6	ENVIRONMENTAL LOAD	8	6.1	EVALUATION OF HUMAN LOAD: NUMBER OF VISITORS, NUMBER OF DIVES, NUMBER OF FISHING BOATS AND ASSOCIATED ACTIVITIES, TOURIST PRESSURE IN SURROUNDING AREAS, GEAR AND PASSENGER TRAFFIC IN THE SURROUNDING AREAS	8	6.2	EVALUATION OF PHYSICAL DAMAGE QUANTITIES AND TYPE ON THE SEAFLOOR	8	7	CONCLUSION	9
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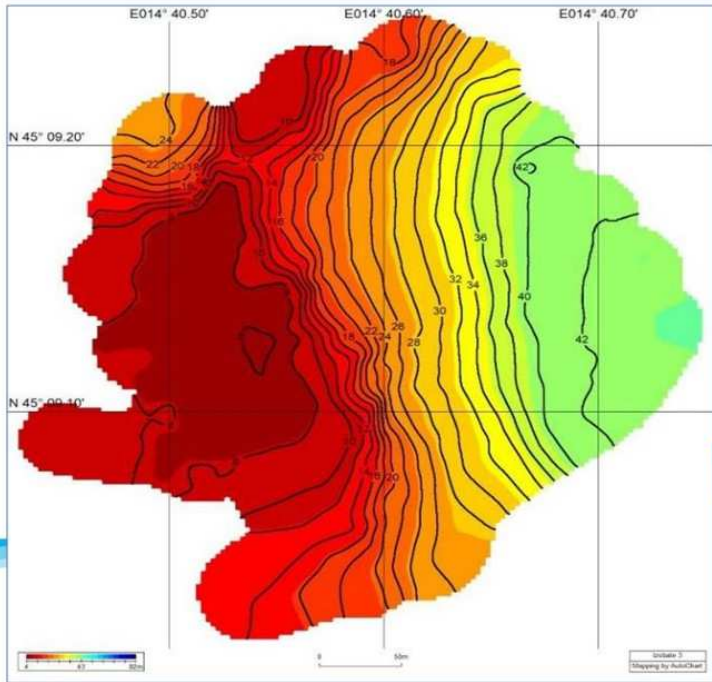
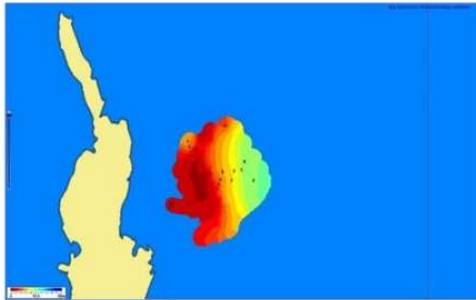
## WP4 MONITORING PHASE OF ADRIATIC REEFS

### GEOMORPHOLOGICAL MAPPING



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### GEOMORPHOLOGICAL MAPPING



## WP4 MONITORING PHASE OF ADRIATIC REEFS - VIDEO RECORDING



## WP4 MONITORING PHASE OF ADRIATIC REEFS - VIDEO RECORDING



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### WATER COLUMN PARAMETERS AND SEDIMENTS



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### WATER COLUMN PARAMETERS AND SEDIMENTS

- In the laboratory – DOC/DOM machine
  - Good correlation in the laboratory conditions
  
- In the field – sensors
  - Very low values due to the Covid19 situation, less good correlations



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## WP4 MONITORING PHASE OF ADRIATIC REEFS

### OTHER CHEMICAL AND MICROBIOLOGICAL ANALYSIS

- Water column and sediments
- pH, Redox, nutrients Chlorophyll, CDOM, PAH, AH, E. coli
- Heavy metals, organ halogenate substances, PAH, fecal coliforms, E. coli, phycotoxins,
- Temperature, salinity, oxygen
- Water samples – monthly sampling (except Vis location)
- Sediments samples – two sampling (at the beginning and end of the monitoring period)

## WP4 MONITORING PHASE OF ADRIATIC REEFS

	Case Study			
	Water column	CS1	CS2	CS3
ΣPAHs(mg/kg)	0.12; 0,11; n.d., 0,09; 0,06; n.d; n.d. n.d..	0.30	0.30	0,30
ΣPCBs (mg/kg)	0.001, n.d.; n.d.; n.d; n.d; n.d.; n.d.; n.d.; n.d.;	0.001	0.001	0.001
TOC	0,9; 1,1; 1,2; 0,9; 0,7; 0,6;0,9; 0,8	2,1	2,0	1,9

- During the investigated period all the chemical and biological parameters were low.
- Till now we do not have identify any increase in summer period due to tourist activity (Covid19 summer)



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### BENTHIC COMMUNITY SETTLED ON THE REEFS



## WP4 MONITORING PHASE OF ADRIATIC REEFS

### ENVIRONMENTAL LOAD – Plićina Konjsko

- Tourist pressure in the vicinity
- 8 diving centres within 20 km of the Plićina Konjsko
- Users – fishermen and recreational divers
- Maritime traffic - generally of lower intensity (small boats of local community, fishing boats)
- Garbage quantities – bottom quite clean, seen several plastic, bottles, cans and remains of fishing nets and nylon.

## WP4 MONITORING PHASE OF ADRIATIC REEFS

### ENVIRONMENTAL LOAD – Vele i male lagne

- Low tourist pressure
- 5 diving centres within 20 nm of the site
- Users – fishermen and recreational divers, boat transfers, boat trips from Zadar to Sakarun beach
- Maritime traffic - generally of lower intensity (small boats of local community, fishing boats)
- Garbage quantities – low (fishing nets and some plastic). High on islands

## WP4 MONITORING PHASE OF ADRIATIC REEFS

### ENVIRONMENTAL LOAD – Plić Seget

- Low tourist pressure
- 5 diving centres within 5 nm from Komiža
- Users – fishermen and recreational divers, organized diving
- Maritime traffic - generally of lower intensity (small boats of local community, fishing boats)
- Garbage quantities – low (fishing nets and other fishing gear)



**Ante Kolanović**

**Sport fishing club ‘HARPUN’, Zadar, (Croatia)**

**Local stakeholder**



Sport fishing is one of the most practiced activities in the Adriatic sea. Sport fishing clubs offer the experience to the newcomers to this sport. Local public has high interest in this sport, especially through international competitions.















**Bruna Petani**

**UniZD, Zadar, (Croatia)**

**Invited speaker**

The biggest shellfish in the Adriatic is at extinction! Why is *Pinna nobilis* important, how we can protect it and why it is connected to Lagnjići reef and diving centres.





## *Pinna nobilis*: challenges

Bruna Petani  
Department of ecology, agronomy and aquaculture  
University of Zadar



## Scientists involved in the research

- Ivan Župan, assistant professor
- Bosiljka Mustać, associate professor
- Dr. sc. Bruna Petani, Ph.D
- Tomislav Šarić, assistant profesor
- Zoran Šikić, associate professor



## Noble pen shell *Pinna nobilis* (Linnaeus, 1758)

- Endemic species of the Mediterranean
- The largest shellfish in the Mediterranean
  - It can grow up to 120 cm in length
- It lives at depths of 0.5 to 60 meters
- Long lifetime
  - Up to 45 years
- Slow population dynamics
  - Slow population recovery



## Noble pen shell *Pinna nobilis* (Linnaeus, 1758)

- It filters large amounts of sea water
  - Retains organic matter from suspended detritus
    - contributes to the clarity of the sea water
- The shell is a hard surface within an ecosystem with a soft seabed bottom
- On this hard surface many different epibionts can be found – pen shell increase biodiversity



## Noble pen shell *Pinna nobilis* (Linnaeus, 1758)

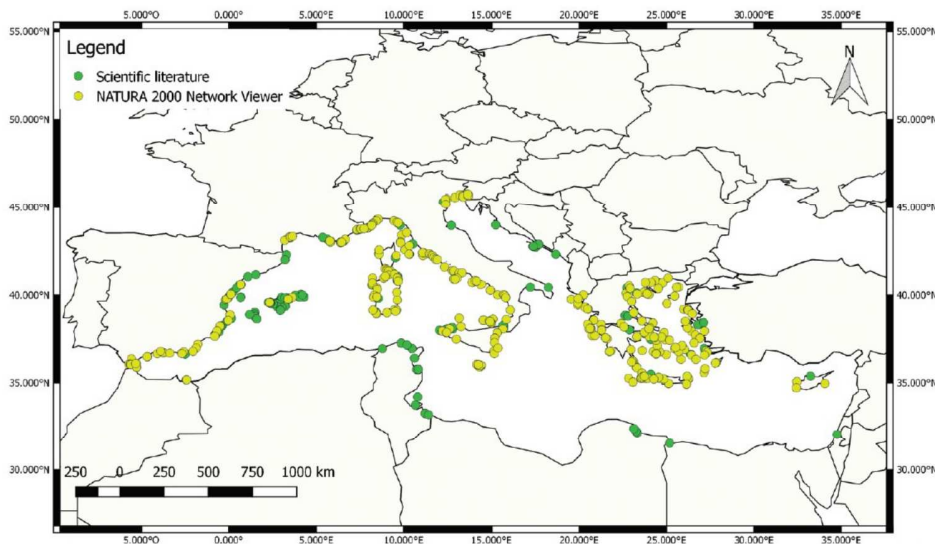
- It also plays an important role in the trophic network, they are prey of other species
- Two species of shrimp live inside the shell
- Lagniçi reef NW side of Dugi otok
- Large area with posidonia (60 %) and large population of pen shell (up to 10 m)
- Mass mortality recorded





## Noble pen shell *Pinna nobilis* (Linnaeus, 1758)

- Pen shell populations have been reduced before due to different impacts
  - Illegal fishing, different types of pollution, damaging of individuals by anchoring, climate change and destruction of seagrass meadows
- Pen shell is listed as an endangered and protected species in relevant international documents
  - Annex IV of the Directive 92/43/EEZ on the protection of natural habitats and of wild plant and animal species (22.07.1992.)
  - Annex II of the Protocol on Specially Protected Areas and Biodiversity in the Mediterranean Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention)
- It is also strictly protected species in the Republic of Croatia
  - Listed in Annex I of the Ordinance on Strictly Protected Species (NN 144/13, 73/16)



Distribution of pen shell populations based on scientific data and Natura 2000 site data (Marrocco et al. 2019.) before mass mortality event

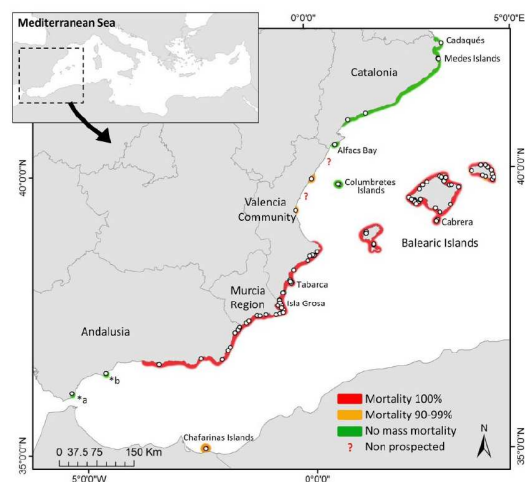
## Mass mortality?

- All organisms die!
- Mortality usually affects certain age categories in a certain percentage
- In mass mortality, all age categories are affected and a large number of individuals of a species die in a short time
  - The event could put the species in danger of extinction



## Mass mortality of pen shell

- In the early fall of 2016 on the west coast of the Mediterranean, along the Spanish coast and around the Balearic Islands, a mass mortality of pen shell was observed, which affected specimens of all sizes
  - Underwater visual census have revealed high mortality rates that have reached up to 100% in some areas
  - Only pen shell was affected of all the shellfish



Vázquez-Luis M. et al. (2017)



## Disease spread in 2017 and 2018

- In 2017 and 2018, the phenomenon of mass mortality spread to the sea coast:
  - Italy
  - France
  - Greece
  - Cyprus
  - North Africa



The situation at the beginning of 2019

## Disease spread across the Adriatic and mass mortality of pen shell the Adriatic



## Mass mortality of pen shell in the Adriatic



## Mass mortality of pen shell in the Adriatic



## Mass mortality of pen shell in the Adriatic



## Mass mortality of pen shell in the Adriatic

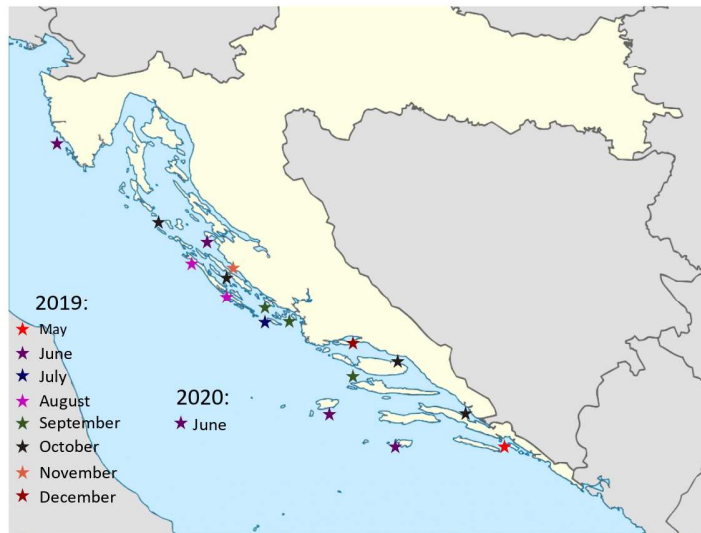


## Mass mortality of pen shell in the Adriatic

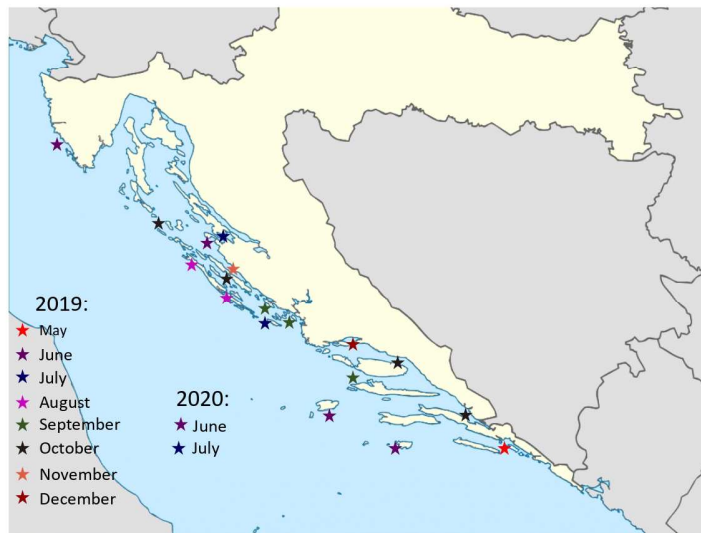




## Mass mortality of pen shell in the Adriatic

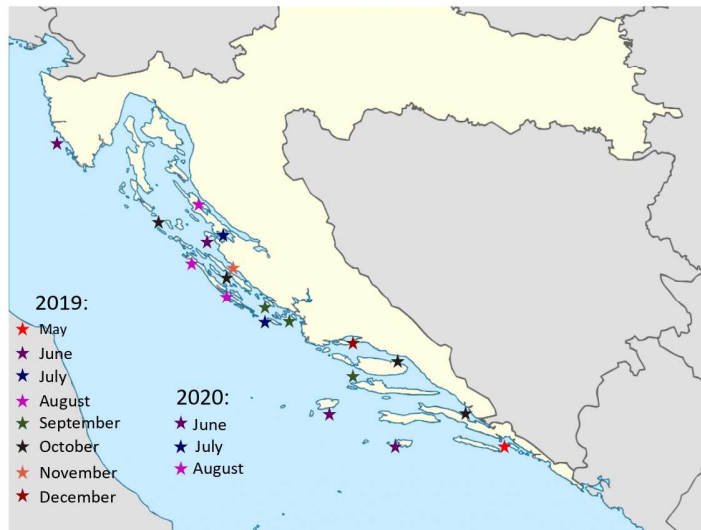


## Mass mortality of pen shell in the Adriatic

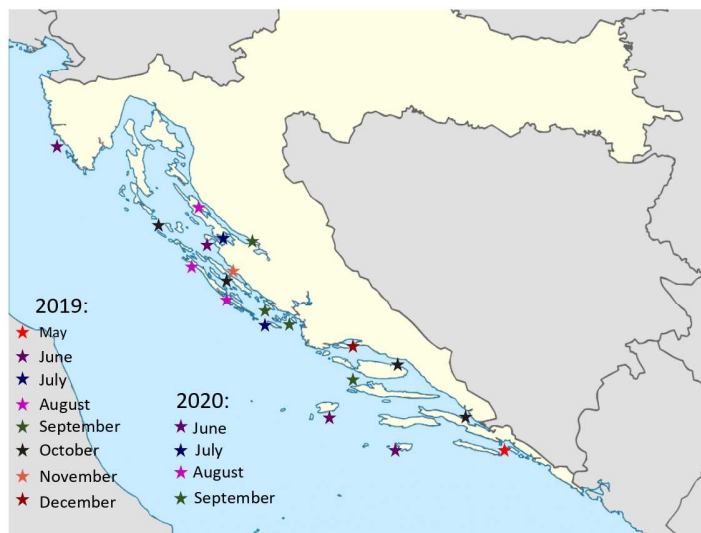




## Mass mortality of pen shell in the Adriatic

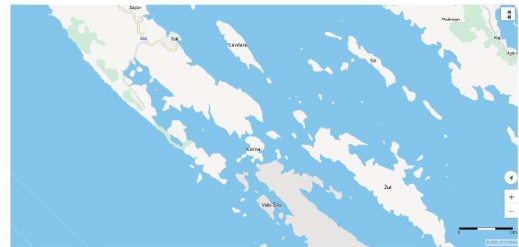
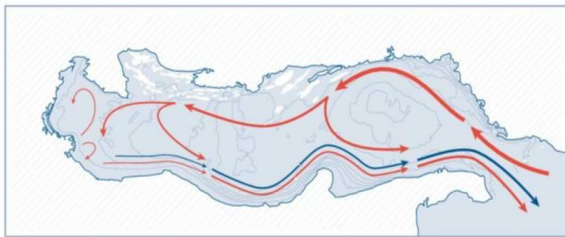


## Mass mortality of pen shell in the Adriatic



## What we found

- The time sequence and locations of the occurrence of mass mortality coincide with the direction and speed of the main sea currents in the Adriatic Sea.
- Mortality first occurred on islands farther from the mainland as well as in bays facing the open sea
  - Example of Telašćica nature park: in the parts of the park exposed to the open sea, the mortality rate reached 100% in August 2019, while at the same time in the inner part of the park (Magrovica bay) the mortality rate was 30%



## Disease spread across the Adriatic



Pelješac - fireworms



Vis - tissue debris

## Disease spread across the Adriatic



Dugi otok - Sakarun



## Disease spread across the Adriatic

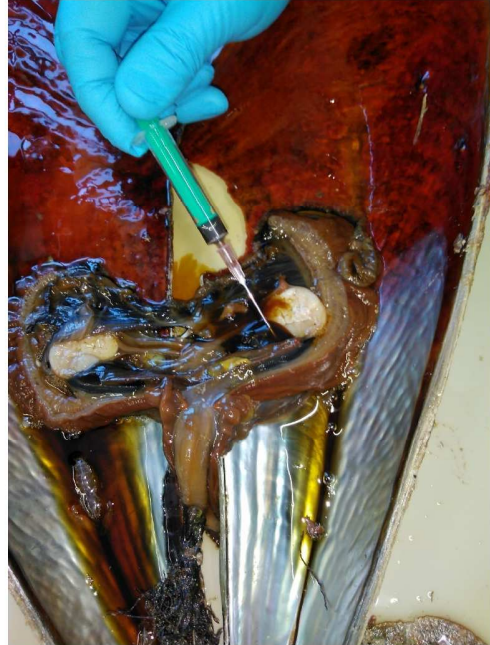


Dugi otok – PP Telašćica



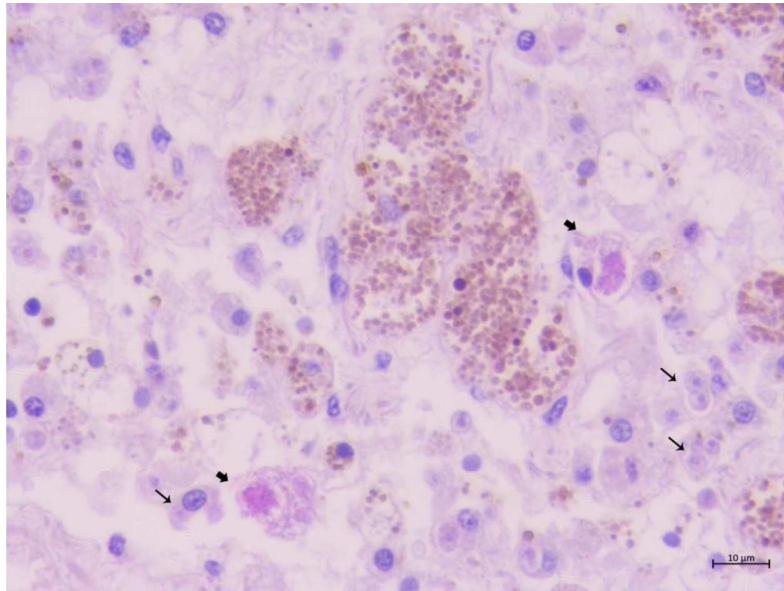
## What we found

- In most locations, at the beginning of the mass mortality, larger - older individuals die first, and then younger ones.
- Symptoms observed:
  - Slower shell closure
  - Retraction of the mantle
  - Weight loss
  - Cystic formations
  - Yellowish digestive gland



## What we found

- Parasite *Haplosporidium pinne* and bacteria of the genus *Mycobacterium* involved in the occurrence of mass mortality
  - In areas with mass mortality, these two pathogens were identified in more than 90% of the sampled individuals
  - Sometimes they occur together and sometimes separately
    - In about 50% of individuals, both pathogens were identified simultaneously
  - In areas where there was no mass mortality, these two causes were not identified
  - Samples of *H. pinne* have identical rDNA sequences as parasite sequences from Greece, Spain and Italy while samples of bacteria from the genus *Mycobacterium* have a similarity greater than 99%



Sample from Sakarun beach August 3, 2019.  
Visible bacteria of the genus *Mycobacterium* (thick arrows) and haplosporidium-like parasites (thin arrows)

## The situation in the Mediterranean

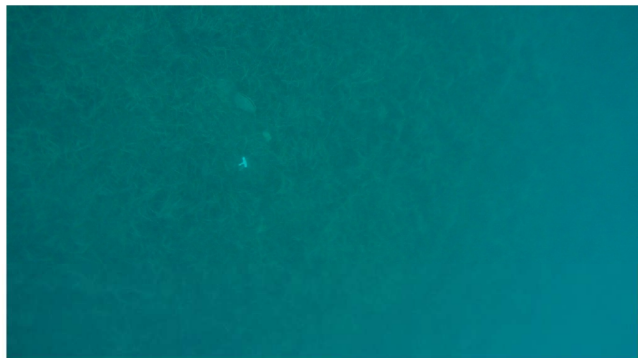
- Some scientists estimate that 90% of the pen shell population in the Mediterranean is already extinct
  - There are only two populations left in Spain
- In a large number of populations mortality reached a level of 100%
  - Spanish scientists are monitoring the few surviving individuals.
    - 6 individuals survived in the Balearics
    - In the Columbretes Islands 2 individuals
      - Hundreds of kilometers away one of other – there is no possibility of reproduction and population renewal!

## Measures to prevent, treat, rebuild the population?

- The disease cannot be cured for now
  - The treatment carried out in the aquariums was not successful
- A ray of hope?
  - Below 13 °C there is no spread of the disease, pen shell exposed to lower temperatures do not show symptoms of the disease
- Transferring pen shell from locations where mass mortality did not occur to those locations where everyone has already died?
  - Experiences from Spain show that this is wrong - the causative agent is present in the environment
- The only way to avoid the disease is to transfer to aquariums with recirculation of units that do not contain the causative agent

## Actions taken by the University of Zadar

- We try to understand the causes of the disease and the way the disease occurs and develops
  - We have permission to sample individuals of protected pen shell
- We have marked individual populations that we regularly monitor
  - To clarify the dynamics of the spread of the disease in the population and the first visible symptoms



## Actions taken by the University of Zadar

- We control numerous populations of pen shell
- We have set up collectors to collect juveniles
- We are working to improve aquarium systems to accept fewer individuals



## Actions taken in the Croatia and throughout the Mediterranean

- Scientists and citizens are monitoring numerous populations of pen shell
- The Pula Aquarium accepted a number of individuals from populations in which the presence of *H. pinne* and *Mycobacteria* was not detected.
  - To repopulate with them
    - Spawning and gamete collection - freezing
- Scientists in Spain and France try to complete pen shell reproductive cycle in recirculation systems (species *P. rudis*)

## Conclusions

- The few surviving individuals are the key to population recovery
  - They need to be found and protected – from predators and from humans!
- Protect the habitats of the pen shell!



Thank you for  
attention!

Plavo oko

<http://plavo.oko.hr>





**Lucija Uglešić**

**Tourist office Dugi otok Božava, (Croatia)**

**Local Stakeholder**



Lagnjići reef and the Michelle shipwreck are a great opportunity for local community and for people living on island of Dugi otok. Lucija talks about all benefits of the site.



## Lagnjići shipwreck

Starting point for Dugi otok blue economy



## Implementation in tourism

The most important industry on  
Dugi otok

### Main problems of the tourism industry on Dugi otok

- Short tourist season (from May until September)
- Lack of half - day trips on the island
- Bad public transportation connections between villages
- Plastic pollution, bad waste management and impact on the environment



## Solutions of problems through shipwreck management

4

### Spearfishing trips to Lagnjići shipwreck

**Problem:** Short tourist season

**Solution:**

- ❖ Spearfishing trips to the shipwreck and around Veli rat lighthouse
- ❖ Teaching courses in spearfishing and freediving (through the local Sportfishing Association)
- ❖ Unique location and good marketing campaign
- ❖ April - May and September - October



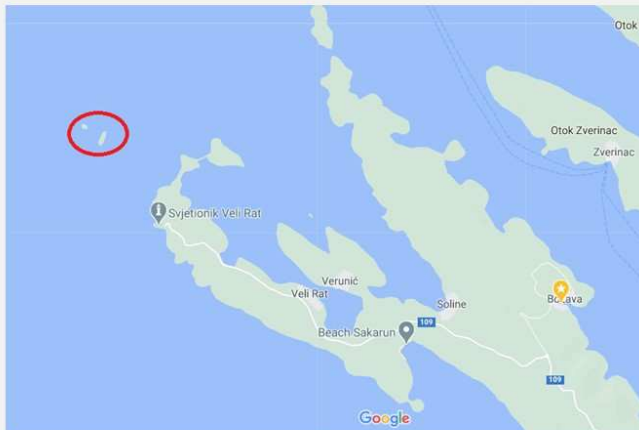
## Boat trips around north – western part of Dugi otok



- **Problem:** Lack of organized trips on the island
- **Solution:**
  - ❖ Organized half – day trips with smaller boats (for cca. 12 persons)
  - ❖ Snorkeling around Lagnjići shipwreck and Mežanj island, visit to the Veli rat lighthouse
  - ❖ Glass boat tours (attractive night tours)
  - ❖ 50% of tourists who are not able to go on adventure tours would rather choose this kind of trip

6

## **Problem:** Bad public transportation connections between villages



- **Solution:**
  - ❖ Need to get to the starting point of the boat trip
  - ❖ Creating an interest for the private concessionaires to connect villages with any kind of public transport
  - ❖ Largest clients : Božava Hotels, camps Cargita and Mandarino

7

## Artificial reef management

**Problem:** plastic pollution, bad waste management and environmental impact

• **Solution:**

- ❖ To build an anchor system with buoys to protect the Posidonia seagrass
- ❖ To give the concession on buoys to someone to charge the stay
- ❖ The concessionaire is obligated to protect the reef from pollution, and to keep an eye on visitors as a lifeguard



**THANK YOU**

## Session 3

**Morana Bačić**

**Public institution “Natura Jadera”, Zadar, (Croatia)**

**Local stakeholder**



Natura 2000 is very important for preserving original landscape and underwater systems. Lagnjići reef and the whole NW side of Dugi otok are under Natura 2000.

**THE NORTHWESTERN PART OF DUGI OTOK – SIGNIFICANT  
LANDSCAPE**

**Natura Jadera** 

JAVNA USTANOVA ZA UPRAVLJANJE ZAŠTIĆENIM DIJELOVIMA  
PRIRODE NA PODRUČJU ZADARSKE ŽUPANIJE

[www.natura-jadera.com](http://www.natura-jadera.com)



mr.sc. Morana Bačić  
conservation manager



## PROTECTED LANDSCAPE



In this presentation:

- Step back: NATURE PROTECTION IN CROATIA
  
- and then
  - Legal protection and management of protected areas on County level
  - Significant landscape NW part of Dugi otok Island

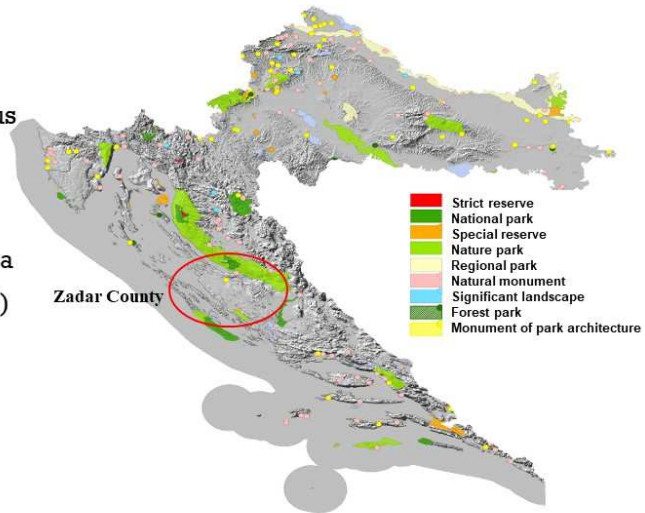
### LEGAL PROTECTION AND MANAGEMENT OF PROTECTED AREAS IN CROATIA

- the Nature Protection Act stipulates 9 categories which differ in the degree of prohibition and intent.
  - Protected areas are managed by the **public institutions**.
  - The **Government** is responsible for establishing Public institutions for **national parks** and **nature parks**.
  - **County** assemblies establish public institutions for managing the other protected areas.
1. Strict reserve
  2. **National park**
  3. Special reserve
  4. **Nature park**
  5. Regional park
  6. Natural monument
  7. Significant landscape
  8. Forest park
  9. Monument of park architecture

## PROTECTED AREAS IN CROATIA

total of **409** areas have been protected in various categories

protected areas account for 8,61% of the total area (12,32% land; 1,95% sea)



## PARKS IN CROATIA





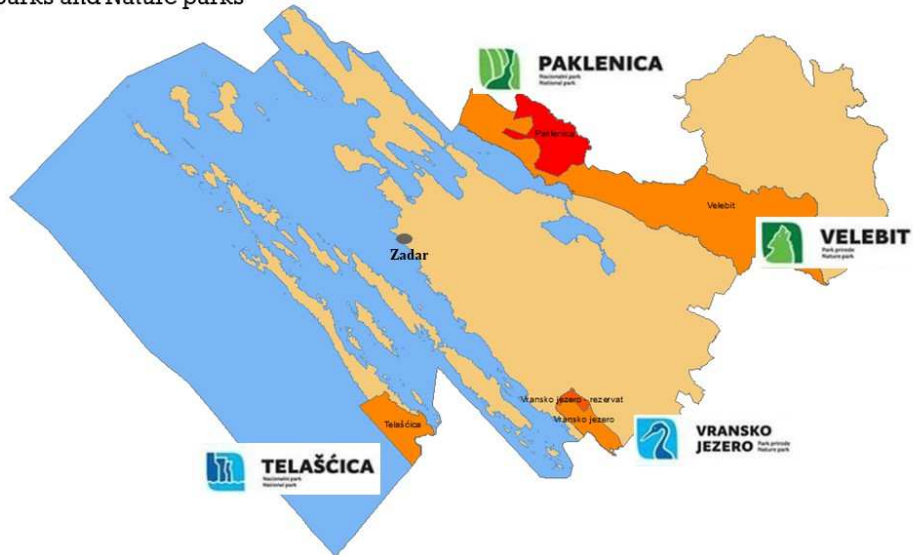
Our primary activities are protection, management and promotion of protected natural areas and Natura 2000 sites in the county's territory.

390 PA  
and all Natura 2000 sites outside the parks

## ZADAR COUNTY

## PROTECTED AREAS IN ZADAR COUNTY

National parks and Nature parks



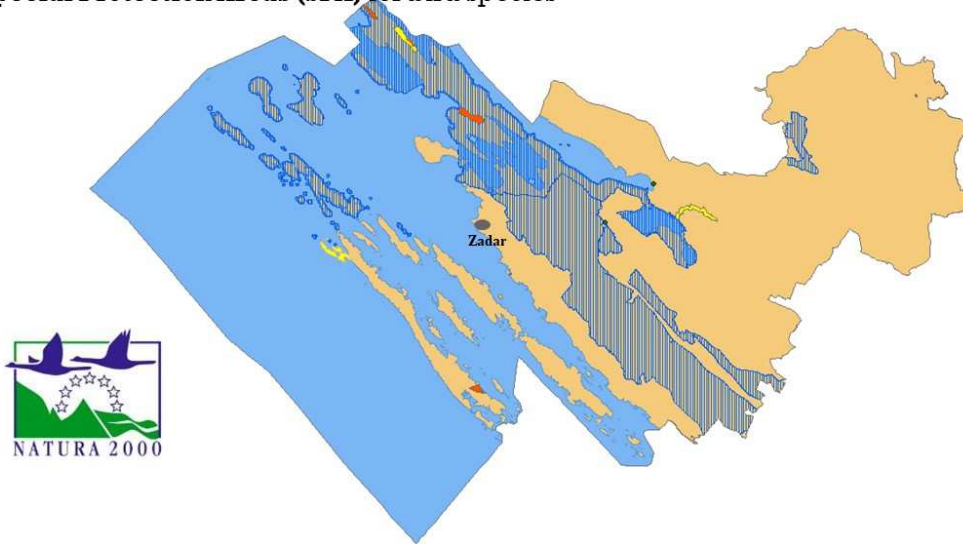
## PROTECTED AREAS IN ZADAR COUNTY

**Natura Jadera**   
 JAVNA AGENCIJA ZA UPRAVLJANJE ZAŠTIĆENIM DIJELI OVIHA  
 PRIRODE NA PODRUČJU ZADARSKOG ŽUPANIJE



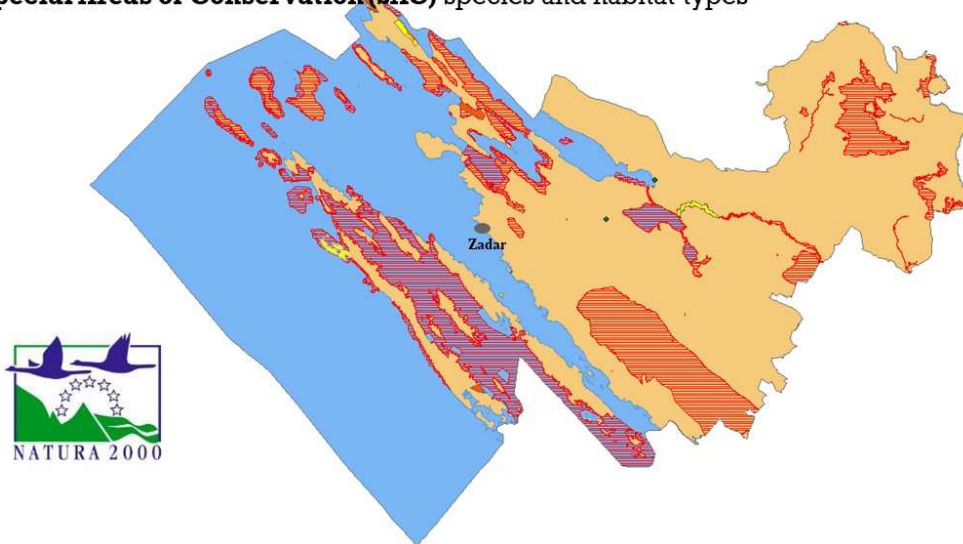
**NATURA 2000 IN ZADAR COUNTY**

**Special Protection Areas (SPA) for bird species**



**NATURA 2000 IN ZADAR COUNTY**

**Special Areas of Conservation (SAC) species and habitat types**



**PROTECTED AREAS IN ZADAR COUNTY**



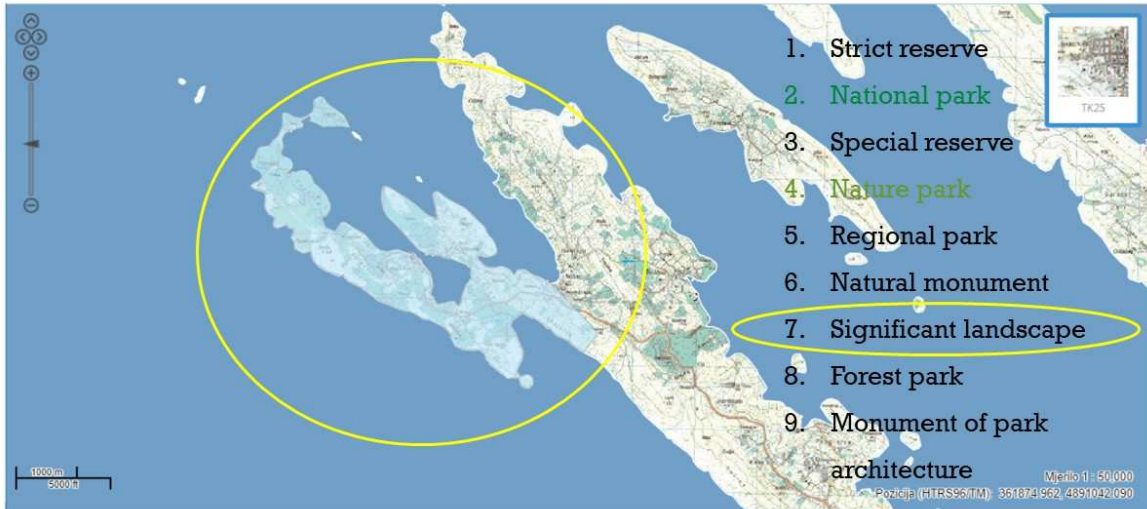
**4 SPECIAL RESERVES**  
**3 NATURAL MONUMENTS**  
**4 SIGNIFICANT LANDSCAPES**  
**2 MONUMENTS OF PARK ARCHITECTURE**

**PROTECTED AREAS IN ZADAR COUNTY**

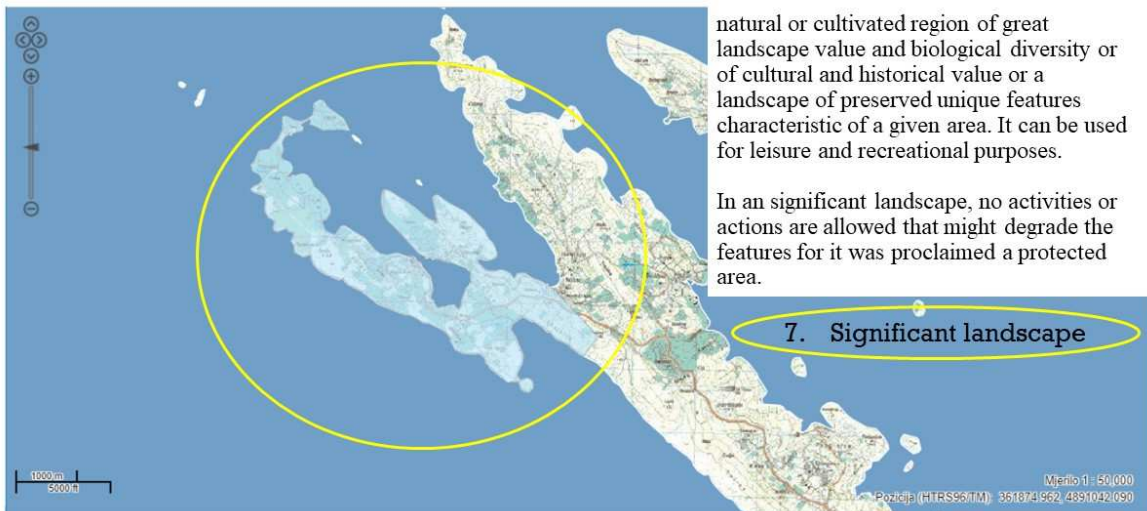


**4 SPECIAL RESERVES**  
**3 NATURAL MONUMENTS**  
**4 SIGNIFICANT LANDSCAPES**  
**2 MONUMENTS OF PARK ARCHITECTURE**

## NW PART OF DUGI OTOK



## NW PART OF DUGI OTOK



## NW PART OF DUGI OTOK



## NW PART OF DUGI OTOK





## NW PART OF DUGI OTOK

Established: 1967  
 Size: 6,36 km<sup>2</sup>  
 IUCN: V category

The coastline of this significant landscape is full of small coves and hidden beaches. The indigenoussness of the land continues under the sea, which represents an ideal area for the retention, feeding and reproduction of many species of fish, cephalopods and crabs, depending on the amount of fish and other organisms in the wider surrounding area.

The area of significant landscape extends to a depth of 40 - 50 m, dominated by a coraligenic community full of different marine organisms. In the far northwestern part, there is a stone **lighthouse Veli rat**, built in 1849, surrounded by pine forests and beautiful bays with pebble beaches.

In the significant landscape is also **Sakarun beach**, the most popular sandy beach on Dugi otok. Small white sand in the shallow sea gives a special lively blue-green color, while the shore is a thicker pebble. The underwater world is rich in the meadows of the *Posidonia oceanica*.




## NW PART OF DUGI OTOK



## NW PART OF DUGI OTOK



## NW PART OF DUGI OTOK

 Zadar

[About Zadar](#) [Hotels](#) [Vacation Rentals](#) [Restaurants](#) [Things to do](#) [Flights](#)

[Europe](#) > [Croatia](#) > [Dalmatia](#) > [Zadar County](#) > [Zadar](#) > [Things to Do in Zadar](#) > [Zadar Day Trips Pictures](#)

[Sakarun beach, or so called Croatian Hawaii](#) - Picture of Zadar

**Photo: "Sakarun beach, or so called Croatian Hawaii :)"**

**Zadar Day Trips**  
 1 Review #25 of 30 Boat Tours & Water Sports in Zadar  
 Website +385 91 225 5323 E-mail Jurja Bjankinja 4, Zadar 23000, Croatia


**Recommended length of visit:** More than 3 hours

**Description:** Experience a full-day boat excursion from Zadar, Zaton & Vir Book... read more

**Other Recent Reviews**

*"Lovely tour - Recommend!"* 05/31/2017

[Read all 1 reviews](#)




## NW PART OF DUGI OTOK



## NW PART OF DUGI OTOK



## NW PART OF DUGI OTOK



**Ivo Benzon**

**RERA, Split, (Croatia)**

**Project partner**



Dissemination of the project is very important for informing general public about the importance of the project and the ongoing activities. RERA is doing a fantastic job in this field.



# ADRIREEF

## WP2 – Communication Activities

PI RERA S.D. – Đeni Vuković Stanišić  
Ivo Benzon  
2<sup>nd</sup> Scietific virtual workshop  
Zadar, 30 October 2020

European Regional Development Fund

1

## WP2 – COMMUNICATION – WORK PLAN

WP (N/Title)	Activity title
WP2- Communication activities	A.2.1 Start-up activities
	A.2.2 Digital media activities
	A.2.3 Printed material for communication
	A.2.4 Festivals of Adriatic Reefs
	A.2.5 Scientific workshop on Adriatic Reefs
	A.2.6 Stakeholder surveys
	A.2.7 Dissimination of results

## ACT. 2.2 – DIGITAL MEDIA ACTIVITIES

➤ 2.2.2 Website updating (LP/PP8)

<https://www.italy-croatia.eu/web/adrireef>

➤ 2.2.4 Social media:

Facebook: <https://www.facebook.com/adrireef>

Linkedin: <https://www.linkedin.com/in/adrireef-project-1b981817b/>

Twitter: <https://twitter.com/adrireef2019>

Youtube:

<https://www.youtube.com/channel/UCmUqoqzeAhqmfqeLj8sRmag>



## ACT. 2.3 – PRINTED MATERIAL FOR COMMUNICATION

- **2.3.3 Portrait of the project (PP8) - ✓**
  - printed copies delivered by RERA S.D within September 2020 (250 copies x PP)
  
- **2.3.4 Flyer (LP and PP8)**
  - promotional leaflet/booklet for the presentation of the 7 case study reefs and their opportunities (what activities can be done there).

## ACT. 2.2 – DIGITAL MEDIA ACTIVITIES

### ➤ 2.2.5 On-line newsletter

- [No.1](#) – ABOUT PROJECT AND PPs
- [No.2](#) – 1st SCIENTIFIC WORKSHOP IN ANCONA 2019
- [SPECIAL ISSUE NEWSLETTER](#) – ADRIREEF  
STAKEHOLDERS ONLINE SURVEY
- [No.3](#) – planned for November 2020 (after Zadar Scientific Workshop) presentations, photos & info of the Zadar workshop

5.

## ACT. 2.4 – FESTIVALS OF ADRIREEFS

### ➤ 2.4.1 ADRIREEF Festival in Ravenna – August 2019

### ➤ 2.4.3 ADRIREEF Festival on island Vis (PP8)

- Postponed from July 2020 to June/July 2021
- Partners technical meeting
- Underwater photography competition and open space exhibition
- Geofood (Vis archipelag) street festival
- Case study location (Stupisce and Seget)
- „Little school” for scuba diving

## ACT. 2.5 – SCIENTIFIC WORKSHOP ON ADRIATIC REEFS

- **2.5.1 Workshop in Ancona (PP5) - ✓** December 2019
- **2.5.2 Minutes and press release of the 1st workshop (PP5) - ✓**
- **2.5.3 Workshop in Zadar (PP2/PP4) - 30 October 2020**
- **2.5.4 Minutes and press release of the 2nd workshop (PP2/PP4)**

## ACT. 2.6 – STAKEHOLDERS SURVEYS

- **2.6.1 Surveys on line (All PP)**
  - in implementation; promoted via special newsletter and direct invitation, 45 days duration
  
- **2.6.2 Data analysis report (PP2/PP4)**
  - Will be done by Ravenna Municipality

## ACT. 2.7 – DISSIMINATION OF RESULTS

### ➤ 2.7.1 Videotape of Adriatic Reef (PP)

- Video clips from the partners --> video making will be rescheduled on the basis of the new monitoring activities times.
- The video will include the map of the Adriatic reefs, it will showcase the best cuts of the 7 case studies videos and will have similar graphic design as the project flyer ("**Enjoy the Adriatic reefs in a sustainable way**" will be the concept of the video and leaflet).
- Made by Ravenna with the clips supplied by all partners.

## ACT. 2.7 – DISSIMINATION OF RESULTS

- **2.7.2 Printed joint scientific publications (PP)**
  - RERA will collect texts by the partners and take care of editing, graphic design, translations and printing
- **2.7.3 Printed guidelines for stakeholders (PP2)**
  - RERA will collect texts by the partners and take care of editing, graphic design, translations and printing
- **2.7.4 Printed White paper of innovative exploitation (PP)**
  - RERA will collect texts by the partners and take care of editing, graphic design, translations and printing

## ACT. 2.7 – DISSIMINATION OF RESULTS

### ➤ 2.7.5 Local workshops (PP)

- At least 5 events organized in PP facilities
- To be decided

### ➤ 2.7.6 Final dissemination event of the project (LP)

- Proposal: final informal dissemination event on the island of Vis at the end of the 2nd Adrireef Festival
- To be decided



THANK YOU!



Ivo Benzon ; Đeni Vuković Stanišić



[ivo.benzon@rera.hr](mailto:ivo.benzon@rera.hr) [deni.vukovic@rera.hr](mailto:deni.vukovic@rera.hr)



+385 98 264 833 ; +385 98 320 367



[www.italy-croatia.eu/adrireef](http://www.italy-croatia.eu/adrireef)

**Matea Špika**

**Sunce, Split, (Croatia)**

**Project partner**



The coralligenous habitat on Seget, Stupišće and Lagnjići locations is full of life. SUNCE did vertical transects on all three locations, counted all the organisms and did some great footage so that general public can see the richness and coloration on the reefs.

# WP4 Activity 4.2

## MONITORING CASE STUDY IN CROATIA

### ADRIREEF

Zadar | PP SUNCE | 30th November 2020

European Regional Development Fund



## Monitoring activities

The main aims of the undertaken monitoring activities were:

- 1) to characterize the coralligenous assemblages dominated by gorgonians at the selected sites and to assess current level of disturbances, if present, in order to set the baselines for future monitoring
- 2) to test several recently proposed protocols applicable for monitoring the effects of climate change on infralitoral reefs
- 3) to provide an on - site practical training in reef monitoring for the employees and volunteers of the NGO Sunce

## Monitoring activities - STUDY SITES

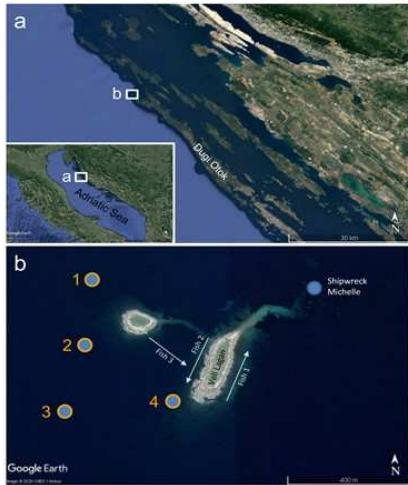


Fig. 1. Map of study sites at the Dugi Otok Island, location Lagnići.



Fig. 2. Map of study sites at the Vis Island, indicating the main project location Stupišće and two other sites where few specific field activities were undertaken.

## Monitoring activities - FIELD ACTIVITIES

Related to the coralligenous assemblages:

- photosampling combined with visual census to gather the information on habitat structure and function as well as on the degree of impact of the main disturbances;
- random transects used for visual census were also video recorded.

Related to infralitoral (shallow water) reefs:

- two protocols tested to track the impact of climate change;
- fish visual census for climate change indicators;
- assessment of conservation status and climate-related responses of sessile benthic macroinvertebrates.

Additionally:

- Lost Fishing Gear protocol tested (developed within the GhostMed programme);
- two artificial reefs assessed (shipwrecks) and their associated biodiversity documented by underwater photography and videography.

## Photosampling

- Within coralligenous assemblages, a minimum of three areas of 2,5 m<sup>2</sup> (comprised of 10 contiguous photos of 50 x 50 cm quadrats to ensure species identification) were photosampled within the same depth range.

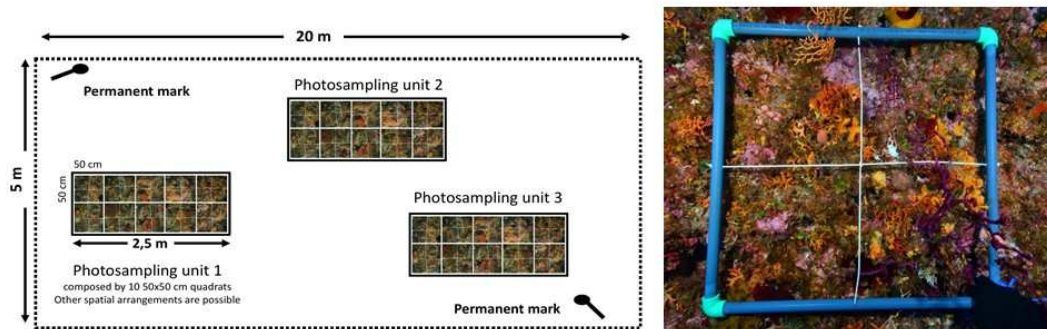


Fig. 3. Scheme of photo sampling carried out within coralligenous assemblages dominated by gorgonians at the selected sites.

## Visual census and video along the transects

- Visual census along three 10 x 1 m horizontal transects to assess the erect layer (by estimating the abundance of arborescent and massive species that can reach min 15 cm).

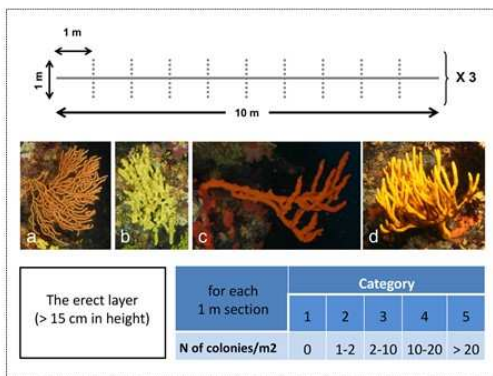


Fig. 4. Visual census along random transect performed to aid the assessment of structural complexity, through estimation of the erect layer.

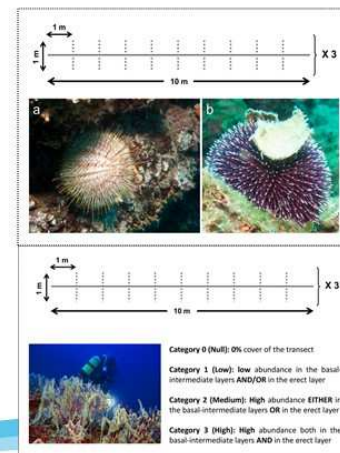


Fig. 5. Visual census along random transect to assess the effect of macrobioeroders and mucilaginous outbreaks



## Assessment of gorgonian demography and conservation status

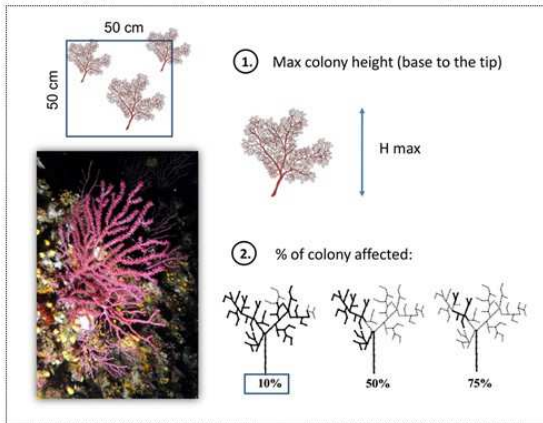


Fig. 6. Scheme of the assessment of gorgonian demography and conservation status.

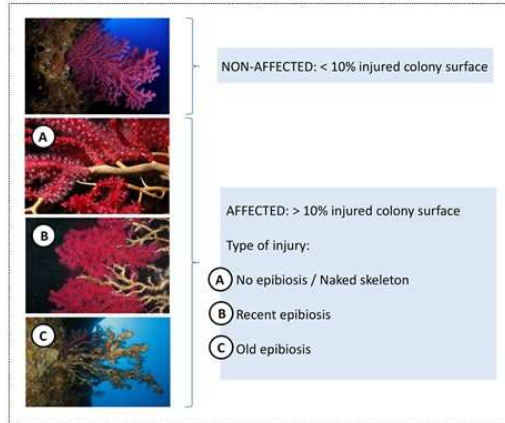


Fig. 7. Criteria used to assess whether gorgonian is affected or not and categories used for characterization of gorgonian tissue damage.

## Assessment of conservation status and climate-related responses of sessile benthic macroinvertebrates

- Protocol by Garrabou, Bensoussan & Azzurro (2018) within Interreg project MPA ADAPT;
- Aims to set the conservation status, while gathering baseline information to assess the impacts of mass mortality events when they occur;
- Target species are the ones sensitive to climate-related stressors, are easy to identify underwater and are sufficiently abundant in the surveyed area.

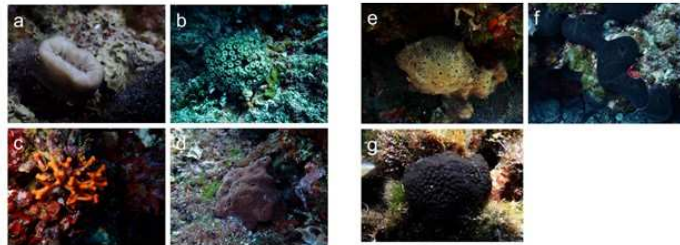


Fig. 8. Target species/groups: a) *Balanophyllia europaea*, b) *Cladocora caespitosa*, c) *Myriapora truncata*, d) *Petrosia ficiformis*, e) *Ircinia* sp., f) *Chondrosia reniformis* and g) black keratose sponge (photo credit: S. Kipson).

## Fish visual census of climate change indicators

- conducted a survey of selected fish species that may be indicative of climate related changes, following the protocol adopted within the Interreg project MPA ADAPT (Garrabou, Bensoussan & Azzurro 2018).



Fig. 9. Target species selected for fish census of climate change indicators

## Assessment of the impact of the lost fishing gear (LFG)

- assess the impact of the lost fishing gear on the marine environment;
- assist managers in their decision making for the removal of nets;
- followed the protocol developed in the scope of the Ghost Med programme (Ruitton et al. 2019).



Fig. 10. Documenting the abundance of lost fishing gear within coralligenous assemblage at the Lagniči location, Dugi Otok Island (photo credit: M. Belošević).

## WP2 – Communication activities

### WP2.7 DISSEMINATION OF RESULTS

D2.7.1) Video tape of Adriatic Reef, including the monitoring phase images, made in different reefs of Adriatic Sea.




## Adriareef project

Organisation name: Association Sunce Split  
Contact person: Matea Špika

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 +385 21 360 779

 [www.italy-croatia.eu](http://www.italy-croatia.eu)

🕒 02.11.2020

## ODRŽANA ZNANSTVENA RADIONICA PROJEKTA ADRIREEF U ZADRU

Druga znanstvena radionica projekta ADRIREEF održana je 30. listopada 2020. u Zadru. Organizacija je pripala Sveučilištu u Zadru, a na radionici su sudjelovali predstavnici Pomorskog fakulteta u Rijeci: izv. prof. dr.sc. Vlado Frančić i Ana Malovrh, mag. ing. logist. Obzirom na novonastalu situaciju uzrokovanu virusom Covid-19, talijanski partneri su sudjelovali virtualnim putem.

U radionici su sudjelovali predstavnici lokalnih i regionalnih institucija te sveučilišta koji su održali zanimljiva predavanja o eksploataciji prirodnih grebena te očuvanju morskog okoliša. Namjena radionice je povezivanje znanstvenika i predstavnika iz javnog sektora u svrhu održivog upravljanja jadranskim grebenima te povećanja ponude lokalnog turizma i ostalih aktivnosti (ribarstvo, ronjenje i sl.). Također, svaki projektni partner održao je prezentaciju o svojim dosadašnjim aktivnostima na projektu te provedenim istraživanjima.

ADRIREEF (Innovative exploitation of Adriatic Reefs in order to strengthen blue economy) ima za svrhu istražiti podmorje Jadrana i potencijale grebena kako bi se ojačalo plavo gospodarstvo. Projekt okuplja 11 partnera iz Hrvatske i Italije. Vodeći partner ADRIREEF projekta je Municipality of Ravenna, a ostali partneri su Regional agency for prevention, environment and energy in Emilia Romagna (Bologna), Agencija za razvoj Zadarske županije Zadra Nova, Udruga za prirodu, okoliš i održivi razvoj Sunce (Split), Sveučilište u Zadru, Consiglio Nazionale delle Ricerche – CNR (Ancona), Agenzia regionale per la prevenzione e la protezione ambientale della regione Puglia (Bari), Istituto Nazionale di oceanografia e di geofisica sperimentale -OGS (Trst), Javna ustanova Rera Sd za koordinaciju i razvoj Splitsko-dalmatinske županije, Institut Ruđer Bošković (Zagreb) te Pomorski fakultet u Rijeci.

Planirano trajanje projekta je bilo trideset mjeseci od 1. prosinca 2018. do 30. svibnja 2021. godine s ukupnim proračunom projekta od 3.328.175,00 EUR. Projekt je produžen na još šest mjeseci s obzirom na situaciju uzrokovanu pandemijom Covid-19 te će trajati do 30. studenog 2021. godine. Projekt je sufinanciran iz INTERREG programa V-A Italija Hrvatska 2014. – 2020.



## The press review

<https://ezadar.net.hr/dogadaji/3918564/na-zadarskom-sveucilistu-odrzana-znanstvena-radionica-u-sklopu-projekta-adrireef/>

<https://www.unizd.hr/obavijesti/view/artmid/18146/articleid/42531/znanstvena-radionica-u-sklopu-projekta-adrireef>

<https://magazin.hrt.hr/659659/price-iz-hrvatske/nove-tajne-o-podvodnim-grebenima-u-jadranu>



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- [Big Brother](#)

Traži

- [12:50 HNK Zadar se ispričao zbog trošenja javnog novca, mercedes vraćen](#)
- [12:40 Ministar Božinović najavio mogućnost popuštanja određenih mjera](#)
- [12:30 U siječnju je u Zadarskoj županiji bilo više zaposlenih u odnosu na godinu ranije](#)

[Događaji: 15 Ovih pet hrabrih pasmina idealni su čuvari svakog dvorišta](#)

- [12:00 Njemačka otvorila vrtiće i škole](#)

Eu projekt

## Na zadarskom sveučilištu održana znanstvena radionica u sklopu projekta ADRIREEF

03.11.2020 17:31

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- Podijeli na Facebooku 1
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Sviđa i



Leonard Kvarantan

Prošlog je tjedna u Svečanoj dvorani Sveučilišta u Zadru u sklopu projekta Adrireef održana druga znanstvena radionica.

Zbog nemogućnosti okupljanja većeg broja ljudi, a prema uputama Nacionalnog stožera, na radionici je prisustvovalo 30 sudionika iz Hrvatske uz pridržavanje epidemioloških mjera, te 20 sudionika preko Zoom platforme.

Talijanski partneri i hrvatski znanstvenici i istraživači te dionici iz područja turizma, plave ekonomije te javnih ustanova koji nisu bili u mogućnosti prisustvovati su se uključili preko Zoom platforme te su održali prezentacije o dosadašnjim rezultatima svojih istraživanja u sklopu istoimenog projekta.

Od hrvatskih partnera sudjelovali predstavnici Pomorskog fakulteta u Rijeci, Institut Ruđer Bošković, Javna ustanova RERA S.D. iz Splita, Udruga za prirodu, okoliš i održivi razvoj Sunce Split, Razvojna agencija zadarske županije Zadra Nova i organizator Sveučilište u Zadru.

Budući da je cilj projekta promicanje plave ekonomije i davanje nove i dodane vrijednosti jadranskim grebenima, fokus radionice je bio na sadašnjim i potencijalnim dionicima. U tu svrhu pokraj istaknutih znanstvenika kao što su prof. dr. sc. Petar Kružić i dr. sc. Bruna Petani, prezentacije su održali

predstavnicima sportskog turizma Ante Kolanović, ronilačkog turizma Igor Glavičić, adrenalinskog turizma Filip Vulić, turističke zajednice Dugog otoka Lucija Uglešić, Javne ustanove „Natura Jadera“, mr. sc. Morana Bačić.



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### Znanstvena radionica u sklopu projekta "Adrireef"



3. studenog 2020.

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Dana 30. listopada 2020. godine, u Svečanoj dvorani Sveučilišta u Zadru, u sklopu projekta Adrireef održana je II. znanstvena radionica. Ista je bila predviđena za travanj ove godine, ali se zbog pandemije bolesti COVID-19 nije održala.

Zbog nemogućnosti okupljanja većeg broja ljudi, a prema uputama Nacionalnog stožera, na radionici je prisustvovalo 30 sudionika iz Hrvatske uz pridržavanje epidemioloških mjera, te 20 sudionika preko *Zoom* platforme.

Talijanski partneri i hrvatski znanstvenici i istraživači te dionici iz područja turizma, plave ekonomije te javnih ustanova koji nisu bili u mogućnosti prisustvovati su se uključili preko *Zoom* platforme te su održali prezentacije o dosadašnjim rezultatima svojih istraživanja u sklopu istoimenog projekta.

Od hrvatskih partnera sudjelovali predstavnici Pomorskog fakulteta u Rijeci, Institut Ruđer Bošković, Javna ustanova RERA S.D. iz Splita, Udruga za prirodu, okoliš i održivi razvoj Sunce Split, Razvojna agencija zadarske županije Zadra Nova i organizator Sveučilište u Zadru.

Budući da je cilj projekta promicanje plave ekonomije i davanje nove i dodane vrijednosti jadranskim grebenima, fokus radionice je bio na sadašnjim i potencijalnim dionicima. U tu svrhu pokraj istaknutih znanstvenika kao što su prof. dr. sc. Petar Kružić i dr. sc. Bruna Petani, prezentacije su održali predstavnici sportskog turizma Ante Kolanović, ronilačkog turizma Igor Glavičić, adrenalinskog turizma Filip Vulić, turističke zajednice Dugog otoka Lucija Uglešić, Javne ustanove „Natura Jadera“, mr. sc. Morana Bačić.



## SVEUČILIŠTE U ZADRU

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SWIFT CODE: OTPVHR2X



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Sastavnice

Znanost i istraživanje

Izdavaštvo

Suradnja

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### Znanstvena radionica u sklopu projekta "Adrireef"



3. studenog 2020.

#### [Novosti](#)

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Dana 30. listopada 2020. godine, u Svečanoj dvorani Sveučilišta u Zadru, u sklopu projekta Adrireef održana je II. znanstvena radionica. Ista je bila predviđena za travanj ove godine, ali se zbog pandemije bolesti COVID-19 nije održala.

Zbog nemogućnosti okupljanja većeg broja ljudi, a prema uputama Nacionalnog stožera, na radionici je prisustvovalo 30 sudionika iz Hrvatske uz pridržavanje epidemioloških mjera, te 20 sudionika preko *Zoom* platforme.

Talijanski partneri i hrvatski znanstvenici i istraživači te dionici iz područja turizma, plave ekonomije te javnih ustanova koji nisu bili u mogućnosti prisustvovati su se uključili preko *Zoom* platforme te su održali prezentacije o dosadašnjim rezultatima svojih istraživanja u sklopu istoimenog projekta.

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Budući da je cilj projekta promicanje plave ekonomije i davanje nove i dodane vrijednosti jadranskim grebenima, fokus radionice je bio na sadašnjim i potencijalnim dionicima. U tu svrhu pokraj istaknutih znanstvenika kao što su prof. dr. sc. Petar Kružić i dr. sc. Bruna Petani, prezentacije su održali predstavnici sportskog turizma Ante Kolanović, ronilačkog turizma Igor Glavičić, adrenalinskog turizma Filip Vulić, turističke zajednice Dugog otoka Lucija Uglešić, Javne ustanove „Natura Jadera“, mr. sc. Morana Bačić.





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